AN ANALYSIS OF A ONE-TO-ONE TECHNOLOGY PROGRAM:

TEACHERS' PERCEPTIONS REGARDING THE IMPLEMENTATION OF A

SCHOOL DISTRICT'S TECHNOLOGY INITITIATIVE

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Kevin Matthew Monaghan

California University of Pennsylvania

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California University of Pennsylvania

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Department of Secondary Education and Administrative Leadership

We hereby approve the capstone of

Kevin Matthew Monaghan
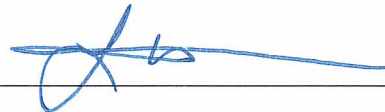
Candidate for the Degree of Doctor of Education

7/16/20

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Dr. Kevin Lordon

Doctoral Capstone Faculty Advisor

Doctoral Capstone Faculty Committee Chair

7/16/2020

_____

Dr. L. Robert Furman

Principal, South Park Elementary School

Doctoral Capstone External Committee Member

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Abstract

There has been a push in educational systems to infuse technology in their curricula to promote and develop digital age skills that will allow students to compete in a global society. It is imperative for schools to understand that the implementation of a one-to-one technology program should not be undertaken until a comprehensive plan of action has been formulated to ensure that the program is implemented with fidelity, and taking into account the human element along with the financial element, which are key components of a these programs. This study evaluated a one-to-one technology program that has been in existence for over four years to better understand the successes and shortfalls of the program in order to determine if the initiative should be expanded to include grades one and two. The mixed-methods approach to the research utilized the perceptions of 55 teachers to answer the three guiding research questions regarding the implementation that included what was effective and ineffective about the current one-to-one technology program, and what needs to occur for effective implementation if the program is expanded to include grades one and two. The assessment tool highlighted the traits found in highly effective one-to-one technology programs, and the degree to which the presence of each trait was identified by teachers' perceptions using a Likert Scale. The results of this study will be used to determine the effectiveness of the current program as well as making recommendations for improvement. The results will provide the district administration with data that will be used to determine if the program should be expanded to include grades one and two. The final outcome of this research will be to provide an assessment tool that can be used by other educational entities to develop a comprehensive technology plan that will ensure that all components of the program are implemented with fidelity while ensuring fiscal responsibility.

CHAPTER I

INTRODUCTION

Background

Over the past four years, the South Park School District has been implementing a one-to-one technology initiative in grades three through twelve that has generated many positive outcomes as well as identified areas for improvement. As we are looking to extend the program in grades one and two, it is imperative to ensure that the endeavor is analyzed, assessed and implemented with fidelity, providing there is a decision by the district to move forward. The main reason that this research is important to me as an administrator in the school district is that I want to ensure that any future implementation of any initiative is handled in a thoughtful, collaborative, and meaningful manner for all stakeholders who are to be impacted by the initiative.

As I reflected on our current one-to-one computing program over the years, I began to list ways that the program has been successful and ways that the program has been deficient. These two lists provided me with the insight that I needed to better understand the characteristics of effective and ineffective one-to-one technology programs. After four years of communicating with teachers, parents, students and other district stakeholders, it became evident that a more comprehensive plan of action should have been established and implemented before putting technology in the hands of the students. Ultimately, this research will be used to provide the necessary data to make informed decisions pertaining to the possible implementation of a one-to-one computing

initiative in grades one and two, thus not repeating the mistakes that were made during the initial implementation of the program in grades three through twelve.

As the middle school principal and Federal Programs Coordinator in the South Park School District, I became responsible for various components of the initiative at the middle school, which were never intended or communicated to me. Though never communicated and discussed with the entire administrative team, we soon found ourselves taking the lead roles in supporting our staff and students in areas where we felt we were unequipped to do so. While in these unintended roles, the building administrators became the sounding boards for district stakeholders who often expressed their displeasure pertaining to the overall program and how it was implemented.

Concerns Regarding the Current State of the One-to-One Technology Program

From the onset of the program, I was acutely concerned about the initial roll-out that involved putting Chromebooks in the hands of students without proper staff and student training. From that point on, concerns pertaining to the implementation of the program grew exponentially as more and more issues arose. After listening to the multiple concerns from teachers, staff, parents and other district stakeholders, it became clear to me that the district did not do its due diligence in taking the necessary time to research, plan and implement the one-to-one initiative before providing students in grades three through twelve a district issued device. It became evident that there was no clear vision for the program and that the devices were put into the hands of the students for the sake of stating that our students had access to technology. It was through this realization that I concluded that the initial implementation needed further planning. More time should have been afforded to formulate and implement a comprehensive technology plan

that ensures the program was being effectively implemented and could be effectively sustained in the years to come.

As stated prior, to provide students with technology solely for the purpose of their having access to technology is not a sufficient reason to implement a one-to-one technology program. Other factors should have been considered before the students took possession of their devices. Based on the lists of concerns communicated by various district stakeholders, I was able to identify a few areas that were glaring concerns that I hoped to better understand so that they could be remedied. The list of needs included: the need for better communication regarding the vision of the program, the need for stakeholder buy-in before implementation, the need for staff and student training regarding the use of instructional technology, and the need for assurances of continued financing so that the initiative can be sustained over the years.

The vision and the goals were not clearly communicated to all parties. This impacted stakeholder buy-in. In order to garner buy-in, stakeholders needed to understand the goal of the initiative. Over time, it was discovered that many of the decisions pertaining to all aspects of the one-to-one initiative were made by a handful of individuals who comprised the technology department. To be transparent, the oversight of the program was blurred in the fact that the district has had three different technology coordinators since the implementation, and none seemed to be eager to take ownership of the program and its maintenance except for the acquisition of devices and keeping the infrastructure updated. This lack of oversight and the decision to implement a program made by a handful of individuals has resulted in a "learn as you go" plan that has created a sense of great frustration among all stakeholders in one form or another.

Regarding staff and student training, sufficient time was not given for teachers to learn how to use the technology as an effective teaching tool. Teachers were asked to create lessons and to infuse technology in their teaching without receiving adequate professional development time. Intentional and adequate professional development would have allowed the teachers opportunities to gain exposure to the available resources that would be afforded by the technology initiative. Students were given devices without a clear understanding of their functionality or how they should be properly utilized as part of their educational program. Though professional development and student trainings were infused at various points over the past four years, this "learn as you go" approach towards implementation has been a major source of frustration for staff regarding the program.

As we have entered our fourth year of implementation, we are now experiencing budgetary shortfalls that may impact the future of our one-to-one initiative. Regarding the financing of the program, the technology director had conversations with the business manager to budget for the devices, the infrastructure and the personnel that would be needed to facilitate the program. In the beginning, adequate funding was made available to meet the financial requirements of the program. Over the years, the district has worked hard to set money aside for costs associated with the procurement of new devices and upgrades to infrastructure, but the plan did not account for the hiring of additional staff that would be required to maintain the devices and to upgrade the infrastructure to meet the digital demands of the program. As a result of the lack of funding for personnel, the technology department struggles to make timely repairs to the devices and to the systems upon which the devices rely.

Guiding Questions for the Action Research

Based on my observations of our one-to-one initiative, I wanted to better understand the areas where the program has been successful, but most importantly, I wanted to understand the areas that needed to be improved so that any further one-to-one technology program implementation is not a waste of time, money and human resources. With that said, this action research project will utilize staff perceptions of the one-to-one technology program in grades three through twelve in order to formulate a comprehensive plan of action that will signify a strong district commitment to an effective implementation of the one-to-one initiative in grades one and two.

In order to assess our current program and to certify that any future initiative implementations are executed with fidelity, the following three questions were developed to guide this research. This is done so that the researcher would have a more robust understanding of the characteristics associated with effective and ineffective one-to-one technology programs and how those characteristics will aid in developing a comprehensive plan of action that may be used for future one-to-one initiatives. The three questions are:

- How was the implementation of the one-to-one technology program effective?

- How was the implementation of the one-to-one technology program not effective?

- How can we make the implementation of the one-to-one technology program in grades one and two more effective?

Anticipated Outcomes of the Action Research

As a result of this research, the main outcome is to better understand the characteristics associated with effective one-to-one technology programs, and to develop a comprehensive technology implementation plan that will allow the South Park School District to implement the one-to-one initiative in grades one and two that takes into account all of the factors that are associated with successful programs. If it happens that a one-to-one technology program in grades one and two is not considered, then another outcome would be to have created a tool that other educational entities could utilize to aid them in planning for their future one-to-one initiatives. Overall, the outcomes will be worthwhile in providing data and a comprehensive action plan for implementing and sustaining a one-to-one technology initiative.

CHAPTER II

LITERATURE REVIEW

The South Park School District initiated a one-to-one technology program four years ago in grades three through twelve. In order to prepare for the possible expansion of the one-to-one technology program in grades one and two, there is a need to understand what a successful one-to-one technology program looks like, and to assess our current initiative in order to identify effective strategies for implementation that will need to occur during the early elementary initiative. This review of literature is to provide an understanding of the factors that contribute to successful one-to-one technology program implementation. The review takes into account three important questions that will be used to guide this review. The research for each question focuses on the characteristics and benefits of effective programs, traits and deficiencies associated with ineffective programs and effective strategies for planning and implementation practices.

One-to-one Technology Programs

The idea of one-to-one computing involves every student having access at all times to a computing and communication device to use in school. The intended purpose of one-to-one initiatives is to enhance learning and to help students attain twenty-first century skills that have become known as digital age skills (Islam and Andersson, 2015). Throughout the world, one-to-one technology programs are becoming more prevalent due to readily available technology, affordable information and communication technologies (Islam and Gronlund, 2016). While policies may differ across countries, the main focus for computer use in schools is a result of making all citizens productive members of the

global workforce, along with equality, efficiency, and process change (Peck and Sprenger, 2008).

There appears to be a broad view when it comes to what these programs should look like. When looking at highly effective programs, Rosso (2010) asserts that one-to-one computing requires a fundamental change to teaching, learning and the educational process overall. This change will encompass how teachers will teach and how students view school work. Because one-to-one computing requires a complete paradigm shift, there are conflicting beliefs among stakeholders pertaining to the new learning models compared to the older models and between the new outcomes compared to the new assessments (Bielefeldt, 2006).

Common Traits of Effective One-to-One Technology Programs

When looking at successful one-to one computing programs, there are common characteristics associated with the fidelity of their implementation. This action research project has been heavily influenced by Kipp Bentley's (2017) article titled, *15 Common Traits of Successful 1:1 Computing Initiatives.* Bentley (2017) identifies common traits that are evident in effective one-to one programs. School districts need to begin by looking at their one-to one program as a pedagogical paradigm shift instead of a misled approach of one-to-one for the sake of needing more technology. Along with this shift, it is important to involve all stakeholders in the planning stages so that a vision for the program is communicated and readily understood so that there is buy-in from all parties. Included with the buy-in component, it is necessary to ensure that school administrators and teachers are embracing the vision in order to emulate the most

effective behaviors of digital leaders and learners. It is important to note that it is not beneficial in all cases to start the implementation on a large scale, as the initial implementation should focus on a small number of grade levels and courses that would be best suited towards the opportunities afforded by the tenets of one-to-one teaching and learning. Once these have been established, the district can expand the program after they have garnered the necessary data to continuously assess and improve the overall program.

Bentley (2017) identifies other traits that include ensuring that the digital networks and technology staff are able to support and maintain the high demands that would come with the addition of a large number of wireless devices. In regards to the technology staff, ample opportunities for professional development must be afforded to all staff. The staff will need to receive initial and ongoing training to support the pedagogical paradigm shift along with how their instructional practices will evolve to accommodate for one-to-one computing. The professional development opportunities may involve the need for teachers and administrators to build or identify curricula that lend themselves to one-to-one teaching and learning, along with trainings regarding web-based productivity tools such as Google for Education tools. Technology staff members need to consider the types of devices that will be best utilized to embrace the vision of the program, and need to consider the sources for ongoing funding to maintain and sustain the initiative.

Another factor associated with effective one-to-one initiatives involves the students utilizing these devices for their learning endeavors. Students must be taught, just like their teachers, how to utilize the devices so that they are able to use them

properly. Students will be taught the importance of digital citizenship and the acceptable use policies that accompany one-to-one initiatives in school districts. When the Chromebooks or other chosen devices replace the traditional textbooks, the district needs to ensure that students have access to the internet at home. In the building, time needs to be provided where students are not utilizing their devices.

Finally, effective programs constantly assess their programs and their implementation plans. These regular reviews are essential in adequately addressing the deficiencies and successes of the program. It is important to note that districts should not evaluate the effectiveness of their one-to-one technology program solely on standardized scores. The International Society of School Technology (ISTE) has a variety of standards which apply to the use of one-to-one technology in the classroom. Only one small part of that considers standardized tests as a valid indicator of one-to-one success. Evaluations should be comprehensive and should address the vision, goals and objectives of the one-to-one initiatives.

Future readiness

According to the Partnership for 21st Century Skills (2003, p 4), "students will spend their adult lives in a multitasking, multifaceted, technology driven, diverse, vibrant world and they must arrive equipped to do so". Today's learners must be prepared to participate in a digital world that changes rapidly (Oh and Reeves, 2014). As schools look to implement programs and opportunities that one-to-one computing can provide, they must consider a plan that encompasses future ready skills. The Alliance for Excellent Education (2015) conducted a webinar titled, "What is Future Ready?", in order to help

educators understand the necessities of future ready skills to graduate students who will

embrace these skills in order to compete in a global economy. The students must not

only compete in a global economy, but become responsible citizens as well. The webinar

describes the future ready movement as, "a free, bold new effort to maximize digital

learning opportunities and help school districts move quickly toward preparing students

for success in college, career and citizenship Alliance for Excellent Education, 2015)."

In order for our students to compete in a global economy, school districts are

focusing on the "Four Cs" that are necessary for students to compete in this ever-evolving

digital world (Kivunja, 2015). The "Four Cs" consist of creativity, communication,

critical thinking and collaboration.

According to the National Education Association's, Preparing 21st Century

Student for a Global Society: An Educator's Guide to the "Four Cs", teaching critical

thinking and problem solving leads students to improve upon other skills that include

thought processing, levels of concentration and analytical abilities. Kivunja (2015)

intimates that a person who becomes adept at critical thinking skills is able to utilize

Bloom's higher order thinking levels of analysis, evaluation and creativity.

In regards to communication, it is an essential skill for students to acquire in order

to analyze and process the amount of information with which a student comes into

contact each day. To do this, schools are teaching the important skill of digital

citizenship. Lynch (2018) writes that students of today are ahead of international

corporations as they are learning internet safety, how to manage relationships and

communications online, and how poor choices pertaining to informational literacy may impact them in the future.

Creativity and innovation, as indicated by De Bono (1995), are two of the most important human skills that help us to progress and to not repeat what has been done before. Amabile (1998) goes on to write that creativity is essential in developing abilities that include finding and identifying multiple solutions to problems, drawing connections between various fields of knowledge and being able to constructively disagree with others.

Collaboration is defined by a person's ability to work with other individuals while working in teams or groups (Kift, Israel, and Field, 2010). Royal (2014) said it well when he stated that collaboration is getting individuals who may or may not have similar interests to work together to produce a satisfying group end. The National Education Association's, Preparing 21ˢᵗ century Student for a Global Society, An Educator's Guide to the "Four Cs" (2012) states, "Collaboration is essential in our classrooms because it is inherent in the nature of how work is accomplished in our civic and workforce lives. Fifty years ago, much work was accomplished by individuals working alone, but not today. Much of all significant work is accomplished in teams, and in many cases, global teams" (The National Education Association's, Preparing 21ˢᵗ century Student for a Global Society, An Educator's Guide to the "Four Cs" (2012, p 19).

Connectivity with youth

As Wainwright (2013) indicates in her article, today's students are digital natives who have their own devices that are necessary for bring your own device

programs. Because they are digital natives, students are already comfortable utilizing their devices so that they are already able to focus on the learning component instead of the prerequisite learning on how to use the device. According to the Resource Center for 1:1 Student Device Management, there is an assumption that even though most kids grow up using mobile devices, they have not been exposed to using them for educational purposes. Schools who implement a one-to-one computing program will allow students to realize that their devices are powerful tools for learning and will put them ahead of their peers who attend schools that do not implement a one-to-one technology program. The enhancement or improvement upon student computer skills has been observed in one such one-to-one initiative (Greenwood, 2007).

Offers more learning opportunities

Regarding learning opportunities, Holcomb (2009) writes that the rise in one-to-one technology programs supports significant opportunities for students in the educational setting. When looking at effective one-to-one educational programs, a potential benefit lies in the area of student-centered classrooms that allow for more individualized learning opportunities. Niles (2006) asserts that student-centered classrooms allow the teacher to take on a facilitator role that guides student learning instead of dictating it. This is a necessity in one-to-one initiatives in order to differentiate for the learning needs of each student. Teachers need to become more student-centered when implementing one-to-one instruction (Ball, 2010). An evolution in instructional practices can aid in differentiation for every student while promoting higher-order thinking (Chandrasekhar, 2009). Teachers as facilitators create personalized learning environments that have moved away from a teacher controlled environment to a more

student empowered environment (Light et al., 2012). When students are empowered through twenty-four-hour access to technology, they become more independent when it comes to their learning (Harris, 2010). According to the Abell Foundation report (2008, p 1), one-to-one technology programs should be generally designed to "transform the quality of instruction and the type of learning, leading to a higher level of engagement".

Pertaining to student engagement, Fleischer (2012) points to research that highlighted that one-to-one computing had a positive impact on student engagement as the programs showed significant results pertaining to a high level of engagement in student-centered education. Grimes and Warschauer (2008) have concluded that one-to-one technology programs not only engage students on a high level but provide them with a greater sense of autonomy and motivation. Bebell and Kay (2010) analyzed the impact of one-to-one on five middle schools. The results of the teacher surveys showed that student engagement and student motivation increased, and 83% of the teachers inferred that the more traditional students were more engaged in a one-to-one setting.

Another positive study that included 70% of students from economically disadvantaged backgrounds revealed two major indicators of student engagement in one-to-one schools. The first indicator showed that the students were more satisfied with school than the control group, and the second indicator showed that students at one-to-one schools were sent to the office less and were suspended less than students in the control group (Shapley, et al, 2006).

Along with a noticeable drop in discipline infractions, improved attendance has also been reported. Many report that the one-to-one technology programs have motivated

even reluctant students to learn, which has also lowered the dropout rates. Pertaining to enrollment, the motivation helps to encourage high performing students to remain in a public school setting (Light et al, 2002) and improved attendance among low-achieving or at-risk students (Great Maine Schools J Educ Change 123 Project 2004). The Zucker and Hug (2007) survey at the Denver School of Science and Technology found that presence of laptops in the classrooms led to a very positive impact on student attendance as they found school more interesting.

Cognitive skills

A child's cognitive abilities and skills are said to be great predictors of their academic success. These mental processing skills include quality of attention, focus and inhibition, various types of memory, communicating and understanding language, problem solving and processing speed, adaptability and decision making. When looking at how these skills are impacted by technology, the evidence suggests that student laptop usage engages students' cognitive efforts (Cristia et al, 2012; Mabry and Snow, 2006; Warschauer, 2009). The Hansen et al. (2012) field experiment at some schools in Ethiopia found that children with laptops achieved significantly higher scores on abstract reasoning in comparison to the children in a control group. According to the study, this positive effect was relatively strong compared to the findings from similar studies in developed countries. Though these studies may appear to be inconclusive as a whole, a well implemented one-to-one computing initiative could enhance a student's cognitive development.

Student achievement

Holcomb (2009), states that student achievement is one of the most critical and essential outcomes of any one-to-one technology program. As a result of 57 studies of one-to-one laptop programs from 2001 to 2013, data suggests that these initiatives moderately improved math, science, reading, writing, and language arts test scores, with the strongest results for writing and mathematics (Zheng and Warschauer, 2013). In 2006, the Metiri Group conducted a review and analysis of various one-to-one technology programs across the country where they found that students in one-to-one technology programs earned significantly higher test scores and grades in core content areas compared to their counterparts who were not in one-to-one technology programs. The Metiri Group also noted that improvements to student learning were observed beyond the increase in test scores. Students reported that they were able to do more work more quickly with greater quality as also reported by teachers in Maine (Silvernail and Gritter, 2007). One-to-one computing has had the greatest impact on writing scores across the country as indicated by Jaroski (2003).

Standardized assessment

According to the Maine Educational Assessment, on a five-year comparison of standardized assessments, it was found that the average student in 2005 scored better than two-thirds of all students in 2000 on their writing assessments (Silvernail and Gritter, 2007). Pertaining to standardized math scores, students in Maine showed improvement, but it was not as significant as writing due in part to the devices not being used as much in math instruction (Lemke and Martin, 2004).

Although many educational leaders who implement one-to-one initiatives are hoping for an increase in standardized test scores, Rockman (2004) notes that there is no clear connection to the educational benefits of one-to-one technology programs and standardized assessments. In fact, he goes on to say that the skills that are developed through a one-to one initiative do not align to the benchmarks associated with standardized testing. Because of this, it is very hard to assess the overall impact of one-to-one technology programs on student achievement. Various researchers have determined that standardized tests do not measure the twenty-first century skills or digital age skills that are developed as a result of one-to-one laptop programs (Goodwin, 2011).

Though many programs have shown data that support student achievement, there is not enough evidence to support this as a fact. Overall, the data shows an increase in writing achievement, but little to no growth of math and reading achievement. More studies regarding student achievement need to be done of schools that have one-to-one technology programs that are implemented with fidelity.

Assistance to students with special needs

Research has been showing that laptops can provide many benefits for students with physical disabilities, learning or behavior difficulties. Laptops or other devices allow these students opportunities to better communicate, to organize, and to build their confidence in reading and other areas of assessment. According to the Corn et al. (2011, p 6) exploration of the role of students with special needs among 18 North Carolina 1:1 Learning Technology Initiative (NCLTI) pilot schools, ''Teachers reported many advantages that a laptop can provide for a student with disabilities. One teacher

suggested, 'There are a lot of ways that computers can mask a disability, or help you compensate for one.' This sentiment was represented within multiple facets of learning, such as communication, organization, confidence, reading ability, and assessment''. Some researchers report that laptops offer these students a much needed visual representation of learning material along with easier ways of writing and understanding the writing process. This ease in facilitating a more meaningful learning opportunity contributes to increased engagement in active learning, and retention of educational materials (Goldberg et al, 2003; Gulek and Demirtas, 2005; Harris and Smith, 2004).

Conway (2005) showed that one-to-one technology programs had a positive effect on students with dyslexia and other reading and writing difficulties. Hezroni and Shrieber (2004) studied the impact of word processing on the performance of students with dysgraphia. The study showed that the students made fewer mistakes with the laptop to read their work aloud, and provided an avenue for students to have greater fluency rates. This study showed that the laptop made it easier for the students to locate information in their writing as it provided them with a more legible platform. Overall, studies have shown that the use of devices and their software have had a profound effect in supporting literacy skills for students with learning disabilities.

Community

There are reports that one-to-one technology programs have had positive results creating equality for students with low socio-economic status amongst their peers when it comes to technological skills, career advancement and broadening their worldviews through the use of devices in schools (Harris, 2010). In regard to families with less

technological and cultural resources, the Ferrer et al. (2011, p 287) study in Arago'n

(Spain) found that use of computers in primary school was ''a strategy that evidently

contributes to the reduction of socio-educational inequalities amongst pupils, in terms of

gender as well as birthplace and the mother's level of education''. Not only does a laptop

program bring equality amongst all students, some studies indicate that their parents may

be impacted as well, as the exposure will contribute to their development of technology

literacy (Rockman, 2003). Along with narrowing or eliminating the digital divide, Zucker

and McGhee (2005) the access to technology and the internet helped parents to receive

training that was sponsored by the schools. The effect of this opportunity helped the

parents to become more engaged in their child's educational experience by allowing for

greater communication with the teachers while staying current with grades and

attendance (Rockman, 2003; Zucker and McGhee, 2005).

Another positive community factor as it relates to the educational environment, as

indicated by Warschauer and Tate (2015), is that digital media allows for opportunities to

bring students together with peers in other schools around the world through discussion

forums, educational apps, blogs, wikis and social media. It is important to note that this

access gives students the opportunities to connect with mentors, specialists or global

connections that allow for students to have invaluable cultural experiences.

Challenges of One-to-One Computing Programs

When looking at one-to-one research, not all studies are in agreement about its

effectiveness. Before one can decide if the program is of quality or not, the parameters

must be set. Many articles found for this review have been mainly about the physical

implementation of the program that includes costs and professional development on how to use the technology. That is only a fraction of the true importance of technology implementation. The ultimate question is "Will this positively impact student achievement?" Then, add on " Does the technology better lend itself more relevant in one subject than another?" By reflecting on those questions, it is safe to say that not everyone agrees with the same answers. Bielefeldt (2006) attributes these differences to the mindsets of those who are still embracing the more traditional approach to education, as opposed to those who embrace the much-needed paradigm shift pertaining to teaching and learning.

Technology over learning

When looking at technology over learning, many critics argue that schools emphasize technology over learning in the respect that they focus on a student's ability to utilize the internet or create elegant presentations that do not measure how well a student understands math or can use critical thinking skills (Jackson, 2009). This situation has been coined as the "cool factor" (Lynch, 2015). Technology can certainly be fun and exciting. When using technology such as augmented reality and virtual reality, the students' eyes light up with interest and excitement. However, with no academic follow-through, the technology has just become a "wow" tool. Teachers must push beyond the "cool factor" and establish academic objectives attached to the technology. The days of teachers using the reasoning of the fact that it is good to get the technology into the students' hands is over. Most students have already had experiences on cell phones, tablets and gaming consoles before they even come to school (Lynch, 2015).

Distract from learning

Some critics argue that laptops can distract from the learning environment rather than enhancing it. Instead of being on task, some students are surfing the net, watching videos or utilizing social media (Jackson, 2009). Computers can be a distraction. There is no denying that a laptop, cell phone or tablet can take a student's or a teacher's thoughts away from what they are to be teaching or learning. Distraction is a major concern that can hinder the development of an environment that is conducive to learning, which in turn can decrease students' academic engagement and increase disciplinary problems.

For example, Hu (2007) found that the students at Liverpool High have used their school-issued laptops to commit academic fraud, access pornographic material and hack into local business systems. The Great Maine Schools Project (2004) also found that laptops provided additional distraction for some students in the classrooms as they used online resources unrelated to class work. Maxwell (2018) writes that either at home or in school, students are very involved in social media, messaging or even taking selfies while utilizing a device for educational purposes. He goes on to say that the proper use of technology is completely up to the user whether it is used as a powerful tool or as a distraction.

In one study in particular, the most significant concern teachers reported was that without effective classroom management the laptops were a distraction for students (Pogany, 2009). In schools, the key to alleviating these situations is for the teacher to have control of the learning environment by providing students with meaningful lessons that are highly interesting, engaging and appropriately utilizing technology for

learning. A window, a pencil, or a crayon can all be a distraction when they are allowed to be. The age of technology has forced the teachers to step up their teaching methodology. It is hard for a teacher to be as dynamic as a first-person video game or 3D movie. With a relevant dynamic lesson and an exciting delivery, the students will not be distracted.

Lack of teacher training and support

Too many times, students are given laptops and teachers are told to begin teaching using the technology. With the pressures of being told to use the technology, the laptops have become glorified typewriters as a means of integrating technology in the classroom. Without significant support for teacher training, the cost ratio for one-to-one computing is rarely justified (Jackson, 2009). Bebell and Kay (2010, p 47) explains that in a study of five middle school programs in Massachusetts, schools that struggled with incorporating laptops were a result of poor implementation, a lack of teacher knowledge and buy-in, indicating that, "It is impossible to overstate the power of individual teachers in the success or failure of one-to-one computing".

Lack of student training

When looking at ineffective one-to-one technology programs, the lack of student training on the goals and expectations for utilizing the devices is evident. The International Society for Technology in Education addresses the need for the modeling of digital learning by promoting digital citizenship (ISTE, 2017). The tenets of digital citizenship are necessary to teach students how to use technology to make their community better, to engage respectfully online with people who may have different

beliefs than you, to be a voice heard by leaders to help shape public policy, to curate a positive and effective digital footprint and to determine the validity of online resources in the realm of digital literacy.

Decrease in staff

The educational system is a labor-intensive system. There are many people needed to run an educational program. The cost to run school programs is high, and the highest cost point is teacher salary. Hansen (2016) acknowledges that the National Center for Education Statistics indicates that fifty-five cents out of every dollar spent in K-12 education goes to paying salaries and benefits. He goes on to say that teachers will never be completely replaced through artificial intelligence because there are skills and responsibilities that only humans can perform. With this in mind, we must consider that the number of teachers could be reduced if the tasks that can be automated are indeed automated. The educational system would be a cost-effective place for technology to take over from a financial sense.

However, there are plenty of needs that the one-to-one technology program will not be able to solve. The artificial intelligence community seems to be in agreement that artificial intelligence is very good with the Who, What, When and Where questions, but it struggles with How and Why. Also, empathy is and will remain a lesson only able to be taught by humans. A large part of education is teaching socio-emotional skills. With those kinds of skills needing a human touch, the one-to-one technology program will not take over the jobs of quality teachers, but may force a change in how teaching occurs. Hesten (1995) explains that learning is significant when one human talks to

another. He goes on to say that when children enter the classroom, they have prior understandings that only a teacher can assess and build upon that particular student's unique understanding.

Traditional learning

Some authors worry that losing the traditional ways of learning through books, paper, and pencil (Lei and Zhao, 2008) due to too much exposure to computers might hurt the 'art of thinking' and development of the mind (MacDonald, 2004). Similarly, the Great Maine Schools Project (2004) reported that dependency on laptops may have an adverse effect on a student's problem-solving abilities. For example, Hu (2007) refers to a comment of a teacher at Liverpool High School in the USA pertaining to the art of thinking being lost due to people being able to enter a word in a search engine to find a source. Many people begin to rely more on the internet for answers instead of their own thought processes.

Social isolation

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

Social isolation can become a problem if the computers are used inappropriately. That is why the International Society for Technology in Education has a listing and explanation of digital age skills. In reviewing those skills, one can see that interacting with other students is paramount. From collaboration using technology to communicating using technology, many concerns are addressed. This issue of isolation can positively connect to the concern of teacher training. If the teachers do not know how to use the technology appropriately, then it is easy for them to find a web site and tell the students to go independently on their one-to-one device. That is why the training is so critical (Jackson, 2009).

Wright (2017) indicates that children who spend more time on the computer than with their peers may fail to develop appropriate social skills that will ultimately impact how they communicate, develop self-esteem and how they may function in working and social environments. The impact of lacking social skills can lead to loneliness and depression, which impacts relationships and academics.

Effects of student dependence on technology

Dependency on technology has made traditional classroom instructional activities, such as direct instruction, textbook readings, and written homework assignments less effective. Fox and Edwards (2019) write that according to Common Sense Media, American youth spend an astounding nine hours a day using these types of technologies. American teenagers average nine hours per day, while "tweens" average about six hours. Technology has changed the way people interact with one another as well as how they proceed with everyday life. The world is changing to accommodate the new way of life,

but K-12 educational systems have been very resistant to change and still use traditional instructional methods in the classroom.

Dependence on devices has shown more negative impacts on the social lives of individuals, especially as it relates to their everyday functions including their quality of sleep. Shorter overall sleep duration and internet usage has been shown to have an adverse effect on an individual's psychological functioning that could lead to other health issues such as depression, suicidal ideation and obesity. This poor sleep quality leads to fatigue, poor academic achievement and many behavioral and social problems (Touitou, 2013).

Sustaining costs

Costs of one-to-one technology programs need to be a major consideration for schools who want to implement a one-to-one initiative. Some schools that originally got on board with the one-to-one movement have begun to scrap the program due to budget cuts which is a harsh reality in school systems (Lemagai, 2010). Another factor that can be difficult for school systems occurs with mushrooming maintenance costs that appear to rise every year (Vascellaro, 2006). Many schools neglect to understand that the resources for the one-to-one initiative go beyond the device, and include the need for digital tools, as well as fabricating and sustaining the network infrastructure, which is quite taxing due to school district budgets being reduced over the years (Bonifaz and Zucker, 2004; Stidham, 2008; Kiker, 2011). In many of these schools, the programs had to be assessed by how the students were actually utilizing the computers (Hu, 2007). Too many times, educational entities implement these technologies without a plan to utilize

them effectively, thus are minimizing the effectiveness of the tools and are creating

glorified typewriters for note taking or web surfing.

Although these cost factors are considerations for implementing one-to-one

technology programs, proponents assert that devices lead to cost reductions in areas such

as textbooks, paper consumption and assessments (Greaves, et al, 2010).

Vision for a One-to-one Technology Initiative

As stated in Proverbs, "Where there is no vision, the people perish." This stands

true for any initiative that has not been thoroughly analyzed. The effect of one-to-one

technology programs critically depends on the implementation method, which takes into

account existing teaching methods, resources and heterogeneities of students with

different needs and abilities (Linden, 2008). A one-to-one computing initiative requires a

systemic approach that looks at the financial implications of the program, planning of

professional development, monitoring of the digital infrastructure, revisions to acceptable

usage policies, plans for maintenance of the devices, implementation strategies and the

buy-in from stakeholders within the community (Frischkorn, 2019). Ultimately, leaders

of the initiative must be committed to the research that is needed to plan, implement and

monitor the initiative. It is necessary for district leaders to have a holistic view of the

endeavor that includes the benefits as well as the challenges that may arise. The

formation of a school vision that centers on technology requires building a shared belief

among stakeholders about how technology will be used to advance teaching and learning.

For example, Reksten (2000) noted that if a technology plan begins with the purchasing

of equipment, then the school has already lost sight of the reason for using technology in education.

Fullan (2014) found that successful technology initiatives require an understanding of how to promote change. School leaders embarking on a digital conversion must understand how to motivate staff, students, and community members to become active participants in the change process. Leadership must guide people back toward the mission and vision when setbacks occur. Finally, leaders must utilize the whole group in order to promote the change and complete successful change toward a digitally enhanced learning environment on a large scale. Leadership is the key to effective technology implementation programs. Furthermore, principals and other district administrators must display digital competence to effectively lead (Mårell-Olsson and Bergström, 2018). This competence allows the leader to support their staff as they work to develop digital competency. Frenzel (2018) says that administrators must recognize how teachers are using the technology, must give them time to utilize the technology, and to provide the needed support in the classroom. Leaders must create the transformational environment that they envision in order to increase the technology being utilized in the schools.

Stakeholder Support

Programs that have been highly effective have started with a well thought out plan that was formulated by a committee that involved stakeholders. Before a one-to-one initiative can be implemented, it is necessary to get buy-in or support from community stakeholders, primarily the teachers and students themselves. Grundmeyer (2014) found

that by not involving stakeholders in the decision making process of a one-to-one initiative, students were not familiar with the goals or outcomes of the program and teachers lacked necessary training to implement the technology, which led to wasted instructional time. Clausen, Britten and Ring (2008) asserted that careful consideration of teachers' instructional practices should be the foundation for the district decision-makers before jumping into a one-to-one initiative.

One recommendation to get these teachers on board is a slow, methodical approach to provide them with a laptop and to have them treat the device as their own personal device. By getting these tools in their hands, they will become more familiar with programs that are available and will feel more comfortable utilizing the technology. This exposure has led to inquiries by teachers in regards to utilizing various programs or inquiring about software that they may be interested in using (Tenbusch, 2019). This approach is very effective at garnering support from those teachers who are digital immigrants and have been resistant to technology incorporation in their classrooms.

Pedagogical Shift

The most crucial implementation factor besides creating a shared vision, is the transforming or shifting of the educational paradigm that can be done by mapping the appropriate curricula priorities (Sipitakiat 2010; Towndrow and Vaish 2009; Weston and Bain, 2010). Without such a shift in practices of teaching and learning, it is difficult to fully comprehend the capabilities offered by technologies (Rubagiza et al. 2011). Rosso (2010) concludes that extensive computer utilization requires a thorough change in the view of teaching and learning, including the relation between teaching/work and tests,

teachers' work methods and roles, and the students' view of school work. There are also indications that the relationship between the school and the home can be affected. However, this change seems to come not from the computer use in schools but from technology use at work and in the home.

It is also noted that the educational paradigm shift is not free from conflict. Bielefeldt (2006, p 1) states, "There are also new tensions that arise, such as conflicts between new learning models and old policy models, and between new outcomes and old assessments". In order to accommodate this change, district decision-makers need to slow the process to ensure that the stakeholders are getting the time that they need to feel comfortable with using the technology and feeling comfortable instructing with the technology. Slay et al. (2008), in this regard, find that incorporating technology into teaching without the required confidence, training and competence can weaken learning experiences. In most cases, the teachers will revert to their comfort zones and will embrace their traditional teaching methods. Teachers should have skills in appropriate instruction and assessment practices, accessing and managing curricular resources, and classroom management (Dunleavy et al., 2007).

To assist in this pedagogical paradigm shift, the International Society for Technology in Education has developed a comprehensive set of standards that address all stakeholders that include students, teachers and administrators (ISTE, 2017). These standards help to infuse technology in the classroom by guiding the digital learning experiences.

Planning and Preparation

In the educational arena, initiatives often seem to be implemented just to have an initiative in place. Too many times, the roll out of these programs have not been adequately researched pertaining to their implementation, sustainability and how district leaders assess the effectiveness of these programs. It is for this reason that the process needs time to ensure that the district leaders can make the best possible decisions regarding the implementation of a one-to-one initiative. They must take into account the multiple variables such as costs, pedagogical shifts in teaching and learning, professional development for staff, types of devices to utilize, software to be used, technological skills of stakeholders, availability of hardware, and attitudes of staff. The time factor regarding one-to-one implementation is viewed by teachers as being a concern in their computer use. Stallard (1998) says that teachers are reluctant to embrace technology because of its potential to shorten learning time.

Roszell's (1995) research delineated multiple factors that all need time to develop in order to positively influence the use of instructional technology. These factors include the availability of software and hardware and teacher preparation. Self-motivation is a key component along with building confidence regarding the infusion of technology in developing the necessary skills. Ample time for software review and teacher preparation needs to be paramount as the process requires a paradigm shift in how teachers teach and how students learn. Two other important factors that impact instructional technology are the attitudes of administrators and teacher education and training. Pelgrum and Plomp (1991) found that the most significant barrier to implementing technology in education is

the willingness of teachers to embrace technology due to a lack of preparation time for teachers to develop lessons.

Professional Development

In order to implement an initiative effectively, professional development is a necessity to equip those individuals with the needed knowledge and skills to carry out the vision for that initiative. When it comes to creating success in changing the educational paradigm that is needed to implement a one-to-one technology program effectively, the success is largely contingent upon the teachers' professional development training programs. Slay et al. (2008) found that incorporating technology into teaching without confidence, training and competence may contribute to weakened learning experiences. Teachers need to develop skills in appropriate instruction and assessment practices, accessing and managing curricular resources, and classroom management (Dunleavy et al. 2007). Schools need to understand that professional development should not only address technological skills, but should also promote an attitude change in regards to preconceived barriers of one-to-one implementation. As one principal explained, "When teachers are successful, the morale of the entire school goes up" (McLester, 2011, p 5).

School leaders need to keep in mind that meaningful professional development has to be structured so that it builds upon existing knowledge. As stated prior, there needs to be ample time for training of teachers regarding technology integration before one-to-one can be implemented. Professional development plans should include a long-term approach that provides a sustained, rigorous, and needs addressing approach that is continuous (Lemke and Martin, 2004).

Due to the fact that teachers do not have the same needs when it comes to professional development, effective programs must create a flexible approach that continuously updates according to the individual, unique needs of the staff. It is important to plan for professional development, but keep in mind that this plan needs to be open to change to meet the needs of the individual teachers. Edwards (2003) deduces that as technology evolves at a staggering pace, so do the teachers' needs. The types of professional development opportunities must be quite diverse themselves. In today's world, professional development may be done in a variety of ways that include onsite learning, webinars, podcasts, training videos and mentoring. Overall, technology is a catalyst for change, and a long range plan for professional development is necessary to positively impact those changes in the learning environment.

Costs to Implementing and Sustaining a One-to-one Technology Initiative

Budgets are limited when it comes to most school districts. There never really seems to be enough money to do all the things that schools feel are necessary to provide our students with meaningful learning experiences. When looking at one-to-one technology programs, district leaders must have a holistic view of the budgetary needs that involves a long-term commitment from the operating budget. Bonifaz and Zucker (2004) attribute multiple sources of funding through state and federal funds as key components for successful one-to-one technology programs. Other districts have found financial solutions through state and federal grant programs. For example, funding from the U.S. Department of Education's Technology Innovation Challenge Grants were obtained by many school districts. Bonifaz and Zucker (2004) go on to say that when

necessary, schools should use outside funds that may come in the form of grants or through partnerships with businesses.

In one study, Virginia's Henrico County public school system showed that a one-to-one computing program can be successfully implemented and sustained even without a surplus budget. The district made a commitment to designate approximately four and one half percent of its budget to implementing and supporting the needs of the program over a ten year period (Lemke and Martin, 2004). In all programs, the financing for the startup is usually the easiest part. School leaders must develop a plan for sustainability as it is the most critical financial component of a one-to-one initiative. Kraemer et. al (2009) refer to several components including opportunity cost or investment in teachers, facilities and other educational resources. Costs need to include a commitment to investing in infrastructure, technical support, hardware maintenance, software licenses, system upgrades and replacement expenditures.

Logistics and Infrastructure

Anyone who has implemented a one-to-one technology initiative has concluded that building a network infrastructure is never done. Infrastructure is something that is constantly evolving and expanding. Initiatives are often delayed by small logistical details instead of major ones. Lemke and Martin (2004) state that to successfully implement a one-to-one initiative, one must think long-term and plan for the most mundane components of the project that includes maintenance, replacement of equipment, upgrades to hardware, software, insurance and infrastructure. Schools must realize that setting up the necessary infrastructure is no longer sufficient, but they must

maintain it. Maintenance of these systems requires onsite technical support in order to maintain the network (Lemke and Martin, 2004).

Tenbusch (2019) writes that one-to-one computing requires a vast networking infrastructure, server, switch and router environment. He goes on to say that when looking at the type of infrastructure, there needs to be a discussion pertaining to the curriculum and what platform will be used to support it.

Bonifaz and Zucker (2004) write that prior to purchasing devices, great care needs to be taken to identify software needs as well as the hardware that is needed to implement the initiative. These needs can be addressed by looking at the vision of the one-to-one initiative and applying the pedagogical changes to determine if the curricula and its resources are being supported. Once these needs have been identified, the school must purchase or license digital materials so that they can be valuable tools in the hands of the teachers. These needs also include filters and control mechanisms for the devices so that the school has control over the type of information that the students will utilize at home and in the classroom (Edwards, 2003).

Types of Devices

Warschauer and Tate (2015) state that districts should choose the types of devices that will best meet their curricular goals. Whatever devices are chosen, it would behoove a district to start out slowly by providing devices to a small group or grade level to assess the functionality of the device as it pertains to the user. Chromebooks are excellent options for writing, research and online activity. For schools that rely on Windows or Mac curricula, laptops may be the most appropriate choice. Chromebooks and laptops

are readily used for older students as the devices lend themselves to more writing applications. For younger students and students with special needs, the authors write that iPads seem to be an excellent choice due to their light weight, high resolution touch screen technology (Warschauer and Tate, 2015). It is important to choose the best device that is best suited to the needs of the students (Tenbusch, 2019).

Policies and Procedures

As with any initiative, policies and procedures need to be put in place and communicated to all stakeholders. Prior to the distribution of the devices, districts should inform the students and parents about these policies and procedures. These communications can be done in a public forum, seminar, workshop or electronically. It is important to keep the stakeholders abreast of the policies and procedures. Acceptable use policies need to be written to ensure that the devices are being properly utilized as well as being cared for (Bonifaz and Zucker, 2004).

Procedures need to be in place for items such as inventory, distribution, insurance, maintenance, payments, troubleshooting and technical assistance. A recommendation to establish a help desk to answer questions pertaining to any problems, needs to have procedures in place for addressing those needs (Edwards, 2003).

Training for Students

Too many times, students are overlooked when considering a one-to-one technology program. In order for students to best utilize the technology at hand, they need to become digital citizens. In order to do this, just like teachers, time needs to be

taken to train the students on how to use the devices appropriately and taking the necessary time to train them on the applications that are on the device. In some schools, this can be accomplished by holding a student training that allows for the students to learn how to use their device (Tenbusch, 2019). The training of students in regards to access and use of technology was found to be a positive predictor of math and reading scores on academic achievement exams (Shapley et al, 2010).

Students need to be taught how to be digital citizens. Even though they are digital natives, students still need to be taught the tenets of digital citizenship in order to keep them safe and to make them responsible digital citizens. Digital citizenship refers to responsible technology usage by understanding digital literacy, ensuring online safety, digital responsibility, digital health and wellness and cyber bullying prevention (Nina, 2019).

Monitoring

A necessary and key component for any one-to-one initiative is how the program is being assessed or monitored. Program monitoring and evaluation are necessary for school leaders and policy makers to assess the effectiveness of the one-to-one initiative so that continuous and ongoing improvements can be made (Bonifaz and Zucker, 2004). Continuous monitoring and assessment are necessary to ensure that the goals of the program are being met and changes can be made to the initiative to improve upon deficiencies or areas that are not being addressed at all. O'Donovan (2009) found that one-to-one technology programs need to have an effective monitoring program so that the school leader can make informed decisions about the program based on the data. Tedre

et. al (2011) found that most one-to-one computing programs lack this necessary component even though it is a critical component.

Conclusion

After a thorough analysis of the literature review, there are many factors that will allow the South Park School District to strengthen its current one-to-one technology program by identifying and addressing deficiencies, while providing a more effective planning and implementation process for the early elementary initiative. As stated in the introduction, the purpose of the literature review is to provide the necessary information to best answer the three questions that will provide the leadership of the school district with a profound understanding of what effective programs have in common, along with how to effectively develop an action plan in order to ensure that the future initiative, in grades one and two, is done with fidelity.

One of the most critical findings of this review deals with the impact that leadership has on determining the success of a one-to-one initiative. The ability of school leaders to lead technology initiatives through planning and inspiration influence the success of the one-to-one plan (Finkel, 1990). Before a one-to-one technology program can be rolled out, it is important to take the time necessary to look at the program holistically, and to analyze the benefits of the program, along with some possible setbacks. Leaders, along with the involvement from all stakeholders, must create a vision that must take into account a commitment to a paradigm shift in pedagogy that will ultimately impact how teachers teach and how students will learn. As part of this systematic approach to planning and preparation, administrators must take into account

the financial implications of the program, the digital infrastructure that will be required to support the program, the technology support needed to address the issues that arise from the usage of technology and the policies and procedures that should be in place that will be communicated to all stakeholders. These policies and procedures will need to be developed with painstaking care in order to address items that pertain to inventory, distribution, insurance, maintenance, payments, troubleshooting and technical assistance (Edwards, 2003).

Another necessary piece deals with teacher preparedness through professional development. Professional development is a necessity to change the educational paradigm that will have a profound effect on a one-to-one technology program as the success of a program is highly contingent upon teacher efficacy. Teachers who incorporate technology without the appropriate training will lead to subpar learning experiences for students (Slay et al. 2008). Ample time for training needs to occur prior to one-to-one implementation. Also, professional development plans should include approaches that provide for continual support for teachers throughout the planning and implementation stages (Lemke and Martin, 2004). As technology evolves over time, long-range plans for training teachers will be necessary to address those changes in the educational environment.

The final piece that is essential to the implementation and sustainability of a one-to-one initiative is how leaders monitor and assess the effectiveness of the one-to-one technology program. A best practice for any school leader is to continually assess the health of any initiative or organization. By continuously monitoring programs, school leaders can ensure that the goals of the initiative are being met, and areas that need

improvement are being addressed as they arise. Bonifaz and Zucker (2004) recognize the importance of monitoring and evaluation by school leaders in order to make the necessary changes to make the program more effective. Effective monitoring and assessment will provide the necessary data to administrators in order to make the best data-driven decisions to enhance the program.

Overall, one-to-one technology programs can have a significant impact on teacher and student efficacy in educational environments. Realizing this significant impact will be determined by leaders who are able to embrace the role of technology in schools by articulating and advocating a clear vision while mobilizing stakeholders to achieve the tenets of the vision. Finally, strong and enthusiastic leadership pertaining to the planning and implementation of a one-to-one technology program has been the most important factor to the success of a school's one-to-one initiative.

Chapter III

Methodology

Introduction

After an exhaustive review of the literature pertaining to the characteristics of effective and ineffective one-to-one technology programs, the researcher was able to better understand the process for orchestrating a more thorough and detailed research methodology. This methodology takes into account the specific procedures that were utilized in order to identify, select and evaluate the information pertaining to one-to-one computing initiatives that will allow the reader to critically assess this particular study's credibility, validity and reliability. The purpose of this chapter will be to provide a more comprehensive understanding of the components and steps that were taken in order to complete the action research project. A brief summary of each section will be used to emphasize the importance of each section.

The purpose of this section will focus on the necessity of the study of one-to-one technology programs and the factors within the South Park School District's program that prompted this research. This particular section will highlight the goals of the study which are guided by the three research questions. The research questions will be listed and further explained as the questions link to the purpose of the action research project. A delineation of research methodology and how that methodology is being employed to attain the desired outcomes of the project will be highlighted.

As stated prior, the necessity of this project is a result of observable concerns that have become evident as the four years have progressed in regard to our district's one-to-one computing initiative. In order to better comprehend the purpose of the study and the

concerns that prompted its inception, the reader needs to have a working knowledge of the dynamics of the school district along with the reasons for the targeting and selection of the participants used in the study. Regarding the participants, the process for receiving informed consent and the language used to acquire that consent will be also be articulated.

Pertaining to the intervention and research section, I will further connect the information garnered by the analysis of the review of literature that led to the basis for the intervention plan. The details of the intervention plan will be discussed in greater detail in regards to the implementation of the plan at the various building levels. Components that will be addressed by the intervention plan will include the resources necessary for implementation and the possible fiscal implications associated with the plan.

The most involved section of this chapter will deal with research design, methods and data collection. It is this section where the research design will be identified along with the multiple forms of data that were used to answer the research questions. It will further detail the plan of how data were collected, and the timeline that was implemented to collect that data. The instrument used for collecting that data, along with the warehousing and analysis of the data will be described in a more thorough manner. An explanation for the use of various data and how that information relates to the research questions will be examined. To conform to ethical guidelines, a portion of this section will be devoted to the process involved in making application for IRB approval and the acknowledgment of IRB approval in order to move forward in conducting the study. Fiscal implications will all be detailed in this section as well.

In an effort to increase the credibility and validity of this research, a section on

validity will describe the overall trustworthiness of the research. This section will describe the strategies that were employed to increase the credibility, transferability, dependability and confirmability of the results. The final component will be a summary of the chapter.

Purpose

The purpose of this research is to provide the South Park School District with the necessary data to make informed decisions pertaining to improve upon the current program and the possible implementation of a one-to-one computing initiative in grades one and two. Due to the increased fiscal implications of implementing the program in grades one and two, along with maintaining and sustaining the program in grades three through twelve, it has been deemed necessary to garner a more profound understanding of successful one-to-one initiatives in order to determine if the implementation in grades one and two is necessary to justify the added financial obligation that will be required. To better understand the purpose for the research, a summary of the one-to-one initiative in the district from its inception to its current status will provide the reader with a greater appreciation for the importance of this research.

Over the past four years, the South Park School District has been implementing a one-to-one computing initiative in grades three through twelve that has seen its share of successes, along with a plethora of unanticipated shortcomings that have created areas of concern for district staff. Due to the financial investment that is required to maintain and sustain a one-to-one technology program, it is necessary to weigh the positives against the negatives associated with our current program. In this particular case, we must look seriously at the concerns regarding the existing program in order to make the

determination to extend the program and to create more of a financial burden to the district budget. It is important to note that the one-to-one technology program in grades three through twelve will continue to exist even if the devices are not being utilized effectively for fear of removing an instructional resource.

Though there are some definite benefits to the one-to-one technology initiative in the South Park School District, the action plan will need to focus on the areas that are in need of improvement in order to justify the expansion of the program and the added financial obligation. Based on the feedback from various district stakeholders over the past four years, here are some beliefs of those stakeholders regarding the concerns that further justify the need for this study. They are as follows:

- The belief that the one-to-one technology program was rolled out in haste without clear vision for the use of technology for teaching and learning. Students were given the technology for the sake of having access to technology. There was a failure among the leadership to formulate a comprehensive technology plan that provided accountability for the use of technology in the educational environment.

- The belief that communication among all stakeholders was lacking or minimal. There seemed to be a handful of people who were involved in the decision making process regarding the one-to-one initiative.

- The belief that insufficient time was given to provide opportunities for staff to learn how to use the technology for instructional purposes. Professional development prior to the initial implementation was limited or non-existent. There were no directives or instructions given to the staff pertaining to how the technology should be utilized.

- The belief that the initial roll out of the one-to-one technology program involved putting devices in the hands of students without properly training the students on how to utilize the devices for educational purposes.

- The belief that the long-term financial commitment was not well planned. Costs for additional personnel and infrastructure to maintain the program has exceeded the initial projections.

To address these perceived issues, the researcher delved deeper into the concerns of the stakeholders by researching multiple one-to-one technology initiatives and the characteristics that have made them effective or ineffective. The literature review documents both the positive and negative characteristics found within effective and ineffective programs, and those characteristics are the basis for the resulting findings for the research questions that have been the driving force behind the research.

Being the most senior administrator in the district, the researcher has witnessed the implementation of many initiatives that have come and gone without much thought given to the sustainability of those initiatives. Due to firsthand knowledge of the one-to-one computer initiative, the researcher became very concerned when the district stated that it wanted to expand the program to grades one and two. It is due to this concern that a decision was made by the researcher to do a thorough assessment of the current program to provide the district administration with pertinent data that would cause them to make a more informed decision when considering the implementation in grades one and two. Again, due to the added financial burden on the district, it is in the district's best interest to thoroughly research and to understand that this endeavor cannot be a waste of time, human resources and most of all money. The questions guiding this action

research have shaped the literature review as the literature review itself has been instrumental in providing me a more profound understanding of the characteristics associated with effective and ineffective one-to-one technology programs. The assessment tool used in this action research project is a questionnaire that utilized staff perceptions of the one-to-one technology program in grades three through twelve in order to collect the necessary data to develop a comprehensive plan of action that will determine the school district's next steps regarding the one-to-one technology implementation in grades one and two.

To assess and certify that any future one-to-one implementation, if undertaken, is executed with fidelity, the following three questions have been chosen to guide this research and to collect the necessary data to ensure that any future one-to-one technology program in the district will have a comprehensive plan of action. The three questions are:

- How was the implementation of the one-to-one technology program effective?

- How was the implementation of the one-to-one technology program not effective?

- How can we make the implementation of the one-to-one technology program in grades 1 and 2 more effective?

These questions, that have been developed to align to the purpose of the study, have been the backbone to the creation of the literature review criteria and to the formation of the questionnaire that takes a mixed-methods approach to answer these guiding questions in a comprehensive manner.

As stated in chapter two, the review of literature provides a deeper understanding to what one-to-one technology programs look like, and the factors that contribute to the implementation and sustainability of successful one-to-one technology programs in an educational setting. The research behind the literature review focused on each of those three guiding questions to provide enough background on successful programs and how that background information will be used to develop a plan of action. This plan of action, as evidenced through the inquiry pertaining to question one, will focus on the characteristics that our staff members have identified as effective traits associated with the implementation of our one-to-one technology program. The second question strives to identify areas that need to be improved upon in our current program, and may assist in recommending the necessary changes to our current program along with what would need to be included in the action plan to ensure that similar mistakes or ineffective practices do not occur in the potential grades one and two technology initiative. Finally, the third question takes into account characteristics and benefits of effective programs, traits and deficiencies associated with ineffective programs and effective strategies for planning and implementation practices, in order to determine if the implementation of a one-to-one initiative is feasible, appropriate or necessary in grades one and two.

There are a several outcomes for this research that the researcher hopes will come to fruition. The very first outcome will be to have a more profound understanding of the characteristics associated with effective one-to-one technology programs, and the ability to develop a comprehensive technology implementation plan that will allow the South Park School District to improve upon its current one-to-one technology initiative. A second outcome will be to provide the district with the

necessary information regarding the factors that are associated with successful technology programs in order to make an informed decision regarding the choice whether or not to expand the program to grades one and two. If it happens that a one-to-one technology program in grades one and two is not considered, a third beneficial outcome will be to create a tool that other educational entities could use in planning for their future one-to-one computing initiatives. No matter what the outcomes are, this research will be worthwhile in providing information for future studies, along with developing a comprehensive action plan for the possible implementation and maintenance of a one-to-one technology initiative that others may find useful when considering their program.

Setting

The setting for this study is the South Park School District. The South Park School District is a suburban, public school that is located in Allegheny County in southwestern Pennsylvania. The district serves the residents of South Park Township, Pennsylvania which encompasses roughly nine square miles and serves a resident population of over thirteen-thousand. It is a small bedroom community that sees very little transient movement. The number of businesses is few, and local taxes rely heavily on the 5,422 households within the district.

Community demographics

Based on the most recent census data from 2010, the per capita income is $21, 538, and the median income for a household in the township was $51,001. The median income for a family was $57,290. The disparity between median income for gender shows that males had a median income of $41,002 compared to $27,138 for females.

Pertaining to the poverty line, about 4.8% of all families and 4.6% of the overall population are below the poverty line. This statistic includes 6.8% of those residents under age 18 and 5.7% of those residents who are age 65 or over. As stated prior, there are 5,422 households in the township and out of those residences there are 4,331 families that abide in the township. Based on the square miles and the overall population, the population density statistic shows that there are 1,563.6 people per square mile. The racial make-up of the township is 86.5% white, 10.2% Black, 1.7% Hispanic, 1.6% Two or More Races, 1.4% Asian, 0.2% Hawaiian or other Pacific Islander and 0.1% Native American.

Of the 5,422 households, 35.3% have children under the age of 18 living with them, 62.0% of those households are married couples living together, 25.7% are non-families and 9.5% have a female householder with no husband present. Looking at the non-family statistic, those percentages reflect 21.9% of those households are made up of individuals and 6.3% had someone living alone who was 65 years of age or older. The average family size per household was 3.09 individuals, and the average household size 2.63 individuals.

Looking at the overall age ranges in the population, 25.6% of the population is under the age of 18, 7.0% is 18 to 24, 31.2% is 25 to 44, 26.0% is 45 to 64, and 10.3% is 65 years of age or older. The median age is 38 years old. Gender statistics reveal that for every 100 females, there are 96.2 males, and for every 100 females age 18 and over, there were 93.1 males.

School district history and demographics

The South Park School District was founded in 1938 and was known as Snowden Township before becoming South Park in 1967. The current configuration of the district is comprised of three schools. The South Park Elementary center houses kindergarten through fourth grade, the middle school grades five through eight and the high school grades nine through twelve. The central administration offices are located in the high school. The annual budget is approximately thirty-five million dollars. The total revenues from local sources are 61.2% with the state contributing 37.7%. The federal government only contributes 1.1% of the district's revenue.

The school mascot is the eagle and the district's motto is, "Strengthening minds. Powering Futures." Its mission statement is, "To provide an educational atmosphere where all students have the opportunities to discover their talents, develop their abilities, and achieve the expectations embedded in our educational program to become responsible and productive members of our society." The district employs 132 teachers, sixty-eight full or part-time support staff and eleven administrators. The school district's colors are royal blue and white.

The South Park School District has a student population of 1,771 students with the percentages of enrollment by race or ethnicity being 89.9% White, 3.7% Black, 3.5% Two or More Races, 1.2% Asian, 1.2% Hispanic, 0.5% Native Hawaiian or other Pacific Islander and 0.0% American Indian/Alaskan Native. The percent enrollment by gender is 52.4% male and 47.6% female. The percent of enrollment by student groups is 28.3% economically disadvantaged, 10.8% special education, 3.3% gifted, 1.1% English Language Learner, 0.3% foster care and 0.3% homeless. The district has 42 students

attending charter schools and 60 students who are enrolled in our partnering career and technical center known as Steel Center for Career and Technical Education. The district boasts a graduation rate of 93.4% for the five-year cohort group and a 94.0% for the federal four-year cohort group. Regarding post-secondary transition to school, military or work, 73.8% of graduates go on to post-secondary education, 6.2% enlisted in the military and 43.4% entered the Pennsylvania workforce in some capacity. The supporting intermediate unit is the Allegheny Intermediate 3.

The South Park Elementary Center was completed in 2001 and consolidated the district's three aging elementary schools into one. Stewart Elementary School, Library Elementary School and Broughton Elementary School were closed at the end of the 2001 school year. The school houses students in kindergarten through fourth grade. The school enrollment is 623 students with 52.2% being male and 47.8% being female. The percent enrollment by race or ethnicity of the school is 88.6% White, 4.7% Two or More races, 3.7% Black, 1.3% Asian, 1.0% Hispanic, 0.8% Native Hawaiian or other Pacific Islander and 0% American Indian/Alaskan Native. Percent enrollment by student groups include economically disadvantaged at 27.6%, special education 11.2%, gifted students 2.3%, English language learner 1.0%, foster care 0.6% and homeless at 0.3%.

The South Park Middle School, formerly known as S.J. Engott Middle School, was renovated in 2016 and includes grades five through eight. The school enrollment is 546 students with the percent enrollment by race or ethnicity being 88.8% White, 4.4% Black, 4.0% Two or More Races, 1.3% Hispanic, 0.9% Asian, 0.6% Native Hawaiian or other Pacific Islander and 0.0% American Indian/Alaskan Native. The percent enrollment by gender is 51.5% male and 48.5% female. The percent enrollment by

student groups is 29.9% economically disadvantaged, 9.9% special education, 3.3%

gifted, 1.7% English language Learner, 0.4% foster care, and 0.2% homeless.

The South Park High School educates students in grades nine through twelve and

has an enrollment of 602. The percent enrollment by race or ethnicity is 92.2% White,

3.2% Black, 1.8% Two or More Races, 1.5% Asian, 1.3% Hispanic, 0.0% Native

Hawaiian or other Pacific Islander and 0.0% American Indian/Alaskan Native. The

percent enrollment by gender is 53.5% male and 46.5% female. The percent enrollment

by student groups is 27.6% economically disadvantaged, 11.3% special education, 4.3%

gifted, 0.7% English Language Learner, 0.0% foster care and 0.0% homeless.

Participants

The participants for this study are teachers from the South Park School District

who taught in grades three through twelve and have been a part of the one-to-one

computing initiative from its inception in 2016. At the time of the initial implementation,

the district employed 128 teachers. Out of those 128 teachers, 110 of them were a part of

the one-to-one initiative having taught students in grades three through twelve. At the

time of the administration of the teacher questionnaire on November 26, 2019, fourteen

of those teachers had retired or left the district. Ninety-six teachers were invited to

participate in the study.

In order to gain informed participant consent, the researcher included a disclaimer

and a description of the study that stated that the submission of the questionnaire is an

indication that the participant consented to the use of their responses. Please see

Appendix A for the disclaimer. Out of the 96 teachers who were a part of the initial

implementation of the South Park School District one-to-one technology initiative, 55

teachers consented to participate by submitting their responses to the survey. Please see

Appendix B to view the survey.

Regarding the participation rate, 57.3% of the teachers completed the survey.

Although more than half of those teachers chose to participate in the study, the researcher

would have liked to have had a higher percentage of engagement. In the Institutional

Review Board approval process, as a worst case scenario, the researcher allowed for a

minimum of twenty respondents in order to garner enough data to bolster the validation

of the results of the study. Though the overall participation exceeded the minimum

expectation by thirty-five respondents, the researcher was hoping for a greater number of

responses. Being that the survey maintained the anonymity of the respondents, the

choice to not participate could have been influenced by a number of possible factors.

The first reason that most people do not respond to surveys is because it may

require too much effort on their part. Most people will not participate unless they are

provided with an incentive to do so. A second reason could be that the teachers were

reticent to participate because they felt that the survey was not legitimate in the fact that

nothing would come from their responses due to institutional dysfunction where the

results of surveys never appear to change the circumstances regarding the topic that they

are being asked to participate. A third possibility for the lack of participation could be a

distrust of the process. Although the collection of data was done in an anonymous

fashion, many people fear that the sensitivity of the topic may create some type of

reprisal from the organization that is requesting the information if they are found to be

connected to their responses.

Researcher

The researcher has worked in education for twenty-eight years and holds a Bachelor of Science Degree in Biology and Master of Education Degree. As the most senior administrator in the South Park School District, the researcher is familiar with tenets and operations of the school district over the past fifteen years. Based on an understanding of school operations and the financial implications that are involved with initiatives such as the one-to-one initiative, the researcher has a vested interest in this study as too many times initiatives are implemented without a comprehensive plan that provides for the initial implementation, maintenance and sustaining of the initiative from a human resources and financial standpoint. It is the researcher's purpose to conduct this action research project in order to assist the district in making informed decisions pertaining to the fidelity of operations of the current one-to-one technology program while providing an assessment of that program in order to determine the necessity for the expansion of the program and justify the substantial expense.

Research Plan

From the very beginning of this plan, a timeline was utilized to ensure that the appropriate steps were being taken in order to allow the plan to be carried out in a methodical manner over time. The literature review was instrumental in allowing the researcher to orchestrate a more comprehensive plan as it focused on a few major components that the guiding questions helped to identify. The review of literature provided a comprehensive look at what factors contribute to the successful implementation and sustainability of one-to-one technology programs in an educational setting. The literature review focused on common traits of effective and ineffective

one-to-one technology programs, pros and cons of one-to-one technology programs and comprehending effective strategies for implementation of a successful program.

The research plan focused on the guiding questions which shaped the review of literature. The first question, "How the implementation of the one-to-one technology was program effective?" will be answered by looking at our current one-to-one technology program, and assessing it by measuring it against the research from the literature review. Ample examples exist to identify the common traits of effective programs, along with a more thorough understanding of the pros of effective one-to-one technology programs. The characteristics associated with effective programs were used to create the survey that was used to collect data regarding the teachers' perceptions on how those traits relate to our program. The literature pertaining to the pros of one-to-one technology programs serve to further reinforce how effective programs are able to be maintained and sustained over time.

The second question, "How was the implementation of the one-to-one technology program not effective?" utilizes the research to discuss the most common concerns or common traits of ineffective programs, while using the research pertaining to the cons of one-to-one computing programs to further enhance knowledge of those characteristics that exist in unsuccessful programs. The survey takes into account the teachers' perceptions regarding these traits as well.

The third question, "How can we make the implementation of the one-to-one technology program in grades one and two more effective?" focuses on effective strategies for implementation. The strategies for implementation include the comprehensive planning of the program prior to the roll out of the program. It focuses

on creating a clear vision, providing the time necessary to plan and provide meaningful trainings for staff, ensuring that logistically that the devices, infrastructure, and technology support are in place, and procuring the finances necessary for sustainability. The implementation of these effective strategies would only be used if it was determined that the program would be worthwhile at the first and second grade level.

As stated above, these guiding questions along with the literature review to help the researcher better understand one-to-one technology initiatives were instrumental in developing the research plan. This thorough understanding will permit the researcher to assess the current state of the existing one-to-one technology program and to make recommendations for changes to enhance the program. The survey that was used to assess the teachers' perceptions regarding the current one-to-one technology program will further highlight what has been successful with the current program and what areas would need to be improved upon. Both the literature review and the survey will work symbiotically to provide the district with the necessary findings that will permit them to improve the effectiveness of the current one-to-one technology program as well as make a determination if the expansion of the program is necessary and sustainable. Due to the financial commitment that is needed to maintain and sustain a one-to-one technology program, this research plan will be invaluable to the district to ensure that all aspects of the program are conducted with fidelity.

Fiscal Implications

The implementation of a one-to-one technology program comes with a major financial commitment. When the program was implemented four years ago, the

financial commitment resulted in an expense of approximately $334,000 for a five year lease on the devices. The issue with this ill-advised move was that the devices were leased for a five-year period, and the Chromebooks were found to be falling into disrepair after three years of use. The choice to lease a product for a time period beyond its actual operational usage was not a well thought out choice. After three years, the school district put a plan together to infuse new Chromebooks at the fifth and the ninth grade levels to ensure that the functionality of the devices remains intact. Those Chromebooks that are taken out of circulation are being scavenged for repairs of those Chromebooks that are still in circulation.

An unintended expense that was taken on by the district came in the form of human resources. Due to the functionality issues and wear and tear on the devices, additional technology staff had to be hired to meet the demand for repairs. The district added an additional technician at a total cost of $84,000 that included salary and benefits. As a result of not having a comprehensive vision for the program, the district has experienced an influx of unintended expenses that have created a financial burden on the budget every year. It is for this reason that this action research is necessary to ensure that a comprehensive plan is developed to ensure fidelity with all aspects of the program so that time and money are not being wasted.

Research Design

A mixed-methods approach was chosen for this study in the form of survey that was developed to assess staff perceptions regarding the implementation of the one-to-one technology program in the South Park School District. The quantitative part of the survey included fourteen statements that were based on the guiding questions that were

researched thoroughly in the literature review process. The statements assess the teachers' perceptions on whether or not the main traits of highly effective one-to-one technology programs were evident in the district's implementation. The participants of the survey were asked to review each statement and to determine the effectiveness of how each trait related to the one-to-one technology program. This was accomplished by using a five point Likert Scale that ranged from "strongly disagree" to "strongly agree" categories. The qualitative portion of the survey utilizes two open-ended questions where the participants were asked to identify one success of the district's implementation strategy, and to identify one thing the district can do to improve upon its one-to-one technology program. Overall, this mixed-methods approach will provide the researcher and the school district's technology team with the data necessary to make an informed decision regarding proposed changes to improve upon the current program, and to determine whether or not the program should be expanded to include grades one and two.

Data Collection

Upon receiving approval by the Institutional Review Board which garnered the approval to continue the research that involved the participation of human subjects, the researcher took the approved survey, along with the statement regarding the survey that was submitted with the IRB request, and put in motion the procedures for data collection that were indicated on the timeline and IRB request for approval form. As per that approval, the researcher initiated a survey that provided an opportunity for grades three through twelve teachers who were a part of the initial implementation of the one-to-one technology program to volunteer for this study. It was determined that

the survey would be given at the end of November and would be left open for two weeks to allow for an optimum number of respondents. Follow up requests were also made by the researcher in order to remind the staff that the survey was available for them to complete. Out of the 96 possible adult volunteers that could participate in the study, only 55 chose to do so, which exceeded the minimum sampling requirement of no less than twenty respondents.

The survey that was used to obtain the data from the teachers was electronically disseminated through the use of a Google Form. The researcher developed a Google Form that contained the necessary information pertaining to the statement that explained what constituted participant informed consent, and the actual survey that used a mixed-methods approach to garner the necessary feedback from the volunteers. As to cause no harm or discomfort to the respondents, participation was communicated as being voluntary and anonymous. Respondents were also given the opportunity to ask any questions of the researcher regarding the study and were able to request a copy of this study once it has been completed. The survey was administered to the qualifying teachers on November 26, 2019 and was made available through December 10, 2019.

In order to organize the data that was collected, a Google Sheet was used to document each volunteers' responses. The Google Form and Sheet were the clear choice for data collection tools as they allow for easy upload and access for the researcher to best view the data. The functionality of Google Sheets provided the researcher with the ability to aggregate similar data to identify trends while being able to break data down to its most basal form to fully understand the meaning of specific

data. The choice to use the Google platform was made due to the ease and functionality of collecting and analyzing the data. Data analysis of the teachers' responses began soon after access to the Google Form had been turned off. The analysis of the data will result in the answering of the problem statement, along with the three guiding questions that will allow the researcher to best formulate a treatment plan.

Ethical Concerns and the Institutional Review Board

As stated in the prior section, this research project involved human subjects. Because of this, IRB approval was necessary before moving forward on the project. On July 21, 2019, a final proposal for the research plan was submitted to the researcher's Doctoral Capstone Committee for review and approval. Once that approval was obtained, that plan was used to complete the IRB application. On August 5, 2019, the researcher submitted by email, the IRB request forms to the Instructional Review Board for approval. Please see Appendix C for information pertaining to the completed IRB Review Request form. On August 6, 2019, the researcher received notification that the study had been conditionally approved, and that research could begin once the stipulation of including a minimum number of participants had been added to the request and resubmitted. Please see Appendix D for information about the conditional approval. On August 7, 2019, the researcher received an email that the revisions had been saved to the IRB files and that research could proceed. The supporting documentation that includes the survey that was used can be found in Appendix E.

Validity and Trustworthiness

In order to increase the credibility and validity to this research, the researcher has utilized a number of strategies to ensure trustworthiness. Being that this research is being conducted in the South Park School District to formulate a treatment plan for the one-to-one technology program and its future implementation, the use of an anonymous survey was chosen so that each participant would feel comfortable in providing responses that were not influenced by the researcher or any other stakeholder within the district. Regarding the survey, the survey was vetted by the researcher's Doctoral Capstone Committee to make certain that the statements and questions used were not misleading or contained researcher bias. The survey is a matter of fact survey developed from the guiding questions and the literature review to best assess the traits of the one-to-one technology program in the South Park School District.

To ensure credibility, the researcher was not involved in the recording of data, as all data was directly collected through digital means. This alleviates any errors in documenting or recording of data and guarantees an accurate recording of the data. Regarding transferability, this research documents extensively the purpose for the study, the setting and the participants involved. The goal was to create a study that other educational entities could use to assist in their assessment of their one-to-one initiatives. Pertaining to the dependability of the study, this particular research was solely focused on one district. Not all districts are alike, but due to the similarities that are found in many educational settings, many components of the research could be used to assess their programs as those components appear to be universal in nature.

Finally, this researcher has no bias towards the study, and the findings. The goal is to gather meaningful data to make informed, data-driven decisions. In regards to confirmability, all data are digitally housed in a Google Sheet that has been untouched and unaltered by the researcher.

Summary

The purpose of this chapter was to describe the methodology that the researcher used to answer the three guiding action research questions. This chapter took a comprehensive look at the many facets involved in the methodology process by highlighting very distinct areas. The areas described in this chapter are the purpose for the study and the connection to the review of literature, the setting and participants, the research plan, the research design that discusses the methods for the collection of data, fiscal implications of the research and the trustworthiness of the research. Each of these sections were covered in a comprehensive manner that has furthered the researcher's quest to garner meaningful data to make the informed, data-driven decisions when assessing the current one-to-one technology program and determining if an expansion is justified. Chapter 4 will serve to outline the results of this study to answer the guiding questions and to help formulate a treatment plan to be used to ensure the fidelity of the district's one-to-one technology program.

Chapter IV

Data Analysis and Results

Introduction

This chapter will focus on the analysis of the data that was collected from the administration of the teacher survey. The quantitative data collected in this study accounts for an attitude rating scale and relates to fourteen items on the survey. These fourteen items pertained to statements about the most common characteristics associated with one-to-one technology programs and the teachers' perceptions of whether these characteristics were evident in the current program in the district. The qualitative data collected resulted from two open-ended questions that asked the respondents to identify perceived successes and shortcomings of the current program in order to formulate strategies that improve the current program, and if deemed appropriate, provide a comprehensive plan to expand the program to grades one and two. This analysis was conducted methodically by working through each item on the survey. Each item will be highlighted and the results will be expressed in charts, along with a narrative of those results. Once the data was analyzed, an interpretation of the findings was utilized to answer each of the guiding research questions.

Results of the Staff Perceptions Regarding One-to-One Initiative Traits

As stated in the methodology chapter, this action research uses a mixed-methods approach to data collection. The data obtained focused on each respondent's perception of how well a particular trait was reflected in the one-to-one technology program. Because it is based on teacher perceptions, the quantitative component uses an attitude scale or Likert Scale ranging from "Strongly Agree" to "Strongly Disagree" to garner

results. For those respondents who were indifferent to the statement or were unfamiliar with the characteristic and its relationship to the existing program, they could choose "Neither Agree or Disagree". The researcher combined the two agree categories to mean "agree", and combined the two disagree categories to mean "disagree" in order to measure how well that particular trait was perceived as being present in the one-to-one technology program.

The qualitative approach to this research consisted of two open-ended questions that were used to compare responses in the quantitative approach to further validate the data. The qualitative data was organized based on the most occurring tendencies. The two open-ended questions ask the respondents to identify the perceived successes of the one-to-one initiative and the perceived areas that are in need of improvement. When applicable, both forms of data were utilized to better understand the research questions and how well the data collected answered those questions. The two open-ended questions were prefaced by the acknowledgement that the district is looking to implement the one-to-one technology program in grades one and two in the near future and was requesting teacher input regarding the successes and shortcomings that they perceive in the current program. The teachers were informed that their recommendations or responses would aid the district in formulating strategies to help with the implementation of the expansion if it comes to fruition.

Possible Bias with the Utilization of the Likert Scale

Being that the researcher implemented a Likert attitude scale for the quantitative data collection, it is important to note that there may be a bias with this scale for a few reasons. The first is the bias for a respondent to choose agree categories over disagree

categories. Though a Google form was used, tendencies to select responses that either occur on the left side of the scale more readily or towards the top of a scale. Some other respondents' tendencies may have been to select responses that occur towards the center of the scale in order to avoid the extremes on the scale. Finally, the last tendency of respondents may include falling into a pattern of responses that do not give the most accurate depiction of their true perception. Individuals may choose responses that are more desirable, which is known as the social desirability effect.

Results and Correlation to the Research Questions

This section will highlight the fourteen most effective traits associated with successful one-to-one initiatives and how those traits are perceived by staff as being present in the current one-to-one technology initiative. The traits have been organized by tables, and those tables will be explained with a narrative that includes the statement regarding the trait being assessed, the participant's responses to survey items, the researcher's conclusions for each of those statements based on the comparison between quantitative and qualitative responses, and the use of the mixed-methods data to show and validate the correlation to the research questions when applicable. All data obtained in this study will correlate with research question three as this question takes into account the successes, shortcomings, and recommendations from staff to improve upon the current one-to-one technology program. This will aid in the determination of whether or not to expand the current program or to develop a plan of action to improve all areas regarding effective implementation.

Table 1

Communication of a Vision and Tenets of the Initiative

1. The 1:1 program was implemented as a result of a pedagogical paradigm shift that needed a 1:1 program to support it. A clear vision was communicated.
55 responses
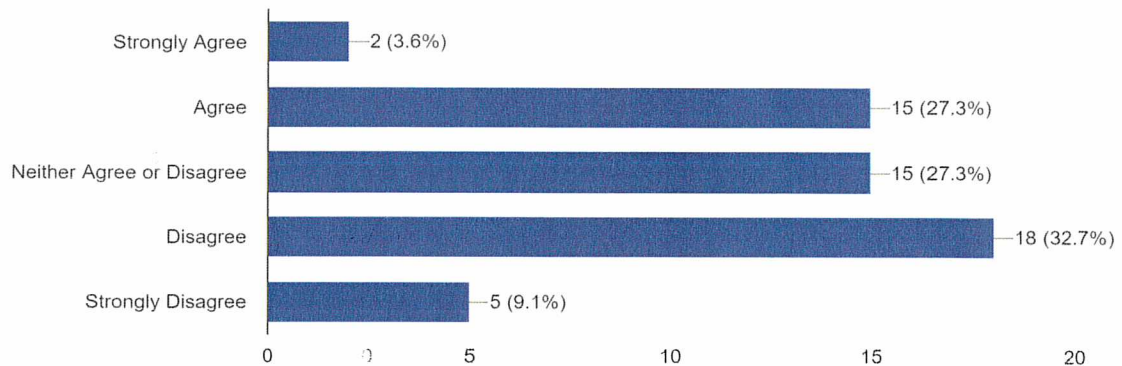
Table 1 reflects self-reported data from 55 participants regarding the clarity of the vision and goals set by the district to create an environment hospitable for one-to-one technology programming. Thirty and nine tenths percent of participants agreed, 27.3% are indifferent, and 41.8% disagreed that the vision was clearly conveyed. Results conclude that more research is needed to determine methods by which district officials can effectively communicate their pedagogical goals for the one-to-one technology program implementation. Shortcomings that were identified in the open-ended responses show a correlation that suggests that this particular characteristic was not communicated effectively as there was uncertainty regarding the communication of a clear vision that focuses on the process of a pedagogical paradigm shift. The fact that many respondents stated in the open-ended questions that they had little to no voice in the decision making process lends validity to the data that suggests evidence of the current program's ineffectiveness regarding this trait and correlates with the second research question

involving ineffective implementation characteristics.

Table 2

Teacher Involvement in Planning and Implementation

2. The teachers were involved in the planning and implementation of the district's 1:1 program.
55 responses
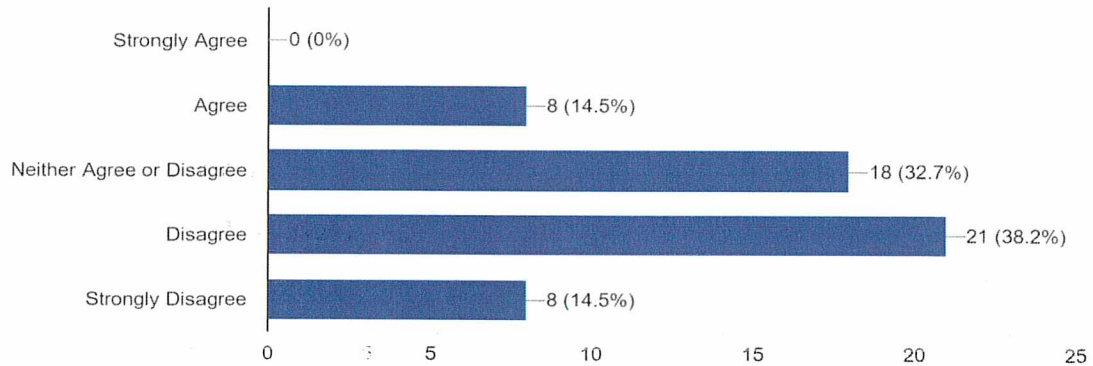
Table 2 reflects self-reported data from 55 participants on whether teachers were integrated and involved in the planning and implementation of the district's one-to-one technology program. Fourteen and five tenths percent of participants agreed, 32.7% were indifferent, and 52.7% disagreed that teachers were involved in the process. Results conclude that more research is needed to determine practices that include and incorporate teachers in the development and implementation of the one-to-one technology programming. As evidenced in the qualitative results, this trait was lacking from the district's program. Many teachers responded that they were not part of the decision to implement the one-to-one technology program, and were ultimately expected to infuse the technology without adequate planning and preparation time to do so. As a result, the data suggests that this characteristic was not made evident to the teachers as more than half of them responded that they felt this trait was not considered in the district's

implementation of the one-to-one technology program. The results of the data align with

the answer to research question number two.

Table 3

Modeling Behaviors of Digital Learners and Leaders

3. The teachers were fully on board and ready to model effective behaviors of digital leaders and learners.
55 responses
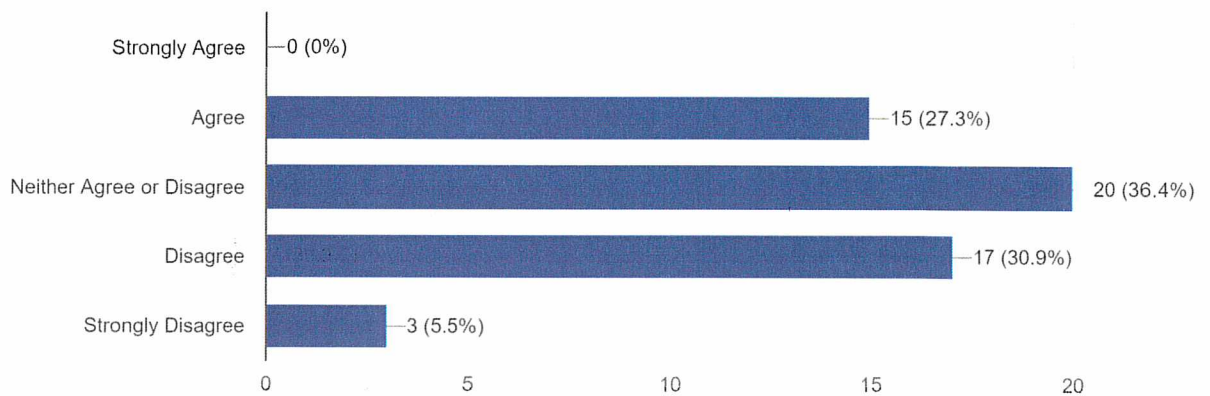
Table 3 reflects self-reported data from 55 participants regarding teacher buy-in

and execution of appropriate and effective digital modeling. Twenty-seven and three

tenths percent agreed, 36.4% were indifferent, and 36.4% disagreed that teachers were

invested or prepared to model effective digital behavior for leaders and learners. This

data concludes that there needs to be further questions asked pertaining to the presence of

this trait as the data is inconclusive with the teachers' perceptions being similar for the

agree and the disagree percentages. Although the quantitative data is inconclusive, the

open-ended responses suggested that staff buy-in should have been sought and that the

district should have provided professional development opportunities to train teachers to

model effective behaviors of digital leaders. Based on the data, it is unclear if the trait

was evident in the implementation, and moving forward, this trait should be improved

upon if implementation is to be expanded to grades one and two. The results correlate

with question number three as there needs to be a provision for professional development

for staff that will be infusing the technology and modeling effective behaviors of digital

leaders and learners.

Table 4

Thoughtful and Sequential Implementation

4. The 1:1 program was implemented in a thoughtful and sequential manner that began small with the teachers, grade levels and courses best suited for the initial implementation.
55 responses

Response	Count (Percentage)
Strongly Agree	0 (0%)
Agree	13 (23.6%)
Neither Agree or Disagree	14 (25.5%)
Disagree	21 (38.2%)
Strongly Disagree	8 (14.5%)
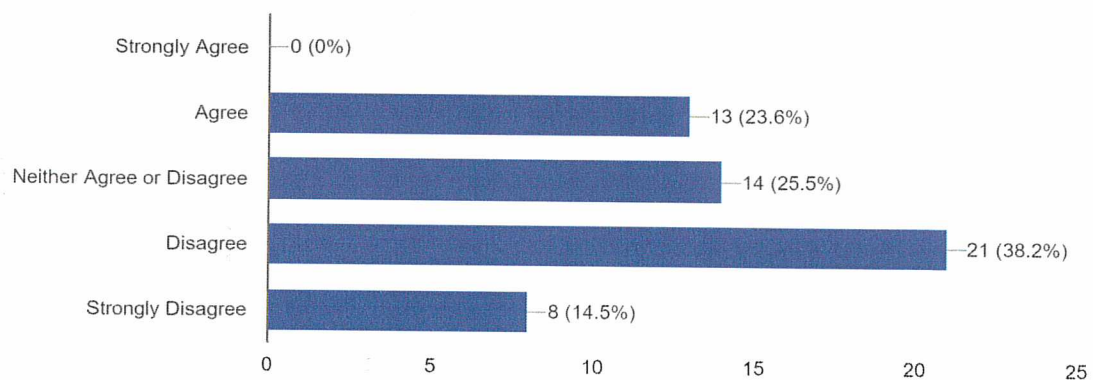
Table 4 reflects self-reported data from 55 participants regarding their perception of

whether the one-to-one technology program was implemented in a thoughtful and

sequential manner that began small with the teachers, grade levels and courses that were

best suited for a one-to-one initiative. Twenty-three and six tenths percent of participants

agreed, 25.5% were indifferent, and 52.7% disagreed that the program was implemented

in a thoughtful and sequential manner. Along with supporting data from the qualitative

component, the data suggests that teachers feel that the program was not implemented in

a thoughtful and sequential manner that involved trial groups prior to the implementation

of the one-to-one technology program. The results conclude that more should have been done on a smaller scale to determine the appropriateness of the program at various grade levels and in various courses. Data suggests that this trait was not as readily perceived as being present and answers research question number two.

Table 5

Support for Digital Networks and the Wireless Devices

5. Teachers were ensured that the district technology staff and their digital networks could support the large influx of wireless devices.
55 responses
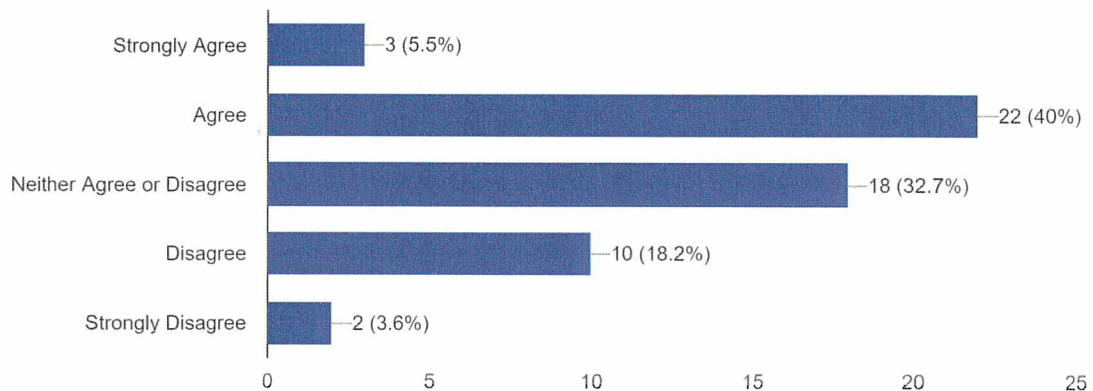
Table 5 reflects self-reported data from 55 participants regarding the assurance of technological resources and the ability to support the significant influx of wireless devices. Forty-five and five tenths of the participants agreed, 32.7% were indifferent, and 21.8% disagreed that teachers received adequate assurance that the technology department had significant resources and network capacity for the influx of wireless devices. Open-ended responses detail the importance of having added extra technology support and the district's efforts to ensure that technological resources and supports are in place. Results conclude that more research needs to be done to better understand how to

inform stakeholders of the capabilities of the digital network and the infrastructure that is present to support the large numbers of devices. The findings correlate to the first research question that shows that the 45.5% of the teachers feel that this trait was an effective component of the one-to-one initiative compared to the 21.8% who disagreed that is was.

Table 6

Initial and Ongoing Training to Address Instructional Shift

6. The district provided initial and ongoing training to support the teachers regarding the instructional shift to fully leverage 1:1 computing in their classrooms.
55 responses

Strongly Agree	0 (0%)
Agree	17 (30.9%)
Neither Agree or Disagree	9 (16.4%)
Disagree	24 (43.6%)
Strongly Disagree	5 (9.1%)
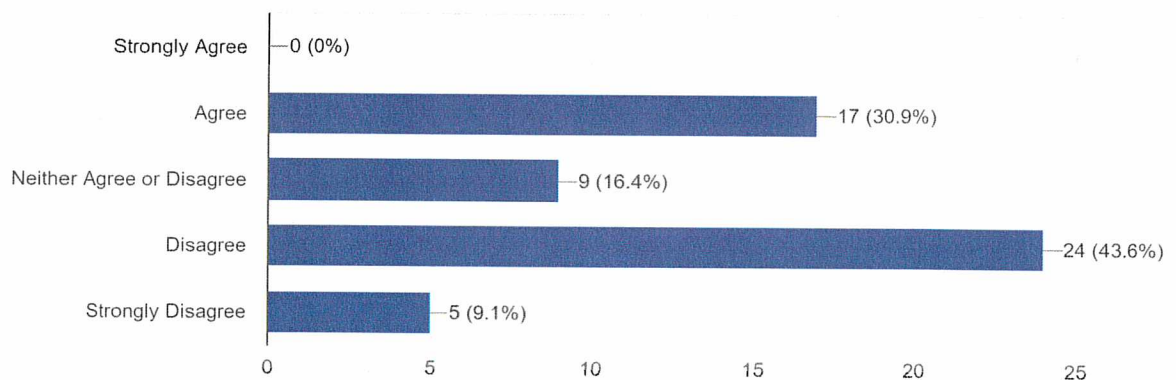
Table 6 reflects self-reported data from 55 participants regarding the district's training and support for teachers to address the instructional shift that is required for one-to-one technology program implementation. Thirty and nine tenths percent of participants agreed, 16.4% were indifferent, and 52.7% disagreed that the district provided the necessary training and supports necessary to address the instructional shift that a one-to-one technology program incurs to be effective. Additional findings show that more teachers felt that professional development and training opportunities should have been provided before the implementation and during the implementation to better

prepare them for the instructional shift that was being expected of them. The results

conclude that more should have been done regarding the training and supports afforded to

the teachers to assist them in the paradigm and instructional shifts. The data suggests that

this was another area that needs to be improved upon in the current program, and this is

another ineffectively implemented characteristic that needs to be addressed in the existing

one-to-one technology program and in the possible expansion of the program in grades

one and two. The results correlate to the second research question regarding what was

ineffective about the implementation of the current one-to-one technology program.

Table 7

Digital Curricula and Resources to Enhance Instruction

7. The teachers were provided with digital curricula or digital resources that would enhance their classroom instruction in order to implement the 1:1 initiative effectively.
55 responses
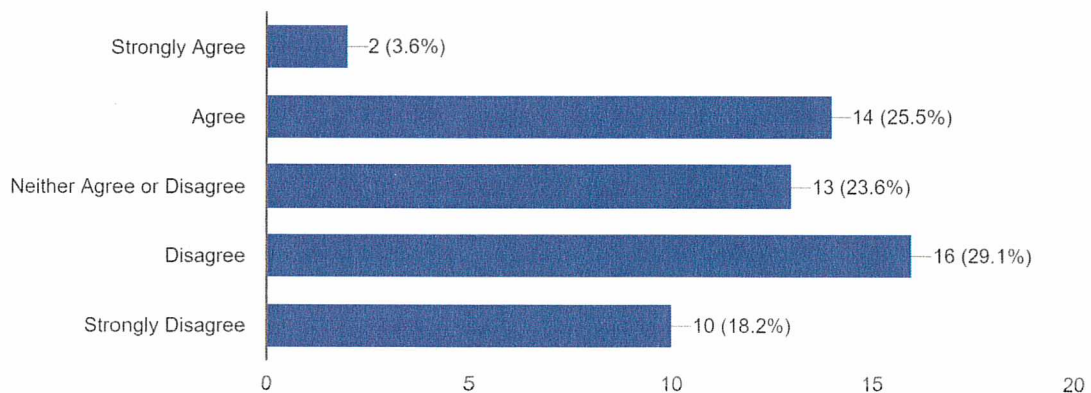
Table 7 reflects self-reported data from 55 participants regarding the district's

provision of digital curricula and resources to the teachers that would enhance their

instructional practices. Twenty-nine and one tenth percent of participants agreed, 23.6%

were indifferent, and 47.3% disagreed that the district provided the teachers with the

necessary digital resources to enhance their instruction. Open-ended responses support that more digital resources and curricula should have been researched and tested before the program was implemented. The results conclude that further research is necessary in order to better understand how to ensure that all stakeholders are being provided with the curricula and resources that they need in order to instruct using the one-to-one platform. As a result, the implementation of this trait has been identified as another area of deficiency pertaining to the district's current program, which correlates to the second guiding research question.

Table 8

Productivity, Collaboration and Communication Tools

8. The district employed web-based productivity, collaboration and communication tools to be used in the classrooms. Example: Google for Education Tools were utilized.
55 responses
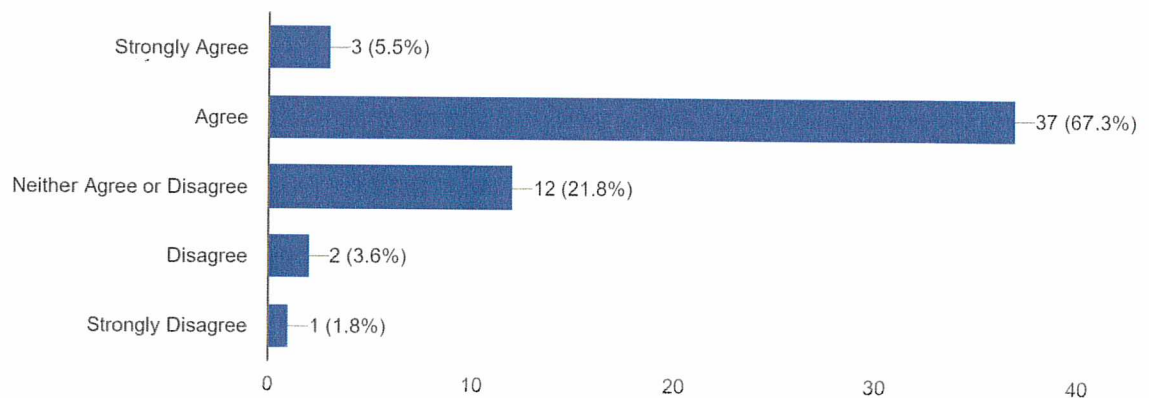
Table 8 reflects self-reported data from 55 participants regarding the district's implementation of web-based productivity, collaboration and communication tools that were used in the classrooms. Seventy-two and eight tenths percent of participants agreed, 21.8% were indifferent, and 5.4% disagreed that the district employed an appropriate

technological tool such as Google for Education as part of the instructional and

operational platform. Based on the open-ended feedback from staff, it has been

suggested that the district effectively employed a web-based productivity, collaboration

and communication tool for teachers to use in the classroom. Many staff members

indicated that the Google platform has been a necessary and meaningful tool in the

infusion of technology in their classrooms. The results conclude that the district did

effectively employ a technology tool that enhanced teaching and learning, and provides

strong evidence that this characteristic was successfully implemented in the current one-

to-one technology program.

Table 9

Efforts to Ensure Connectivity at Home

9. Efforts were made by the school district to ensure that the students who were given 1:1 devices
had home internet access.
55 responses
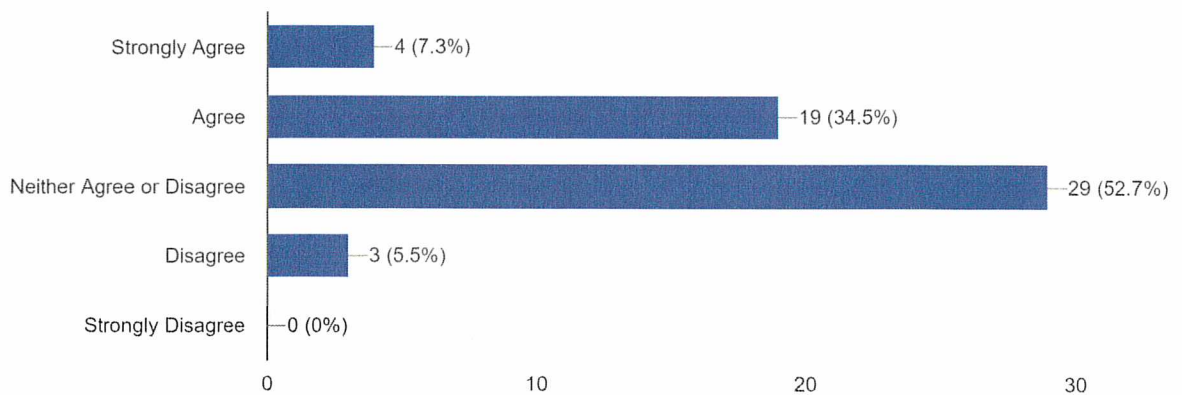
Table 9 reflects self-reported data from 55 participants regarding the efforts that

were made by the district to ensure that students who were given devices had home

internet access. Forty-one and eight tenths percent of participants agreed, 52.7% were

indifferent, and 5.5% disagreed that the district made efforts to ensure the home connectivity for the students. As reflected in the qualitative data, many staff members indicate that they were aware of the programs that were afforded to families who did not have internet access. These programs were offered through internet providers who instituted free internet availability for families whose children qualified for free or reduced meals. Several open-ended responses acknowledged the district's attempt to communicate the availability of these programs to all parents of school aged children. The results provide evidence and support for the first research question that identifies this characteristic as a perceived success of the one-to-one technology program.

Table 10

Funding for One-to-One Technology Programs

10. Efforts were made to ensure that funding was in place to support the 1:1 program.
55 responses
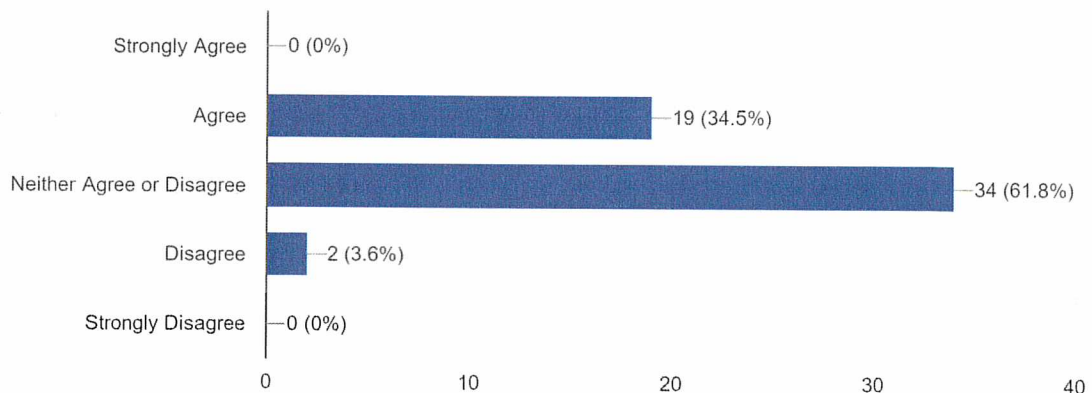
Table 10 reflects self-reported data from 55 participants regarding the district's efforts to provide the financial resources to support the one-to-one technology program. Thirty-four and five tenths percent of participants agreed, 61.8% were indifferent, and 3.6% disagreed that the district accounted for the financial support that is necessary to

support the short-term and long-term needs of the one-to-one technology program. The results conclude that further research needs to be done in order to communicate and make the financial obligations more transparent to all stakeholders. With 61.8% of staff perception being non-committal in nature, perhaps funding is a characteristic that is outside of the teachers' awareness. As with any program, fiscal implications need to be heavily considered when assessing the fidelity of any initiative. The qualitative data did not provide any references to financial implications, but some responses detailed the need for additional technology personnel to maintain the infrastructure and the devices. The results of these findings correlate to research question one that refers to a perceived effective attribute associated with the current one-to-one technology program.

Table 11

Types of Devices Chosen for One-to-One Programs

11. Thought was given towards the types of 1:1 devices (Chromebooks) that would be employed by the district.
55 responses
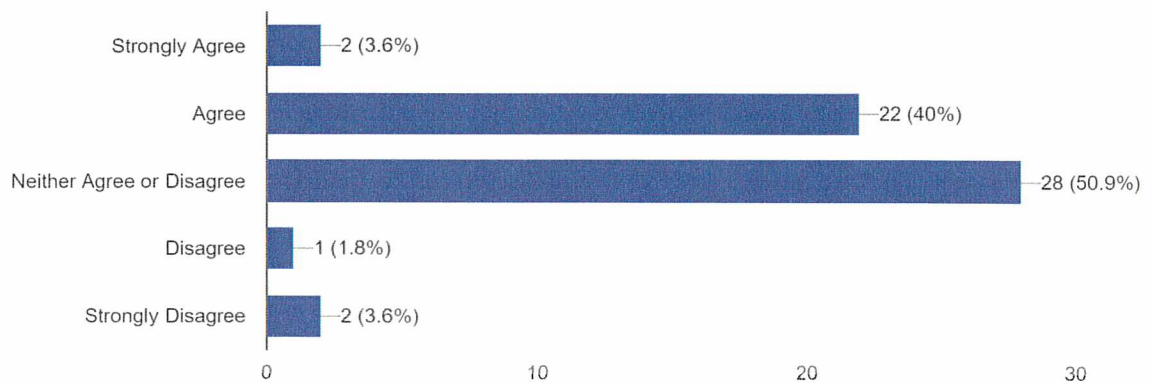
Table 11 reflects self-reported data from 55 participants regarding the thought that was given towards the devices to be used. Forty-three and six tenths percent of respondents agreed, 50.9% were indifferent, and 5.4% disagreed that thought was given

to the types of devices that were employed in the district. The results indicate that more

research needs to be conducted regarding the process and how the final decision was

made regarding the employed devices. There was no qualitative data that alluded to the

type of devices that were chosen. With 50.9% of the participants being non-committal,

perhaps those teachers' were not aware of the process utilized to determine the final

choice for devices to be employed. With 43.6% of the teachers agreeing that thought was

given, compared to the 5.4% who disagreed, the findings correlate to answering research

question one.

Table 12

Strategies for Balancing Screen Time

12. The implementation considered strategies that balanced student screen time throughout their school day.

55 responses
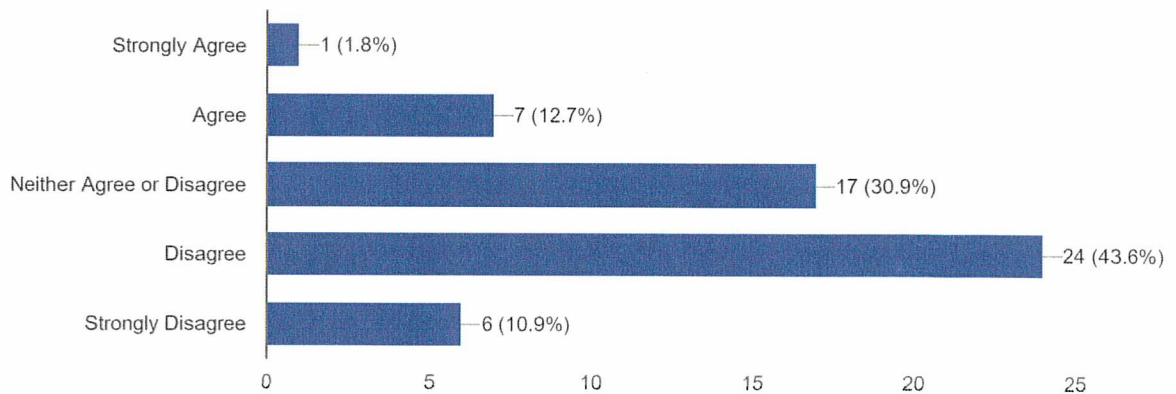
Table 12 reflects self-reported data from 55 participants regarding the

consideration of the implementation plan to consider strategies that balanced student

screen time during a school day. Fourteen and five tenths percent of participants agreed,

30.9% were indifferent, and 54.5% disagreed that the implementation plan considered

strategies that balanced student screen time. The results conclude that a majority of the

staff feel that balanced screen time was not considered as part of the implementation

plan. Open-ended responses justify the teachers' perceptions as a number of the

responses mentioned the need for policies that contribute to the appropriate use of

technology and the need for taking breaks from the technology. As a result, more

research will need to be conducted to garner information that will provide the district

leaders a better understanding of the effects of technology on students at various ages and

incorporation of strategies to establish balance of a student's screen time. The data

suggest that this characteristic was perceived to not be evident in the implementation as a

majority of the respondents indicated. The results correlate to the second research

question regarding what is perceived to not be effective about the current program.

Table 13

Digital Citizenship and Acceptable Use

13. The district emphasized the importance of digital citizenship with their students in order for the students to appropriately utilize their devices.
55 responses
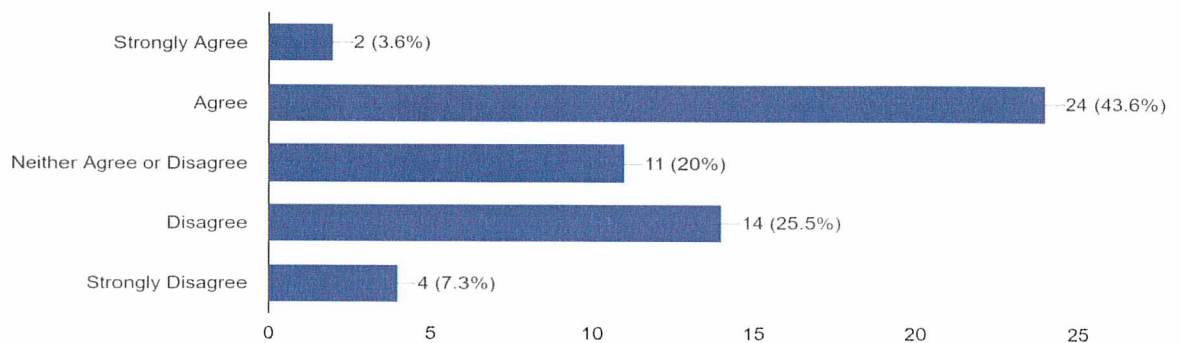
Table 13 reflects self-reported data from 55 participants regarding the district's

perceived emphasis on the importance of digital citizenship in order for students to utilize

the technology. Forty-seven and two tenths percent of participants agreed, 20% were

indifferent, and 32.8% disagreed that the district emphasized the importance of digital

citizenship with the students. The results conclude that the teachers were divided on their

feelings pertaining to whether or not the district emphasized digital citizenship with the

students. Regarding the qualitative findings, teachers stated that more needed to be done

to educate students on the appropriate use of technology to allow them to become more

astute digital citizens. Teachers went on to express the need for student training on how

to effectively utilize the technology that the student possesses, along with understanding

the implications of inappropriate uses and how it can impact their futures. Further

research needs to be done regarding how digital citizenship was communicated and

reinforced with the students. Based on the findings, the data indicate that the teachers

perceive this trait as being an effective component of the program. The results correlate

to question number one.

Table 14

Monitoring of the One-to-One Technology Program

14. The district held reviews and asked for feedback over the past three years regarding the
successes and shortcomings of the 1:1 program.
55 responses
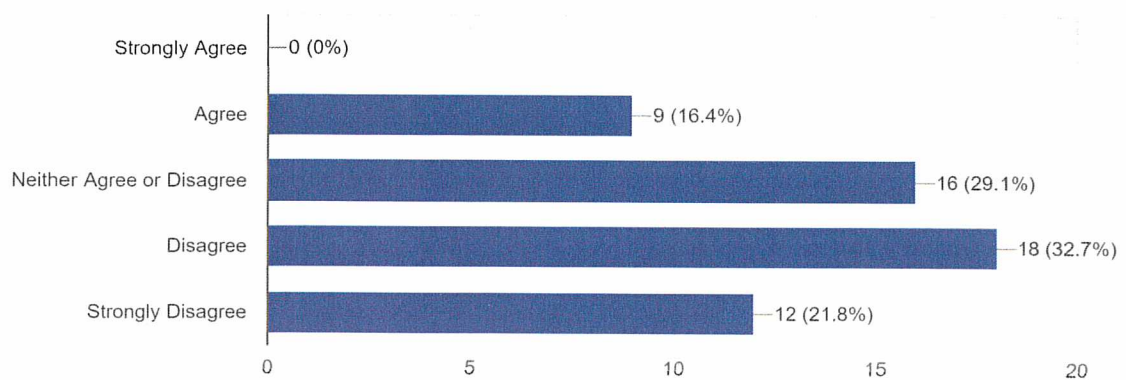
Table 14 reflects self-reported data from 55 participants regarding their perception

pertaining to the district's review of the current program and its use of feedback to determine the successes and shortcomings of the one-to-one technology program. Sixteen and four tenths percent of participants agreed, 29.1% were indifferent, and 54.5% disagreed that the district held reviews in order to assess the current one-to-one technology program. Responses from the open-ended questions describe the lack of oversight regarding the one-to-one technology program. One particular respondent acknowledged the fact that having three technology coordinators in four years has been a detriment to the program. The results conclude that many teachers were either unaware of these reviews or believe that no reviews of the one-to-one technology program occurred. Further investigation needs to be done pertaining to reviews of the program and whether or not these reviews have occurred. This component correlates with the second research question.

Correlation to Research Questions

The tables above reflect many of the aspects related to the district's current one-to-one technology program. Each table takes into account the data from a mixed-methods approach, the findings associated with that data, a discussion pertaining to the interpretation of those findings, and the correlation between the attribute and the guiding research questions. In many of those categories, further research needs to be done so that improvements can be made to the current program, and an informed decision can be made regarding the expansion of the program.

Correlation of data to research question 1

Regarding research question number one and the effectiveness of implementation of the current one-to-one technology program, there are few items that were identified as

effective practices. The first perceived success is the district's assurance to the staff that the availability of technological resources and the ability to support the significant influx of wireless devices would be available. Both types of data suggest that the staff perceptions regarding this component were favorable and felt that the district made the concerted effort to ensure that the infrastructure, hardware, software and technological support were made available to maintain the needs of the one-to-one technology program.

Another perceived success is in the realm of the district's implementation of web-based productivity, collaboration, and communication tools that were used in the classrooms. The findings suggest that the district employed a robust teaching and learning platform in the form of Google Classroom. Teachers indicate that the platform has helped to enhance their instructional efficacy by allowing for greater flexibility in their instruction, which allows for greater differentiation of content in a single classroom setting.

When looking at the district's approach to ensure that home internet access for students was made available, the data indicates that the teachers' perception regarded this endeavor as a success. Some data evidences the district's outreach to families regarding free internet services for those families who are economically disadvantaged in order to provide them with digital opportunities in the household. Some respondents went on to indicate the importance of 24/7 access to all students to increase learning opportunities for all students. It has been suggested that internet access for all creates opportunities for digital connections for the entire family not just the student.

Pertaining to funding, the teachers indicate an assurance that the one-to-one technology program would be maintained and sustained through the availability of

technological resources and the support needed to maintain those resources. In order for these assurances to occur, the district had to commit financial resources to ensure the sustainability of the program long-term. The teachers' perceptions regarding the school district's financial commitment was shaped by these assurances.

In consideration of the types of one-to-one devices, the district's choice of Chromebooks was another success. The employment of Chromebooks for grades three through twelve provided the students the best possible device in terms of durability and functionality when it comes to research, writing, and access to other digital resources.

Another item perceived by the teachers as a success of the implementation of the one-to-one technology program is the efforts put forth to emphasize digital citizenship education for the students. Many teachers believe that digital citizenship is necessary in order for students to become more responsible with the digital tools that are afforded to them along with an understanding of the positive and negative impacts that technology plays in their lives. Many teachers referred to improved digital age skills or 21st century skills that will allow our students to compete in a global economy.

Regarding the responses of the open-ended data about the perceived successes, the most common, reported success was identified as the use of Google Classroom as a powerful communication, collaboration, and instructional tool. Forty-three and six tenths percent of the respondents stated that the functionality of Google Classroom to enhance communication and instruction has been considered a success of the program. Thirty and nine tenths percent of respondents say that another success of the one-to-one technology program is that all students now have access to technology and the vast opportunities and access to resources that it affords. The next most common trend found in the qualitative

data was that 18.2% of respondents stated that it has enhanced the quality of student work by providing them with the tools to develop their digital age skills. Another common item that was communicated as a success was that the infrastructure and online access has been stable and reliable within the buildings. Three and six tenths percent of respondents noted this as a success. Finally, the last area of success that was mentioned by 3.6% of the respondents alluded to the fact that money has been saved pertaining to paper costs due to more of the work being digital.

Correlation of data to research question 2

As indicated in the data analysis of each table, the perceived ineffective traits of the current program correlate to guiding question number two which asks, "How was the implementation of the one-to-one technology program not effective?" This question enveloped a greater number of traits that were perceived by staff to be less evident in the current program. Although these traits were deemed to be not as effective, it is important to note that all the traits can be improved upon to ensure that the program can be improved. The following is a re-iteration of the results from the data analysis for each table that was determined to be a characteristic that was not effectively implemented in the program.

The implementation of the one-to-one technology program was a pedagogical paradigm shift that was poorly communicated to staff. 41.8% believe that no clear vision for the program had been communicated as opposed to 30.9% who say that it was. From the results of the quantitative data, along with 7.3% of respondents of the open-ended data, it appears that the program was implemented without a clear articulation of the vision, goals and expectations of the program. As a result, these shortcomings will need

to be addressed in order to improve communications pertaining to the current program relative to the paradigm shift, and planning for communicating the vision, goals and expectations of the expansion to grades one and two, if it occurs.

The data from table two shows that 52.7% of the teachers feel that they were not involved in the planning of the implementation process. Open-ended responses show that over 12.7% of teachers stated that they were not asked to be included or involved in the decision making process. Many feel that they should have been consulted and greater buy-in should have been a necessity before the district put technology into the hands of the students.

Table three shows that more should have been done to get more staff buy-in before the implementation of the program. In order for this to have occurred, staff should have been a part of the initial planning. By involving them in this process, more time would have been given to better prepare for the implementation which would have provided the teachers ample professional development opportunities and trainings that would allow them to model the effective behaviors of digital leaders and learners. Eighteen and two tenths percent of the open-ended responses pointed to the need for greater preparation time that would have afforded the teachers with more opportunities for professional development.

Table four examines whether the program was implemented in a thoughtful and sequential manner. Based on 52.7% of respondents, it was evident that the teachers were not involved in the planning of the implementation of the one-to-one initiative because many believe that it should have been done on a smaller scale before implementing district wide. It is the perception of many that essential feedback pertaining to the

devices and their functionality would have been helpful before a full scale implementation. Many issues that arose pertaining to the devices and their functionality may have been alleviated if a small scale approach to implementation was trialed. A better understanding for the use of technology in various grade levels or in certain courses would have allowed the staff a better understanding of the capabilities of the technology in regards to the students and the discipline that they teach.

Table six shows that the district did not do its due diligence in supporting the teachers by providing ongoing training to assist them with making the instructional shift that is required through one-to-one computing. Fifty-two and seven tenths percent of the respondents re-iterated the need for more training and professional development offerings to aid them in developing their own technological efficacy. Thirty-two and seven tenths percent of responses from the open-ended questions identify the need for more training and targeted professional development.

Table seven shows that 47.3% of teachers feel that the district did not provide them with the necessary digital resources or curricula that would be needed to best utilize the technology in the classrooms. Ten and nine tenths percent of the open-ended responses indicate that digital resources and curricula should have been researched and tested prior to full implementation. This lack of planning or thought regarding digital resources placed stress on teachers to incorporate or infuse technology into their lessons without providing them with a clear understanding of available curricula and resources.

Table twelve considers the strategies that can be employed to balance student screen time throughout the day. The results show that 54.5% of teachers feel that this was not a consideration in the planning for implementation. It has been indicated by

10.9% of the teachers in the open-ended responses that students are constantly on their devices even when they are not using them for instructional purposes. The teachers allude to the fact that some students are using the devices inappropriately by constantly being on social media or gaming sites. Several teachers recommended incorporating time during the day for students to disconnect from all technology.

Table fourteen shows the teachers' perceptions indicating the lack of oversight regarding the one-to-one technology program. As with any initiative, an assessment of the initiative should occur so as to make recommendations for change if needed. Fifty-four and five tenths percent of the teachers feel that there has not been a review of the program since the inception of the program. Further investigation needs to be done to determine if there were opportunities for staff to provide feedback to the administration regarding the successes or shortcomings of the one-to-one technology program.

Correlation of data to research question 3

In response to the correlation of data to answer the third research question, all data collected correlate to, "How can we make the implementation of the one-to-one technology program in grades one and two more effective?" The quantitative data identified areas that are perceived as being successful or in need of improvement, while the qualitative data provided a less structured solicitation of responses that allowed respondents to answer without limitation. When looking at the current program in a comprehensive manner, each of the characteristics of successful one-to-one technology programs will need to be addressed in the improvement plan. It is important to note that all characteristics can be improved upon and will only serve to enhance the program. When determining if the expansion of the program to grades one and two is appropriate,

the data will provide the district leadership with the information necessary to make an informed decision regarding the expansion. If the decision is made to expand the program to grades one and two, the assessment tool can be utilized to guide the processes and to ensure that the initiative can be implemented with fidelity.

Summary

Chapter 4 focused on the analysis of the quantitative and qualitative results from the questionnaire that were given to staff that were a part of the one-to-one technology program at its inception. The data focused on the fourteen traits that are found to be consistent with highly effective one-to-one technology programs. The analysis of data allowed for the findings to correlate with the three guiding research questions. As a result of that correlation, each of the questions can be assessed further in order to provide more developed conclusions and recommendations regarding the action research.

Chapter V

Conclusions and Recommendations

Introduction

Chapter 5 will enumerate the conclusions derived from the analysis of data collected from the survey that was administered to all teachers who were a part of the one-to-one technology initiative from its onset. The teachers' perceptions of the program were obtained from their analysis of fourteen indicators that the researcher identified as essential characteristics evidenced in effective one-to-one technology programs. This chapter will address the researcher's conclusions and recommendations as to how those conclusions can be utilized to enhance the existing program or to aid in the expansion of the current program if deemed appropriate. This chapter will also highlight the fiscal implications that were reflected in the study, along with recommendations for future research.

Conclusions and Recommendations

The conclusions from the research will be delineated according to each effective trait that was used as a part of the survey. These traits are all evident in successful one-to-one technology initiatives. Each trait will be explained in greater detail in order to focus on the effectiveness of the intervention as dictated by results of the data. Each of these areas will address the recommendations for applying that particular characteristic in a district setting while highlighting the implications of improvements that could be made in the current one-to-one technology program, and recommendations for possible expansion of the program in grades one and two. The final recommendation will address those educational entities that are looking to implement a one-to-one technology initiative

and provide them with the necessary data that will allow them to plan and implement their programs with fidelity. This is providing that they choose to move forward with implementation.

Trait 1: Communication of vision and tenets of the initiative

Item number one refers to the one-to-one technology program being communicated and implemented as a result of a pedagogical paradigm shift that requires a one-to-one technology program to support it. According to the data that is supported in Table 1, it is evident to the researcher that the district did not effectively communicate a clear vision to all stakeholders regarding the implementation of the one-to-one technology program to support the pedagogical paradigm shift that a one-to-one technology program requires. Though 30.9% of the respondents agreed that the vision for the one-to-one technology program was clearly communicated to the stakeholders, the results show that 41.8% disagree that the reason for the program was communicated. The 27.3% who were non-committal in their responses leads the researcher to believe that more should have been done to communicate the vision, goals and objectives of the one-to-one initiative before the actual implementation. This belief is further supported by the numerous open-ended responses that stated the need for greater communication for why the program was being implemented and why it was rolled out abruptly without regard to its impact on instructional practices. The researcher believes that there should have been a higher response total in the agree categories if the district had taken the necessary time to exercise the tenets associated with effective trait one.

Moving forward, a recommendation for the current program is to ensure that future communications are timely and address the tenets behind the implementation of

any new or miscommunicated aspects of the program. The recommendation also affirms that more time is needed to engage all stakeholders and garner buy-in to better understand how to incorporate technology into current instructional practices that are a result of the pedagogical evolution that is occurring in the educational environment. The second recommendation is to ensure that this component is a part of a district's comprehensive plan when looking to introduce or implement a one-to-one technology program. This recommendation can be applied to the existing program as it looks to expand the program further, and to school entities looking to implement a program. It is critical to understand that great care needs to be taken to not move in haste concerning the planning phase, and to include a wide-range of stakeholders so as to gather as much data to gain a more comprehensive understanding of the successes that the program envisions, as well as the hurdles that it may encounter. It is important to weigh the pros and cons to determine if the endeavor is worthwhile in the realization of district educational goals and whether those educational goals warrant the financial commitment needed to implement, maintain and sustain the program.

Trait 2: Teacher involvement in planning and implementation

The second trait associated with effective one-to-one technology programs shows the necessity of having teachers be a part of the planning and implementation of the program. According to the results from Table 2, the evidence suggests that very few teachers were involved in the planning and implementation process. An overwhelming 52.7% of respondents disagree that the district included them in the decision making process. This is supported by open-ended data that specifically state that the teachers were not involved in the decisions leading to the implementation of the program in the

district. Based on the research conducted and the data garnered from the results of the intervention, it is paramount that teachers need to be included in decisions that directly impact them and their instructional practices.

One recommendation for the introduction of this factor in the current program entails the involvement of stakeholders in the acquisition of software and changes to the hardware moving forward. Due to the program's significant impact on teaching and instructional practices, any changes to the current program or any upgrade needs to be communicated and researched for future implementation. Regarding the impact of this factor on a new program, it is essential to have stakeholder involvement so that more data and information can be obtained or derived from multiple viewpoints.

Trait 3: Modeling behaviors of digital leaders and learners

Professional development and training are essential characteristics associated with successfully implemented one-to-one initiatives. If students are expected to utilize technology appropriately, it is necessary for leaders to be able to model those appropriate behaviors associated with the effective utilization of technology. The results in Table 3 show that 36.4% of all respondents feel that the district did not provide enough professional development trainings in order to develop the skills needed for teachers to model effective digital behaviors to become digital leaders. It is the perception of staff that the district did not provide enough teacher trainings or targeted trainings over the past four years to enhance their digital capabilities in the classroom.

Recommendations for the current program are to provide teachers with targeted trainings that will allow them to develop personal and professional efficacy with regards to technology implementation. This efficacy can be significantly improved through

personalized professional development opportunities that will focus on the individual needs of each teacher. Though the current program is already in place, teacher training can still be implemented to provide the skills to best infuse the tenets of the one-to-one technology program into their instructional practices. For those who are considering implementation of a one-to-one technology initiative, it is important to take the necessary time to provide all staff members with the training that will enhance their digital skills to adeptly incorporate technology in their classroom and to ensure that they are modeling appropriate digital behaviors. If this occurs prior to implementation, this will allow them to become digital leaders in their classrooms.

Trait 4: Thoughtful and sequential implementation

Pertaining to the thoughtful and sequential implementation of the current program, 52.7% of the teachers feel that this was not done appropriately. Along with supporting data from the open-ended responses, it has become evident that the teachers were not involved in the planning and implementation process. No small scale implementation was conducted in order to garner feedback pertaining to the use of technology in the classroom, thus more should have been done to determine if the technology was appropriate for certain grade levels or particular courses of study. Instead, the current program was implemented, and teachers were forced to implement the technology into their instructional practices without first understanding how to effectively do so.

A recommendation for the current program would be to allow teachers the flexibility to pilot various programs, curricula or other digital supports before moving forward with the purchase of those resources. If the one-to-one technology program is to

be expanded to grades one and two, the teachers should have the opportunity to pilot the possible devices the students may be using and the technological resources that they may be employing in their classroom to determine if it is appropriate for that grade level or that discipline. Before issuing a device to the students, further feedback regarding the best type of device to employ should also be ascertained in the trials. For entities that are determining if one-to-one is a way to go, it is important to consider the types of devices and the resources that may be utilized on those devices before making a hasty decision that will incur a significant financial commitment. It is important to take the necessary time to gather enough data to make an informed, data-driven decision for implementation.

Trait 5: Support for the digital networks and the wireless devices

The results from Table 5 show that 45.5% of teachers agree that assurances were made regarding the district's support for the digital networks and their capabilities to support the large influx of wireless devices that could be managed by the district technology staff. Though this number does not indicate a strong correlation that this factor was considered in the planning of the current program, it is worth noting that perceived assurances of support, whether intentional or not by the district, must have been communicated to the staff in some manner to elicit the number of agrees compared to the 21.8% who disagree. Due to the newness of the buildings in the district, the digital infrastructure has been upgraded and staff members that were surveyed have been a part of the upgrades and were aware of the benefits of those upgrades. As a result, the researcher contends that it is for this reason that there was a favorable response to this particular factor.

A recommendation to further assure staff that the networks can sustain the high numbers of devices would be for the technology department to send out an annual communique regarding the current state of the technology department that provides information regarding all aspects of the program, including information regarding technology support staff, current state of the infrastructure and upgrades to that infrastructure, the number of devices being employed and maintained, and the plan for ensuring that the technology does not become obsolete or antiquated in nature. Before moving to a one-to-one technology initiative, school entities must be sure that they have the proper infrastructure and manpower in place to manage the needs that accompany a program. Providing infrastructure and manpower will result in a definite financial commitment to initiate and sustain the program.

Trait 6: Initial and ongoing training to address instructional shift

An essential component of effective one-to-one technology initiatives is the provision for initial and ongoing professional development opportunities to help teachers fully leverage one-to-one computing in their classrooms as part of the shift in instructional practices. As indicated by the results of Table 6, 52.7% of the teachers disagreed that the district provided the initial support or the ongoing support to better prepare them for the instructional shift that occurred in order to facilitate one-to-one technology in their classrooms. Further open-ended responses concur that many staff members felt ill-equipped to infuse technology without adequate training. Some stated that the program was initiated with very little to no professional development opportunities, and staff members were ill-equipped and unprepared to effectively adjust and infuse the technology in their classrooms. More should have been done before the

roll out of the program in order to provide teachers with the skills and tools necessary to infuse technology in their instructional practices.

A recommendation to improve upon the current program would be to provide targeted professional development for teachers that meet their specific needs. Not all professional development should be a one-size fits all approach as there are many resources and practices that are very specific to grade levels and disciplines being taught. In order to determine if the program should be expanded in grades one and two, teachers at those levels need to be exposed to professional development opportunities that can provide them with experiences that will allow them to understand how technology can be used at their grade level to enhance their instruction. This exposure can provide the district with essential feedback regarding whether or not the infusion of technology will have a positive effect on teaching and learning. For districts that are looking to implement a one-to-one technology initiative, ample time should be provided for teacher trainings prior to a program's implementation. Once the program has been initiated, great care needs to be taken by leadership to ensure a continuous and targeted approach towards professional development to address the pedagogical paradigm shift that will fully leverage one-to-one computing in all classrooms.

Trait 7: Digital curricula and resources to enhance instruction

Providing teachers with digital curriculum or resources that will enhance their instruction is a best practice that is employed in successful one-to-one schools. Table 7 shows that 47.3% of the teachers feel that the district did not do enough to provide the teachers with the resources needed to strengthen their instructional practices. Open-ended responses state that resources should have been provided prior to the

implementation so that decisions made pertaining to the curriculum or other digital resources could have been thoroughly vetted for the most appropriate resources to be employed. Due to the financial implications that come with purchasing curricula and other educational resources, time should have been provided to pilot and trial these digital resources before a determination for purchase was made. Due to the lack of vetting, the district spent money on digital resources that were found to be lacking or inappropriate for use at various grade levels or in various courses.

One recommendation to improve the current program is to allow teachers to pilot or test possible curricula or resources that could be implemented at a later time. With more than one teacher piloting digital curriculum or related digital resources, appropriate feedback can be collected and shared with district administration to make the best decision in regards to curriculum at a particular grade level or in a particular course of study. When considering the expansion of the program in grades one and two, teachers should be afforded the opportunity to pilot multiple curricula and digital programs to assess their appropriateness and functionality in regards to their current educational practices. For those looking to implement a program, a recommendation to thoroughly vet curricula and resources is a necessity in order to make an informed decision, especially one that carries a hefty financial obligation.

Trait 8: Productivity, collaboration and communication tools

As identified with successful one-to-one technology initiatives, the employment of well thought out web-based productivity, collaboration and communication tools are essential for increasing a teacher's efficacy in infusing technology in the classroom. The results shown in Table 8 indicate that 72.8% of all teachers agree that the district

employed a highly effective technological tool in the form of Google Classroom

platform. Open-ended responses praise the use of Google Classroom and its multi-

faceted functions that have assisted the teachers in their efforts to incorporate technology

in their lessons.

A recommendation for improvement regarding our current program would be to

offer continued training pertaining to the Google Classroom platform. These ongoing

training opportunities will expose teachers to other multi-faceted functions of the

platform to which they may not be familiar. Though favorable responses were indicated,

there is always room to improve. For those entities that are looking for a platform to

utilize in their initiative, a recommendation is to research the many platforms that are

available on the market, and choose the one that best meets the district's needs. As with

professional development, one size does not fit all, and it is important for educational

entities to choose a platform that will be most appropriate to meet their educational

needs.

Trait 9: Efforts to ensure student connectivity at home

Successful one-to-one technology programs ensure that students who are given

devices have access to internet at home. As shown in Table 9, 41.8% of the teachers

agree that the district made efforts to confirm that students were connected to the internet

in their homes. A response of one staff member alluded to the district's communications

asking for anyone who did not have internet access to contact the school so that the

district could assist them in gaining access. In all cases, homes that did not have internet

access were found to be economically-disadvantaged families, and the school was able to

assist those families in providing them the necessary contacts to acquire free internet

services.

A recommendation for the current program is to provide all parents with information regarding free internet services when their child is issued a device. When students are given a school issued device, the parents receive forms regarding insurance options and acceptable use guidelines. When these forms are provided, the district could send a form that addresses the acquisition of free internet for families who do not have the means to afford it. For educational entities that are looking to implement a one-to-one initiative, internet access for all students is a necessity to give them equal opportunities to access learning twenty-four hours a day, seven days a week. It is for this reason that a comprehensive technology plan should include a process for ensuring that all students are afforded internet access regardless of their ability to pay for such services.

Trait 10: Funding for one-to-one technology programs

One of the most highly prolific traits found in successful one-to-one technology programs is the certainty of the availability of funds to implement, maintain and sustain the program. Due to the financial implications that are required to conduct a program with fidelity, a short-term and long-term approach towards funding the program needs to be heavily considered before making the determination to move forward with the initiative. Though money is needed up front to ensure that the infrastructure, devices and support personnel are in place, a holistic vision for the program must be realized to plan for costs over the course of the initiative. It would be a travesty to implement a program and then have to shut it down due to a lack of funding. It is for this reason that 34.5% of the teachers agree that funding had been in place as opposed to the 3.6% who disagreed that the district ensured that funding was in place.

Regarding the current program, the district has ensured that funding is available to sustain the program. Money for the upgrading of infrastructure, purchasing of new devices and the hiring of personnel to support the technology plan has been set aside and is a priority for future funding. If the district chooses to expand the program in grades one and two, the financial commitment towards the purchase of new devices for two grade levels will need to be considered. Through the addition of 300 new devices, the district will need to make certain that the network can support the additional wireless devices, along with support personnel to repair and maintain the devices. For any educational entity considering a program, a thorough analysis of the costs to implement that program needs to account for many scenarios that account for unforeseen circumstances, such as batches of devices that are defective or what to do when devices become unusable at the end of their warranty.

Trait 11: Types of devices chosen for one-to-one technology program

The types of devices that are utilized for one-to-one technology programs should always be researched and chosen based on their functionality in relation to the educational outcomes the district is expecting. According to the results in Table 11, 43.6% of teachers indicate that the district gave thought to the implementation of Chromebooks from grades three through twelve as opposed to 5.4% who disagree. The results indicate that the teachers believe that thought was given to the types of devices that would be used in grades three through twelve. By examining the functionality of a device and how the device meets the expected instructional outcomes, decisions can be made to justify the expenditures for the purchase of those devices.

A recommendation for the current program would be to continue utilizing the

Chromebooks in grades three through twelve as their functionality has been proven to meet the educational outcomes for both the teachers and the students. In regards to the expansion of the program in grades one and two, research will need to be conducted regarding the types of devices that will be best suit students in those grade levels, along with great consideration given to the curricula or resources that the district is looking to implement in those grades. For educational entities looking to implement a one-to-one initiative, a recommendation is to take the necessary time to assess the devices that are available and to determine which one will best meet the needs of their instructional vision. Multiple types of devices may be employed based on consideration of the student's age and what digital functions they will need to use for instruction. Due to the financial implications regarding the purchase and maintenance of the devices, it is important to not move in haste and to thoroughly evaluate these devices.

Trait 12: Strategies for balancing screen time

As evidenced in highly effective one-to-one technology programs, procedures are in place that provide for a balance of screen time throughout a student's day. Research shows that screen time should vary based on the age of the student and that all students need a break from technology during their day. Table 12 shows that 54.5% of teachers disagreed that the district considered strategies to implement that provided guidelines for balanced screen time in a student's day. Several open-ended responses state that too many students are using their devices for non-educational purposes and not taking breaks from them. Teachers report that students, when not engaged in educational use of their Chromebooks, are using their down time for gaming and social media purposes.

A recommendation for improvement in the current program is to implement a

policy to provide technology-free time. As stated above, students are constantly utilizing their devices for gaming and social media during down time such as lunch and independent study times. More needs to be done by the district administration to communicate times, especially for younger students that should account for device free or technology free times throughout the school day. When considering the expansion in grades one and two, the teachers will need to actively determine when and how the devices will be used during the school day. A plan for screen time should be put in place district-wide moving forward. Regarding educational entities who are considering one-to-one implementation, a plan for balanced screen time will be an essential component to their comprehensive technology plan. Students, as part of digital citizenry, need to be taught how to effectively manage screen time.

Trait 13: Digital citizenship and acceptable use

The results from Table 13 indicates 47.2% of the teachers feel that the district has put an emphasis on digital citizenship with students compared to 32.8% of those who disagree. The results from open-ended responses mention the concerns pertaining to the students' appropriate usage of their devices and their belief that many are using the devices for gaming and non-educational exploration. The teachers indicate that there needs to be required training for all students regarding appropriate use, along with better understanding of the tenets of digital citizenship.

A recommendation for the current one-to-one technology program is to begin every year educating the students on digital citizenship, and the acceptable use policy employed by the school district. Each year, students are reminded of the district's and individual school's policies and procedures to ensure that the students are all informed of

these practices. Along with a review of these policies and procedures, time should be taken to review and teach digital citizenship, along with the ramifications associated with being poor digital citizens. For any district looking to implement a one-to-one technology program, policies and procedures should be put in place that include the training of students to appropriately use technology and to understand what digital citizenry entails.

Trait 14: Monitoring of the one-to-one technology program

In order to assess the efficacy of a program or the fidelity of its implementation, multiple and thorough reviews of that program should occur. Results conclude that 54.5% of the teachers stated that the district did not conduct reviews of the program or ask for feedback regarding its implementation. Open-ended responses cite the lack of oversight by administration with regards to the one-to-one technology program in the school district. One respondent suggested that the district has been through three technology coordinators in four years, and none have conducted a review of the initiative or asked for feedback regarding the initiative.

A recommendation for improvement in the current one-to-one initiative is to build in annual assessments of the program that will help the technology department to plan for ongoing improvements. If expansion of the one-to-one technology program is going to occur in grades one and two, the above recommendation will take into account the assessment of that implementation and will further assess the entire one-to-one technology program. For any district looking to implement a program, the recommendation for reviews is a necessity that should not be overlooked when determining the efficacy of any initiative.

Fiscal Implications

As evidenced throughout the entire research project, the financial implications for implementing an effective one-to-one technology program are great and are woven into nearly every aspect of the program. The implementation and sustainability of a one-to-one technology program comes with a major financial commitment, as the district must ensure that the financial backing will exist over the years. Though the financial commitment was never readily discussed in the current program, behind the scenes, the technology coordinator and business manager worked together to provide the necessary monetary resources to purchase devices, equipment, software, and support staff to manage these items and keep the infrastructure updated and functional.

If deemed appropriate for the expansion of the one-to-one technology program in grades one and two, the additional devices will result in an expenditure of approximately $90,000.00 for both the devices and the software. With the additional three-hundred devices added to the technology department's service and repair load, decisions will need to be made regarding the addition of support staff, which will incur an additional expense of a minimum of $84,000.00 for salary and benefits. As stated earlier in the research, the district spent $334,000 on devices alone over four years ago that were leased for a period of five years. The district now understands that five year leases are not advisable considering the devices appear to reach their longevity after four years. It is for this reason that devices will need to be purchased out right and that new inventory will need to be infused every year at the first, fifth and ninth grade levels. Depending on the size of the classes at those levels, the costs for the new devices may require an approximate minimum financial obligation of $125,000.00 for

every year moving forward.

For an educational entity looking to implement a one-to-one technology program, there are more costs that will need to be considered beyond the devices, infrastructure equipment and support personnel. When looking at instructional programs, student information systems, professional development and trainings, these present a large financial commitment. Great consideration for costs that will be incurred regarding training prior to the implementation for all staff, along with continued training, has to be paramount for a one-to-one technology program to be successful and sustainable.

Overall, the fiscal implications should be heavily considered before making a final determination to implement a one-to-one initiative or to expand the initiative in an existing program. To be clear, the financial implications are going to be the determining factors for the implementation of a one-to-one technology program as the financial backing is essential for the sustainability of the program. Educational entities must understand that this involves a long-term commitment that cannot be abandoned. The educational paradigm shift that drives the tenets of one-to-one technology programs will force schools to alter their instructional practices to incorporate technology that enhance teaching and learning. The comprehensive technology plan will need to account for the financial assurances that are required to fully realize the evolution in educational pedagogy. Ultimately, this research has highlighted the importance of the fiscal component of the comprehensive plan to ensure operational fidelity and sustainability of all one-to-one technology programs.

Topics for Future Research

Reflecting on the conclusions and recommendations for each of the traits found in effective one-to-one technology programs, there are items or areas that would lend themselves to future research opportunities. One of those possible future research items could include comparing schools that implement a one-to-one initiative to determine what characteristics of effective one-to-one technology programs exist in their individual programs, and what traits are deemed to be essential or non-essential for a program to be considered effective. Not all schools are alike and school dynamics differ. By comparing various schools according to size, grade levels served and demographics, one can examine the components that make up each of those programs based on the perceptions of various stakeholders.

Being that the world has changed with the pandemic during the course of this study, one topic that opens up multiple avenues for future research would be how COVID-19 has affected or influenced one-to-one technology programs in schools. In some of these cases, does the one-to-one technology program become a need instead of a want? With the closing of all schools in the nation, many schools were forced to go digital in order to educate their students. As a result, technology may have been put into the hands of the students without a comprehensive technology plan in place which, as evidenced through this research, is the main staple of highly effective one-to-one technology programs.

Another possible topic for research could be to study the school systems that may not have had one-to-one technology programs implemented before the pandemic, and chose to purchase devices in order to educate their students during the pandemic. The

study may include the next steps that each district has undertaken on how to continue with the utilization of that technology once social restrictions have been lifted. Questions that can be addressed may include the examination of how schools plan to sustain the program or what alternatives exist if the program is unable to be sustained. As far as sustaining the program, could an educational entity put together a comprehensive technology plan after the fact and still implement an effective program that will meet their educational needs?

Summary

      After looking at the data, the main conclusion and recommendation for the implementation of a one-to-one technology program lies in the planning and preparation process. Benjamin Franklin once said, "When we fail to plan we plan to fail." These words are very meaningful in the fact that highly effective programs share characteristics that need to be addressed through thorough planning that accounts for each trait that was identified via the assessment tool. As a result of the findings, no educational entity should move forward unless a comprehensive technology plan has been developed that has financial assurances regarding the sustainability of the program. The plan must include a clear vision for the program and the educational outcomes that are sought through the educational paradigm shift. Stakeholders need to be involved in the process so as to garner support for the initiative as well as solicit input to make informed data-driven decisions. Professional development and training for staff are essential prior to and during implementation. Student training should not be overlooked as digital citizenship and digital age skills need to be taught and acquired. Finally, no one-to-one technology program should be implemented without a clear review or monitoring

process.

Overall, time needs to be taken to properly research and truly understand what makes a one-to-one technology program effective and what needs to be done to ensure that the program is implemented with fidelity. Due to the fiscal implications associated with a one-to-one initiative, educational entities need to not move in haste, and look to making an informed decision that is comprehensive in nature. If this is done properly, it ensures that time, money and human resources will be used efficiently to bring about a successful one-to-one technology program.

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APPENDICES

Appendix A

Survey and Informed Consent Disclaimer

You have been invited to complete this questionnaire because of your involvement in the district's one-to-one technology program. This questionnaire is completely voluntary. You are under no obligation to complete this questionnaire and may elect to stop completing it at any time after you have begun. If you elect to participate in this study by completing this anonymous questionnaire, you will respond to questions and statements regarding your perception of the implementation process that was utilized to institute our current one-to-one program used in grades 3 through 12. Submission of the questionnaire is an indication that you consent to the use of the data that you provide. This data will be used to formulate a more effective 1:1 program implementation strategy for grades 1 and 2 over the next few years.

This questionnaire should take 10-15 minutes to complete.

This questionnaire should cause you no harm or discomfort beyond what you may encounter in your daily life. You will receive no benefit or compensation for completing this questionnaire. Your responses will help to identify and better understand the most effective 1:1 implementation strategies that will aid in the implementation of the program in grades 1 and 2.

If you have any questions regarding this study or would like to request a copy once it is complete, you may reach out to me at the contact information listed below.

Thank you,

Kevin Monaghan

MON6171@calu.edu

kevin.monaghan@sparksd.org

412-655-3111 extension 3002

Appendix B

Survey of Effective Traits of One-to-One Technology Programs

All effective 1:1 program initiatives share traits that assist in making the implementation highly effective. The following statements reflect some of those traits. Please review each statement, and determine the effectiveness of how each trait relates to the 1:1 program in the district by indicating your level of agreement with each.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
The 1:1 program was implemented as a result of a pedagogical paradigm shift that needed a 1:1 program to support it. A clear vision was communicated.					
The teachers were involved in the planning and implementation of the district's 1:1 program.					
The teachers were fully on board and ready to model effective behaviors of digital leaders and learners.					
The 1:1 program was implemented in a thoughtful and sequential manner that began small with the teachers, grade levels and courses best suited for the initial implementation.					
Teachers were ensured that the district technology staff and their digital networks could support the large influx of wireless devices.					
The district provided initial and ongoing training to support the teachers regarding the instructional shift to fully leverage 1:1 computing in their classrooms.					
The teachers were provided with digital curricula or digital resources that would enhance their classroom instruction in order to implement the 1:1 initiative effectively.					
The district employed web-based productivity, collaboration and communication tools to be used in the classrooms. Example: Google for Education Tools were utilized.					
Efforts were made by the school district to ensure that the students who were given 1:1 devices had home internet access.					
Efforts were made to ensure that funding was in place to support the 1:1 program.					
Thought was given towards the types of 1:1 devices (Chromebooks) that would be employed by the district.					
The implementation considered strategies that balanced student screen time throughout their school day.					

The district emphasized the importance of digital citizenship with their students in order for the students to appropriately utilize their devices.					
The district held reviews and asked for feedback over the past three years regarding the successes and shortcomings of the 1:1 program.					

As the district looks to implementing the 1:1 program in the first and second grades in the coming years, please help us to determine some successes and shortcomings that will aid the district in formulating strategies that will help with implementing the program more effectively.

Identify 1 success of the district's 1:1 program implementation strategy.

Moving forward, identify one thing the district can do to improve upon its 1:1 program implementation strategy.

Appendix C

California University
of Pennsylvania

Proposal Number

IRB Review Request

Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects

Submit this form to instreviewboard@calu.edu or Campus Box #109

Project Title: __Factors Regarding the Effective Implementation of a 1:1 Program__

Researcher/Project Director: __Kevin M. Monaghan__

Phone #:   __(724)—884-3634__   *E-mail Address:*   __MON6171@calu.edu__

Faculty Sponsor (if researcher is a student)   __Dr. Kevin Lordon__

Department __Ed. Admin. & Leadership, Sec. Ed. & Admin. Leadership__

*Anticipated Project Dates*____8-16-19_____ *to*_____8-16-20_____

*Sponsoring Agent (if applicable)*_____

Project to be Conducted at ___South Park School District_____

Project Purpose: ☐ *Thesis*   X *Research*   ☐ *Class Project*   ☐ *Other*

Keep a copy of this form for your records.

Required IRB Training

All researchers must complete an approved Human Participants Protection training course. The training requirement can be satisfied by completing the CITI (Collaborative Institutional Training Initiative) online course at http://www.citiprogram.org *New users should affiliate with "California University of Pennsylvania" and select the "All Researchers Applying for IRB Approval" course option. A copy of your certification of training must be attached to this IRB Protocol. If you have completed the training within the past 3 years and have already provided documentation to the IRB, please provide the following:*

Previous Project Title _____

*Date of Previous Project IRB Approval*_____

Please attach a typed, detailed summary of your project AND complete items 2 through 6.

1. *Provide an overview of your project-proposal describing what you plan to do and how you will go about doing it. Include any hypothesis(ses)or research questions that might be involved and explain how the information you gather will be analyzed. All items in the Review Request Checklist, (see below) must be addressed.*

2. *Section 46.11 of the Federal Regulations state that research proposals involving human subjects must satisfy certain requirements before the IRB can grant approval. You should describe in detail how the following requirements will be satisfied. Be sure to address each area separately.*
   (text boxes will expand to fit responses)

   a. *How will you insure that any risks to subjects are minimized? If there are potential risks, describe what will be done to minimize these risks. If there are risks, describe why the risks to participants are reasonable in relation to the anticipated benefits.*

An anonymous questionnaire will be utilized. Participation is voluntary and the participant can opt out of the questionnaire at any time. The questionnaire should cause no harm to the participant, and I believe there are minimal risks associated with this research study.

Statement Regarding the Survey/Questionnaire

You have been invited to complete this questionnaire because of your involvement in the district's one-to-one technology program. This questionnaire is completely voluntary. You are under no obligation to complete this questionnaire and may elect to stop completing it at any time after you have begun. If you elect to participate in this study by completing this anonymous questionnaire, you will respond to questions and statements regarding your perception of the implementation process that was utilized to institute our current one-to-one program used in grades 3 through 12. Submission of the questionnaire is an indication that you consent to the use of the data that you provide. This data will be used to formulate a more effective 1:1 program implementation strategy for grades 1 and 2 over the next few years.

This questionnaire should take 10-15 minutes to complete.

This questionnaire should cause you no harm or discomfort beyond what you may encounter in your daily life. You will receive no benefit or compensation for completing this questionnaire. Your responses will help to identify and better understand the most effective 1:1 implementation strategies that will aid in the implementation of the program in grades 1 and 2.

If you have any questions regarding this study or would like to request a copy once it is complete, you may reach out to me at the contact information listed below.

Thank you,

Kevin Monaghan

b. *How will you insure that the selection of subjects is equitable? Take into account your purpose(s). Be sure you address research problems involving vulnerable populations such as children, prisoners, pregnant women, mentally disabled persons, and economically or educationally disadvantaged persons. If this is an in-class project describe how you will minimize the possibility that students will feel coerced.*

Adult volunteers will be used. A questionnaire will be sent electronically to the staff who participated in the initial 1:1 program in grades 3 through 12. There are over one hundred twenty teachers who will receive the questionnaire, and I am expecting a sampling of greater than twenty respondents, but less than one hundred and twenty respondents.

c. *How will you obtain informed consent from each participant or the subject's legally authorized representative and ensure that all consent forms are appropriately documented? Be sure to attach a copy of your consent form to the project summary.*

Submission of the questionnaire will be an indication of consent. The questionnaire will have statement regarding the questionnaire for the participants to read, which will highlight information about the questionnaire, study and each participant's involvement. Please see the attached statement. **Please see the statement in part 2 (a).**

d. *Show that the research plan makes provisions to monitor the data collected to insure the safety of all subjects. This includes the privacy of subjects' responses and provisions for maintaining the security and confidentiality of the data.*

The data collected will not contain personally identifiable information. The questionnaire is anonymous, and I will be the only person who will have access to the Google Form and any data contained in it. There are over one hundred twenty teachers who will receive the questionnaire, and I am expecting a sampling of greater than twenty respondents, but less than one hundred and twenty respondents. **I have attached the questionnaire that I plan to utilize for the study.**

3. *Check the appropriate box(es) that describe the subjects you plan to target.*

X *Adult volunteers*	☐ *Mentally Disabled People*
☐ *CAL University Students*	☐ *Economically Disadvantaged People*
☐ *Other Students*	☐ *Educationally Disadvantaged People*
☐ *Prisoners*	☐ *Fetuses or fetal material*
☐ *Pregnant Women*	☐ *Children Under 18*
☐ *Physically Handicapped People*	☐ *Neonates*

4. *Is remuneration involved in your project?* ☐ *Yes or* **X** *No. If yes, Explain here.*

5. *Is this project part of a grant?* ☐ *Yes or* **X** *No   If yes, provide the following information:*

    Title of the Grant Proposal _____

    Name of the Funding Agency _____

    Dates of the Project Period _____

6. *Does your project involve the debriefing of those who participated?* ☐ *Yes or* **X** *No*

    If Yes, explain the debriefing process here.

7. *If your project involves a questionnaire or interview, ensure that it meets the requirements indicated in the Survey/Interview/Questionnaire checklist.* **The statement regarding the participation of the survey and the questionnaire are included in this submission.**

California University of Pennsylvania Institutional Review Board
Survey/Interview/Questionnaire Consent Checklist (v021209)

This form MUST accompany all IRB review requests

Does your research involve ONLY a <u>survey</u>, <u>interview</u> or <u>questionnaire</u>?
YES—Complete this form
NO—You MUST complete the "Informed Consent Checklist"—skip the remainder of this form

Does your survey/interview/questionnaire cover letter or explanatory statement include:

[X] (1) Statement about the general nature of the survey and how the data will be used?

[X] (2) Statement as to who the primary researcher is, including name, phone, and email address?

[X] (3) FOR ALL STUDENTS: Is the faculty advisor's name and contact information provided?

[X] (4) Statement that participation is voluntary?

[X] (5) Statement that participation may be discontinued at any time without penalty and all data discarded?

[X] (6) Statement that the results are confidential?

[X] (7) Statement that results are anonymous?

[X] (8) Statement as to level of risk anticipated or that minimal risk is anticipated? (NOTE: If more than minimal risk is anticipated, a full consent form is required—and the Informed Consent Checklist must be completed)

[X] (9) Statement that returning the survey is an indication of consent to use the data?

[X] (10) Who to contact regarding the project and how to contact this person?

[X] (11) Statement as to where the results will be housed and how maintained? (unless otherwise approved by the IRB, must be a secure location on University premises)

[*] (12) Is there text equivalent to: "Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm"? (the actual dates will be specified in the approval notice from the IRB)? **This will occur once approved.**

[X] (13) FOR ELECTRONIC/WEBSITE SURVEYS: Does the text of the cover letter or

explanatory statement appear before any data is requested from the participant?

[X] (14) FOR ELECTONIC/WEBSITE SURVEYS: Can the participant discontinue participation at any point in the process and all data is immediately discarded?

California University of Pennsylvania Institutional Review Board
Informed Consent Checklist (v021209)

This form MUST accompany all IRB review requests

Does your research involve ONLY a <u>survey</u>, <u>interview</u>, <u>or questionnaire</u>?
YES—DO NOT complete this form. You MUST complete the
"Survey/Interview/Questionnaire Consent Checklist" instead.
NO—Complete the remainder of this form.

1. **Introduction** (check each)
    [_] (1.1) Is there a statement that the study involves research?
    [_] (1.2) Is there an explanation of the purpose of the research?

2. **Is the participant.** (check each)
    [_] (2.1) Given an invitation to participate?
    [_] (2.2) Told why he/she was selected.
    [_] (2.3) Told the expected duration of the participation.
    [_] (2.4) Informed that participation is voluntary?
    [_] (2.5) Informed that all records are confidential?
    [_] (2.6) Told that he/she may withdraw from the research at any time without penalty or loss of benefits?
    [_] (2.7) 18 years of age or older? (if not, see Section #9, Special Considerations below)

3. **Procedures** (check each).
    [_] (3.1) Are the procedures identified and explained?
    [_] (3.2) Are the procedures that are being investigated clearly identified?
    [_] (3.3) Are treatment conditions identified?

4. **Risks and discomforts**. (check each)
    [_] (4.1) Are foreseeable risks or discomforts identified?
    [_] (4.2) Is the likelihood of any risks or discomforts identified?
    [_] (4.3) Is there a description of the steps that will be taken to minimize any risks or discomforts?
    [_] (4.4) Is there an acknowledgement of potentially unforeseeable risks?
    [_] (4.5) Is the participant informed about what treatment or follow up courses of action are available should there be some physical, emotional, or psychological harm?
    [_] (4.6) Is there a description of the benefits, if any, to the participant or to others that may be reasonably expected from the research and an estimate of the likelihood of these benefits?
    [_] (4.7) Is there a disclosure of any appropriate alternative procedures or courses of treatment that might be advantageous to the participant?

5. **Records and documentation**. (check each)
    [_] (5.1) Is there a statement describing how records will be kept confidential?

[_] (5.2) Is there a statement as to where the records will be kept and that this is a secure location?

[_] (5.3) Is there a statement as to who will have access to the records?

6. For research involving more than minimal risk (check each),

[_] (6.1) Is there an explanation and description of any compensation and other medical or counseling treatments that are available if the participants are injured through participation?

[_] (6.2) Is there a statement where further information can be obtained regarding the treatments?

[_] (6.3) Is there information regarding who to contact in the event of research-related injury?

7. Contacts.(check each)

[_] (7.1) Is the participant given a list of contacts for answers to questions about the research and the participant's rights?

[_] (7.2) Is the principal researcher identified with name and phone number and email address?

[_] (7.3) FOR ALL STUDENTS: Is the faculty advisor's name and contact information provided?

8. General Considerations (check each)

[_] (8.1) Is there a statement indicating that the participant is making a decision whether or not to participate, and that his/her signature indicates that he/she has decided to participate having read and discussed the information in the informed consent?

[_] (8.2) Are all technical terms fully explained to the participant?

[_] (8.3) Is the informed consent written at a level that the participant can understand?

[_] (8.4) Is there text equivalent to: "Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm"? (the actual dates will be specified in the approval notice from the IRB)

9. Specific Considerations (check as appropriate)

[_] (9.1) If the participant is or may become pregnant is there a statement that the particular treatment or procedure may involve risks, foreseeable or currently unforeseeable, to the participant or to the embryo or fetus?

[_] (9.2) Is there a statement specifying the circumstances in which the participation may be terminated by the investigator without the participant's consent?

[_] (9.3) Are any costs to the participant clearly spelled out?

[_] (9.4) If the participant desires to withdraw from the research, are procedures for orderly termination spelled out?

[_] (9.5) Is there a statement that the Principal Investigator will inform the participant or any significant new findings developed during the research that may affect them and influence their willingness to continue participation?

[ ] (9.6) Is the participant is less than 18 years of age? If so, a parent or guardian must sign the consent form and assent must be obtained from the child

    [ ] Is the consent form written in such a manner that it is clear that the parent/guardian is giving permission for their child to participate?

    [ ] Is a child assent form being used?

    [ ] Does the assent form (if used) clearly indicate that the child can freely refuse to participate or discontinue participation at any time without penalty or coercion?

[ ] (9.7) Are all consent and assent forms written at a level that the intended participant can understand? (generally, 8th grade level for adults, age-appropriate for children)

California University of Pennsylvania Institutional Review Board
Review Request Checklist (v021209)

This form MUST accompany all IRB review requests.
Unless otherwise specified, ALL items must be present in your review request.

Have you:
   [X] (1.0) FOR ALL STUDIES: Completed ALL items on the Review Request Form?
   Pay particular attention to:

      [_] (1.1) Names and email addresses of all investigators

         [X] (1.1.1) FOR ALL STUDENTS: use only your CalU email address)

         [X] (1.1.2) FOR ALL STUDENTS: Name and email address of your faculty
         research advisor

      [X] (1.2) Project dates (must be in the future—no studies will be approved which
      have already begun or scheduled to begin before final IRB approval—NO
      EXCEPTIONS)

      [X] (1.3) Answered completely and in detail, the questions in items 2a through 2d?

         [X] 2a: NOTE: No studies can have zero risk, the lowest risk is "minimal
         risk". If more than minimal risk is involved you MUST:

            [X] i. Delineate all anticipated risks in detail;

            [X] ii. Explain in detail how these risks will be minimized;

            [_] iii. Detail the procedures for dealing with adverse outcomes due
            to these risks. **N/A**

            [_] iv. Cite peer reviewed references in support of your explanation.
            N/A

         [X] 2b. Complete all items.

         [X] 2c. Describe informed consent procedures in detail.

         [X] 2d. NOTE: to maintain security and confidentiality of data, all study
         records must be housed in a secure (locked) location ON UNIVERSITY
         PREMISES. The actual location (department, office, etc.) must be specified
         in your explanation and be listed on any consent forms or cover letters.

      [X] (1.4) Checked all appropriate boxes in Section 3? If participants under the age of
      18 years are to be included (regardless of what the study involves) you MUST:

[_] (1.4.1) Obtain informed consent from the parent or guardian—consent forms must be written so that it is clear that the parent/guardian is giving permission for their child to participate. **N/A**

[_] (1.4.2) Document how you will obtain assent from the child—This must be done in an age-appropriate manner. Regardless of whether the parent/guardian has given permission, a child is completely free to refuse to participate, so the investigator must document how the child indicated agreement to participate ("assent"). **N/A**

[_] (1.5) Included all grant information in section 5? **N/A**

[_] (1.6) Included ALL signatures? **N/A**

[_] (2.0) FOR STUDIES INVOLVING MORE THAN JUST SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:

[_] (2.1) Attached a copy of all consent form(s)?

[_] (2.2) FOR STUDIES INVOLVING INDIVIDUALS LESS THAN 18 YEARS OF AGE: attached a copy of all assent forms (if such a form is used)?

[_] (2.3) Completed and attached a copy of the Consent Form Checklist? (as appropriate—see that checklist for instructions)

[X] (3.0) FOR STUDIES INVOLVING ONLY SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:

[X] (3.1) Attached a copy of the cover letter/information sheet?

[X] (3.2) Completed and attached a copy of the Survey/Interview/Questionnaire Consent Checklist? (see that checklist for instructions)

[X] (3.3) Attached a copy of the actual survey, interview, or questionnaire questions in their final form?

[_] (4.0) FOR ALL STUDENTS: Has your faculty research advisor:

[_] (4.1) Thoroughly reviewed and approved your study?

[_] (4.2) Thoroughly reviewed and approved your IRB paperwork? including:

[_] (4.2.1) Review request form,

[_] (4.2.2) All consent forms, (if used)

[_] (4.2.3) All assent forms (if used)

[_] (4.2.4) All Survey/Interview/Questionnaire cover letters (if used)

[_] (4.2.5) All checklists

[_] (4.3) IMPORTANT NOTE: Your advisor's signature on the review request form indicates that they have thoroughly reviewed your proposal and verified that it meets all IRB and University requirements.

[_] (5.0) Have you retained a copy of all submitted documentation for your records?

Project Director's Certification
Program Involving HUMAN SUBJECTS

The proposed investigation involves the use of human subjects and I am submitting the complete application form and project description to the Institutional Review Board for Research Involving Human Subjects.

I understand that Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects. If the Board grants approval of this application, I agree to:

1. Abide by any conditions or changes in the project required by the Board.
2. Report to the Board any change in the research plan that affects the method of using human subjects before such change is instituted.
3. Report to the Board any problems that arise in connection with the use of human subjects.
4. Seek advice of the Board whenever I believe such advice is necessary or would be helpful.
5. Secure the informed, written consent of all human subjects participating in the project.
6. Cooperate with the Board in its effort to provide a continuing review after investigations have been initiated.

I have reviewed the Federal and State regulations concerning the use of human subjects in research and training programs and the guidelines. I agree to abide by the regulations and guidelines aforementioned and will adhere to policies and procedures described in my application. I understand that changes to the research must be approved by the IRB before they are implemented.

Professional (Faculty/Staff) Research

_____
Project Director's Signature

Student or Class Research

_____   _____
Student Researcher's Signature   Supervising Faculty Member's Signature

ACTION OF REVIEW BOARD (IRB use only)

The Institutional Review Board for Research Involving Human Subjects has reviewed this application to ascertain whether or not the proposed project:

1. provides adequate safeguards of the rights and welfare of human subjects involved in the investigations;
2. uses appropriate methods to obtain informed, written consent;
3. indicates that the potential benefits of the investigation substantially outweigh the risk involved.
4. provides adequate debriefing of human participants.
5. provides adequate follow-up services to participants who may have incurred physical, mental, or emotional harm.

☐ Approved[_____]   ☐ Disapproved

_____   _____

Chairperson, Institutional Review Board   Date

Appendix D

Conditional Approval from the Institutional Review Board

Institutional Review Board
California University of Pennsylvania
Morgan Hall, Room 310
250 University Avenue
California, PA 15419
instreviewboard@calu.edu
Melissa Sovak, Ph.D.

Dear Kevin,

Please consider this email as official notification that your proposal titled "Factors Regarding the Effective Implementation of a 1:1 Program" (Proposal #18-077) has been approved by the California University of Pennsylvania Institutional Review Board as amended with the following stipulation:

How many respondents, roughly, are expected in this study? Too-few could make it possible for supervisors to determine the identities of some subjects.

Once you have completed the above request you may immediately begin data collection. You do not need to wait for further IRB approval. At your earliest convenience, you must forward a copy of the changes for the Board's records.

The effective date of the approval is 8/5/19 and the expiration date is 8/4/20. These dates must appear on the consent form.
Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

(1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)
(2) Any events that affect the safety or well-being of subjects
(3) Any modifications of your study or other responses that are necessitated by any events reported in (2).

(4) To continue your research beyond the approval expiration date of 8/4/20 you must file additional information to be considered for continuing review. Please contact instreviewboard@cup.edu. Please notify the Board when data collection is complete.

Regards,
Melissa Sovak, Ph.D.
Chair, Institutional Review Board

Appendix E

Emails Pertaining to Revisions and Final IRB Approval

Re: IRB Review Request Forms

InstReviewBoard <instreviewboard@calu.edu>
Wed 8/7/2019 12:16 PM
To: MON6171 - MONAGHAN, KEVIN M <MON6171@calu.edu>
Dear Kevin,

Your revisions will be saved to our files. Thank you.

Alexa Ponick
Institutional Review Board - Graduate Assistant
California University of Pennsylvania

From: MON6171 - MONAGHAN, KEVIN M <MON6171@calu.edu>
Sent: Wednesday, August 7, 2019 1:46 AM
To: InstReviewBoard <instreviewboard@calu.edu>
Cc: Lordon, J.Kevin <lordon@calu.edu>
Subject: Re: IRB Review Request Forms

Thank you for the approval. I have made the recommended changes, and I have included the number of expected respondents for this study. I added the number of respondents to the end of the first paragraph of the, "Detailed Summary." I also included the number of respondents in part 2(b) and 2(d). I hope that this satisfies the requirement. Thank you, again.

Kevin

From: InstReviewBoard <instreviewboard@calu.edu>
Sent: Tuesday, August 6, 2019 12:25 PM
To: MON6171 - MONAGHAN, KEVIN M <MON6171@calu.edu>
Cc: Lordon, J.Kevin <lordon@calu.edu>
Subject: Re: IRB Review Request Forms

Dear Kevin,

Your study has been conditionally approved by the IRB. Once the revisions are made, resubmitted, and received by the IRB you may immediately begin data collection. Please see the attached form for further information. Thank you.

Alexa Ponick
Institutional Review Board - Graduate Assistant