

One-to-One Initiatives and Quality Professional Development's

Impact on Missouri High School Algebra I and English II

End of Course Exam Scores

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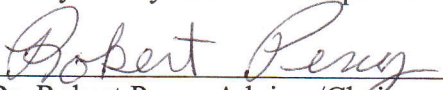
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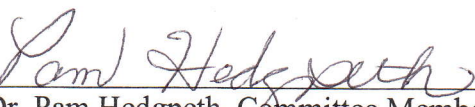
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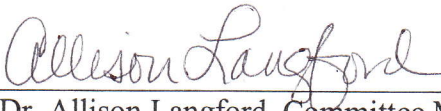
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A Dissertation
Presented to
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ABSTRACT

As one-to-one computer initiatives become more prevalent in schools across the state of Missouri, school leaders are faced with the challenge of determining whether one-to-one initiatives are achieving the desired academic results. Studies show that there is a connection between one-to-one initiatives and increased student engagement; however, in the reality we live in today, tests scores are the measure of accountability that are scoured over by patrons, politicians, and school leaders. This study assessed whether there was a significant difference between one-to-one schools and non-one-to-one schools as determined by Algebra I and English II End of Course Exam scores in the state of Missouri. Results from the independent t-test indicated that in English II, one-to-one technology had an impact. Principals were surveyed utilizing the Standards Assessment Inventory that gauged their perceptions of the quality of professional development utilized in the implementation process based upon Learning Forwards Standards for Professional Learning. Leadership was the overwhelming theme that emerged from the qualitative portion of the study in the high-performing one-to-one schools. Leadership plays a huge role in setting goals, providing a focus for professional development, and providing support and time when implementing a one-to-one initiative. The goals of this study were for school administrators to have quantitative data that would allow them to make informed decisions about implementing a one-to-one initiative and then provide school leaders with qualitative insight into what high performing one-to-one schools principals perceived as important when providing professional development for the implementation.

CHAPTER ONE

INTRODUCTION

Computers have been in schools for almost three decades, according to a 2013 report from the National Center for Education Statistics [NCES]. Seventy-one percent of the United States population aged three years and up uses the internet, and the trend has increased as technology improves and becomes less expensive (NCES, 2017).

Technology has changed almost every aspect of modern life. Education is no exception. The availability of desktop computers, laptops, tablets, smartphones, and the Internet has transformed today's classrooms into a different learning environment from what they were 20 years ago (Holen, Hung, & Gourneau, 2017).

One-to-one initiatives are not a new phenomenon in education (NCES, 2017). Numerous research-based, computer-centric educational programs have been implemented over the last quarter of a century. In 1985 the Apple Classrooms of Tomorrow project started the implementation of computer technology into the classrooms and over the last 30 years have seen a steady increase in one-to-one computer initiatives (Penuel, 2006; Ruggiero & Mong, 2015). Educators have long tried to implement 21st century skills, which includes soft skills like problem solving, critical thinking, communication, collaboration, and creativity, and self-directed learning that will help all students become better consumers and citizens (Anagun, 2018).

But because of the expanding role of global technologies in the workplace, 21st century learners must also leave high school with the digital literacy that will enable them to effectively contribute to the world (Brusic & Shearer, 2014). Warschauer, Zheng,

Niiya, Cotton, & Frarkas (2014) found laptop classroom teachers benefited in facilitating these 21st century learning skills, including technological competence and competitive soft skills like problem solving, critical thinking, communication, collaboration, and creativity, and self-directed learning (Anagun, 2018). They also showed students in one-to-one classrooms had more opportunities for individualized experimentation and learning. One-to-one initiatives assisted in the transition to learner-centered classrooms, which increase self-direction and independence (Varier, Dumke, Abrams, Conklin, Barnes, & Hoover, 2017). Increased student engagement and motivation, the quality of work and achievement, and independent learning are the three most frequently cited positive findings of one-to-one initiatives (Islam & Gronlund, 2016).

This transition to technology-centered classrooms has caused educators across America, including those locally, to rethink how to best prepare and serve their students. Students need to have the ability to gather information, review it, and create a product with it, whether it's designing a multimedia presentation or a rocket into space. Instead of asking students only to regurgitate memorized information, schools should be facilitating the application of the knowledge they have learned. Islam and Gronlund (2016) ascertain that learning is most effective when the experience allows the students to construct a meaningful product as part of the activity. School districts in the United States are now providing opportunities for students to apply 21st century skills such as enhanced collaboration, communication, creativity, digital literacy, and self-directed learning (Varier et al., 2017).

Educators are faced with increasing governmental involvement, which in turn, has led to increased high-stakes standardized testing. The average student in public school

takes up to 112 mandatory standardized tests between kindergarten and the end of their 12th grade year for an average of about eight per school year. Standardized assessments can occupy about 20 to 25 hours a school year (Washington Post, 2015). According to the Washington Post (2015), high-stakes testing has become the principal indicator of school reform starting in 2002 with No Child Left Behind. These exams are set up to hold schools accountable and impact learning. Teachers and students both experience anxiety and disengagement due to the overwhelming number of tests administered (Croft, Roberts & Stenhouse, 2015).

Increasingly, schools administer these standardized tests on technological devices, a shift motivated in large part by the opportunity for increased efficiency. One-to-one initiatives are understood as a way not only prepare students for the world after graduation, but also to help prepare students for these standardized tests. School districts are purchasing, leasing, and renting computers and are employing initiatives in hopes that students' use of technology will lead to better prepared students and higher test scores. (U.S. News and World Report, 2015). They reason that if students are used to self-directed and independent learning on technological devices, they performed as well or better on standardized tests administered on devices. However, although beneficial for efficiency sake, during high-stakes testing some students expressed their preference to take a paper-based test over electronic administration due to the uncertainty of whether the computer would reliably record responses (Varier et al., 2017).

The determination as to the positive or negative effect of the one-to-one initiatives on academic achievement, and specifically on standardized testing outcomes, is still debated. Chaudhry and Malik (2014) stated the effectiveness of classroom-based

technology is of great interest to academia since this new technology has transformed teaching and learning from a traditional environment to one that uses technology to enhance student-centered learning. According to Stortz and Hoffman (2013), there is a need for additional research to better understand the student achievement outcomes associated with a one-to-one implementation. One-to-one initiatives are polarizing because though some allude to a correlation between these technologies and improved student achievement, others believe there is a lack of evidence to prove that one-to-one initiatives are the determining factor that improves standardized testing scores. For example, Topper and Lancaster (2013) establish that though there are a variety of viable measurements for the positive impact of technology on student learning, standardized test scores may not be the best measure that impact.

The Greaves Group, The Hayes Connection (2006) found 88% of technology directors who track student academic performance saw an increase in achievement after implementing one-to-one computing environments. Conversely, Ruggiero and Mong (2015) and Cuban (2006) have been skeptical of the need for schools to adopt a one-to-one computing environment. They find that what most districts that adopt one-to-one environments see increased student motivation, more engagement in lessons, and increased interest in learning, but there is not a direct impact on student achievement. Topper and Lancaster (2013) confirm in their study that most schools did not use academic achievement through standardized tests as a measure to the success of one-to-one initiatives. According to Islam and Gronlund (2016), one-to-one supporters mistake the laptop, not the instruction as being responsible for achievement gains as measured by standardized assessments. Some schools have abandoned the one-to-one programs due to

high costs, technical problems, and difficulties in finding measurable positive effects. A Blackley and Walker (2015) study show that there was little evidence that scores improved due to teachers and students utilizing technology over a seven-year period.

Ruggiero and Mong (2015) also questioned the reasoning for implantation of one-to-one computing initiatives in high schools. Tarbuton, (2018) added that the development of 21st century learning skills while important, will not just appear in one-to-one learning environments without proper instruction and practice. While Tarbuton (2018) is skeptical of one-to-one initiatives they will eventually come to pass. Therefore, schools and teachers must find the best way to integrate devices into the classroom where instruction can be maximized.

A Capella University (2017) study listed four key professional development activities that must be addressed during the implementation period. First, teachers must determine how to use and integrate the devices in the classroom setting. According to the study, technology can be present but does not always have to be front and center. The second activity in the study is to take time to play with technology. When teachers take time to familiarize themselves with the technology, they were able to use it more effectively and efficiently with students. The third activity is teachers restructuring their classrooms so that they allow for flexibility—students working independently, in groups, or with a teacher—which can maximize learning potential. The last activity in the study suggests researching and understanding digital standards so there is focus and a plan. The study recommends aligning curriculum and lessons with standards from the International Society for Technology in Education for clarity and efficiency purposes. Professional development opportunities for teachers must be driven by these standards: Learning

Communities, Leadership, Resources, Data, Learning Designs, Implementation, and Outcomes to ensure high levels of implementation of any new initiative (Learning Forward, 2017h).

Nash (2009) stated training should begin at least six months in advance of teachers working with students. She had four findings that help with implementation and could positively affect the success of the project: (1) Develop partnerships between schools and higher education institutions in order to offer a range of educational and professional development opportunities,(2) Implement train-the-trainer models to reach large groups of teachers,(3) Include training for technology staff in the professional development plan, and (4) Utilize the knowledge of the technology provider to offer specialized professional development.

The influx of technology over the past two decades, along with increase in assessments and accountability, puts demands on teachers. The introduction of technology needs to be accompanied by quality professional development to maximize efficiency, as well as provide quality learning opportunities for students. Successful one-to-one integration is influenced by multiple factors such as time, access, and support (Learning Forward, 2017h). If these factors are not addressed in the implementation process, teachers may not fully utilize technology in their instruction, which could negatively affect students' ability to improve achievement on standardized tests (Beeson, Journell & Ayers, 2014).

Problem Statement

School districts that implement one-to-one initiatives without research that support both the worth and the merit of the implementation are possibly doing a

disservice to both student and taxpayers. Financial constraints must be addressed when adopting technology (Chaudhry & Malik, 2014). According to the National School Boards Association, 37% of U.S. school districts have implemented one-to-one computer initiatives (Pautz & Sadera, 2017). Islam and Gronlund (2016) estimated there are over 14,000 one-to-one initiatives in the United States alone. Unfortunately, there is not sufficient research to determine the impact of technology on student, namely standardized tests. Some studies indicate achievement growth while others are inconclusive (Lawrence, Al-Bataineh & Hatch, 2018).

There is a need for additional research to provide data for those making the decisions about one-to-one implementations for their school districts. An aspect of the decision-making process that is often forgotten, or is an afterthought, when schools implement one-to-one programs devices cannot simply be distributed and there be expectations of gains in student achievement (Islam & Gronlund, 2016). Islam and Gronlund (2016) indicate that prior to implementing a new project, it is imperative to have a thorough understanding about its context, costs, risks, barriers, and challenges that may affect expected benefits. An implementation plan must be embedded and must take the socioeconomic and cultural realities of the district into consideration. Devices need to be supported by professional development, appropriate training, and support to effectively use computers for academic means (Ruggiero & Mong, 2015).

As previously mentioned, the Capella University (2017) study stated four things must be present or addressed when implementing a one-to-one initiative: (1) Determine the role of the device in your classroom, (2) Take time to play with technology, (3) Restructure the classroom so that it allows for flexibility, and (4) Research and

understand digital standards so that there is focus and a plan. These findings about technology-related professional development fostered a transformation in the way school districts are implementing one-to-one initiatives.

Previously, teachers were expected to become adept at using technology in the classroom and instructionally through hit and miss professional development opportunities. Teachers were not able to practice their new skills or gain confidence in the use of technology in the classroom. Teachers were made aware of technology available but lacked the time and resources to apply what they had learned. This type of model was confusing to the teacher and difficult to apply to the classroom. This approach gets the information out but has no authentic opportunity for the teacher to utilize with support thus not being useful in the classroom (Capella University, 2017; Plair, 2008).

Longitudinal programs, or professional development that are sustained over time, are more effective and focused. Teachers are able to apply these new technological strategies to the context of their classroom while being reflective on how they implemented them. Longitudinal programs allow for scaffolding lessons that will improve teaching with technology (Plair, 2008).

Research findings are mixed concerning the impact of one-to-one initiatives on standardized test scores of high school students in Missouri schools. Districts are making huge financial commitments and are implementing one-to-one initiatives in hopes of seeing improved scores in Algebra I and English II End of Course Exams. Due to the cost and large financial investment needed to implement and sustain one-to-one technology, many institutions are examining the effect of one-to-one on academic achievement results (Penuel, 2006). One-to-one computing initiatives represent a significant investment in

technology. Funding is an especially critical element to be considered when implementing a one-to-one initiative. A one-to-one initiative is not a one-time expenditure and funding must be taken into consideration during this time of reduced state budgets for K–12 schools (Topper & Lancaster, 2014).

The researcher provided data to help those making decisions about the benefit of one-to-one initiatives as it results to student success on standardized tests. The researcher used Algebra I and English II End of Course Exam results to compare the success of the quality of professional development, or lack of professional development, provided by the school district before implementation. The researcher then determined the effect on student academic achievement and the variation of professional development provided before implementation that was most beneficial.

Theoretical Framework

One-to-one initiatives are increasing across the nation and region due to an educational push that incorporates the tenants of the Constructivist Educational Theory and the growth and need for 21st century skills (Geisinger, 2016). Constructivists such as Lev Vygotsky believed that learning is a process in which learners construct new ideas based on current or prior knowledge and ones experiences. Vygotsky stated in his book, *Thought and Language*, that learners must be in charge of their learning (Vygotsky, 1962). Constructivist researcher Jerome Brunner stated that children are far more active in their learning by developing concepts and problem solving skills through ones previous experiences and knowledge (Brunner, 1960). Vygotsky and Brunner supported the need for students to be active learners that take ownership in their own learning, as well as shape new ideas not dictated by the social culture they have been raised in.

Jean Piaget, a constructivist theorist who lived from 1896 – 1980, believed that understanding the way children think at different levels of development are shaped by one’s actions and experiences. Piaget’s research points out two basic tendencies of learning. The first is organization, which includes combining, arranging, and reorganizing. The second tendency is adapting and adjusting within one’s environment (Bormanaki & Khoshhal, 2017). Piaget theorized when school-age children mature and grow, they begin to develop their own understanding of what is going on around them and develop ideals that shape who they are. Adolescents use this acquired knowledge to solve problems in life as well as in school (Piaget, 1962). Piaget (1962) expanded on this in what he refers to as the concrete operational stage, where specific cognitive and physical development occurs, children learn to be perceptive during various social situations, and they apply that knowledge to perform tasks.

Implementation of constructivist theory in classroom instruction promotes the development of the 21st century skills that students needed once they complete school. The term “21st century skills” is prevalent in education today, and the Partnership for 21st Century Skills created a framework of defined skills: collaboration, communication, creativity, digital literacy, and self-directed learning (Geisinger, 2016; Partnership for 21st Century Skills, 2016). Islam and Gronlund’s (2016) research found that one-to-one programs in schools are inspired by constructivist learning theory (in contrast to traditional instructionism)—which advocates the use of computing technology in education and strives to enhance learning processes by doing and playing—and helps prepare students for life and work in the highly connected digital environment of the 21st century. Penuel (2006) found that many one-to-one initiatives focused on changing

instruction to become more student-centered and less teacher driven, further reinforcing the constructivist theory. Education has been the least technology-focused industry in the United States, this hinders students to receive the instruction and guidance that will help them develop these 21st century skills (Vockley, 2008). Classroom instruction and academic content standards work best in conjunction with the incorporation of technology to produce in students these 21st century skills (Partnership for 21st Century Skills, 2016).

Inquiry- and experiential-based education that actively involves the student is currently resonating within the educational ranks (Stortz & Hoffman, 2013). The Framework of 21st Century Learning includes skills such as life concepts, learning and innovation, information, media and technology. These 21st century themes need to be integrated into the curriculum (Geisinger, 2016; Kereluik, Mishra, Fahnoe, & Terry, 2013).

Large-scale, one-to-one programs are being implemented in South Dakota, Pennsylvania, New Hampshire, Georgia, Louisiana, California, Florida, Kansas, and Massachusetts (Bebell & Kay, 2010). Students are encouraged to utilize the provided technological devices to research and find answers to their questions (Stortz & Hoffman, 2013). One-to-one initiatives have been shown to increase student confidence in research and software skills and have enhanced opportunities for students (Bebell & Kay, 2010). The skill of accessing information through the use of technology is crucial for 21st century students (Kereluik et al. 2013).

One-to-one initiatives support this constructivist theory of learning by providing information and the hand-on opportunity for students. Bruce Dixon, the founder of the

Anytime Anywhere Learning Foundation (AALF) established in an interview with District Administration (2008) that the citizens of tomorrow will need to be digitally competent, continuous learners in order to participate fully in social and economic life. This is a change from the industrial revolution classrooms set up to mass-produce learners who were only be prepared for the world of the past. The constructivist one-to-one classroom provided these 21st century learners the opportunity to be digital citizens that are productive in the future (Schwahn & McGarvey, 2011). The Partnership for 21st Century Skills, the International Society for Technology in Education (ISTE), and the State Educational Technology Directors Association (SETDA) collaborated to determine the best course of action to preparing students for a digital world (Vockley, 2008). The efforts of these groups encourages educational leaders to utilize technology to develop 21st century skills that support facilitative teaching and discovery skills, and to create a strong technological education support systems (Topper & Lancaster, 2013; Vockley, 2008). The study evaluated the need for quality professional development that was provided to teachers as they were being asked to implement one-to-one initiatives. Harris, Al-Bataineh and Al-Bataineh (2016) asserted that without proper professional development, academic gains would be nearly impossible.

The Learning Forward organization provides guidance to school leaders regarding developing quality professional learning opportunities, and through extensive research has identified seven key standards that can be used to benchmark the effectiveness of current programming. These seven standards include (1) Learning communities that are a collective group that works together to improve student achievement through increased educator effectiveness (Learning Forward, 2018a), (2) Leadership that increases educator

effectiveness through developing capacity, advocating for, and creating support systems for teachers (Learning Forward, 2018b), (3) Resources that increase educator effectiveness through the allocation and prioritization of district resources for educator learning (Learning Forward, 2018c), (4) Data that increases educator effectiveness by having a variety of data sources and a data plan that assesses and evaluates student and educator learning (Learning Forward, 2018d), (5) Learning designs that increase educator effectiveness through a series of models and research theories that lead to intended outcomes (Learning Forward, 2018e), (6) Implementation that increases educator effectiveness by developing and sustaining long-term change and supports to improve professional learning (Learning Forward, 2018f), and (7) Outcomes that align curriculum standards and educator performance to increase educator effectiveness (Learning Forward, 2018g).

Purpose of the Study

This study investigated the impact of one-to-one initiatives on the test scores of those Missouri high schools that have implemented one-to-one initiatives. The researcher compared student scores in Algebra I and English II End of Course Exams of students involved in one-to-one initiatives and then compared the Algebra I and English II test scores of students not involved in one-to-one initiatives. The researcher determined if there is a statistically significant difference between the one-to-one initiatives end of course exam scores and the non-one-to-one initiatives end of course exam scores. Additionally, the researcher determined through the perceptions of the one-to-one administrators what aspects of Learning Forwards seven standards was most important in the implementation of the one-to-one initiative. This was done through the use of the

Learning Forward Standards Assessment Inventory (SAI), which was sent to identified one-to-one initiative schools.

The purpose of the comparison determines if the implementation of one-to-one instructional technology has been beneficial in assisting students to perform better on the End of Course exams in Algebra I and English II. The researcher provided data that will allow schools to make educated decisions about implementing one-to-one technology as well as what components of professional development are perceived as crucial in the implementation process

Research Question

RQ1: What is the difference between Algebra I test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ2: What is the difference between English II test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ3: How is professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of students with one-to-one initiatives?

Null Hypotheses

H₀1: There is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on Algebra I End of Course exams.

H₀2: There is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on English II End of Course exams.

Limitations

The limitations of this study were relative to geographical area, and designs utilized by the researcher are as follows:

1. Schools that have implemented one-to-one computer initiatives.
2. Motivation of the students to perform on the exam is a factor.
3. Variance in student abilities may impact the results of the EOC exams.
4. The number of respondents to the survey.
5. The willingness of the superintendents to distribute the survey.
6. The quality of the district's implementation of the curriculum.
7. Leadership and funding were not reviewed for the study.

Delimitations

The delimitations that may exist in this research are as follows:

1. The study only includes Missouri public high schools that include grades 9 -12.
2. The study only looks at two tested areas, Algebra I and English II.
3. This study encompassed all computer devices and did not limit based on the type as it adhered to the definition of a one-to-one device for the purpose of this study.

Assumptions

The assumptions for the research as follows:

1. That the data collected are correct and that all those who fill out the survey was done so honestly and with integrity.

2. Superintendent information from the Missouri Department of Elementary and Secondary Education was correct and up to date.
3. The schools' data will limit the ability to determine the improvement the one-to-one initiative has on improvement of scores in Algebra I and English II.

Definition of Terms

Digital Natives: people raised during the age of digital technology and, therefore, are familiar with computers and the internet from an early age (November Learning, 2013)

One-to-One: where every student has an internet-connected, wireless computing device, with internet connection 24 hours a day, seven days a week (Lawrence, Al-Bataineh & Hatch, 2018)

End of Course Exams: administered by the state of Missouri on an annual basis to determine student growth, curricular alignment with state standards, and schools accreditation (MoDESE, 2017)

High-Performing Schools: are performing at a combined rate of 60% proficient or advanced on Algebra I and English II End of Course Exams (MoDESE, 2017)

Pedagogy: the science and art of education. It refers to the methodology or process of instruction, with focus on teaching rather than the learning (Merriam-Webster, 2018).

Professional Development: activities that:

(1) are an integral part of school and local educational agency strategies for providing educators (including teachers, principals, other school leaders, specialized instructional support personnel, paraprofessionals, and, as applicable, early childhood

educators) with the knowledge and skills necessary to enable students to succeed in a well-rounded education and to meet the challenging state academic standards; and

(2) are sustained (not stand-alone, one-day, or short-term workshops), intensive, collaborative, job-embedded, data-driven, and classroom-focused, and may include activities that improve and increase teachers' knowledge of the academic subjects the teachers teach, promote understanding of how students learn, and improve their ability to analyze student work and achievement from multiple sources, including how to adjust instructional strategies, assessments, and materials based on such analysis (Learning Forward, 2018h)

Quality Professional Development: professional development that reflects the seven professional development standards determined by Learning Forward which include learning communities, leadership, resources, data, learning design, implementation and outcomes (Learning Forward, 2018h).

In Chapter Two the researcher presents the relevant literature pertaining to one-to-one initiatives, including the history and evolution of the one-to-one initiatives, as well as how it impacts student engagement and student achievement. The researcher also presents how one-to-one initiatives apply to the application of 21st century skills in the students' and teachers' lives through teacher practices and the constructivist lens. Chapter two concludes with a summary of the literature presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

There are numerous ways to look at the effectiveness of one-to-one initiatives. School districts around the country are implementing one-to-one initiatives (Penuel, 2006). The initiatives can be cost prohibitive, and due to the large financial investment, districts are closely scrutinizing the learner outcomes of these initiatives (Rohr, 2014). With the need for students to be prepared for an ever-evolving workforce that requires technological skills far beyond what is required or taught today, the study of schools' ability to successfully provide these 21st century skills through one-to-one initiatives is needed.

The review of related literature is divided into eight sections that pertain to one-to-one initiatives. The first section deals with the advent and growth of one-to-one initiatives in the American education system. The second section looks at student engagement and the implementation of one-to-one initiatives. The third section looks at if engagement leads to gains in academic achievement. The fourth section looks at how one-to-one initiatives support 21st century skills. The fifth section looks at the constructivist educational theory as it relates to one-to-one initiatives. The sixth section focuses on teacher practice and professional development required to determine if one-to-one initiatives are successful in schools.

History of One-to-One Initiatives

One-to-one initiatives are not a new phenomenon in education. Numerous research-based, computer-centric educational programs have been implemented over the

last quarter of a century, and one-to-one initiatives can be linked back to 1990 (Islam & Gronlund, 2016). The use of computer devices prior to 1980 was reserved for government and large-scale businesses using mainframe computer technology (Gilling, 2015). The advent of smaller microchip architecture provided the impetus for creation of simplified computer language, primarily supported by Microsoft and Apple, and small personal computing devices affordable for the home consumer (Stewart, 2015). All of that changed by mid-1990, though, as prices dropped, performance improved, and accessibility increased. According to Statista (2015), the number of households in the United States with a television has reached 116 million, and 227 million families own a cell phone. American youth's use of technology devices for social media connection to one another is evident with youth ages 12-24 averaging 585 total contacts in their personal social media accounts (Statista, 2015).

This growth has created a generation of “digital natives.” Prensky (2010) defined children born into a digital landscape as digital natives and adults who lived prior to personal home computers, the Internet, and wireless access as “digital immigrants.” Prensky (2010) articulated digital natives learn to conceptualize and respond differently than previous generations. Many schools and districts have undertaken technology initiatives with the intention of creating classrooms that are immersed in technology hoping to prepare students for 21st-century workplaces (Ally & Prieto-Blazquez, 2014). The 21st century learners are also known as digital natives. Digital natives are defined as students born with a markedly different approach to learning (November Learning, 2013). Creating learning spaces for digital natives requires a change from schools' traditional pedagogy.

For the past fifty years, the educational community has based its pedagogical focus on teaching (Weimer, 2013). School has been teacher-centered and requires little definition and explanation, since it has been utilized since the beginnings of universal education in the United States. In teacher-centered approaches, the learner requires a person who can guide or advise, and help achieve the objectives of education (Nagaraju, Madhavaiah, & Peter, 2013). In classes considered teacher-centered, the teacher is the most engaged and active person in the room, while students are the recipients of learning as demonstrated by listening, taking notes, giving brief answers, or completing assignments and tests (Sawant & Rizvi, 2015). Teacher-centered classrooms have been reported to provide increased control of content and of students in the classroom (Weimer, 2013). One-to-one classrooms are learner-centered spaces that take on various meanings in today's technology-driven world (P21 Partnership for 21st Century Schools, 2016). Learning spaces may be defined as virtual, online, and remote; in other words, the space does not have to be a physical place at all (P21 Partnership for 21st Century Schools, 2016).

Many school leaders and policymakers have focused on the wrong aspect of technology. It is not the computer they should be focusing on but how the computer can be used in the classroom to transform education. Because of this misconception, how technology has been integrated in schools has been greatly impacted (Bhatta, 2008). The intent of one-to-one school environments is to increase student learning by providing instruction and opportunity using a keyboard or tablet (Bebell et al., 2014). According to Islam and Gronlund (2016), the most important implementation challenges present are (1) efficient management by a strong leadership, (2) having adequate contextual knowledge

or understanding about local environment for effective implementation of work processes, (3) shifting educational paradigm, (4) teachers' professional development, (5) stakeholders' commitment and uninterrupted support, to ensure program sustainability, (6) monitoring and evaluation, and (7) a robust infrastructure that includes localized creative contents, adaptive technology, sufficient Internet connectivity, and power supply.

Beaufort County in South Carolina was a leader of early one-to-one efforts and implemented a pilot program as early as 1994 that used laptops for instruction with 330 sixth grade students. The initiative was subsequently expanded to include all middle school students by 2000 (Gulek & Demirtas, 2005). Similar laptop programs were implemented by Clovis Unified School District in California and New York City Community School District Six in 1996. In addition, Texas launched a wireless one-to-one laptop program for more than 7,300 students in 13 schools so that students could have access at home or at school as part of the Technology Immersion Project (Gulek, & Demirtas, 2005).

One-to-one laptop initiatives have assumed a number of approaches, and the programs in education are becoming popular worldwide for three main reasons: easy availability, affordable information, and communication technologies. (Islam & Gronlund, 2016). Islam and Gronlund (2016) found that prior to implementing a new project, it is imperative to have a thorough understanding about the context, costs, risks, barriers, and challenges that may affect expected benefits. An implementation plan must be contextually embedded and must take the socioeconomic and cultural realities into consideration. In order to have learning environments where digital natives are

comfortable, there must be a change in pedagogy. Professional development is one means to change the self-efficacy of teachers and the level with which they integrate technology in the classroom (Lasry, Whittaker, Dedic & Rosefield, 2013).

One-to-One Initiatives and Students Engagement

One-to-one initiatives have been linked to making school more engaging for today's digital natives, but the evidence is not decisive about whether they increase student achievement. McConnel (2018) listed the following items that have been used to measure student engagement: attendance, attitude, sense of community, goal setting, reflection, and motivation. McConnel (2018) indicates that goal-setting and self-reflection increased student motivation, which led to more engagement.

Research has shown that students are looking for things to stimulate them intellectually in the classroom. The 2006 High School Survey of Student Engagement (Voices of Students on Engagement, 2007) surveyed 81,499 students in 110 schools from 26 different states to understand what students think about the life and work of their high schools. In reviewing the survey data, three primary dimensions of engagement were constructed: Cognitive, Social, and Emotional Engagement. Based on the results of the survey students were asked to identify the kinds of class work that would excite or engage them in the learning. Students were most engaged by being allowed to peer teach while being active participants. Project based learning where collaboration took place such as group projects, discussions, presentations or anything they could be actively involved in was identified as a favorite by the students.

When one-to-one initiatives are implemented, students are more engaged. One-to-one initiatives have been found supportive in the transition from teacher centered

classrooms to learner-centered classrooms (Varier et al. 2017). In one project, (Indiana's TECH-KNOW-Build Project, 2006), teachers reported, that students were more engaged and active in their work. This was noted by the fact they reported fewer behavior referrals and students were much more engaged in the learning taking place. Attendance was also higher after the implementation of one-to-one devices. However, there was not a significant difference in the students writing assessments between the computer-based classes and the traditional classrooms. According to Indiana's TECH-KNOW-Build Project (2006), students learned practical skills and had an increased belief that laptops help them learn and that their technological learning skills increased.

Lowther, Inan, Ross & Strahl (2012) found gains in student engagement and attentiveness in comparison to students not in a one-to-one computer initiative. Classroom discipline problems in one-to-one classrooms has seen a decrease, which could stimulate increased student engagement (Shapley, Sheehan, Sturges, Caranikas-Walker, Huntsberger, & Maloney, 2006). Studies have shown that one-to-one computing has brought about increased student engagement which has led to decreased disciplinary problems. Studies has also shown that classrooms are moving away from teacher centered classrooms to student centered which allows for my time for students to be on task utilizing the devices for writing (Bebell & Kay, 2010). Students who have an affinity for technology have shown increased motivation and interest. Improved motivation to learn, fewer discipline disruptions and engagement in learning activities could, in turn, lead to more quality time spent on important learning tasks (Islam & Gronlund, 2016). Much evidence suggests that one-to-one initiatives enhance students' academic engagement and motivation, quality of academic work, self-efficacy for learning,

computing skills, and collaboration (Irby, 2017; Islam & Gronlund, 2016).

However, it is still unclear whether one-to-one initiatives will lead to improved standardized test scores because most of the studies on one-to-one initiatives look at grade point averages as indicators of achievement but not standardized test scores (Islam & Gronlund, 2016). Varier et al. (2017) found positive outcomes associated with the implementation of one-to-one initiatives; however, there are mixed results whether they are reaching optimal outcomes on standardized tests.

One-to-One Initiatives and Students Achievement

Although research shows that student engagement is stronger with the implementation of one-to-one initiatives, research has not shown a strong correlation between computer implementation and improved standardized test scores. Robinson (2016) finds conflict in the effectiveness of technology in the classroom. Technology usage is growing, but results are not definitive as to whether it increases student learning. The use of technology opens up opportunities that allow students to learn outside the classroom, seek out answers; however, the effects of one-to-one technology have shown mixed results (Holen, Hung & Gourneau, 2017).

One significant hindrance to attaining achievement results is how teachers are trained and use technology in their classrooms. One of the major hindrances in education when implementing technology is that the emphasis is on the wrong thing, the technology, and not the teaching and how that will be supported to avoid logistical, technical, financial, and resistance issues (Islam & Gronlund, 2016). Through the use of technology, students can be given the opportunity for authentic learning opportunities. Computer technology is an effective way to widen educational opportunities, as evidence

suggests that one-to-one initiatives enhance students' academic engagement and motivation, quality of academic work, independent learning, computing skills, and collaboration (Islam & Gronlund, 2016).

New methods and instructional strategies infused with collaboration and technology are showing the desired results. Much research has been done on the impact of one-to-one technology initiatives on student learning as represented by standardized test scores (Islam & Gronlund, 2016). Demski (2012) stated that by uniting the principles of personalized learning with the tools of technology, educators believe they can create a hybrid model of education that allows for personalization that is customized to the learner's needs and passions and break away from the archaic assembly line model that has a one size fits all approach. To support this change in instructional strategies and pedagogy, school districts have initiated one-to-one initiatives to support academic achievement, equity, and improve quality of classroom instruction (Penuel, 2006). While each individual program has different goals, these programs are designed to promote an increased level of academic achievement. The quality of instruction is transformed, as well as the type of learning that takes place, which fosters the opportunity to develop a higher level of student engagement.

The classrooms in such programs evolve from a teacher-centered environment, where the instructor doles out information, to an environment where the instructor facilitates not only learning, but the students now are the center of the environment and are more actively engaged in the learning. The technology allows the students to create and work on learning projects that are individualized or are parts of collaborative teamwork that focuses on higher-order thinking skills (Varier et al. 2017). Technology-

infused instruction also works well to provide equitable access to information for all students or learners. No longer should socioeconomic status or a regional location inhibit the learner's ability to access information. One-to-one technology initiatives that provide every student with equal access to computers and the internet not only serve a social justice purpose, but also prepare more technologically competent students, including disadvantaged student populations, for the 21st century workforce (Holen, Hung & Gourneau, 2017).

Preparation for a global economy requires that students be prepared for skills and work that will be infused with technology. Initiatives such as Maine's one-to-one initiative hope to improve regional economies by producing technology savvy employees for the community (Penuel, 2006). The implementation of one-to-one initiatives into education is a step in preparing students to thrive in 21st century work environments, which require skills such as information gathering and critical thinking, communication and problem solving (Anagun, 2018). The exposure to technology puts students in touch with the multimedia resources that are essential in building such skills (Varier et al. 2017).

In a study of ten schools in Maine and California that have implemented some form of one-to-one computing, Warschauer (2007) ascertained that the laptop classrooms had an advantage implementing 21st century skills due to the individualized nature for investigation and learning. Warschauer (2007) also confirmed that the use of laptops made it easier for students to engage in research projects. However, the research showed that the outcomes, such as test standardized test scores, did not occur evenly across the schools in the study. One of the largest studies that has taken place on one-to-one laptop

programs took place in Maine and included 16,000 students (Silvernail & Gritter, 2007), in the first year of implementation, 2000, only 29.1% of the eighth grade students were proficient on the Maine Educational Assessment (MEA).

However, Mooresville Graded School District of North Carolina, that is considered one of the leading one-to-one school districts in the nation, saw a 20% increase in the number of students who scored proficient in state assessments after the district moved towards one-to-one. District leaders emphasize that the technology was only part of that success. Mooresville also focused on changing the way teachers integrated the technology throughout the curriculum (Quillen, 2011). An analysis of the assessment results of several one-to-one laptop initiatives from across the United States concluded overall that students in one-to-one programs academically achieved greater success on standardized tests, higher grades in writing, and overall grade point averages than students in non-one-to-one programs (Holcomb, 2009; Islam & Gronlund, 2016).

A study conducted on this learning initiative showed again that after three years of one-to-one implementation, student achievement had been positively impacted through the types of educational access and opportunities afforded by the one-to-one pilot program as well as the training for the teachers (Bebell & Kay, 2010). Wendt (2013) provided insight as to how to integrate literacy into the curriculum through the use of laptop integration at the secondary level. One-to-one initiatives have been found to have a positive impact on student achievement scores. However, Islam and Gronlund (2016) found an increase in cumulative grade point average more than standardized test scores.

Likewise, Warschauer et al. (2014) also discovered positive outcomes. They established individual laptop use by students in writing has a positive impact. Daily

access to internet-connected laptops allows the students more time and freedom to write and use the writing process which includes background research for their writing; they write, revise, and publish more; laptops have allowed for more feedback and editing and it allows the students the ability to produce higher quality writing on more topics and genres. Islam and Gronlund's (2016) research supported improved writing skills finding that research verified that laptops bring more positive attitudes toward writing since students enjoy writing more on their laptops than on paper. Bebell (2014) indicated that students participating in a one-to-one initiative were more engaged in the writing process, understood how to research on the device and made gains in standardized ELA test scores. Stortz and Hoffman (2013) indicated that students who use computers to write produced high quality written work. Holen, Hung & Gourneau (2017) conformed that teachers used technology in the math classroom, but mainly for drills and practice and not for delivery.

One-to-one initiatives can be polarizing because of conflicting evidence about the impact technology in the classroom has on student achievement. Harris, Al-Bataineh and Al-Bataineh (2016) verified that students who had one-to-one technology did score better on topic tests than students who did not. Vigdor and Ladd (2010) noted there was a negative impact on English and math achievement when students had computer access at home. There is no real quantitative data that supports the idea that learning is increased by adding technology into the classroom. The existence of one-to-one initiatives alone do not guarantee improved student achievement, especially if good pedagogy is not present (Islam & Gronlund, 2016).

Larry Cuban (2006) has been unconvinced of the need for schools to adopt a one-to-one computing environment. Cuban asserts that most districts find that engagement, motivation, and increased interest in learning are the major attributes of the one-to-one initiatives. He goes on to iterate that one-to-one initiatives do not show an increase in academic achievement and many advocates for one-to-one misunderstand. The teacher and the instructional strategies not the laptop improve achievement scores.

Holen, Hung, & Gourneau (2017) suggested that the increase in the use of and the proficiency in technology may provide enough evidence for school administrators to invest in laptop programs due to increased individualized learning opportunities even though achievement on standardized tests may not increase. While student achievement, measured via standardized tests, may not show improvements, the students' acquisition of 21st-century skills are realized (Topper & Lancaster, 2013).

One-to-One Initiatives and Twenty-First Century Skills

The public education process that is in place was developed during the industrial revolution. Creativity and problem solving were not skills that were necessary for workers to have as they went into the workforce at that time. This method prepared workers for the one skill they would need when leaving school and entering either the next level of education or the workforce (Schwahn & McGarvey, 2011). Anagun (2018) asserts that in this era of globalization, it is imperative that schools prepare students effectively with the knowledge, dispositions, and skills they need to connect, collaborate, and compete in a highly competitive, interconnected world. Anagun (2018) defines 21st century skills as basic skills such as critical thinking, problem solving, creativity, communication, collaboration, innovation, teamwork, decision making, leadership,

knowledge application, self-direction, and learning how to learn. Schools looking to implement one-to-one initiatives do so to prepare students for life in a technological world and while technological skills are not directly related to student achievement, technologically savvy students have the skills to be college and workforce ready, which is why 21st century skills are tied directly to one-to-one initiatives and curricula (Geisinger, 2016). Through the use of technology in the classroom, students have demonstrated improvement of 21st century skills (Tarbutton, 2018). Current research does find a correlation between one-to-one implementation and increased technology skills. One-to-one initiatives have improved student technology proficiency (Warschauer et al., 2014).

The use of technology in the classroom can provide student-centered learning experiences that can lead to improved student engagement, motivation and on task behavior (Lapek, 2017). Constructivism is a theory that opposes the traditional assembly line of the industrial revolution and has been linked to the introduction of one-to-one technology initiatives. Developed by Jean Piaget, constructivism examined the idea that students learn through the construction of one logical structure after another and mostly learn based upon their experiences. Constructivist classrooms are based on students' needs and interests, as well as connecting curriculum to events and items that are relevant to the students' lives. The Constructivist theory has influenced the implementation of one-to-one computing in classrooms. Twenty-first century skills such as critical thinking and problem solving (Anagun, 2018) are hallmarks of the both constructivist approach and one-to-one learning. The 21st century educational paradigm has evolved into a student-focused, collaborative learning environment that advocates for the use of

technological skills that prepare students for the highly connected digital world they will live (Islam & Gronlund, 2016).

One-to-one programs have demonstrated increased technology skills for students, as well as building confidence in them, which allows them to utilize 21st century skills in the classroom (Lowther et al., 2012). Students that are immersed in a one-to-one initiative have demonstrated growth in technology proficiency and are better prepared students for the technology-rich work environment (Varier et al., 2017).

Twenty-first century students need to have a solid foundation of the core concepts in the disciplines; with the skills they have acquired they are able to frame, investigate, evaluate, and problem solve using a wide range of information resources and digital tools (Darling-Hammond, Burns, Campbell, Goodwin, Hammerness, Low, McIntyre, Sato, & Zeichner, 2017). Twenty-six organizations make up P21 with entities including the U.S Department of Education, the National Education Association, Apple, Dell, Microsoft Systems as well as Cisco Systems (Partnership for 21st Century Skills 2016).

With fifteen state departments of education joining in with the 21st century skills movement, P21 has become a leader in advocating for the integration of 21st century skills into education that will allow for students' success in the new global economy (Anagun, 2018).

The Partnership for 21st Century Skills defines five tenants that would work as a framework for student mastery of 21st century skills. These tenants outline a skill set that should provide the opportunities for students to obtain the skills necessary for them to become successful members of the global job market. These tenants should include 21st century standards in which schools are designed to prepare all students with 21st century

knowledge. These standards should allow for authentic assessments that are applicable to real-world settings and are based on curriculum and instruction that require students to demonstrate mastery of 21st century knowledge and skills—critical thinking, problem solving, and communication skills, as well as exhibiting competency on information and technology literacy. Twenty-first century schools should be organized to function as professional learning communities which allows for partnerships with the business community and organizations to help implement the 21st century skills and provide students with the opportunity to work and learn outside the classrooms (Partnership for 21st Century Skills 2016).

Twenty-First Century Student Outcomes outline core subjects and 21st century interdisciplinary themes. Subjects involved with this are English Language Arts, World Languages, Arts, Mathematics, Economics, Science, Geography, History, and Government and Civics (Partnership for 21st Century Skills 2016). The organization has also defined five 21st century themes into core subjects that will better prepare students for life in a globally competitive world. The first of the five deals with global awareness in which students are taught to learn, respect, and collaborate. Financial/economic literacy is another subject in which students learn to understand the role of the economy and use entrepreneurial skills to enhance workplace productivity and explore career options. Civic literacy teaches students to participate effectively in civic life. Health literacy helps students understand preventative physical and mental health measures for an-ever evolving world. The final subject is environmental literacy, which helps students to understand and demonstrate knowledge of society's impact on the environment and to take necessary action (Anagun, 2018; Partnership for 21st Century Skills 2016).

The Partnership for 21st Century Skills has also developed a series of frameworks that describe skills necessary to meet the needs of ever-evolving global knowledge (Anagun, 2018). The skills also include abilities and/or attributes that a student would need to be a functioning team member on a project such as flexibility, leadership and responsibility (Partnership for 21st Century Skills, 2016). The outdated schooling model, in which teachers transmit information through textbooks and lectures, does not enhance these 21st century skills. However, the new model encourages students to apply and transfer information to one another not through the teacher, but through a collaborative model which will enhance retention (Tucker, 2014). When technology is introduced and used effectively in the classroom instruction, it not only improves student achievement, but also motivates active student learning, collaboration, and cooperation which solidifies 21st century learning and skills (Eyyam and Yaratan, 2014).

One-to-One Initiatives and Teacher Practice

Beeson, Journell and Ayers (2014) believed that computers can be a tool used by teachers in the instructional process. This can be used to enhance the students' engagement and learning when using the devices, as opposed to the teacher being the focal point of instruction. Teachers who are successful in implementing the technology have learned the new computer-based tools, but they have also learned new approaches to teaching. Recent education developments in many schools and countries have seen a shift from traditional delivery methods to more of a constructivist approach that is more learner-centered in which the teacher serves as the guide and facilitator, not just the transmitter of information.

The success of a one-to-one initiatives can hinge on the ability and comfort

levels of teachers to effectively integrate laptops into learning. Teachers who do not have confidence in their technology skills commonly fail to utilize laptops (Beeson, Journell & Ayers, 2014). According to Prasojo, Mukminin, Habibi, Marzulina, Sirozi, & Harto (2018), technology skills alone do not prepare teachers for technology integration. They went on to say that technology classes have been added to teacher education programs, but classes are not enough to ensure teachers are prepared to integrate technology in the classroom where they facilitate learning.

The most common reason for the lack of technology usage or implementation appears to be teacher fear of something going wrong in the classroom when using technology. This plays a significant role in teacher adoption or lack of technology in instructional settings (Kay, 2014). Teacher self-efficacy is a huge player and has been defined as the extent to which a teacher is confident enough in his or her ability to promote student learning. Getting past that fear is important, as many teachers have a great deal of anxiety about using technology in the classroom around students which leads to a negative attitude and thus never implementing it in the classroom (Ruggiero & Mond, 2015). Two such fears, according to research from the past fifteen years, are that teachers have not been shown how to use technology properly (Godsey, 2015), and that teachers will have less technology knowledge and skills than the students (Kay, 2014). Furthermore, Kay (2014) noted many teachers experience challenges when trying to use technology in their classrooms, including the amount of time required to learn new software and insufficient access to software and hardware. If teachers do not embrace technology and use it to assist in transforming their teaching practices, there will not be any significant effect on the classroom community or on student understanding

(November Learning, 2013). Thus, including technology tools in student learning is a risky venture for most teachers (Rebora, 2016).

Teachers have been labeled digital immigrants, the opposite of students who are digital natives, comparing the gap between students and teachers to two nationalities who speak different languages (Prensky, 2010). Classroom instruction is often led by digital immigrants who may struggle to make learning relevant to the digital native population (Prensky, 2010). In examining integration of technology in the classroom, Smaldino, Lowther, Mims, & Russell (2014) noted teachers must undergo implementation stages and grow from novice learner to teacher facilitator of student technology use. According to Project Red (2015), results indicate proper implementation of one-to-one programs achieves more educational success, however, the following must be present in order to see the positive results. Positive results depend on the technology being properly integrated into the school as it will be more cost effective, which allows resources to be utilized for interventions and training. Schools that implement properly utilizing these factors outperform all other schools. The factors that have the most impact are strong principal leadership that provides a clear vision as to what the school is trying to accomplish; support and time to use of technology daily (Project Red, 2015).

In order to engage students, the teacher must first get through these fears of change. According to Weimer (2013), teachers' attitudes are an important factor that must be considered when using technology to engage the student. In the results of a survey consisting of 700 classroom teachers, Rebora (2016) noted teachers tend to put more stock in other teachers' experiences about technology than they do in the opinions of administrators or outside experts. When initiating change, there is usually a mixture of

negative and positive terms associated with it (Keengwe, 2013). Beeson, Journell, & Ayres (2014) found that effective programs reduced the hurdles by providing support to their staff through access, time, and training. They also achieve buy-in from the staff by assessing implementation performance and providing time for reflection and feedback.

Schools are putting new standards in place to help teachers infuse technology into their classes to improve student achievement. The International Society for Technology in Education (ISTE) developed the National Education Technology Standards (NETS), which are standards of excellence and best practices in learning, teaching, and leading with technology in education. The benefits of using the NETS (2016) are improving higher-order thinking skills, such as problem solving, critical thinking, and creativity. All of the standards prepare students for their future in a competitive global job market. Teachers are also prepared by the construct of standards which prepare students to be collaborative, digitally literate and project-based. These standards change the way we operate in schools as it prepares students and teachers for the ever changing digital world. The NETS (2016) include specific standards for students, teachers, administrators, and coaches. This specificity is beneficial, as each role is different and should have technology standards that reflect those differences.

Technology creates new challenges for teachers in the classroom. Teachers are now competing with computers in their classrooms, having that vast amount of information at their fingertips creates the challenge of harnessing and guiding information. Teachers must also learn how to implement and utilize hardware and software to enhance the teaching and learning process (Ruggiero & Mong, 2015). Teachers accustomed to a traditional landscape of classroom instruction often find

difficulty in the transition to classroom environments with access to technology for every student (Godsey, 2015; November Learning, 2013). These new collaborative approaches, allow for the focus to be on learning together in which the teachers and pupils work collaboratively participating as co-learners. The focus has shifted toward participation and negotiation rather than direction and instruction. This collaborative approach can give students new insights and greater independence as learners, while offering students the opportunity to become experts and share their constructed knowledge with students and teachers (Keengwe, 2013).

Technology increases student participation and though it is more interesting and sophisticated in many ways, it also changes the fundamental view of teaching and learning. This includes the relation between teachers' role in the learning process, and the students' view of the learning process. Such change also leads to new tensions, such as conflicts between new learning and traditional models, and between new outcomes and old assessments (Islam and Gronlund, 2016). Hsu and Kuan (2013) found very few teachers didn't want to know more about the technology but they wanted to know more about how to use the technology in their instruction in the classroom.

Integration of technology allows for students to explore and have more say in their voice and choice. The pedagogy acknowledges the student voice as integral part of the learning experience as learning requires lessons to be more relevant to the student which helps them be more responsible and active participants (Coalition of Essential Schools, 2016; November Learning, 2013). For digital students, learning is not about the technology; it is about being able to learn in any context where the technology can go (Ally & Prieto-Blazquez, 2014). Further supporting voice and choice and student

partnerships in an education format, November Learning (2013), described the need for collaboration between learners and educators in selecting what to learn, when to learn, and where to learn. Employers rank collaboration as one of the top traits they expect in their future employees. Technology allows employees to work around the world not hindered by geography or time. Working collaboratively and electronically are two jobs skills employees need today but definitely in the future (Roland, 2016).

When technology is used effectively in the classroom instruction, not only has an increase in student achievement been shown, it also motivates active student learning, collaboration, and cooperation, which enhances 21st century learning and skills (Eyyam and Yaratan, 2014). As K-12 educators prepare students with 21st century skills such as critical thinking, collaboration, communication, and creativity (Anagun, 2016), schools must adapt to the changing world around them. No matter where teachers fall on the technology continuum, they must understand the need for 21st century skills (Donahue, 2014).

One-to-One Initiatives and Constructivist Teaching Practices

When students work with computers, they usually don't know how computers work, but they do know that the device will quickly retrieve information (Glance, Rhinehart & Brown, 2018). Computer-based educating technology potentially supports some version of constructivism, but there are constraints with some one-to-one initiatives in that there is little flexibility for the student to construct their own model. One-to-one initiatives, or the use of devices, can support constructivism but is not inherently constructivist in nature (Glance et al, 2018).

A constructivist definition of teaching puts the role of the teacher as guiding the learner as an autonomous process in which the teacher builds on and modifies their existing mental models, focusing on knowledge construction of the learner rather than knowledge transmission from the teacher (Cristea, 2015). There are three principles associated with the constructivist theory: building on one's own experiences, developing one's own knowledge based on inconsistencies developed, and developing knowledge through one's social context (Glance et al., 2018). Kant and Dewey theorized that each person forms their own knowledge that is formulated by their own individual experiences. Piaget said learning occurs when the learner's exploration discovers a tension between what they know and what they experience (Geisinger, 2016). Vygotsky believed that learning occurs within a social context that allows for interaction between learners and their peers. This interaction helps them develop mental models essential in the learning process (Vygotsky, 1962).

Teaching in a truly constructivist environment can be frustrating for teachers as they try to integrate technology into their lessons (Windschitl, 1999). Baldins (2016) and Windschitl (1999) give five examples of how technology can tie to constructivist principles when utilizing devices in the classroom. The first example is when learning begins with what we already know. Technology can help students create lists of their ideas in which they organize their already-existing and newly learned knowledge. The second example is when students conduct their own investigations, deal with local issues, or engage in conversations about the topic. In this context, students have access to materials from which they can research, construct their arguments, or engage or collaborate with the problems. The third example is when students explore ways to

decipher information, and analyze it so they have a better understanding of the problem they are trying to solve. Accessing the information is important, but understanding what they find is crucial to the process. Through data and the exploratory process, students begin to form a deeper understanding which allows them to explain them. The fourth example is when students work collaboratively, sharing ideas with others in a social context. Collaborating with students from around the world about issues helps students conceptualize their own world. The final example is when students are able to demonstrate their understanding for the project through presentation. Constructivist instruction is intended to develop deep understandings which allows the students to understand things differently based on their own experiences.

Not all educational theorists agree that one-to-one initiatives are constructivist in nature. There is a strong claim that one-to-one learning environments support constructivist theory is not always accurate because the four key points of a constructivist environment are not always present. The four components of a constructivist environment are an engaged learner that has hands-on interaction with materials who engages in an authentic problem-solving task where there is human interaction during the learning process (Gance, 2002).

There is sometimes a breakdown between constructivist pedagogy and what can actually or commonly happen within a one-to-one learning environment. One-to-one technology can support constructivist pedagogy but is not necessary constructivist. The importance of learning interaction with the environment, as well as interpersonal social interaction with peers and the teacher, is key to facilitation of learning (Gance, 2002). Technology is not essential to constructivist teaching and learning, but it can support

powerful learning opportunities for students. Constructivism offers philosophical guidance and technology provides a tool to apply the learning (O'Neill, 2015).

Although research shows that student engagement is stronger with the implementation of one-to-one initiatives, research has not shown a strong correlation between computer implementation and actual achievement on standardized test scores. The first-year results of the Texas Immersion Pilot found mixed results on indicators of student engagement, learning that students in computer based classrooms were more engaged, behaved better with fewer disciplinary referrals and had a more positive feeling about being at school. The study concluded that students in the laptop classrooms showed no significant effect on achievement as measured by the Texas state assessment (TAKS). The researchers found that the implementation of laptop computers varied widely thus requiring more research in future years of the project (Shapley et al., 2006).

Quality Professional Development

Integration of one-to-one initiatives does not happen by chance; there must be a plan in place to prepare teachers and students. Professional development plays a key role in that plan and, therefore, is an integral part that will lead to higher student achievement. Effective, high quality professional development allows teachers to increase their knowledge and instructional practices, which would result in student learning (Howard & Rennie, 2013). Since technology has been implemented in schools, studies have shown that one-to-one technology has a significant positive effect on student achievement. This would not be possible without adequate training and professional development (Ramsdell, 2014).

Change is a difficult path to maneuver, and while on that path of change, teachers need to feel supported through professional learning opportunities and to stay focused on increasing student achievement with the new one-to-one technology (Tackett, 2014). By 2013, more than 300,000 K-12 students were enrolled in online programs. New technological tools have also become more prevalent in classrooms. With this information teachers must adapt their teaching styles so that they can integrate technology into their teaching methods (Hanover Research, 2014). In order for this technology to be used, it must be modeled for students as we prepare them for their present and future. Mingus (2014) described factors such as 21st-century skills and how the teachers' use of technology in the classroom will have an impact on student achievement.

Technology integration will impact student achievement, but according to Gallamore (2016), a teacher is the most important factor and needs support during a change to one-to-one. Schools need to ensure that teachers are supported during a change to one-to-one technology because they have the greatest effect on student achievement. This can be done through professional development. Professional development should be a continuous, articulate process and be viewed as a professional responsibility of teachers focused on student performance. According to Sun, Strobel, & Newby (2017) teachers need to have had three components in order to be more prepared for success in the classroom: skills-based courses in teacher training, the integration of technology into methods courses, and application of technology in student teaching, as well as in their actual classrooms.

The preservice and novice teacher had greater intent, as they appeared to view participation in professional development as an obligation to their position. Teachers at the middle stages of their careers generally participated in professional development to satisfy requirements or to receive credits, as opposed to for intrinsic purposes. Teachers in late stages of their careers or near retirement generally attend professional development if it was deemed worthwhile over any required or mandatory professional development. Regardless of the career stage of teachers, a common trait that joined each of them was a love for learning and an awareness of its necessity for professional growth (Wilkerson, H., Andrews, C., Shaban, Y., Laina, V., & Gravel, B., 2016).

Darling-Hammond et al. (2017) established that the perception of professional development by teachers varies not only by content area but also by career stage. Beginning teachers have different needs than more experienced educators, and special consideration needs to be made for all levels of training necessary within a staff. This variance in experience creates a challenge for those planning professional development activities for teachers. Another challenge is how teachers are trained. According to Hanover Research (2014), another challenge for districts is that teachers are well-prepared in traditional delivery methods; therefore, integrating technology into the curriculum is difficult and must be overcome by providing professional development for teachers on new methods. Teachers may not use the one-to-one technology when they are not properly trained or confident in the use of technology (Sun et al. 2017). The researchers also noted that learning how to use technology is not the same as learning to teach with technology. Therefore, a strong and relevant professional development will

help achieve the goal of integrating technology into classes and curriculum (Sun et al. 2017).

Professional development looks different in all schools and, as previously mentioned, based on the experience level of the teachers. New teachers have the skills to utilize technology in the classroom, but usually need more training because many of the skills needed to be an effective teacher are not learned from a book, but through experience (Prasojo et al., 2018). Professional development provides educators the opportunity to learn new strategies that they can implement into their pedagogical arsenal to enhance and adjust their instructional style to utilize effectively (Hanover, 2014). Teachers said that relevance to their classroom instruction was the primary component they used to measure the usefulness of a professional development activity. Specifically, the teachers reported that they favored professional development sessions that offered things they could immediately implement in their classrooms (Parise, et al., 2015).

Learning Forward and Professional Development

Professional development must be organized, applicable, and aligned. Learning Forward (2018h) stated that there must be standards to guide school leaders and teachers that correlate to the Every Student Succeeds Act (Every Student Succeeds Act, 2016). The law provides a restructured definition of professional development that includes continuous, job-embedded professional development and any activity that can influence positive changes in student performance. The act also extends new authorized residencies to help prepare principals and school leaders that have the responsibility of daily managerial duties or instructional improvement of the school (Every Student Succeeds Act, 2016). Learning Forward states that the following seven standards must be present

for quality professional development. First, Professional Learning Standards should include Learning Communities, Leadership, Resources, Data, Learning Designs, Implementation, and most importantly, be Outcome driven. Learning communities promote collective responsibility and alignment for the individual, team, and school. They meet regularly to strengthen practice and help increase student results. Learning communities are essential in incorporating the standards for quality professional development. The major indicators present in learning communities are collective responsibilities and accountability, which guide the school or district when implementing professional development (Learning Forward, 2018a).

For learning communities to be effective, strong leadership that supports the collective vision of the district or school must also be in place. Leaders provide guidance in meeting strategic and positive student achievement goals. The leader is responsible for setting high expectations for professional learning by role modeling and advocating for quality professional development (Learning Forward, 2018b).

Leaders that advocate for quality professional learning to take place must also have resources available to them to provide learning communities with time to collectively work toward goals. Resources can come in the way of tangible items, but time is a key resource that is available to achieve results for educators and students. Leaders must align these resources with professional learning goals, so it is essential that the leader understand the alignment as well as prioritize adequate resources equitably (Learning Forward, 2018c).

Additionally, data must guide decisions regarding improving student and educator learning. Data enriches decisions and can come from multiple sources that help guide the

direction of schools and districts. Data includes quantitative and qualitative information; it can be formative and summative assessments, performance events, work samples, performance metrics, portfolios, and self-reports. This data can be used by leaders or learning communities to drive instruction so that student achievement outcomes meet the desired goals (Learning Forward, 2018d).

Next, learning designs allows districts to integrate theories, research, and models of human learning into quality professional development opportunities. Learning designs encourage active engagement, which is done in the form of learning communities that allow for the collaborative groups to reflect, model, and apply knowledge. Supporting change through the exchange of knowledge will increase the quality and effectiveness of the professional learning taking place (Learning Forward, 2018e).

Implementation is also a key standard and step in the professional learning process. The implementation is a result of collaboration through learning communities that has been guided by leaders who set student achievement and educator learning goals. This is done through analyses of data and the use of researched-based ideologies that promote learning. Resources such as time help develop an implementation plan that occurs over time with benchmarks to hit along the way to monitor the change process. As the embedded process takes place, there is a time for feedback and reflection to refine the process and make sure that quality professional learning is taking place (Learning Forward, 2018f).

Ultimately the culminating standard is the outcomes. Outcomes determine the standard that educators are held to and the performance level that they must meet. Outcomes integrate the professional learning and student curriculum by meeting the

student achievement goals. Outcomes are a direct reflection of the link between educator learning and student learning. High standards are in place that hold educators to performance standards that include knowledge, skills, and practices that guide preparation, assessments, practice, and evaluations. These standards tell teachers what they need to know to deliver an effective education to all students (Learning Forward, 2018g).

There are numerous types of professional development available to school districts and teachers. Whether the professional development is online, face-to-face, workshops, study groups, action research, or collaboration through the professional learning communities, model teachers want the information to be relevant and applicable to their classrooms (Parise, et al., 2015). Face-to-face trainings allow for hands-on training or interaction with the facilitator, but these training can be more costly due to the expense to bring in a presenter or trainer (Parise, et al., 2015). One of the most common approaches to training teachers today is the use of collaboration time in the professional learning community model. Professional learning communities (PLC) have been identified as an effective systemic approach for providing collaborative learning opportunities for teachers to improve their practice (Kelly & Cherkowski, 2015). For one-to-one initiatives to be successful, professional learning is a key component of developing teachers' self-efficacy related to technology. A key to the success of a one-to-one technology initiative is PLCs because they help teachers collaborate and grow with an ongoing structure (Stephens, 2012). A professional learning community provides opportunities for collaboration and reflection, as well as opportunities for teachers to

work together to learn and reflect on their practice with colleagues (Kelly & Cherkowski, 2015).

Perhaps the best benefit a professional learning community offers, if properly managed, is overall school improvement. It provides educators time to work together and collaborate on relevant topics and concerns, such as technology integration, and provides encouragement for professional involvement (Dever & Lash, 2013). Teachers have reported that the most useful professional development opportunities involve being able to learn from or with other teachers (Parise, et al., 2015).

Professional development is a crucial component for any school undergoing a technology initiative, teachers will need time to train and practice as well as be provided collaborative support as they look to integrate the technology into their current instructional practices (Beeson et al., 2014). Professional development can not only help teachers build the necessary technological skills for them to implement into their classes but it also gives them confidence and a growth mindset (Donovan, Green and Hanson, 2009). Successful 21st century professional development programs are programs that work to make certain that educators fully understand the value and necessity of 21st century skills and they understand how to integrate these skills into the instructional program in their schools. The program must also support teachers and instructors as they progress to facilitators of learning who use and model 21st century tools (Partnership for 21st Century Skills, 2016). Bebell & Kay (2010) state the real change in education is not only the technology device, but the educational theory that supports this move.

Summary

Chapter II outlined the research available on the implementation of one-to-one

initiatives and the types of high-quality professional development used to implement effectively. This chapter was divided into eight sections including the history of one-to-one initiatives, one-to-one initiatives and student engagement, one-to-one initiatives and student achievement, one-to-one initiatives and 21st century skills, one-to-one initiatives and teacher practices, one-to-one initiatives and constructivist teaching practices, quality professional development, and Learning Forward and professional development.

Literature was reviewed in each section explaining the growth of technology in schools, the reason for change to meet the learning needs of the students, the need for quality professional development to address the needs of the teachers as the schools adapt to address the needs of 21st century learners, all while monitoring results gained from the implementation of one-to-one technology.

CHAPTER THREE RESEARCH DESIGN AND METHODOLOGY

Introduction

Students and teachers are operating in a world full of technology. This technology is being implemented into schools in the form of one-to-one computer initiatives. The hope of educators is to enhance instruction and learning by their students. As the transition to one-to-one computer initiatives progresses, administrators should understand that both students and teachers must feel comfortable using devices for one-to-one computer initiatives to be effective. The success of one-to-one initiatives depends on professional development and the comfort level of the teacher (Pautz & Sadera, 2017).

The purpose of this quantitative and qualitative study is to help school districts determine whether one-to-one initiatives, and the professional development provided, are effective in raising test scores. The participants of the study, as well as the sampling process for selecting the participants, are described in Chapter Three. The researcher will describe the research setting, detail the research design, explain the instrument to be used to collect the data, present the data treatment, and answer the following research questions and null hypothesis:

Research Questions:

RQ1: What is the difference in Algebra 1 test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ2: What is the difference English II test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ3: How is the professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of one-to-one?

Null Hypothesis:

H₀₁: There is no statistically significant difference between schools identified as one-to one-schools and non-one-to-one schools on how students perform on Algebra I End of Course exams.

H₀₂: There is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on English II End of Course exams.

Participants

The participants in this study are from Missouri public high schools. According to the Missouri Department of Elementary and Secondary Education, also referred to as DESE, in the 2016-2017 school year there were a total of 883,957 students enrolled in Missouri public schools. For the purposes of this study, the researcher will focus on the 566 high schools, grades 9 – 12, that populate the 561 school districts in Missouri. There were 267,328 students enrolled in Missouri public high schools in the 2016-2017 school year. The demographic makeup of these students across the state is as follows: Caucasian students 71.7% or 192,061; African American students 15.9% or 42,591; Hispanic students 6.2% or 16,607; Multi-Race students 3.4% or 9,107; Asian students 1.9% or 5,089; Indian students 0.4% or 1,071; and Pacific Islander students 0.3% or 803 students.

Table 1

Number of Students Enrolled in Missouri Public High Schools

Ethnicity/Race	Number of Students	Percentage
Caucasian	192,061	71.7%
African American	42,591	15.9%
Hispanic	16,607	6.2%
Multi-Race	9,107	3.4%
Asian	5,089	1.9%
Indian	1,071	0.4%
Pacific Islander	803	0.3%

Sampling Procedures

Participants in this study were determined by a total population survey of all public high school superintendents in the state of Missouri to determine those that have one-to-one initiatives. Based on the results obtained from the survey, those districts that fully implemented one-to-one computer initiatives could be included in the study by meeting the criteria established by the researcher for inclusion. The researcher utilized a purposive sample of Missouri high schools meeting the following criteria. To be included in the study, a Missouri high school must have fully implemented one-to-one computer initiatives. All demographic information and survey responses were secured and password protected with Question Pro software. Question Pro software has built-in safeguards to ensure the study remained safe and confidential.

Research Setting

The state of Missouri consists of 561 school districts. Four hundred and fifty-eight school districts are considered rural, which is 82% of Missouri public schools, with a population makeup of 387,704 students (McShane, 2016). The vast majority of students come from four population centers: Kansas City, St. Louis, Columbia, and Springfield. These areas have districts on their periphery that would be considered suburban. The ethnic mix is fairly homogeneous with 7 out of every 10 students being Caucasian in the state of Missouri.

The rural versus urban demographics create another divide in the state, as there is a discrepancy in funding and course access between urban and rural schools. McShane (2016) reports that advanced course offerings in rural schools lagged far behind urban and suburban districts. In the four course areas of chemistry, physics, calculus, and Advanced Placement (AP) courses, there is a major concern in rural districts because of a lack of course access. In the area of chemistry, only 2% of urban districts did not have students enrolled, while 23% of rural schools did not have students enrolled. In the area of physics, only 5% of urban districts did not have students enrolled, while 47% of rural schools did not have students enrolled. In the area of calculus only 13% of urban districts did not have students enrolled, while 56% of rural schools did not have students enrolled. In the area of Advanced Placement courses only 15% of urban districts did not have students enrolled, while 62% of rural schools did not have students enrolled. These numbers show a disparity in the course access, or lack thereof, between rural schools, and when compared to urban districts, it magnifies the diversity in the state. These statistics

identify the state’s population as diverse and the schools’ makeup and educational offerings vary dependent upon the location of the community in the state.

Table 2

Students Not Enrolled in Advanced Courses

Group	Chemistry	Physics	Calculus	A.P._
Urban	2%	5%	13%	15%
Rural	23%	47%	56%	62%_

Research Design

A survey was used to determine what schools are one-to-one and what year they implemented the technology. Once returned, the researcher compared one-to-one EOC data with the non-one-to-one EOC data. Additionally, the participants identifying as one-to-one schools answered questions from Learning Forwards Standards Assessment Inventory to determine if they met the seven indicators required for quality professional development.

This study provides quantitative and qualitative data to determine the most effective professional development that could contribute to effective implementation of one-to-one initiative in Missouri public high schools. The qualitative research provides better understanding of the effectiveness of the one-to-one computer initiatives and the role of professional development in the success of student academic performance (Creswell, 2014).

Instrumentation

An online survey was used to collect the data for this study. An introduction letter was provided detailing the instructions for completing the survey, giving consent to be a part of the study, the purpose for the survey, and the researcher’s information. The survey

was broken into three sections. The first section asked if they are a one-to-one school. If the response was yes, they would continue on to the second section which identified the year they implemented one-to-one device usage in their schools. The final section of the research was emailed to the respondents that identified as a one-to-one school. Those schools identifying were sent the Learning Forward Standards Assessment Inventory (SAI). The Learning Forward Standards Assessment Inventory is a valid and reliable survey according to psychometric analysis. Three pilot studies were completed and a Cronbach's alpha for instrument reliability were consistent and high, reporting back at $\alpha = .98$.

Construct validity was done at the school level in more than 400 elementary schools in Georgia where three overarching factors were present. Factor 1 was content, which had a Cronbach alpha coefficient of $\alpha = .992$. Factor 2 was process, which had a Cronbach alpha coefficient of $\alpha = .968$. The third factor was equity, which had a Cronbach alpha coefficient of $\alpha = .911$ (Vaden-Kiernan, Jones & McCann, 2008). The technical report provided by AdvancedED also provided an interclass correlation coefficient for each of the items on the SAI. The SAI is currently in its third iteration, which measures the degree to which a school's professional development aligns with Learning Forward's seven standards (Denmark and Weavery, 2012). The Learning Forward Standards Assessment Inventory is a valid and reliable survey according to psychometric analysis.

The Standards Assessment Inventory consists of 50 questions that relate to the seven Learning Forward Standards. Each of the 50 questions uses a 6-point Likert scale, which is as follows: (1) Don't Know, (2) Never, (3) Seldom, (4) Sometimes, (5)

Frequently, and (6) Always. The respondents would then answer questions from the Learning Forward SAI to determine if the school districts used components of high-quality professional development during the implementation. This inventory covers the seven components of a successful professional development program. The components are Learning Communities, Leadership, Resources, Data, Learning Designs, Implementation, and Outcomes.

The initial data collected from this survey will be used to compare the high schools scores in the area of Algebra I and English II EOC scores. The process of constructing the EOC tests that were administered in 2016-2017 used content-related evidence of validity that supports test interpretation. Riverside Publishing test development specialists created a detailed item and passage development plan based on the blueprints for each content area. The plans included the number of items necessary for each assessed course level expectation and an outline of the review process for developed items and passages. This process included internal Riverside Publishing reviews, DESE item review, and a content and bias review by Missouri educators (MoDESE, 2017).

The forms for the Fall 2008 through the Spring 2017 administrations were constructed using items field tested in Spring 2008, 2009, and 2010. During the process of building the forms for the operational test administrations, statistical characteristics were used to evaluate the items and test forms (MoDESE, 2017). The goal was to construct operational test forms that were similar within each content area. Large-scale state summative assessments reliabilities range from the mid .80s to the low .90s, which are common. In 2016 Algebra I EOCs were administered three times, summer $r = .88$,

fall $r = .89$ and spring $r = .88$. English II was also administered in the summer $r = .88$, fall $r = .89$ and spring $r = .85$, with all reliability coefficients falling within the common range. The English and Mathematics forms for 2016-17 assessed the old standards and will not be used moving forward. Forms that assess the new standards for English I, English II, Algebra I, Algebra II, and Geometry are being developed for 2017-18 and subsequent years. During this process, steps will be taken to ensure form comparability by using strong test-design methodology, anchor sets, and equating strategies that are consistent with best practices (MoDESE. 2017). How the data collected was treated and analyzed are presented in the next section.

Data Treatment

The researcher collected student academic test scores and compared one-to-one initiative student academic achievement test scores, as measured on the EOC for Algebra I and English II test scores, to non-one-to-one initiative student academic achievement, as measured on the EOC Algebra I and English II test scores. An independent sample t -test was used to compare the scores. The dependent variables are one-to-one initiative student test scores and non-one-to-one initiative test scores. These results are valid as the following assumptions are present. The assumptions are independent observations, as the researcher data is public information collected by a third party and researcher bias is not a factor. The normality and homogeneity of the student group data will be tested with Levine's Test of Homogeneity of Variance when the independent sample t -test is run to compare the difference in EOC Algebra I and English II test scores between one-to-one initiative student academic achievement and non-one-to-one initiative student academic

achievement. The groups are assumed normal and homogenous if the significance of the test is greater than $p >.05$.

Qualitative data collected from the responses on the Learning Forward Standards Assessment Inventory were analyzed doing a comparative analysis by averaging the responses to determine the perceptions of the administrators of the implementation of the Learning Forward Standards. The researcher has established an average response of four positive perceptions about the standards of professional development and an average of three as a negative perception about the standards of professional development. Data collected during the research project was held in a secure location and Question Pro was utilized to survey and store data once completed by the respondent.

Summary

The data collected provides information that will be of assistance to educators exploring or researching the implementation of one-to-one technology initiatives to meet the needs of students. The responses to this survey provide information that will be helpful to schools looking to implement one-to-one initiatives and the professional development that has garnered the best results in the two tested areas of Algebra I and English II. The reliability and validity of this study has been supported through the statistical analysis of results as well as analyzing the final survey responses. Information that the survey has collected is pertinent and valuable, and this will be exhibited and explained in length in Chapter Four of this study.

CHAPTER FOUR

DATA ANALYSIS

Introduction

Research suggests professional development is crucial in the success of educational reform, especially in the implementation of one-to-one initiatives (Ruggiero & Mong, 2015). The introduction of technology into the classroom presents challenges and opportunities for teachers to improve student academic achievement. Results have shown that student engagement is improved with implementation of one-to-one technology; however, results concerning academic achievement on standardized tests are still in question (Howard & Rennie, 2013). The purpose of this study was to determine if one-to-one schools performed at a higher rate academically than those that were not one-to-one schools. The researcher sought to identify the difference in academic achievement on Algebra I and English II test scores between schools that have implemented one-to-one initiatives and those that are not one-to-one. The researcher sought to identify high-performing one-to-one schools and their professional learning practices as identified by the Learning Forward's Standards for Professional Learning. The researcher then compared the responses of the high performing school administrators to the responses of participant administrators of schools not determined to be high-performing schools as identified by the results of student performance on the EOC test for Algebra 1 and English II.

In Chapter Three, the researcher detailed the methodology of the study, including participants, the research setting, research design, sampling selection, instrumentation, and data analysis. Descriptive statistics were used to present the data in an easy-to-

understand format. Inferential statistics were applied to infer what the data revealed about the participants' perception of their professional development practices. Data are presented in Chapter Four to identify if a difference exists between one-to-one schools and non-one-to-one schools' academic achievement on End of Course Algebra I and English II Exams. Data are also presented on the professional development practices of high performing one-to-one schools versus non-high-performing one-to-one schools that participated in the Learning Forward's Standard Assessments Inventory.

Research Question

RQ1: What is the difference of Algebra 1 test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ2: What is the difference of English II test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

RQ3: How is the professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of one-to-one?

Null Hypotheses

H₀1: There is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on Algebra I End of Course exams.

H₀2: There is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on English II End of Course exams.

Summary of Methods

Missouri high schools must have fully implemented one-to-one computer initiatives for at least one year prior to 2016. A total population survey was sent to Missouri superintendents asking for their participation in the study. The researcher utilized a purposive sample of Missouri high schools meeting the criteria of a one-to-one school.

Approval was obtained from Learning Forward to utilize the Standards Assessment Inventory (Appendix A). This allowed the researcher to contact superintendents of Missouri schools asking them to be a part of the research project. The superintendents consenting to participate in the study sent the survey to their building principals for completion (Appendix B). The survey was administered through the use of Question Pro online survey. One hundred five of the 561 districts agreed to participate. The survey was closed after three weeks, and the data was downloaded to Microsoft Excel for analysis. Quantitative analysis was used to investigate the first two research questions by conducting an independent *t*-test to determine if a statistical significance existed between Algebra I and English II EOC scores of one-to-one and non-one-to one schools. The third research question was analyzed by comparing SAI results of high performing one-to-one schools with those not meeting the criteria as a high-performing one-to-one school.

Data Presentation

There were 561 requests sent to districts with high schools with 105 high schools completing the survey for a participation percentage of 19%. There were 39 schools that responded as being one-to-one districts that completed the Standards Assessment

Inventory. Therefore, 561 districts with high schools received the survey, 147 viewed it, 117 started it, and 105 principals completed the survey, which makes 19% participation. The respondents were divided into two groups, one-to-one schools and not one-to-one schools. Thirty-nine high schools were one-to-one based on the criteria and 66 high schools were not one-to-one. The EOC scores in Algebra I and English II from 2016 were collected from the Department of Elementary and Secondary Education. Test scores from 2016 were utilized as they are the most current scores available as public data. Prior to running the statistics on the data retrieved from the survey, incomplete results were eliminated from the study. All one-to-one schools that had not implemented before 2015 were eliminated as test results were not available from MODESE for any years more current than 2016, thus allowing for at least one year of implementation. Responses were grouped into two groups those that had implemented one-to-one computer technology and those that were not one-to-one technology schools. High performing schools were identified as one-to-one schools that scored higher than 60% on both Algebra I and English II EOC's as they are above the state average on both tests.

An independent sample *t*-test was calculated using SPSS software to determine if there was a significant difference in the proficient and advanced achievement scores of the one-to-one schools when compared to the non-one-to-one schools. The results of the independent sample *t*-test are presented in Table 3 and Table 4 for Algebra 1 and Table 5 and Table 6 for English II.

The Learning Forward's Standards Assessment Inventory instrument was used to collect qualitative data of the school administrators' perceptions of the usage of the SAI seven professional development learning standards. Two groups were compared to find

the agreement level, high-performing schools that scored 60% or higher on both Algebra I and English II EOC's, and all one-to-one schools that completed the survey. A comparative analysis was utilized to evaluate the data from the survey. The survey consisted of 50 Likert-scale questions measuring how well districts aligned their implementation process to the seven learning standards. The survey was broken into seven sections that were composed of seven to eight questions that corresponded to the standards: Learning Communities, Leadership, Resources, Data, Learning Design, Implementation, and Outcomes. The scale measured the respondents' answers with (1) Don't Know, (2) Never, (3) Seldom, (4) Sometimes, (5) Frequently, (6) Always. The next three sections were organized by way of three research questions.

RQ1: What is the difference of Algebra I test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

This section compared the results of the Algebra I test scores of one-to-one schools with those of non-one-to-one schools using an independent *t*-test to determine if there was a significant difference at the $p < 0.05$ level. The results are shown in Table 3 and Table 4.

Table 3

Algebra I Group Statistics

<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Std. Error Mean</i>
Non One-to-One	64.0	56.0	21.4	2.7
One-to-One	39.0	58.5	16.0	2.6

Table 4

Algebra I Independent Samples t-test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	Mean Difference	Std. Error Difference	95% Confidence Interval	
								Lower	Upper
Equal variances assumed	1.88	0.173	-0.64	101	0.53	-2.53	3.98	-10.4	5.36
Equal variances not assumed			-0.68	97	0.50	-2.53	3.71	-9.89	4.84

An independent samples *t*-test was conducted to assess whether Algebra I EOC scores in one-to-one conditions and non-one-to-one conditions differed significantly. The assumption of homogeneity of variance was assessed by the Levene's test, $F = 1.88$, $p = .173$. These results indicated no significant violation of the equal variance assumption; therefore, equal variances were assumed. There was no statistical difference in the scores for Algebra I EOC's for one-to-one schools ($M = 58.5$, $SD = 16.0$) and non-one-to-one schools ($M = 56.0$, $SD = 21.4$) conditions; $t(101) = -.64$, $p = .53$.

The 95% CI for the difference between one-to-one and non-one-to-one groups had a lower bound of -9.89 and an upper bound of 4.84. Therefore we fail to reject the null hypothesis that there is no difference between one-to-one and non-one-to-one schools. Further, Cohen's effect size value ($d = .12$) suggested low practical significance.

RQ2: What is the difference of English II test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri?

The researcher compared the results of the English II test scores of one-to-one schools with those of non-one-to-one schools using an independent sample *t*-test to determine if there was a significant difference at the $p < 0.05$ level. The results are shown in Table 5 and Table 6.

Table 5

English II Group Statistics

<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Std. Error Mean</i>
Non One-to-One	66.0	78	11.4	1.4
One-to-One	38.0	82	7.5	1.2

Table 6

English II Independent Samples t-test

	<u>Levene's Test for Equality of Variances</u>		<u>t-test for Equality of Means</u>						
	<i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	<i>95% Confidence Interval</i>	
								<u>Lower</u>	<u>Upper</u>
Equal variances assumed	4.55	0.035	-1.76	102	0.081	-3.64	2.07	-7.75	0.46
Equal variances not assumed			-1.96	100	0.052	-3.64	1.85	-7.32	0.04

An independent-samples *t*-test was conducted to assess whether English II EOC scores in one-to-one conditions and non-one-to-one conditions differed significantly. The

assumption of homogeneity of variance was assessed by the Levine test, $F = 4.55$, $p = .035$. These results indicated there is a significant violation because $p < .05$; therefore, the equal variances not assumed results were used. There was in this case a statistical difference in the scores for English II EOC's for one-to-one schools ($M = 82$, $SD = 7.5$) and non-one-to-one schools ($M = 78$, $SD = 11.4$) conditions; $t(100) = -1.96$, $p = .052$. The 95% CI for the difference between one-to-one and non-one-to-one groups had a lower bound of -7.32 and an upper bound of $.037$. Due to p value of $.052$ being so close to $p < .05$ we reject the null hypothesis that there is no difference between one-to-one and non-one-to-one schools. Further, Cohen's effect size value ($d = .35$) suggested medium practical significance.

RQ3: How is the professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of one-to-one?

Tables 7 – 13 present the seven Professional Learning Standards (PLS) of the Learning Forward's Standards Assessment Inventory. Each table is labeled by one of the SAI descriptors necessary for high-quality professional development. Highlights of the responses will be noted after the table. The categories for comparison are one-to-one school administrators' perceptions of their districts' implementation of the labeled professional learning standard. The comparative groups are labeled "High Performing Administrators" (scores on Algebra I and English II equal or exceed 60% in both) and "All Administrators." The researcher will draw conclusions from the data presented in the tables in Chapter Five: Conclusions and Recommendations. Table 7 - 13 contains seven Likert items and measures the administrators' perceptions of their districts' implementation of the Learning Communities Professional Learning Standard.

Table 7

PLS # 1 Learning Communities

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	My school system has policies and procedures that support the vision for learning communities in schools.	75	6	74	29
2.	Learning communities in my school meet several times per week to collaborate on how to improve student learning.	38	3	36	14
3.	Learning community members in my school believe the responsibility to improve student learning is shared by all stakeholders, such as all staff members, district personnel, families, and community members.	100	8	69	27
4.	In my school, some of the learning community members include non-staff members, such as students, parents, community members.	12	1	21	8
5.	My school's learning communities are structured for teachers to engage in the continuous improvement cycle (i.e., data analysis, planning, implementation, reflection, and evaluation).	75	6	62	24
6.	In my school, learning community members demonstrate effective communication and relationship skills so that a high level of trust exists among the group.	75	6	62	24
7.	All members of the learning communities in my school hold each other accountable to achieve the school's goals.	62	5	41	16

The researcher notes that there is little difference between the two groups. Items one, three, five, and six were rated higher by the Higher Performing Administrators.

Table 8

PLS # 2 Leadership

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	My district's leaders provide teachers with equitable resources to support our individual and collaborative goals for professional learning.	87	7	67	26
2.	My district's leaders are active participants with other staff members in the school's professional learning.	100	8	72	28
3.	My district's leaders advocate for resources to fully support professional learning.	87	7	82	32
4.	My district's leaders regard professional learning as a top priority for all staff.	87	7	69	27
5.	My district's leaders cultivate a positive culture that embraces characteristics such as collaboration, high expectations, respect, trust, and constructive feedback.	100	8	69	27
6.	My district's leaders speak about the important relationship between improved student achievement and professional learning.	87	7	67	26
7.	My district's leaders consider all staff members capable of being professional learning leaders.	100	8	56	22

The researcher notes that Leadership is a perceived strength of the two groups. Items two, five, and seven were rated higher by the Higher Performing Administrators.

Table 9

PLS # 3 Resources

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	Practicing and applying new skills with students in my classroom are regarded as important learning experiences in my school.	75	6	66	26
2.	Teachers in my school are involved with monitoring the effectiveness of the professional learning resources.	50	4	49	19
3.	Professional learning expenses, such as registration and consultant fees, staff, and materials are openly discussed in my school.	25	2	49	19
4.	In my school, time is available for teachers during the school day for professional learning.	50	4	49	19
5.	Teachers in my school are involved with the decision-making about how professional learning resources are allocated.	50	4	51	20
6.	Professional learning is available to me at various times, such as job-embedded experiences, before or after-school hours, and summer experiences.	100	8	51	20
7.	Teachers in my school have access to various technology resources for professional learning.	87	7	69	27

The researcher notes that Resources is not a perceived strength of the two groups. Item

six and seven were rated higher by the Higher Performing Administrators.

Table 10

PLS # 4 Data

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	Some professional learning programs in my school, such as mentoring or coaching, are continuously evaluated to ensure quality results.	38	3	53	21
2.	In my school, teachers have an opportunity to evaluate each professional learning experience to determine its value and impact on student learning.	38	3	62	24
3.	In my school, various data such as teacher performance data, individual professional learning goals, and teacher perception data, are used to plan professional learning.	38	3	49	19
4.	My school uses a variety of student achievement data to plan professional learning that focuses on school improvement.	38	3	62	24
5.	In my school, teachers use what is learned from professional learning to adjust and inform teaching practices.	62	5	53	21
6.	My school uses a variety of data to monitor the effectiveness of professional learning.	38	3	49	19
7.	A variety of data are used to assess the effectiveness of my school's professional learning.	50	4	38	15
8.	In my school, how to assess the effectiveness of the professional learning experience is determined before the professional learning plan is implemented.	38	3	28	11

The researcher notes that Data is not perceived strength of the two groups with the higher performing administrators marking lower than all administrators. Items five and seven was rated higher by the Higher Performing Administrators.

Table 11

PLS # 5 Learning Designs

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	In my school, teachers' backgrounds, experience levels, and learning needs are considered when professional learning is planned and designed.	62	5	53	21
2.	The use of technology is evident in my school's professional learning.	62	5	67	26
3.	Teachers in my school are responsible for selecting professional learning to enhance skills that improve student learning.	50	4	62	24
4.	Professional learning in my school includes various forms of support to apply new practices.	62	5	56	22
5.	In my school, participation in online professional learning opportunities is considered as a way to connect with colleagues, and to learn from experts in education.	50	4	49	19
6.	In my school, teachers have opportunities to observe each other as one type of job-embedded professional learning.	50	4	49	19
7.	Teachers' input is taken into consideration when planning school-wide professional learning.	38	3	62	24

The researcher notes that Learning Designs is not perceived strength of the two groups with the higher performing administrators marking lower than all administrators. Items one, two, and four were the highest-rated category by the Higher Performing Administrators.

Table 12

PLS # 6 Implementation

		<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
		<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1.	A primary goal for professional learning in my school is to enhance teaching practices to improve student performance.	87	7	85	33
2.	Teachers in my school receive on-going support in various ways to improve teaching.	87	7	74	29
3.	My school has a consistent professional learning plan in place for three to five years.	38	3	46	18
4.	My school's professional learning plan is aligned to school goals.	87	7	77	30
5.	In my school, teachers individually reflect about teaching practices and strategies.	87	7	62	24
6.	Professional learning experiences planned at my school are based on research about effective school change.	50	4	62	24
7.	In my school, teachers give frequent feedback to colleagues to refine the implementation of instructional strategies.	25	2	36	14

The researcher notes that Implementation is a perceived strength of the two groups, items one, two, four and five were rated higher by the Higher Performing Administrators.

Table 13

PLS # 7 Outcomes

	<i>High Performing Administrators Responses (N = 8)</i>		<i>All Administrators Responses (N = 39)</i>	
	<i>% frequent or always</i>	<i># of responses</i>	<i>% frequent or always</i>	<i># of responses</i>
1. Professional learning at my school focuses on the curriculum and how students learn.	75	6	56	22
2. Professional learning in my school contributes to increased student achievement.	100	8	56	22
3. Professional learning experiences in my school connect with teacher performance standards (e.g., teacher preparation standards, licensing standards, etc.).	50	4	54	21
4. All professional staff members in my school are held to high standards to increase student learning.	100	8	69	27
5. In my school, professional learning supports teachers to develop new learning and then to expand and deepen that learning over time.	100	8	56	22
6. Student learning outcomes are used to determine my school's professional learning plan.	62	5	44	17
7. My professional learning this school year is connected to previous professional learning.	62	5	69	27

The researcher notes that Outcomes is a perceived strength by the Higher Performing Administrators, items two, four and five were rated higher by the Higher Performing Administrators with 100% agreement.

Overall Results

This study included 105 schools that responded to the survey in an effort to determine if there was a significant difference between Algebra I and English II End of Course exam scores as if there was agreement about the seven standards of high-quality professional development between the High Performing one-to-one schools that likely led to these results. The response was lower than desired. RQ1 asked the difference in Algebra I test scores between high school students with one-to-one computing and high school students without one-to-one computing. This study noted no significant statistical difference in the area of Algebra I, thus supporting H_01 : there is statistical significance between schools identified as one-to-one schools and non-one-to-one schools on how students perform on Algebra I End of Course exams. RQ2 asked the difference in English II test scores between high school students with one-to-one computing and high school students without one-to-one computing. This study found there was a statistically significant difference on English II tests scores between one-to-one schools and non-one-to-one schools with one-to-one schools scoring markedly higher, thus rejecting H_02 : there is no statistically significant difference between schools identified as one-to-one schools and non-one-to-one schools on how students perform on English II End of Course exams.

The researcher utilized the Learning Forward's Standards Assessment Inventory to determine if any of the seven standards necessary for high quality professional development were present in the high performing one-to-one schools. RQ3 asked how is the professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of one-to-one? The results from

the qualitative SAI survey indicated that Leadership and Outcomes were the two highest categories, with Leadership seeing agreement at 100% in three of the seven questions in that category. Outcomes also was highlighted as an area of strength with three of the seven questions returning at 100% in that category. Leadership and Outcomes are areas on the SAI that indicate a strong agreement amongst high performing one-to-one schools. Overall, results of this research indicate that there is significance between one-to-one implementation and English II EOC exam scores and that Leadership and Outcomes are important components in the implementation and sustainability of a high performing one-to-one schools.

Summary

This chapter provided the findings for the study. The survey results from 105 participants were analyzed inferentially and descriptively. The inferential statistics were reported to determine the difference between one-to-one schools' and non-one-to-one schools' End of Course exam scores in the areas of Algebra I and English II. Thirty-nine schools were identified as one-to-one schools that implemented before 2016 and 66 schools were identified as non-one-to-one schools. An independent t-test was run on the results acquired from the Department of Elementary and Secondary Education on 2016 Algebra I and English II EOC scores. There was no significant difference on the Algebra I exam scores, but there was a statistically significant difference on the English II scores, therefore rejecting the null hypothesis for that category. The SAI survey was completed by 39 one-to-one schools, and the results were compared to determine the agreement between high-performing high schools and all one-to-one schools. The dominate results were in the area of Leadership and Outcomes with three of the seven questions being

responded to 100% as always present in professional development. The SAI standard of Implementation was also in overall agreement with the high-performing schools, with four of the seven questions receiving responses at an 87% agreement rate. Chapter 5 provides conclusions drawn by the researcher. In addition, recommendations for practice and future research are presented.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

One-to-one technology is becoming more prevalent in the educational world (Goral, 2015). Technology is being introduced with the belief that student achievement will rise and 21st century skills will be acquired (Ramsdell 2014, Anagun, 2018). As technology is introduced into schools, there is a paradigm shifting amount of change that takes place for teachers so high quality professional development is essential (Gulamhussein, 2014). Christensen (2013) confirmed that a problem with innovation is that more times than not, the progress outpaces the training and the ability of the organization to progress which does not help students. Christensen (2013) goes on to say that successful innovations are incremental and sustained.

Learning Forward (2018h) articulates that high quality professional development should include the following seven standards: include Learning Communities, Leadership, Resources, Data, Learning Design, Implementation and Outcomes. Learning Forward (2018h) goes on to state that high quality professional development must be sustained and an integral part of the school culture for an innovation to be successful. The purpose of this study was to determine if implementing one-to-one computers into schools had an effect on Algebra I and English II EOC scores as well as to determine what components of the Learning Forwards Standards Assessment Inventory were present to provide quality professional development for those schools implementing one-to-one initiatives. These findings helped to determine what areas administrators perceive should be the focus on during for professional development during a one-to-one

implementation. A survey was sent to 561 districts asking for them to participate in the study. One hundred and five districts participated in the study, with 39 identifying as one-to-one. Of the 39 participants eight schools met the criteria established by the researcher to qualify as high-performing districts. High-performing districts are one-to-one districts that achieved 60% or higher in both Algebra I and English II EOC scores which are above the state average in both categories.

Research Questions and Null Hypothesis

RQ1 asked was there a difference between Algebra 1 test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri? An independent sample *t*-test was run on the data obtained from the Department of Elementary and Secondary Education on the test scores of the students attending the participating schools of the study. There was no significant difference from the results from the analysis as $p < .05$ and the results of the analysis was $p = .527$. This result affirmed H_0 as there is no statistically significant difference between schools identified as one to one schools and non-one-to-one schools on how students perform on Algebra I End of Course exams and the researcher rejected H_0 .

RQ2 asked was there a difference between English II test scores between high school students with one-to-one computing and high school students without one-to-one computing in the state of Missouri? An independent sample *t*-test was run on the data obtained from the Department of Elementary and Secondary Education on the participants of the study. There was a significant difference from the results of the analysis as $p < .05$ and the results of the analysis was $p = .052$. With this result the

researcher failed to reject H₀₂ as the result indicates that schools that have implemented one-to-one initiatives scored higher on the English II EOC.

RQ3 asked how is the professional development aligned with the seven components of the Learning Forward standards connected to the achievement success of one-to-one? Thirty nine schools responded as one-to-one schools and completed the Learning Forward SAI. The principals filled out the survey sharing their perceptions of what was utilized in their schools when implementing or being a one-to-one school. Of the 39 schools completing the survey, eight were considered to be high-performing schools. High performing schools were defined as scoring a combined 60% proficient and advanced on both the Algebra I and English II EOC's. The results focused on the eight high-performing schools and then was compared to the total of all one-to-one schools to determine if there was agreement. Agreement was determined to be scores that had more than 50% of the respondents answer Always, Frequently or Sometimes. When 50% or more of the high-performing schools agreed this was considered a perceived strength. Table 14 provides a comparison of high-performing administrator's perception versus that of the whole group.

Table 14

Comparative Data on Administrator Perceptions of Their Schools use of the Seven SAI Standards

SAI Standard	High Performing Administrators %	All Group Administrators %
Learning Communities	62.4	52.1
Leadership	92.5	69.2
Resources	62.4	54.8
Data	42.5	49.5
Learning Designs	53.4	56.8
Implementation	65.8	63.1
Outcomes	78.4	57.7

Six of the seven SAI standards were considered a strength for both groups. Leadership, Implementation and Outcomes were the three standards that showed the most agreement and highest rankings amongst administrators from high-performing schools and all one-to-one schools. Data was the standard that scored the lowest by both groups and was also scored lower by the high-performing schools than the all administrator group.

Leadership was a perceived strength of the high-performing schools. Three of the seven areas had 100% agreement between the high-performing group. The data indicated that leaders play an important role in professional development in those eight schools. According to the results leaders must be active participants, create a positive culture, set high expectations for all and believing that all staff members can be leaders in the school. The average response in the category of Leadership for the high-performing administrators had an agreement level of 92.5% while the average response for the all administrators group was 69.2%.

Implementation was a perceived strength of the high-performing schools. Four of the seven areas had 87% agreement between the high-performing group. The data showed that leaders play an important role of professional development in those eight schools when implementing professional development or an initiative like one-to-one. According to the results in the implementation process the school leader's believed that teaching practices had a positive impact on student learning. During the implementation support was present during the process and it needed to align with the schools goals. During the implementation process teachers needed time to reflect on practices and

strategies that would impact their teaching and the students learning. The average response in the category of Implementation for the high-performing administrators had an agreement level of 65.8% while the average response for the all administrators group was 63.1%.

The final category from the SAI survey with strong agreement and a perceived strength of the high-performing schools was Outcomes. Three of the seven categories had 100% agreement. The data found that professional development contributes to increased student achievement outcomes and that professional development allows for new learning and the expansion of already present skills. This process holds everyone in the school accountable by having high standards for all to reach the desired outcome. The average response in the category of Outcomes for the high-performing administrators had an agreement level of 78.4% while the average response for the all administrators group was 57.7%.

Data was a standard that had a low perception from both groups that completed the survey. Only two questions on the survey had an agreement level of more than 50% from the high-performing group. Those two standards were that data was used to adjust and inform practice in the classroom and a variety of data was used to assess school practices. The average for the high-performing group was 42.5% and the all administrators group was 49.5%. This was the lowest scoring standard of the high-performing group and one of two standards in which the all administrator group had a higher overall average.

The information gleaned from the inferential qualitative data of the SAI survey supports the fact that the leader is important and plays a crucial role in the professional

learning in their school. The leadership is responsible for the positive culture as well as cultivating an environment where teachers and students are held to high expectations. The principal needs to provide time for reflection and goal setting, however various types of data need to be used as professional learning is implemented whether it be one-to-one initiative or any activity that allows the teacher to grow and refine their craft.

Conclusions/Professional Implications

The findings from this study indicate that one-to-one implementation can have a positive impact on academic achievement namely EOC exams in the state of Missouri. As Bebell (2014) indicated one-to-one initiatives seem to have a positive impact on ELA standardized tests scores. The findings of this study also support Islam and Gronlund's (2016) and Strotz and Hoffman's (2013) findings that one-to-one initiatives increase students writing ability as exhibited on the EOC exam. The findings in the area of math are aligned with Holen, Hung and Gourneau's (2017) findings that one-to-one technology used in the classroom is good for drills but does not show the results on the standardized tests. The possible connection between improved ELA performance in one-to-one schools would indicate school leaders must be intentional about the implementation of this instructional approach. Professional learning may be a key tool to ensure fidelity and quality of one-to-one instruction. Principals need to consider the research that indicates ELA performance on standardized tests. Utilizing this information could benefit students and enhance teaching practices that would benefit the school. The research on the SAI survey results show that leadership is a crucial part of professional development and implementing initiatives. Principals must be invested in the professional learning process. Learning Forward (2018c) research supported, the principal or leader must

allocate time and direction to the professional learning process. The results of the study supported that teachers have the biggest impact on student achievement (Gallamore, 2016) and need support during the process. Teachers need specific goals that align with the school implementation process to focus and refine the work being done. As the findings indicated, high expectations and the belief that all students can learn are important factors for the principal to keep in mind as the implementation professional learning opportunity takes place. School districts and principals need to be aware they must have a clear vision and direction as they implement one-to-one initiatives that includes clear goals, how they are going to reach those goals, and that time is allowed for that to take place (Kelly & Cherkowski, 2015). Professional development is a key component for schools implementing one-to-one technology initiatives and sustained systemic professional development geared toward instructional strategies provided over time will help teachers and schools successfully attain the results they desire (Beeson et al., 2014).

After determining that a one-to-one technology initiative is the direction for the school the information from RQ3 can be very useful in developing a plan to implement. Leadership must give clear direction and the timeline necessary for the process to take place. The voices of the teachers and school community must be included during the process for guidance but also in a reflective manner which will aid in the implementation. By communicating, holding the team to high expectations and providing support throughout the process the outcomes of student learning can become a reality.

Recommendations for Future Research

As districts move to one-to-one technology with the understanding that one-to-one technology will have an impact on academic achievement either in a positive or negative way, the administrators need to understand that their teachers must be adequately prepared to utilize this form of instructional tool. Topics that need further research based on this study are as follows (1) larger group of respondents to get more detailed results on one-to-one initiative districts, (2) effective professional learning opportunities either prior to or during the one-to-one initiative, (3) The perceptions of teachers in a one-to-one initiative and the impact of leadership on the success of the implementation, (4) a more detailed look at why ELA scores can be tied to higher academic achievement due to the use of one-to-one technology, and (5) what instructional and technological practices might be used to improve math results in a one-to-one classroom.

Conclusion

The results of the study indicated that one-to-one implementation does not show a statistically significant difference on students' performance on the Algebra I EOC exam. The research did show a significant difference of students' performance between one-to-one schools and non-one-to-one schools on the English II EOC exam.

The qualitative research from Learning Forward's Standards Assessment Inventory indicated that Leadership, Implementation and Outcome practices were prevalent in high-performing one-to-one schools. Leadership is an important component when implementing a one-to-one initiative as they set the course for the implementation and outcomes. The researcher concludes that leadership, clear goals, high expectations,

time and reflection are essential components when implementing a one-to-one initiative.

High-performing schools indicate these standards helped them reach their goal of improved student achievement especially in the content area of English.

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Appendix A



September 6, 2018

Chip Arnette
875 Shary View Road
Branson, MO 65616

Dear Chip,

Learning Forward grants you permission to use the Standards Assessment Inventory (SAI) in your doctoral dissertation research for the Southwest Baptists University as an instrument to help measure the impact of professional learning on student test scores in Missouri.

Please ensure that this credit line appears in your work in reference to the SAI: “Used with permission of Learning Forward, www.learningforward.org. All rights reserved.”

Good luck in your pursuit of your doctorate.

Sincerely,



Tom Manning
Associate Director of Consulting and Networks, Learning Forward
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Appendix B

1. Are you a one-to-one high school based on the definition below? Yes or No
One-to-one definition: One-to-One programs are defines as one technology device for every student in the defined setting of class, school, district where each student has an internet-connected, wireless computing device for use 24 hours a day, seven days a week.

If you answered **No** thank you for your time and consideration. (Please return at this time).

If you answered **Yes** please proceed and complete the survey below.

2. What year did you implement your high schools one-to-one initiative?

Please complete the survey below:

SURVEY ITEMS: All items in the SAI use the following Likert scale items as responses:

- Don't know
- Never
- Seldom
- Sometimes
- Frequently
- Always

Learning Communities

1. My school system has policies and procedures that support the vision for learning communities in schools.
2. Learning communities in my school meet several times per week to collaborate on how to improve student learning.
3. Learning community members in my school believe the responsibility to improve student learning is shared by all stakeholders, such as all staff members, district personnel, families, and community members.
4. In my school, some of the learning community members include non-staff members, such as students, parents, community members.
5. My school's learning communities are structured for teachers to engage in the continuous improvement cycle (i.e., data analysis, planning, implementation, reflection, and evaluation).
6. In my school, learning community members demonstrate effective communication and relationship skills so that a high level of trust exists among the group.
7. All members of the learning communities in my school hold each other accountable to achieve the school's goals.

Leadership

8. My district's leaders provide teachers with equitable resources to support our individual and collaborative goals for professional learning.
9. My district's leaders are active participants with other staff members in the school's professional learning.
10. My district's leaders advocate for resources to fully support professional learning.
11. My district's leaders regard professional learning as a top priority for all staff.
12. My district's leaders cultivate a positive culture that embraces characteristics such as, collaboration, high expectations, respect, trust, and constructive feedback.
13. My district's leaders speak about the important relationship between improved student achievement and professional learning.
14. My district's leaders consider all staff members capable of being professional learning leaders.

Resources

15. Practicing and applying new skills with students in my classroom are regarded as important learning experiences in my school.
16. Teachers in my school are involved with monitoring the effectiveness of the professional learning resources.
17. Professional learning expenses, such as registration and consultant fees, staff, and materials, are openly discussed in my school.
18. In my school, time is available for teachers during the school day for professional learning.
19. Teachers in my school are involved with the decision-making about how professional learning resources are allocated.
20. Professional learning is available to me at various times, such as job embedded experiences, before or after-school hours, and summer experiences.
21. Teachers in my school have access to various technology resources for professional learning.

Data

22. Some professional learning programs in my school, such as mentoring or coaching, are continuously evaluated to ensure quality results.
23. In my school, teachers have an opportunity to evaluate each professional learning experience to determine its value and impact on student learning.
24. In my school, various data such as teacher performance data, individual professional learning goals, and teacher perception data, are used to plan professional learning.
25. My school uses a variety of student achievement data to plan professional learning that focuses on school improvement.
26. In my school, teachers use what is learned from professional learning to adjust and inform teaching practices.
27. My school uses a variety of data to monitor the effectiveness of professional learning.
28. A variety of data are used to assess the effectiveness of my school's professional learning.

29. In my school, how to assess the effectiveness of the professional learning experience is determined before the professional learning plan is implemented.

Learning Designs

30. In my school, teachers' backgrounds, experience levels, and learning needs are considered when professional learning is planned and designed.
31. The use of technology is evident in my school's professional learning.
32. Teachers in my school are responsible for selecting professional learning to enhance skills that improve student learning.
33. Professional learning in my school includes various forms of support to apply new practices.
34. In my school, participation in online professional learning opportunities is considered as a way to connect with colleagues, and to learn from experts in education.
35. In my school, teachers have opportunities to observe each other as one type of job-embedded professional learning.
36. Teachers' input is taken into consideration when planning school-wide professional learning.

Implementation

37. A primary goal for professional learning in my school is to enhance teaching practices to improve student performance.
38. Teachers in my school receive on-going support in various ways to improve teaching.
39. My school has a consistent professional learning plan in place for three to five years.
40. My school's professional learning plan is aligned to school goals.
41. In my school, teachers individually reflect about teaching practices and strategies.
42. Professional learning experiences planned at my school are based on research about effective school change.
43. In my school, teachers give frequent feedback to colleagues to refine the implementation of instructional strategies.

Outcomes

44. Professional learning at my school focuses on the curriculum and how students learn.
45. Professional learning in my school contributes to increased student achievement.
46. Professional learning experiences in my school connect with teacher performance standards (e.g., teacher preparation standards, licensing standards, etc.).
47. All professional staff members in my school are held to high standards to increase student learning.
48. In my school, professional learning supports teachers to develop new learning and then to expand and deepen that learning over time.
49. Student learning outcomes are used to determine my school's professional learning plan.

50. My professional learning this school year is connected to previous professional learning.