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Changed Perceptions of Teachers and Administrators on Professional Development after Implementation of a One-to-One Technology Initiative

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by

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A Dissertation submitted to the Education Faculty of Lindenwood University in partial fulfillment of the requirements for the degree of

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Dr. Bradley Hanson, Dissertation Chair — Date 2/20/18

Dr. Sherry DeVore, Committee Member — Date February 20, 2018

Dr. Dennis Cooper, Committee Member — Date 2/20/18

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

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Abstract

As technology prices continue to decline, access to devices has become less of a barrier, and public schools are able to implement one-to-one initiatives easier (Ruggiero & Mong, 2015; U.S. Department of Education [USDOE], 2016; Zheng, Warschauer, Lin, & Chang, 2016). It has become vital to support teachers in the area of professional development, but oftentimes these programs have failed to prepare teachers for technology integration (Hunter, 2015; USDOE, 2016). The purpose of this study was to identify key aspects of professional development teachers and administrators have found to be of the utmost value when implementing a one-to-one initiative to further the development of future professional development programs. An online survey was sent to school districts known to have been implementing a one-to-one initiative for a minimum of three years. The population included five public school districts in the southwest Missouri area, and the sample was comprised of 16 administrators and 33 high school teachers. Descriptive and inferential statistics were used to analyze quantitative data and to provide a statistical summary of the survey findings. A Mann-Whitney *U* Test was performed to analyze nonparametric values. This causal-comparative study revealed areas of professional development proven to be the most important when considering a technology initiative as well as differences in perspectives, visions, and values found amongst administrators and teachers. The findings of this study further revealed the importance of creating professional development programs to meet the needs of teachers in accordance to their individual levels of knowledge, thus requiring a differentiated approach to future professional development practices.

Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

As a plethora of technology has become widely available in public schools throughout the nation, teachers have been overwhelmed with information regarding technology integration in teaching and learning (Hunter, 2015). Technology has become an integral part of education with increased expectations in teaching standards and government requirements (Whitehead, Jensen, & Boschee, 2013). On December 10, 2015, President Obama signed the Every Student Succeeds Act (ESSA) into law, replacing the previous version of the law, No Child Left Behind (NCLB), which was signed in 2001 (U.S. Department of Education [USDOE], 2016). According to the USDOE (2015), competitive programs will be developed to support school leaders and teachers in using data and technology to improve instructional capabilities, as well as investing in innovations to provide interventions to allow all students to achieve high standards.

School districts implementing one-to-one technology initiatives have increased, according to the 2016 report from the National Center for Education Statistics (National Center for Education Statistics [NCES], 2016). As per the Office of Educational Technology (OET), integrating technology into classrooms has been the expectation in the newest generation of teaching; "however, to realize fully the benefits of technology in our education system and provide authentic learning experiences, educators need to use technology effectively in their practice" (OET, 2016, p. 1). Many teachers have been using technology in their classrooms without the training and support to make its use effective, causing them to be inadequately prepared to use technology resources (Whitehead et al., 2013).

Schools have evolved in the provision of digital resources within classrooms for the intended purpose of increasing student learning opportunities. As technologies have continued to decrease in price, the implementation of one-to-one initiatives has become more widespread (Zheng, Warschauer, Lin, & Chang, 2016). Beyond the scope of integrating digital tools in the classroom environment, teachers must understand how to integrate digital resources into curriculum and how to deliver content in a matter which helps students develop 21st-century skills (Hunter, 2015).

Teachers must also understand the pedagogical differences between technology integration and ensuring 21st-century skills are learned versus the traditional aspect of teaching through lecture only (USDOE, 2016). These differences include shifting from teacher-led instruction using historical teaching strategies to student-led or student-centered learning environments (Hattie, 2012). Since schools have been implementing one-to-one initiatives for several years, it is important to draw upon the expertise of these districts to better understand how to make improvements in existing one-to-one initiatives and to provide information for schools that will implement one-to-one initiatives in the future.

Background of the Study

The change from analog to digital has been known as the "digital revolution," and has impacted how people live and communicate with each other in both the business and educational worlds (Delgado, Wardlow, McKnight, & O'Malley, 2015). According to Sauers and McLeod (2012), "Recognizing that we now live in a digital rather than analog world, many schools are implementing one-to-one initiatives to help accomplish these academic goals and many others are considering making the transition" (p. 2). Schools

have been transitioning away from the historical industrial models of schooling and have begun focusing more on what is important for learning in the 21st century (Hunter, 2015). As noted by the USDOE (2016), "Historically, a learner's educational opportunities have been limited by the resources found within the walls of a school" (p. 7). These transitions have left policymakers and school leaders with decisions to make about whether or not the benefits outweigh the costs of implementing technology initiatives (Sauers & McLeod, 2012).

The first statewide technology initiative was in 2002 in Maine (Doran & Herald, 2016). According to Zheng et al. (2016), "With individual laptop computers, such as Chromebooks, now falling below $200, and schools in the United States and other countries transitioning to more computerized assessment, a growing number of schools are considering implementing individualized laptop programs" (p. 2). As stated by Ruggiero and Mong (2015), past external obstacles, including training and hardware and software access, disallowed technology integration practices from corresponding with teaching styles, but these barriers have diminished over the last several years.

The federal government has even allocated monies to support schools in their professional development programs for teachers through federal programs known as Title II funds (Culatta, 2014). The USDOE (2016) reported the digital divide among economic classes still exists, yet is decreasing. According to a survey administered in April of 2016 by Education Week Research, 42% of teachers reported lack of digital devices being a major barrier of technology integration within the classroom, with the second major barrier being lack of training reported by 33% of teachers (Rebora, 2016, p. 5).

Educational practices must transform students into lifelong learners by increasing both creativity and productivity; this will contribute to the closing of the digital divide and transformation of learning for all students (USDOE, 2016). This is necessary, as a profound gap has continued to exist between the knowledge and skills students learn in school versus what skills are needed to be successful in the 21st-century workforce (Partnership for 21st Century Skills, 2014). Delgado et al. (2015) stated, "Technology has not only affected the amount (of) information available to students, but it has also transitioned the type of skills students need to identify quality information and where learning takes place" (p. 398). According to the Partnership for 21st Century Skills (2014), the need has continued to increase each year for more citizens to understand how to use technology in the workforce. As noted by the USDOE (2016), "Educators can help students make connections across subject areas and decide on the best tools for collecting and showcasing learning through activities such as contributing to online forums, producing webinars, or publishing their findings to relevant websites" (p. 28).

As the implementation of technology initiatives has increased in schools, provision of instruction using technology has been considered a relatively new concept (Sauers & McLeod, 2012). The USDOE (2016) stated, "Schools need to support teachers in accessing needed technology and in learning how to use it effectively" (p. 25). The 21st century entails workforce preparation, which requires vastly different teaching practices than in times past (Bernhardt, 2015). Chesley and Jordan (2012) articulated:

> The teacher of today faces more demands than ever before. That teacher must have the confidence and skill to assess and respond to a wide range of student needs with engaging, relevant, tightly focused lessons that not only present

> content, but also teach students how to read, write, listen, collaborate, research, and integrate technology. (p. 45)

Since teaching with technology has been a relevantly new concept in education, teachers must have access to support to meet the many demands of technology integration (Chesley & Jordan, 2012; Sauers & McLeod, 2012; USDOE, 2016).

Conceptual Framework

The framework of Technological Pedagogical Content Knowledge, otherwise known as TPCK or TPACK, was utilized for the purposes of this study (Herring, Koehler, & Mishra, 2016). According to Herring et al. (2016), teachers' knowledge in the areas of technology, pedagogy, and content are all important in increasing the effectiveness of teaching skills, but teachers are often at different levels of knowledge. Professional development programs often focus too much on ensuring teachers understand how to use the device and fail in preparing teachers to understand how to incorporate technology, pedagogy, and content together when integrating technology into the classroom (Hunter, 2015; Ruggiero & Mong, 2015; USDOE, 2016). The TPACK framework was used to provide further understanding of the importance of professional development practices, thereby ensuring knowledge areas of technology, pedagogy, and content were analyzed in this study to promote teaching effectiveness when designing professional development programs.

The primary focus of one-to-one initiatives should include, most importantly, the preparation of teachers to effectively engage and provide students with relevant digital learning content, not just through the provision of devices and internet access for students (USDOE, 2016). The gap which has begun to be of most concern is the one that has been

identified within teaching itself and the lack of preparation for integrating technology within the classroom (Ruggiero & Mong, 2015). Shulman (1986) founded the ideas of categorical knowledge bases and stated:

> The key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy, in the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students. (p. 15)

The ideas through which technology, pedagogy, and content are intricately connected are evident in the frameworks of TPACK (Herring et al., 2016). According to Herring et al. (2016):

> [They] conceptualized the TPCK framework in terms of seven knowledge domains, namely (a) content knowledge (CK), which is knowledge about the actual subject matter that is intended to be learned or taught, (b) pedagogical content (PK), which is knowledge about the processes and practices or strategies about teaching and learning, (c) technological knowledge (TK) that constitutes knowledge about operating digital technologies, (d) pedagogical content knowledge (PCK) – the interaction of PK and CK, (e) technological content knowledge (TCK) – the interaction of TK and CK, (f) technological pedagogical knowledge (TPK) – the interaction of TK and PK, and (g) technological pedagogical content knowledge (TPACK) – the interaction of PCK, TCK, and TPK. (p. 15)

The TPACK model and framework explains how teachers can integrate technology into teaching more effectively by understanding how pedagogy and content, when combined, can increase student engagement (Common Sense Education, TPACK, 2016).

As established in a study by Carver (2016), one of the greatest benefits of integrating technology is increased student engagement. The TPACK framework allows for analysis not only of the technological component, but also the content and pedagogical aspects of integrating technology into instruction (Ruggiero & Mong, 2015). For the purpose of this study, it is important to understand how these components need to be incorporated when providing professional development for teachers when integrating technology, as many schools have failed by focusing on the technology alone (USDOE, 2016).

According to the author of *The Critical Theory of Technology*, Alan Feenberg (1991), "The real issue is not technology or progress *per se* but the variety of possible technologies and paths of progress among which we must choose" (p. 3). Examining professional development provided during one-to-one technology initiatives through the lens of a critical theory perspective can help school leaders and teachers scrutinize past assumptions of historical teaching practices and encourage transformative learning needed to update teaching methods (Wang & Torrisi-Steele, 2015). According to Bernhardt (2015):

> While many schools and districts throughout the United States have committed their attention to the paradigm of 21st century learning, there is a need to ensure teachers have clear ideas about what it means to "be a 21st century learner,"

> [because] developing this understanding while experiencing the learning process within this pedagogical framework is both practical and important. (p. 1)

According to *The Critical Theory of Technology*, teachers must see technology as more than just a tool and must understand the impact of technology can be shaped by pedagogical beliefs of the person(s) utilizing it (Feenberg, 1991; Schmid, 2006).

Decreased prices in technology have increased the availability of digital tools in widespread public school initiatives and have helped to close the digital divide among social classes of students (USDOE, 2016). The USDOE (2016) further specified, "The conversation has shifted from *whether* technology should be used in learning to *how* it can improve learning to ensure that all students have access to high-quality educational experiences" (p. 5). As reported by Delgado et al. (2015), "Technology has begun to change education, affecting how students acquire the skill sets needed to prepare for college and a career and how educators integrate digital technological instructional strategies to teach" (p. 397).

For students to be prepared, educators, school leaders, and policymakers must work together (Partnership for 21st Century Skills, 2014). The USDOE (2016) stated, "All students deserve equal access to (1) the Internet, high-quality content, and devices when they need them and (2) educators skilled at teaching in a technology-enabled learning environment" (p. 30). If technology initiatives are to have an impact on student learning and achievement, teachers must be supported by appropriate professional development activities (USDOE, 2016; Whitehead et al., 2013). According to Shulman (1987), "Teaching requires basic skills, content knowledge, and general pedagogical skills" (p. 6).

Statement of the Problem

As the global economy evolves, information technologies are reshaping the American life and must become more prevalent in the way students learn (Whitehead et al., 2013). It is evident one-to-one laptop initiatives and increased technology integration in schools are not just trends, since "the cost of digital devices has decreased dramatically, while computing power has increased, along with the availability of high-quality interactive educational tools and apps" (USDOE, 2016, p. 5). However, even though prices for new technologies have decreased, according to the OET (2016) in the *2016 National Education Technology Plan*, many schools across the country still lack the resources to use technology on a daily basis, which is why it is important to understand effective approaches as adoption of technologies occurs.

Using technology in the classroom promotes increased student engagement and learning (Cydis, 2015). Whitehead et al. (2013) stated, "Like their students, teachers must be in a consistent state of learning about their profession, and it is likely the responsibility of the school to provide the infrastructures to aid in teacher growth" (p. 60). Integrating technology can be challenging for teachers, especially considering the pace at which it is continuously changing (Hunter, 2015). The USDOE (2016) found, when measuring the effectiveness of how teachers implement technology, university and professional development programs have continuously failed teachers in adequately preparing them for success.

The purpose of this study was to help both teachers and school leaders understand the importance of sound professional development when implementing a one-to-one laptop initiative. Sauers and McLeod (2012) established, "Although one-to-one programs

are gaining in popularity, they still are a relatively new instructional intervention" (p. 2). Professional development should target specific factors and practices that influence successful integration (USDOE, 2016).

By having a better understanding of what areas need to be addressed the most when providing professional development, teachers can be more prepared to integrate technology within the classroom setting through the knowledge of what a 21st-century school looks like and the type of learning that should take place (Whitehead et al., 2013). Research is needed concerning the areas of professional development and influential factors that contribute to successful one-to-one laptop implementation. Murthy, Iyer, and Warriem (2015) noted, "While the actual use of ICT in education has increased, not much change has occurred in terms of the pedagogical practices followed" (p. 16). Addressing this gap in current research will enable schools to better prepare their teachers to meet the needs of 21st-century students.

Purpose of the Study

As school districts across America implement more technology within the classroom setting to meet the increased expectations mandated by national and state standards, school districts are beginning technology initiatives to keep up with pressures and to better prepare students for success in the 21st century (USDOE, 2016). According to Zheng et al. (2016):

> The falling price of hardware, software, and wireless access; the increasing digital literacy of teachers, students, and parents; the growing sophistication of educational technology applications; and the rising need for computers to be used

> in student assessment all suggest that one-to-one laptop programs are going to continue to expand in K-12 schools. (p. 25)

Oftentimes, these initiatives are implemented within a short period of time, causing educators to be inadequately prepared due to insufficient funding for teacher professional learning (Hunter, 2015).

According to the OET (2016), as schools integrate technology through initiatives, preparing teachers to effectively use technology should not be overlooked by focusing too much on how to provide internet access. To achieve success "in our increasingly technological world, it is evident that all educators and learners must be skilled in the use of technology" (Whitehead et al., 2013, p. 17). However, as teachers are given training in these areas, districts find increasing student engagement via technology integration alone does not positively impact student learning (Cydis, 2015). When classrooms substitute technology for print materials and keep the traditional lecture-based pedagogy, the impact is minimal (Hattie, 2012). According to Chris Hon (2016), the superintendent of a rural school district in Poplar Bluff, Missouri, the one-to-one initiative implemented in his district "would have been a flop if we simply substituted a device for textbooks" (p. 24).

At first glance, teacher preparedness for one-to-one laptop initiatives looks like increased professional development in the areas of software, hardware, and web-based resources (Whitehead et al., 2013). However, many other factors contribute to successful technology integration in public schools when one-to-one laptop initiatives are implemented (Hunter, 2015). Since schools have been implementing one-to-one initiatives for several years, it is important to draw upon the expertise of these districts to

better understand how to make improvements in existing one-to-one initiatives and to provide information for schools that will implement one-to-one initiatives in the future.

The purpose of this study was to gain information from districts that have already implemented one-to-one initiatives. These districts can provide insight about how professional development could have better provided them with the support needed for successful implementation. Further study is needed in the areas of instructional technology integration, the alignment of digital resources/curriculum to current standards, and understanding which teaching strategies help students most by increasing engagement levels (Hunter, 2015; Whitehead et al., 2013).

Research questions and hypothesis. The following research questions guided the study:

1. What are the perceptions of teachers regarding professional development prior to implementation of a one-to-one initiative as compared to their professional development experiences after implementation?
2. What are the perceptions of administrators regarding professional development prior to implementation of a one-to-one initiative as compared to their professional development experiences after implementation?
3. What are the differences in perceptions between teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative implementation prepared teachers for technology integration?

$H3_0$: There are no differences between the perceptions of teachers and administrators regarding whether or not professional development provided prior

to a one-to-one initiative implementation prepared teachers for technology integration.

4. According to teachers and administrators, what additional training or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom?

Significance of the Study

The findings of this study may be significant in identifying which areas of professional development have proved to be the most beneficial in implementing a one-to-one laptop initiative. The purpose for surveying school districts that already implemented a one-to-one initiative for a minimum of three years was to gain understanding from both administrators and educators who had more experience in regard to which professional development activities were essential. Their expertise in technology integration could provide further insight for schools implementing technology initiatives in the future as well as school districts struggling with current implementation practices. The findings of this study may signify the professional development practices valued the most by administrators and teachers and how perceptions have changed once more expertise in technology implementation has been achieved.

Definition of Key Terms

For the purposes of this study, the following terms are defined:

One-to-one laptop initiative. According to Sauers and McLeod (2012), a one-to-one laptop initiative is most commonly defined as an initiative implemented by "a school that provides a take-home laptop computer for every student within some grade span of the school system" (p. 2).

Central office administrators. For the purposes of this study, central office administrators are defined as superintendents, assistant superintendents, directors of instruction and/or curriculum, and technology instructional specialists.

Digital immigrants. Subjects born prior to the invention of digital technologies are known as digital immigrants (Chaves, Maia Filho, & Melo, 2016).

Digital natives. Subjects born during the present generation possessing skills needed to operate digital technologies are known as digital natives (Chaves et al., 2016).

Personalized learning. The use of instructional strategies and design to individualize instruction for students to improve learning is known as personalized learning (USDOE, 2016).

Technology integration. Incorporating hardware and software technologies into instruction, lessons, and to enhance teaching and learning is known as technology integration (Hunter, 2015).

Limitations and Assumptions

The following limitations were identified in this study:

- The results of this study were limited to the survey responses of participants within five public school districts located in the southwest region of Missouri that implemented a one-to-one initiative for three or more years.
- The participants were limited to high school teachers, high school administrators, and central office administrators.
- Participants were purposely selected to meet specific criteria, which included having been employed with the district at least one year prior to when one-to-one implementation began.

- Participants were asked to compare perceptions of professional development prior to and after implementation within the same point in time via a survey.
- Baseline surveys were not administered to the participants to give a true reflection of perceptions of professional development prior to the implementation of a one-to-one initiative.

Sample demographics. The samples selected for participation in this study were limited to educators from high schools located within the southwest region of Missouri.

Instrument. The survey utilized for the purposes of this study was limited in its validity due to the majority of the questions having been designed by the researcher. However, a few of the questions were modified, according to the research of Hanson (2014).

The following assumptions were accepted:

- The survey questions were stated in a clear, understandable vernacular.
- The responses of the participants were offered honestly and without bias.

Summary

Since one-to-one initiatives have continued to increase in implementation in K-12 schools, researchers have been encouraged to "systematically identify what works, what does not, for what purposes, and for whom in the one-to-one laptop classroom" (Zheng et al., 2016, p. 25). Educators must continuously strive to remain globally competitive and to develop engaged citizens by incorporating 21st-century competencies into classroom curriculum and instruction (USDOE, 2016). According to Ruggiero and Mong (2015), "Given the growth of technology in the field of education, it is more important now for

researchers and practitioners to understand how current teachers are using it to create meaningful learning opportunities for students in compulsory education" (p. 163).

In this chapter, the background of the study, framework, and statement of the problem were presented. To further clarify the intent of the study, the purpose, research questions and hypothesis, and significance of the study were described. Completing the chapter were the definition of key terms, limitations, and assumptions.

The review of literature in Chapter Two is focused on the gap in integrating technology in the classroom, which has indeed shifted from the previous barrier of access to technology to that of educators not having adequate skills to integrate technology within curriculum and instruction (Ruggiero & Mong, 2015). The importance of using a research-based framework when designing professional development programs for teachers to meet needs at all levels is delineated (USDOE, 2016). The TPACK framework, when designing professional development programs, can help teachers gain a better understanding of how to balance technology, pedagogy, and content knowledge to ensure increased student engagement (Common Sense Education, TPACK, 2016).

The literature review includes information on how the role of school leaders can impact technology initiatives, how pre-service teachers coming into districts may need support in content and pedagogy when implementing technology, and how educational technology may be used to reform schools and student learning (USDOE, 2016; Whitehead et al., 2013).

Chapter Two: Review of Literature

Technology integration and one-to-one laptop initiatives have continued to increase in schools across the nation as devices have decreased in price (USDOE, 2016). As more technology has been integrated into classrooms, it has become apparent teachers need continuous professional development to promote growth as teaching and learning have evolved (Whitehead et al., 2013). The concern has been that while the presence of technology has increased in the classroom, the pedagogical practices have not (Murthy et al., 2015). According to the USDOE (2016), neither professional development provided by public schools nor teacher preparation programs in colleges have sufficiently prepared teachers to integrate technology within the classroom. Whitehead et al. (2013) stated:

> It is easy to find research that explores specific instructional strategies, communication techniques, and learning methodologies related to bringing technology into the classroom, but there is limited discussion into how technology is actually challenging the educational pedagogies of the teaching and learning experience. (p. 105)

Integrating technology has become more complex than simply handing a student a device; it has required teachers to reduce historical lecturing practices and relinquish the control of learning to students in order to prepare them for success in the 21st century (Pautz, Elmendorf, & Mullenax, 2015). As Sauers and McLeod (2012) specified, "Much more research is needed related to the benefits and/or drawbacks of handing every student a robust computing device all day, every day for academic purposes" (p. 2). Teachers should have an understanding of how to use digital tools to meet the needs of all

students through personalized learning experiences, differing from what students have been offered in the past through traditional teaching formats (USDOE, 2016).

As stated by Ruggiero and Mong (2015), a technology divide still exists, but this "gap exists within teaching itself, preparation for teaching with technology, and implementation of technology at different levels" (p. 162). According to Shulman (1987) in regard to knowledge, "Teachers themselves have difficulty in articulating what they know and how they know it" (p. 6). Teacher preparation programs and professional development practices must also evolve to ensure teachers have the tools necessary to integrate technology into the classroom setting (Ruggiero & Mong, 2015; USDOE, 2016).

When examining the literature for this study, it was found that investigating the role of school leaders and educators has been vital to the success of technology initiatives (Herring et al., 2016). School leaders should collaborate with teachers in order to provide vision and direction when beginning the implementation of a one-to-one initiative, while teachers act as a conduit to communicate changes to students and parents, working together to provide communication to all stakeholders (Sauers & McLeod, 2012; USDOE, 2016; Whitehead et al., 2013). Furthermore, understanding what training pre-service teachers have received further indicated a need to determine how professional development should be delivered when comparing pre-service teachers to in-service teachers (Herring et al., 2016). Literature in the areas of technology integration, pedagogy, and school reform provided a deeper understanding for developing the instruments for the study.

Conceptual Framework

It is evident knowledge of technology, pedagogy, and content are intricately connected in the framework of Technological Pedagogical Content Knowledge, otherwise known as TPCK or TPACK (Herring et al., 2016). This framework was based originally on the work of Shulman (1986), who stated although the idea of teaching competency regarding content and pedagogical skill may seem like a new idea, it has been evidenced reaching back as far back as 1875. Shulman (1986) broke down content knowledge into the categories of subject matter content, pedagogical knowledge, and curricular knowledge. Content knowledge is the amount and organization of content the teacher can demonstrate; pedagogical knowledge refers to a teacher's ability to apply content expertise to teaching for student comprehension; and curricular knowledge refers to the teacher's ability to utilize programs and instructional materials to relate content (Shulman, 1986).

In a study led by Shulman (1987), the knowledge base of teachers was broken down into the categories of content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners' characteristics, knowledge of educational contexts, and knowledge of educational values and philosophies. However, out of these categories, Shulman (1987) found one source of knowledge to have more importance over the others:

> [Pedagogical content knowledge] represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction. Pedagogical content knowledge is the

category most likely to distinguish the understanding of the content specialist from that of the pedagogue. (p. 8)

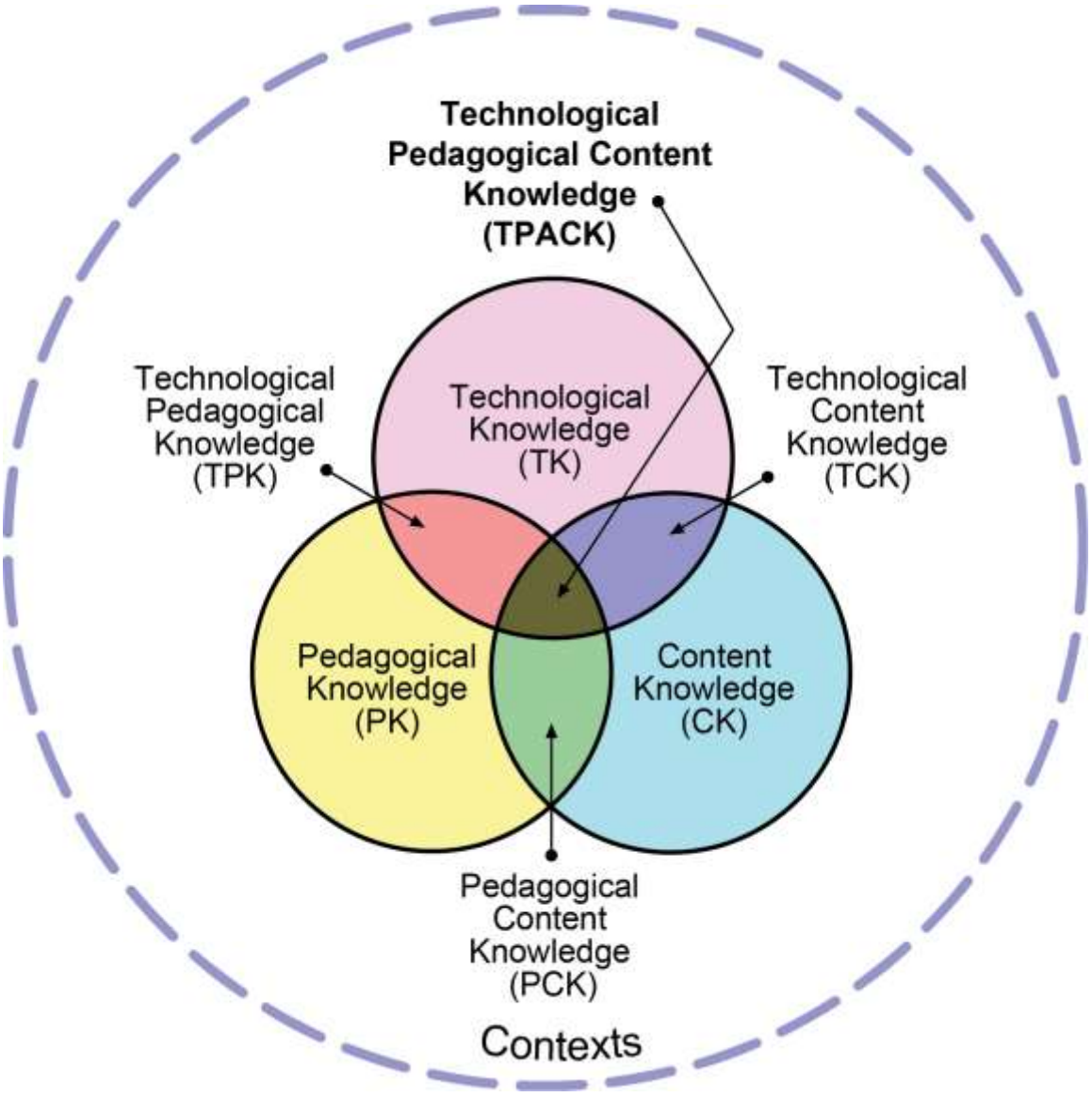

Figure 1. A visual representation of the TPACK framework. Reprinted from tpack.org by J. M. Koehler & P. Mishra, 2011. Retrieved from http://tpack.org. Copyright 2012 by tpack.org. Reprinted with permission.

Herring et al. (2016) divided the TPCK framework into knowledge domains based on the original research of Shulman (1986, 1987). These include content knowledge (CK), pedagogical content (PK), and technological knowledge (TK) (Herring et al., 2016). According to the author of *The Critical Theory of Technology*, Alan Feenberg (1991), "The real issue is not technology or progress *per se* but the variety of possible technologies and paths of progress among which we must choose" (p. 3).

Examining professional development provided during one-to-one technology initiatives through the lens of a critical theory perspective can help school leaders and teachers examine past assumptions of historical teaching practices and encourage transformative learning needed to update teaching methods (Wang & Torrisi-Steele, 2015). According to Bernhardt (2015), teachers need to have a true understanding of what 21st-century learning means, and schools should enable teachers to shift teaching pedagogies through active learning experiences. According to *The Critical Theory of Technology*, teachers must see technology as more than just a tool and must understand the impact of technology can be shaped by pedagogical beliefs of those utilizing it (Feenberg, 1991; Schmid, 2006).

The TPACK model and framework explains how teachers can integrate technology more effectively by understanding how pedagogy and content, when combined, can increase student engagement (Common Sense Education, TPACK, 2016). As stated by Herring et al. (2016):

> Pre-service and in-service teachers differ with regard to their development and integration of pedagogical and content knowledge, and we predict that separate

> support for these components is more appropriate for pre-service teachers, whereas integrated support is more appropriate for in-service teachers. (p. 121)

The TPACK framework also aids teachers in understanding how curricular standards and goals should be integrated using technology to make content accessible to learners (Hutchison & Woodward, 2014). The USDOE (2016) recommended, "States, districts, and post-secondary institutions should develop and implement learning resources that embody the flexibility and power of technology to create equitable and accessible learning ecosystems that make learning possible everywhere and all the time for all students" (p. 22).

For the purpose of this study, the TPACK framework enabled the researcher to analyze professional development in the areas of technological, pedagogical, and content knowledge. According to Tsai (2015), "The concepts underlying TPACK and its components comprise the primary criteria for technology integration in teaching, thus indicating the direction of teachers' professional development regarding technology integration" (p. 152). As specified by Herring et al. (2016), both new (pre-service) and experienced (in-service) teachers lack technological knowledge and need support for the application of digital technologies.

Role of School Leaders and Educators

Many technology initiatives have failed in the past due to a lack of vision and direction from school administrators (Herring et al., 2016). For school leaders, especially superintendents and principals, it is important "the vision for use of technology is congruent with the over-all district vision" (Whitehead et al., 2013, p. 34). Strong leaders must create a vision shared by all stakeholders to transform learning through integration

of technology (USDOE, 2016). As public schools continue to implement technology initiatives, "the quality of educational leadership is becoming one of the essential elements required for the organization and realization of successful technology initiatives in schools" (Whitehead et al., 2013, p. 21). Through the support of administration, teachers must be immersed in learning, and perceptions of professional development needs must be congruent between school leaders and teachers according to the frameworks of the TPACK Model (Herring et al., 2016).

With advances of real-time technology, administrators can instantly have access to data that diagnose both the strengths and weaknesses of schools (Whitehead et al., 2013). According to Machado and Chung (2015), "If principals are to establish funds for technology tools, create a technology integration vision, and push for adequate professional development of teachers, they must believe that proper technology integration boosts student achievement" (p. 44). Student data should be used to design and modify instruction by using highly effective practices in technology integration (Whitehead et al., 2013). These data have the ability to give teachers knowledge on "the best ways to integrate technology into curriculum and instruction" (Delgado et al., 2015, p. 401). Whitehead et al. (2013) indicated student achievement data can aid administrators and teachers as tools when determining whether or not students meet expected outcomes according to state learning standards.

School leaders should have the acquired skills to demonstrate application of technology integration, not just knowledge of it, to exhibit a positive influence (Herring et al., 2016). Pautz et al. (2015) noted, "School leaders must strive to model the types of innovative learning environments they want to see in the classrooms, and let people know

that they can fail" (p. 10). Administrators should collaborate with teachers to determine desired outcomes when implementing a one-to-one initiative before designing professional development, implementation processes, and assessment of success (Sauers & McLeod, 2012). Accomplishing the vision of a one-to-one technology initiative and increasing educational possibilities can be achieved if clear goals are set for all stakeholders (USDOE, 2016).

Another factor to consider, according to Cydis (2015), is that for students to further develop in the area of technology integration and increase in competency, teachers must believe in the importance of the integration. Whitehead et al. (2013) stated, "It is within the hustle and bustle of classroom activities that technology initiatives will ultimately succeed or fail" (p. 40). Technology allows teachers to increase student collaboration and to provide learning experiences outside the traditional brick and mortar setting of a classroom by connecting with experts around the world (USDOE, 2016).

According to Williams and Hierck (2015):

> If schools and districts don't evolve from compliance to commitment, then they won't see the results of their work; improved learning for both students and adults. The fact is, schools systems typically look to new programs, initiatives, and strategies without examining their fundamental beliefs, core values, and the school's fundamental purpose. Schools must get beyond implementation primarily out of compliance, and move toward implementing initiatives because they see the need for a culture of collective responsibility. The commitment to ensuring high levels of learning for all students is challenging work. Students benefit when their schools are purposeful places that not only clearly define

> what they want all students to know and be able to do but also clearly describe how they are going to bring about the desired results and how they will know if they have succeeded. (p. 162)

Integrating technology into instruction can help to achieve the goal of providing high levels of learning for all students (USDOE, 2016). According to the International Society for Technology Education (ISTE) (2016), new standards have been created for students in the areas of technology to better enable student success in the 21st century.

Through collaboration between teacher-leaders and administrators, support can be provided to other teachers through modeling of effective technology integration practices and sharing knowledge of tools with peers to support learning (USDOE, 2016). Along with administrators, teachers need to constantly communicate with parents any changes by involving parents in the planning process and developing working relationships to provide an avenue for parental viewpoints and support (Whitehead et al., 2013). Successful initiatives require clear communication and strongly shared visions involving all stakeholders (USDOE, 2016).

The Importance of Professional Development

As schools have implemented one-to-one initiatives, it has been recognized professional development is one of the most important aspects (Whitehead et al., 2013). To continue growth in innovation, leaders should demonstrate and help schools to cultivate principles of collaborative professional development (Pautz et al., 2015). According to Whitehead et al. (2013), “At their core, quality professional development programs commonly reflect a shared vision, mission, and goals, ethics and integrity, as well as collaboration with families and stakeholders” (p. 67).

Barriers such as inadequate technology skills, especially when considering senior teachers, may lead to insufficient implementation of technology in the classroom, rather than the unwillingness of teachers to use it (Tsai, 2015). According to a meta-analysis on one-to-one laptop initiatives, Zheng et al. (2016) indicated, "Teachers had initial concerns about use of laptops for instruction, wither due to limited technology skills, lack of sufficient technical support, uncertainty about ways in which the technology would affect them, or fear of losing control in the classrooms" (p. 20). Professional development in technology integration is vital to whether or not teachers have the ability to incorporate it into instruction (Tsai, 2015). Sauers and McLeod (2012) stated, "Like any wide-scale innovation, adjustments will need to be made to achieve optimal results" (p. 6).

Teachers need support in acquiring knowledge to effectively use technology in their classrooms and in gaining greater access to it (USDOE, 2016). As Murthy et al. (2015) established, "The TPACK framework provides a means to understand and describe the different types of knowledge–technological, pedagogical and content knowledge–and their syntheses, which are needed by a teacher to achieve meaningful ICT integration" (p. 17). When considering professional development in the area of technology integration, the primary components of TPACK provide teachers the direction needed (Tsai, 2015). It is also important to consider "professional development that is teacher-centered, draws on the specific needs of teachers, allows teachers to take on leadership roles and learn from their colleagues is most effective in creating a sustainable professional learning environment" (Bernhardt, 2015, p. 2). With ample planning and preparation in place a one-to-one initiative can be implemented in a manner which

presents a clear alignment of curriculum, best teaching practices, and devices (Amiel, Kubota, & Wives, 2016).

According to survey results in a study by Ruggiero and Mong (2015), "Teachers identified that training about technology is most effective when it is contextually based in their own classroom" (p. 161). As per the USDOE (2016):

> For many teacher preparation institutions, state offices of education, and school districts, the transition to technology-enabled preparation and professional development will entail rethinking instructional approaches and techniques, tolls, and the skills and expertise of educators who teach in these programs. (p. 25)

Teachers surveyed by Ruggiero and Mong (2015) "claimed that access to a knowledgeable community of educators was a key factor to their growth in technology integration practices" (p. 174).

Through the collaboration of administrators and teacher-leaders, support can be provided to peers by sharing experiences in learning with technology through modeling and answering questions (USDOE, 2016). As reported by Ruggiero and Mong (2015), teachers with an average of 14 years of teaching experience stated a lack of continuous training still presents a barrier to integrating technology more in the classroom. Furthermore, Ruggiero and Mong (2015) indicated professional development for teachers should be delivered in the same manner as in the classroom setting using collaborative and blended learning strategies to help teachers have a better understanding of successful technology integration.

Shift in Pre-Service Teacher Education

When discussing pre-service teachers' usage of technology in their educational programs, one may assume current pre-service teachers are digital natives and prefer to use technology (Kivunja, 2014). As recommended by the USDOE (2016), pre-service and in-service teachers should be provided with "professional learning experiences powered by technology to increase their digital literacy and enable them to create compelling learning activities that improve learning and teaching, assessment, and instructional practices" (p. 37). As reported by Cydis (2015), a study evaluating pre-service teachers' preferences when creating lessons showed that 93% of students chose to integrate technology in their lessons, even though it was not a requirement. The issue therein relies not on the pre-service teachers' ability to use technology, but actually the requirement of the educational institution's program (Cydis, 2015).

The OET (2016) recognized the challenge by stating, "Systemic change on the part of teacher preparation providers so their faculty and programming reflect more closely the standards and setting for which they are preparing teacher candidates" is required (p. 81). Teachers must be given the ability to practice a strategy before being expected to implement it within the classroom (Murthy et al., 2015). According to Tsai (2015), teachers are enticed to apply technology in the classroom after they have been able to create successful experiences. The USDOE (2016) further specified, "Institutions responsible for pre-service and in-service professional development for educators should focus explicitly on ensuring all educators are capable of selecting, evaluating, and using appropriate technologies and resources to create experiences that advance student engagement and learning" (p. 25).

Teachers determine the success of a technology initiative and whether or not they have the ability to connect technology with the curriculum (Whitehead et al., 2013). According to the USDOE (2016):

> Teachers need to leave their teacher preparation programs with a solid understanding of how to use technology to support learning. Effective use of technology is not an optional add-on or a skill that we simply can expect teachers to pick up once they get into the classrooms. (p. 32)

Teaching programs with the largest effect on student learning depend on the influence of peers, feedback, and making learning intentions clear, whereas the least effective programs do not include peers, overstress technologies, and focus too much on surface knowledge rather than deeper learning (Hattie, 2012). The USDOE (2016) asserted:

> Schools should be able to rely on teacher preparation programs to ensure that new teachers come to them prepared to use technology in meaningful ways. No new teacher exiting a preparation program should require remediation by his or her hiring school or district. (p. 32)

Chesley and Jordan (2012) determined, "Changing teacher preparation to match the expectations of today's teaching profession will require new forms of collaboration between universities and schools" (p. 45). As school leaders hire new teachers, it is dangerous to assume novice teachers are ready to integrate technology into instruction simply because of the technological generation in which they grew up (USDOE, 2016).

Ensuring Professional Development Meets the Needs of All Levels of Teachers

After addressing why professional development is important and the shortcomings of some institutions in preparing pre-service teachers, it is necessary to understand professional development programs should not be one-size-fits-all if the needs of all levels of teachers are to be met (Bernhardt, 2015). When beginning a one-to-one initiative, leadership should plan professional development activities well in advance and should provide support to teachers where their level of knowledge currently exists (Whitehead et al., 2013). Bernhardt (2015) indicated many professional development programs are overly prescriptive, causing teachers to resist efforts and see the strategies as unfavorable practices in general.

When implementing a one-to-one initiative, school leaders must recognize if teachers do not have the ability to integrate technology into instruction, they may not utilize it as a tool; instead, a negative attitude may develop regarding technology, which is why leaders need to develop professional development programs according to how teachers find it to be meaningful (Tsai, 2015). In a study conducted by Bernhardt (2015), it was found "that the majority of surveyed teachers preferred professional development that included both subject-area content and pedagogical strategies focused on motivation, engagement, and creative assessment strategies" (p. 10). Teachers need to receive training based on the level of their technological, pedagogical, and content knowledge according to the TPACK framework, and delivery needs to be conducive to the preferences of the teacher (Murthy et al., 2015).

When given an option, one study revealed teachers preferred conferences, workshops, and university coursework over other professional development delivery

methods such as faculty meetings and opportunities held within the school district (Bernhardt, 2015). Outside professional development was preferred because of the opportunity to share ideas and learn from other teachers in the areas of content and pedagogy (Bernhardt, 2015). School leaders need to understand "in order for participants to apply an instructional strategy in their own courses, it is essential that they experience the strategy themselves" (Murthy et al., 2015, p. 22).

Integrating Technology: The Purpose

Technology integration must increase student motivation, understanding, and preparation for the future (Machado & Chung, 2015). As school leaders become more aware of the impact of emerging technology on school districts and student learning, they also have a greater understanding of school reforms needed to ensure their districts are providing students with an appropriate education for 21st-century success (Whitehead et al., 2013). As mentioned by Cydis (2015), "The use of technology in teaching and learning is a valuable practice for supporting student learning and engagement" (p. 68). Most educators recommend technology integration in the classroom to promote student-centered constructivist learning (Murthy et al., 2015).

Throughout a meta-analysis of 96 studies concerning one-to-one laptop initiatives, it was established the most common changes included "significantly increased academic achievement in science, writing, math, and English; increased technology use for varied learning purposes; more student-centered, individualized, and project-based instruction; enhanced engagement and enthusiasm among students; and improved teacher-student and home-school relationships" (Zheng et al., 2016, p. 24). According to Clark (2015), providing students with experiences to learn at home via videos while giving them time

to practice skills in class, also known as a flipped model of instruction, creates an environment which increases student engagement. The goal of technology integration should be for all students to have engaging learning experiences that are empowering and prepare them to be creative and knowledgeable global citizens (USDOE, 2016). Whitehead et al. (2013) emphasized how important it is to ensure the needs of students are placed above any other consideration when implementing a technology initiative.

Professional Development for Teachers

Technological knowledge: Integrating software and hardware. It has become a common understanding that the digital transformation has changed the way the world learns forever (Horn & Staker, 2015). According to the USDOE (2016), "Educators can be guides, facilitators, and motivators of learners" (p. 27). In order for teachers to feel like true stakeholders in a professional development program, they need to partake in the decisions and activities leading up to its implementation (Bernhardt, 2015). Tsai (2015) stated, "When teachers lack the ability to integrate technology into their instruction, they might not consider technology integration as part of an effective teaching method and even develop a negative attitude toward technology integration" (p. 152).

As defined by the TPACK Model, technological knowledge refers not only to the skills needed to operate technology, but also the means to operate it in such a way to achieve the goals of a lesson (Herring et al., 2016). When teachers do not understand how to use digital tools required to increase student engagement in lessons, the lack of knowledge quickly becomes a barrier to technology integration (Tsai, 2015). When first introducing technology to teachers, they often have concerns about how to use the devices themselves and fear losing control both of their classrooms and the educational

process (Zheng et al., 2016). For teachers to feel comfortable implementing new digital resources, they must be given an opportunity to practice implementation beforehand (Murthy et al., 2015).

Pedagogical knowledge: Pedagogy designed to increase student engagement. According to the TPACK Model, pedagogical knowledge, otherwise known as the "practice of teaching," helps teachers plan lessons according to the changing levels and abilities of students (Herring et al., 2016, p. 251). As defined by Whitehead et al. (2013), "The pedagogical concept of education is the art and science of helping students to learn" (p. 4). John Hattie (2012) stated learning requires flexible strategies which build on background knowledge and must include active participation of the learner to reason and problem solve when exposed to new content. Through technology, teachers can design engaging learning experiences when combined with the right digital tools and pedagogy relevant to their learning needs (USDOE, 2016).

According to a one-to-one laptop meta-analysis by Zheng et al. (2016), teachers indicated they can provide more individualized (or personalized) instruction, increase student-centered teaching practices, and deliver more project-based learning experiences through one-to-one initiatives. Hunter (2015) noted, "It's not about the tools being used, but how teaching practice, when it is mindful of pedagogy and rich subject matter, can be enhanced and re-imagined when technology is used to engage students in learning" (p. 3). Hattie (2012) summarized:

> Dialogue is seen as an essential tool for learning, student involvement is what happens during and not 'at the end' of an exchange, and teachers can learn so

> much about their effect on student learning by listening to students thinking aloud. (p. 83)

The purpose of integrating technology is to design and personalize relevant learning experiences that increase student engagement (USDOE, 2016). According to Machado and Chung (2015), "Many classrooms have made teacher-centered technology available already, however, the true goal of meaningful technology in classrooms is to move toward student-centered tools and pedagogy" (p. 44). Pedagogy should lead to student engagement in a manner wherein teachers foster an environment of growth to support the educational process of all students (Whitehead et al., 2013). Through the usage of technology, students are allowed an increased chance of success by learning in an innovative and student-centered environment (Machado & Chung, 2015).

Ruggiero and Mong (2015) revealed teachers naturally create more learning experiences incorporating 21st-century skills when designing lessons exhibiting student-centered practices. When technology is combined with personalized instruction, the needs of struggling students and students who need enrichment opportunities can be met (USDOE, 2015). Ruggiero and Mong (2015) also showed teachers believe the act of integrating technology is a process, or a way of creating learning, instead of just a tool within the classroom environment. Murthy et al. (2015) stated, "For each technology being introduced, it is necessary to equip participants not only with the skills to use the technology but also with the pedagogical affordances of the technology" (p. 25).

According to the USDOE (2016), blended learning and project-based learning are also important pedagogical concepts to consider when integrating technology within the classroom. The USDOE (2015) reported, "Blended learning is an important support for

transforming teaching and learning to increase individual student performance. It goes beyond adding technology to an existing learning flow" (p. 62). Project-based learning allows students to incorporate technology around real-world challenges, making learning relevant and increasing students' exposure to problem-solving skills (USDOE, 2016). Technology usage in the classroom environment through blended and project-based learning enables students and teachers to become co-learners, which in turn promotes a deep understanding of content (USDOE, 2015, 2016).

Content knowledge: Curriculum design and the alignment of standards. It is becoming increasingly obvious how important technology is to curriculum in education (Whitehead et al., 2013). Whitehead et al. (2013) stated:

> The role and importance of technology in the curriculum is a given educational reality. With this reality, the challenge facing educational leaders and technology coordinators is to tune into the future direction of education and better synchronize learning with modern, technological pedagogies and curriculum. (p. 1)

Robert Marzano (2012) recognized a "guaranteed and viable curriculum" is a significant factor that must be considered in student learning (p. 10).

One of the key elements impacting change is that "21st century schools must implement curricula where working, learning, and activities converge allowing learning to occur at any time and any place" (Whitehead et al., 2013, p. 8). Information technology (IT) and curriculum and instruction (C&I) goals and initiatives should support a school district's vision by engaging students in 21st-century learning experiences, while

creating a continuous learning environment for all stakeholders through collaboration ("IT and Curriculum," 2015, p. 34).

To make curriculum more engaging for students, teachers should make learning relevant by connecting it to real-life applications (Jensen, 2013). According to the USDOE (2016), "Technology can help organize learning around real-world challenges and project-based learning using a wide variety of digital learning devices and resources to show competency with complex concepts and content" (p. 11). Eric Jensen (2013) suggested five strategies to make engagement a daily routine part of the classroom: establishing rituals, fostering leadership and teamwork, captivating with curriculum, integrating technology, and cultivating schoolwide social support. Technology has the potential to increase student access to information, allow for collaboration in real time, and give immediate feedback on assessments (USDOE, 2016). Jensen (2013) further specified, "Project-based learning is one of the best ways to integrate real-world issues and authentic tasks into your curriculum" (p. 146).

With new standards requiring the incorporation of technology, public schools are forced to address this subject (Missouri Department of Elementary and Secondary Education [MODESE], 2016). With updated changes in national and state standards now requiring students to incorporate media for research and presentations, technology has become a catalyst of change in schools (Machado & Chung, 2015). Although Missouri adopted new standards to be assessed beginning during the 2017-2018 school year, these standards reflect the same expectations of technology incorporation as the previous Common Core State Standards (MODESE, 2016). As noted in the article "IT and Curriculum" (2015), "In order for any tech initiative to not just survive but thrive, the

technology and curriculum departments must share the same goals, which many times is easier said than done" (p. 32).

School Reform and Student Learning

An element of school reform is that "students need to know how to use their knowledge and skills by thinking critically, applying knowledge to new situations, analyzing information, comprehending new ideas, communicating, collaborating, solving problems, and making decisions" (Whitehead et al., 2013, p. 4). According to Doran and Herald (2016), one-to-one initiatives may offer student-centered and project-based instruction, increase student engagement, and promote positive relationships between students and teachers. As the rapid development of changing technologies progresses in education, societal and career needs are changing as well, causing school reform to be a necessity (Whitehead et al., 2013).

As stated by Machado and Chung (2015), if the goal of school reform does not include increased student achievement, it has no purpose for schools today. A meta-analysis compiling 15 years of research revealed "1-to-1 laptop programs, on average, had a statistically significant positive impact on student test scores in English/language arts, writing, math, and science" (Doran & Herald, 2016, p. 11). However, the topic of technology integration in the classroom is up for debate as research increases about whether or not the impact is significant (Delgado et al., 2015). According to Whitehead et al. (2013), professional development must become a priority to ensure teachers understand how students' learning has changed as technology comes to the forefront for the newest generation of learners.

Summary

As Chapter Two revealed, the implementation of a one-to-one initiative is about much more than the actual devices. Oftentimes in education, the rollout of laptop or hardware devices has led to decreases in funds for professional development (Hunter, 2015). The USDOE (2016) stated, "The focus on providing internet access and devices for learners should not overshadow the importance of preparing teachers to teach effectively with technology and to select engaging and relevant digital learning content" (p. 6). Advances in technology have changed what skills students need in order to be successful in the 21st century, which has also changed education for teachers and students (Delgado et al., 2015). The digital gap has shifted from whether or not students have access to technology to whether or not teachers can effectively integrate technology within the classroom to prepare students for the future (Ruggiero & Mong, 2015).

As presented in Chapter Two, school leaders were found to have an impact on the success of one-to-one initiatives, especially when both have a shared vision (USDOE, 2016; Whitehead et al., 2013). Administrators must support and promote shared perceptions of professional development according to the TPACK Model and must possess the actual technological knowledge (Herring et al., 2016). Both administrators and teachers must believe in the importance of integrating technology and commit to the efforts required to ensure higher levels of learning for students (Cydis, 2015; Williams & Hierck, 2015).

Also discussed in Chapter Two was the importance of professional development when implementing a one-to-one laptop initiative. According to the USDOE (2016), "Professional learning and development programs should transition to support and

develop educators' identities as fluent users of technology; creative and collaborative problem solvers; and adaptive, socially aware experts throughout their careers" (p. 34). Frameworks such as the TPACK Model can support teachers in all areas of knowledge and ensure the proper integration of categorical knowledge (Murthy et al., 2015). The components of TPACK have provided teachers the direction needed and have guaranteed teacher-centered professional development to meet the needs of teachers according to their level of knowledge (Bernhardt, 2015; Tsai, 2015).

Even though pre-service teachers may start with more technological knowledge as digital natives, connecting the technology with the curriculum may still be a struggle and requires the support of professional development (Whitehead et al., 2013). This exhibits yet another reason why it is important for professional development programs to meet teachers' needs according to their levels of technological, pedagogical, and content knowledge per the TPACK Model (Murthy et al., 2015). Through the conceptual framework of TPACK, one can conclude an individual factor does not determine teaching successes, but rather how all of these factors work together (Herring et al., 2016).

In the next chapter, the problem and methodology are explained to further clarify the purpose for this study. The focus of the instrumentation tool was to reveal the perceptions of both teachers and administrators in specific areas of professional development. Four research questions were developed to aid in refining the focus of the study.

Chapter Three: Methodology

Problem and Purpose Overview

As technologies have become more affordable, public school districts have implemented more digital tools to meet the increased expectations mandated by national and state standards and have begun technology initiatives to keep up with pressures (USDOE, 2016). According to the OET (2016), many schools across the country still lack the resources to use technology on a daily basis, which means many districts have not yet implemented one-to-one initiatives. One-to-one initiatives have been considered a fairly new aspect to education, even though acceptance has increased (Sauers & McLeod, 2012). Oftentimes, these initiatives have been implemented in a short amount of time, causing educators to be ill-prepared (Hunter, 2015).

Integrating technology can be challenging for teachers, while professional development programs fail to provide teachers with skills needed for success (Hunter, 2015; USDOE, 2016). It is the responsibility of the school district to ensure professional development programs provide teachers opportunities for growth while meeting teachers' needs, rather than making assumptions all teachers have the same level of knowledge in every area (Murthy et al., 2015; Whitehead et al., 2013). Professional development should target specific factors and practices which influence successful integration.

With a better understanding of what areas need to be addressed when launching professional development, teachers can be more prepared to integrate technology within the classroom setting through the knowledge of what a 21st-century school looks like and the type of learning that should take place (Whitehead et al., 2013). Research is needed concerning the areas of professional development and influential factors that contribute to

successful one-to-one laptop implementation. Little has changed from professional development offered prior to one-to-one technology implementation in regard to pedagogical practices (Murthy et al., 2015). When teachers replace current methodologies by substituting technology while keeping the traditional lecture-based pedagogy, the impact is minimal (Hattie, 2012).

Since schools have been implementing one-to-one initiatives for several years, it is important to draw upon the expertise of these school districts to make improvements in existing one-to-one initiatives and to provide information for schools that will implement one-to-one initiatives in the future. The purpose of this study was to learn from districts that have implemented one-to-one initiatives about how professional development could have better provided the support needed for successful implementation in the areas of instructional technology integration, alignment of digital resources/curriculum to current standards, and understanding which teaching strategies help students most according to local demographics.

Research questions and hypothesis. The following research questions guided the study:

1. What are the perceptions of teachers regarding professional development prior to implementation of a one-to-one initiative as compared to their professional development experiences after implementation?
2. What are the perceptions of administrators regarding professional development prior to implementation of a one-to-one initiative as compared to their professional development experiences after implementation?

3. What are the differences in perceptions between teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative implementation prepared teachers for technology integration?

$H3_0$: There are no differences between the perceptions of teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative implementation prepared teachers for technology integration.

4. According to teachers and administrators, what additional training or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom?

Research Design

The design chosen for this study was quantitative and identified as causal-comparative research. The study was considered causal-comparative because differences between two groups were analyzed (Fraenkel, Wallen, & Hyun, 2015). The research questions were designed to determine whether a significant statistical difference existed between the perceptions of the administrator and teacher participants who were surveyed. Any differences between the groups occurred prior to the beginning of the study. The researcher was dependent upon numerical information, which required mathematical analysis, to determine the significance; therefore, the study was determined to be quantitative (Creswell, 2016). The instrumentation utilized to collect responses included close-ended approaches through an online survey, which result in quantitative data.

Population and Sample

Five school districts in the southwest Missouri area were asked to participate in this research regarding implementation of one-to-one technology initiatives in their secondary schools. The instrumentational tool in the form of a survey was sent to these school districts asking for the superintendent to share the survey with teachers and administrators, if permission was granted for his or her district to participate. Out of these districts, a goal of 5-21 administrator responses and 30-240 high school teacher responses was set, totaling 261 participants as the maximum population size for this study. A 25% response rate was assumed for administrators to provide enough information to perform a Mann-Whitney *U* test to analyze the differences outlined in research question three. The same 25% response rate for teachers was assumed; however, no less than 30 responses should be used as the recommended minimum requirement for accurate statistical calculations and normal distribution (Bluman, 2014).

Purposeful sampling was used to determine the participants within the sample size, since specific criteria must be met (Fraenkel et al., 2015). Participants must have fulfilled the role of either an administrator or high school teacher and must have been employed at least one year prior to implementation of the one-to-one initiative within their school districts. The first two survey questions required the participants to identify their roles as either teachers or administrators, as well as the number of years employed prior to implementation. If the participant was identified as a staff member other than a high school teacher or administrator, or was not employed at least one year prior to the beginning of the one-to-one implementation, the survey tool exited the participant from the survey.

After submitting the survey according to the parameters noted, it was quickly ascertained many participants could not fulfill the criterion of being employed at least one year prior to when the district implemented a one-to-one initiative. As a result, the researcher was able to collect a total of 89 responses. Out of these responses, 49 participants were employed with their districts for two years or more prior to one-to-one implementation, seven were employed at least one year, and 33 were employed for less than one year. Overall, only 56 responses were used for the purposes of this research according to the parameters set. Out of the 56 responses, only 49 were identified to fulfill the role of either teacher or administrator. This dropped the participation rate from 34% to 21.5%. For the purposes of this research, the responses of 33 teachers and 16 administrators were used for statistical analysis.

Instrumentation

A survey was developed (see Appendix A) using a close-ended approach to collect quantitative data for the purposes of determining whether there were significant differences when analyzing the participants' results. The majority of questions and statements were developed by the researcher, although a few were adapted from a survey created by Hanson (2014) and were based on recommended future research according to his findings. The survey was sent to three university professors to be checked for validity and reliability prior to administration.

The first five questions and statements of the survey were used to determine whether a prospective participant met the criteria for inclusion in the study and aided in disaggregating data for further analysis. The first question helped to determine whether or not the administrator or teacher was employed prior to his or her district's

implementation of a one-to-one initiative, while the second question defined the role of the participant to verify he or she was either a high school teacher or an administrator. The third question asked how many years the district had been implementing a one-to-one initiative to verify the district had been implementing it for three years or more. Question four helped to determine how many years of experience the teacher and/or administrator had in education, and question five asked each teacher to identify which subject he or she primarily taught.

A Likert-type scale was used to determine how important the teachers and administrators perceived professional development to be prior to the implementation and again after implementation for the purposes of assigning value to each group's perceptions (Fraenkel et al., 2015; Hanson, 2014). The data were used to determine if there was a significant difference between perceptions before and after implementation. Data were cross-analyzed to determine whether significant differences existed between the perceptions of teachers when compared to the perceptions of administrators. A Likert-type scale was also used to determine the level of comfort teachers and administrators had in integrating technology.

Two questions asked for teachers and administrators to identify how professional development was delivered in comparison to how it *should* have been delivered, which was suggested as a recommendation for future research by Hanson (2014) in his study on the impacts of professional development. Other statements and questions asked teachers and administrators to identify their backgrounds in integrating technology before implementing the one-to-one initiative in comparison to after the implementation. Another question was open-ended to ask for teachers and administrators to determine

what additional training or professional development could have been provided to more effectively prepare them to implement a one-to-one initiative.

Data Collection

After approval was granted from the Institutional Review Board of Lindenwood University (see Appendix B), written permission via email from the superintendents of the five southwest Missouri school districts was requested. Each superintendent was asked, based on his or her approval, to forward the letter to his or her high school teachers, high school administrators, and central office administrators. For the purposes of this study, central office administrators were defined as superintendents; assistant superintendents; directors of technology, instruction, curriculum; and technology instructional specialists. Respondents were invited to participate in an online survey administered through the survey tool Qualtrics. In the written notice to superintendents requesting approval, a link to the survey was included with the email, as well as the official informed consent for the school and teachers as required.

Parameters used to select schools for participation were dependent upon the timeline of one-to-one technology initiative implementation, requiring each school to have implemented a one-to-one technology initiative for three years or more. Administrators and teachers recruited for participation of the survey must have been employed at least one year prior to when the respective school district began one-to-one implementation. Qualtrics was used in the collection of these data when participants answered the first two questions of the survey. If the participant was not a teacher or an administrator and was not employed with the district prior to the time one-to-one implementation began, Qualtrics automatically exited the participant from the study.

Five school districts meeting outlined parameters were approached to participate in an online survey. The purpose for surveying school districts that have already implemented a one-to-one initiative for a minimum of three years was to gain understanding from school districts and their faculty who are more experienced and can provide expertise in the area of technology integration.

Data Analysis

After receiving permission from area superintendents to administer the survey to their faculty, an introduction letter with an embedded link was shared with the superintendents to forward to both administrators and teachers. Participants were given the opportunity to respond during the collection of data for 15-30 days in May and again in September before the survey was disabled. The time period for collection of data was set at 15 days during each survey period. The researcher closed the survey at this time, as the number of responses collected was sufficient to begin data analysis. The survey instrument required Likert-type scale responses to provide quantitative data to enable the researcher to compare perceptions prior to and after the implementation of a one-to-one initiative. Descriptive and inferential statistics were used to analyze quantitative data and to provide a statistical summary of the survey findings for research questions one, two, and three.

A Mann-Whitney *U* Test was performed to analyze nonparametric values for research question three (Fraenkel et al., 2015). When taking into consideration the small sample size of administrators surveyed, a parametric technique would not yield accurate results (Bluman, 2014). A nonparametric technique was utilized when analyzing the results of the administrators' perceptions of professional development prior to a one-to-

one initiative in comparison to after at least three years of implementation (Bluman, 2014). Mann-Whitney *U* Tests can be performed in sample sizes as small as five (VassarStats, 2017). Survey data were collected from two populations, teachers and administrators, and a Mann-Whitney *U* Test was performed to examine the likelihood there was a significant difference in perceptions between administrators and teachers to answer research question three.

Research question four required quantitative data through the collection of an open-ended response using the study's instrumental survey. The purpose of collecting these data was to increase the study's validity when comparing the quantitative data collected for research questions one, two, and three. Descriptive statistics were used to summarize the findings for research question four, and then a triangulation design allowed the researcher to see whether the quantitative data validated each other (Fraenkel et al., 2015).

Summary

Chapter Three included a review of the problem and purpose of the study, a delineation of the research questions and hypothesis, and a description of the research design. The research questions required quantitative data. With the purposeful selection of participants, population and sample were approximated through the participation of five school districts. Due to the quantitative nature of the causal-comparative study, a survey was determined to be the most appropriate instrumentation to measure the responses of both teachers and administrators. The data collection and data analysis procedures were discussed in detail.

In Chapter Four, the data collected and analyzed are described. The responses of the teachers and administrators from the survey were downloaded as raw data for further analysis. Both descriptive and inferential statistics were used to reveal the findings of this study. Visual representations of the data are utilized to clarify findings.

Chapter Four: Analysis of Data

As access to digital devices continued to increase while barriers like costs decreased, schools transitioned historical models of teaching through the implementation of one-to-one technology initiatives (Hunter, 2015; Sauers & McLeod, 2012). With diminished barriers of access, a new barrier has been exposed–the lack of training teachers have received in implementing technology within the classroom environment (Ruggiero & Mong, 2015; USDOE, 2016). The purpose of this study was to gain a greater understanding of how professional development programs have failed teachers in the past by asking expert districts to reflect upon what practices would have better enabled their success with technology integration. The instrumentation tool in this research yielded results which have highlighted strengths and weaknesses in professional development programs. This information can be utilized to help districts with one-to-one technology implementation and can also assist districts that have already implemented such initiatives, but have not seen expected results.

Demographics

Questions one and two asked participants to identify the number of years employed with the district prior to its one-to-one technology initiative implementation as well as the participant's role. After 89 participants answered question one, 33 were not allowed to continue the survey as the parameter of employment for at least one year prior to the technology implementation was not met. The second question identified seven more participants who did not fulfill the role of teacher or administrator/director, leaving 49 participants. Of these participants, 16 were identified as administrators/directors, and 33 were identified as teachers.

Question three asked how many years the participant's district had been implementing a one-to-one technology initiative with the inclusion of the current school year. The results showed 0% had implemented an initiative for one or two years, 4% for three years, 33% for four years, 23% for five years, and 40% for six years or more. Question four asked how many years of experience each participant had in the field of education with the inclusion of the current school year. The survey showed 8% had 2-5 years of experience, 16% had 6-10 years of experience, 21% had 11-15 years of experience, and 55% had 16+ years of experience in education. Question five asked for the identification of which primary subject was taught. Of the participant teachers, 12% taught English language arts, 15% mathematics, 12% science, 12% social studies, 6% fine arts, 6% practical arts, and 37% other.

Statement six had each teacher to rate his or her comfort level with effectively integrating technology into a classroom, or if an administrator, to rate the comfort level with aiding teachers in technology integration. Teachers answered 6% a little uncomfortable, 12% moderately comfortable, 36% mostly comfortable, and 46% completely comfortable. Administrators answered 6% a little uncomfortable, 6% moderately comfortable, 44% mostly comfortable, and 44% completely comfortable. In comparison, 82% of teachers scored themselves in the top two tiers when describing comfort levels, while 88% of administrators scored themselves the same.

Data Analysis

Perceived values of professional development prior to implementation. In statement seven, teachers and administrators identified perceptions of professional development prior to the implementation of a one-to-one initiative and compared it to

how important the areas of professional development were after having fully implemented an initiative. The areas of professional development included the following categories: hardware/devices, software programs (Microsoft Office, etc.), Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.), learning management system (Canvas, Schoology, Blackboard, Moodle, etc.), integration of technology into lessons (examples, modeling, etc.), teaching with textbooks versus incorporating digital content, aligning digital resources with curriculum and standards, frameworks for integration (SAMR, TPACK Model), best teaching practices using technology (pedagogy, student-centered/led versus teacher-led), and incorporating 21st-century skills (collaboration, communication, creativity, critical thinking).

A Likert-type scale ranged from *unimportant* to *very important* with five responses possible and a sixth response of *no PD provided.* Raw data from Qualtrics were downloaded into an Excel spreadsheet where values of each response were assigned as shown in Table 1. For the *no PD provided* category, a value of zero was assigned.

Table 1

Likert-Type Scale Responses for Perceived Value of Professional Development Prior to and after Implementation of a One-to-One Initiative

Response	Assigned Score
Unimportant	1
Of Little Importance	2
Moderately Important	3
Important	4
Very Important	5

Teachers and administrators responded to each of the 10 categories regarding professional development as described previously via the instrumentation tool. In the first category, participants were asked to reflect on the perceived value of hardware/device training for successful one-to-one implementation prior to the actual implementation. The results showed 68.76% of teachers perceived hardware/device training to be *important* or *very important* as a component of professional development, whereas only 12.50% of teachers indicated it to be *of little importance* or *unimportant*. In comparison, results showed 56.25% of administrators perceived hardware/device training to be *important* or *very important* as a component of professional development, while only 6.25% of administrators found it to be *of little importance* or *unimportant* (see Figure 2).

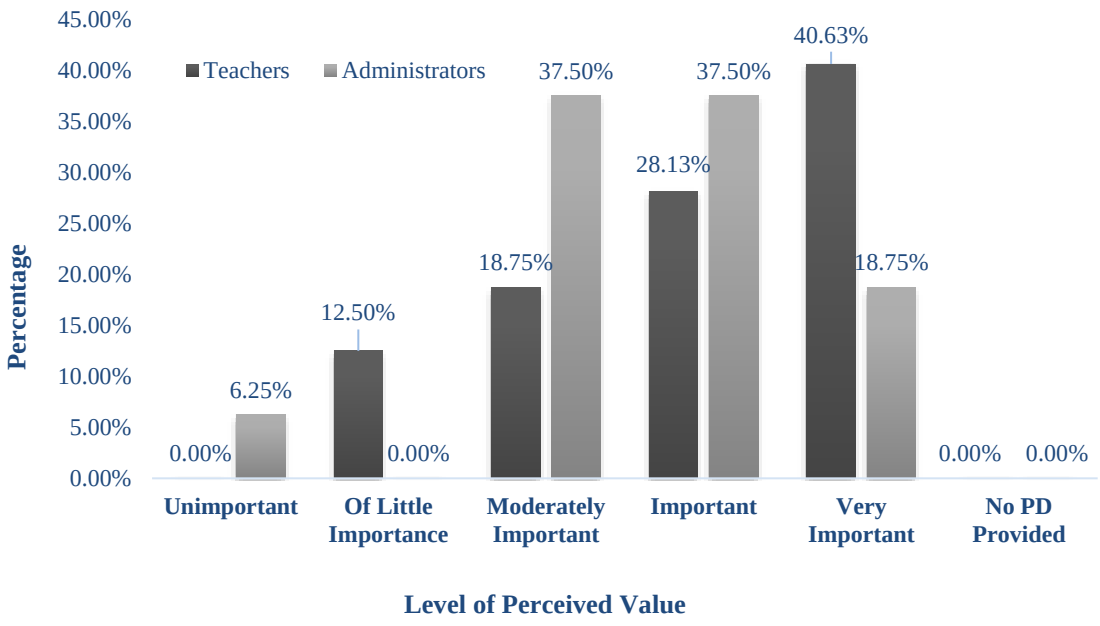

Figure 2. Perceived value of professional development on hardware/devices prior to the implementation of a one-to-one technology initiative.

In the second category, teachers and administrators reflected on the perceived value of software programs training (Microsoft Office, etc.) for one-to-one implementation to be successful. The results showed 65.63% of teachers perceived software programs training to be *important* or *very important* as a component of professional development, and 6.25% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 68.75% of administrators perceived software programs training to be *important* or *very important* as a component of professional development, and 6.25% of administrators found it to be *of little importance* or *unimportant* (see Figure 3).

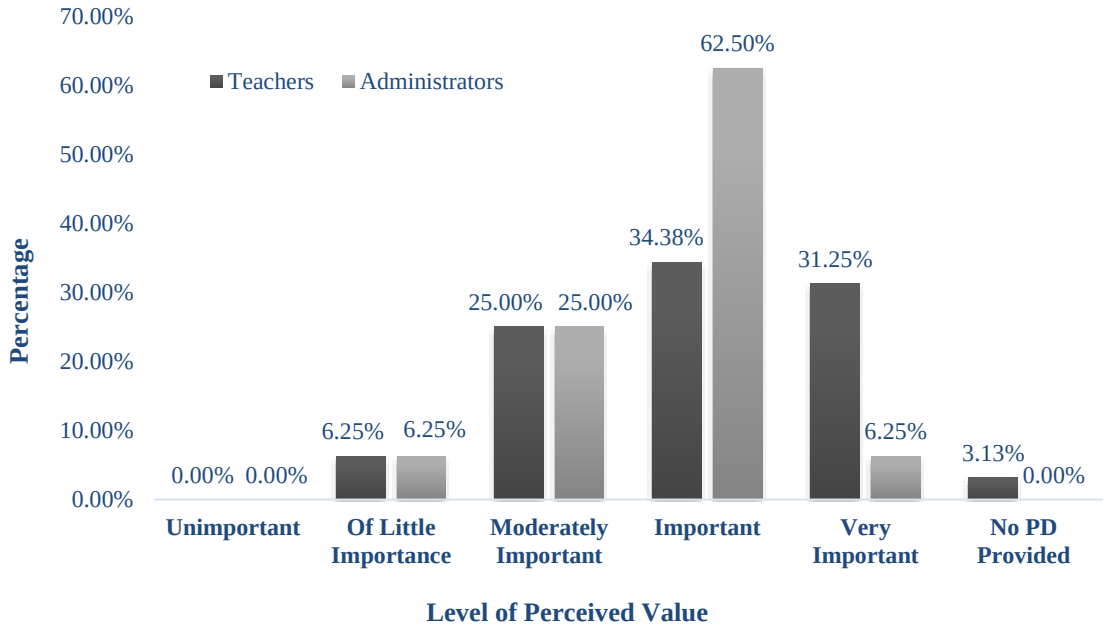

Figure 3. Perceived value of professional development on software programs prior to the implementation of a one-to-one technology initiative.

In the third category, teachers and administrators reflected on the perceived value of Google Apps for Education (Docs, Sheets, Slide, Gmail, etc.) training for one-to-one implementation to be successful. The results showed 65.63% of teachers perceived Google Apps for Education training to be *important* or *very important* as a component of professional development, and 12.51% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 81.25% of administrators perceived Google Apps for Education training as *important* or *very important* as a component of professional development, and 12.50% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 4).

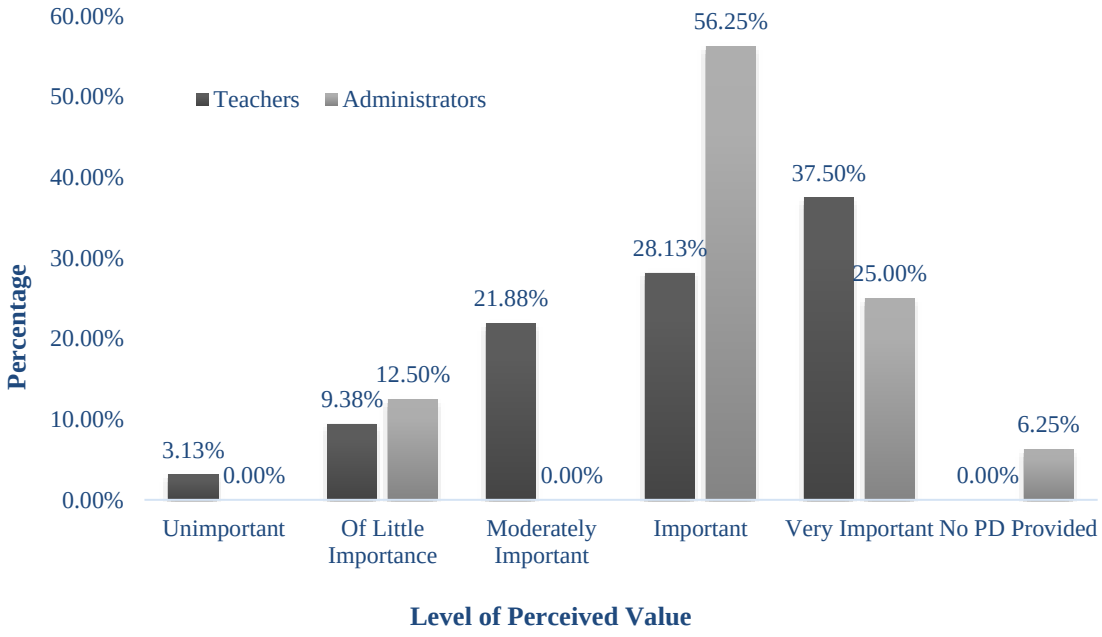

Figure 4. Perceived value of professional development on Google Apps for Education prior to the implementation of a one-to-one technology initiative.

In the fourth category, teachers and administrators reflected on the perceived value of learning management system (Canvas, Schoology, Blackboard, Moodle, etc.) training for one-to-one implementation to be successful. The results showed 68.76% of teachers perceived learning management system training to be *important* or *very important* as a component of professional development, and 12.50% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 62.50% of administrators perceived learning management system training as *important* or *very important* as a component of professional development, and 12.50% of administrators found it to be *of little importance* or *unimportant* (see Figure 5).

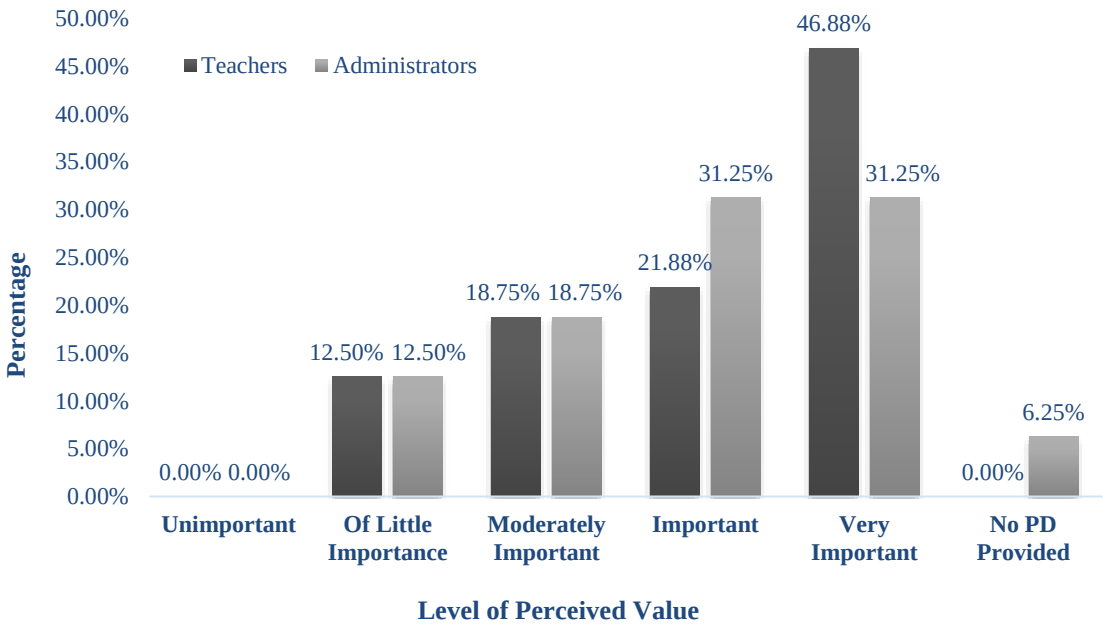

Figure 5. Perceived value of professional development on learning management systems prior to the implementation of a one-to-one technology initiative.

In the fifth category, teachers and administrators reflected on the perceived value of training in the integration of technology into lessons (examples, modeling, etc.) prior to implementation for one-to-one implementation to be successful. The results showed 68.75% of teachers perceived training in the integration of technology into lessons to be *important* or *very important* as a component of professional development, and 6.25% of teachers found it to be *of little importance* or *unimportant*. The results showed 68.75% of administrators perceived training in the integration of technology into lessons to be *important* or *very important* as a component of professional development, and 6.25% of administrators found it to be *of little importance* or *unimportant* (see Figure 6).

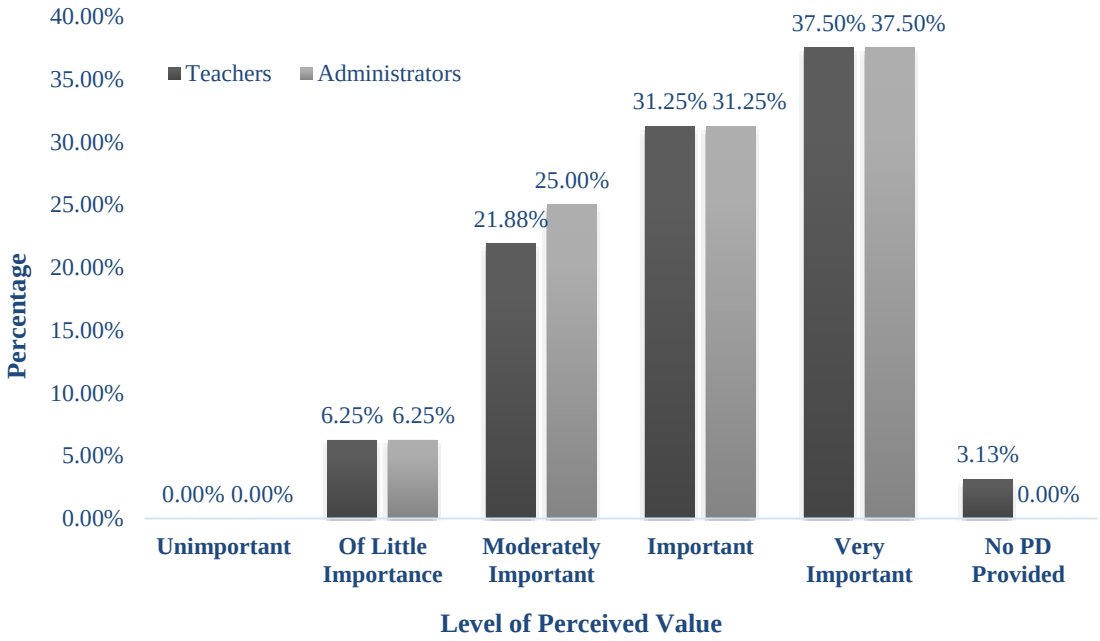

Figure 6. Perceived value of professional development on integration of technology into lessons prior to the implementation of a one-to-one technology initiative.

In the sixth category, teachers and administrators reflected on the perceived value of teaching with textbooks versus incorporating digital content professional development prior to one-to-one implementation. The results showed 59.38% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 15.63% of teachers indicated it to be *of little importance* or *unimportant*. In comparison, responses revealed 62.50% of administrators perceived training on teaching with textbooks versus incorporating digital content as *important* or *very important* as a component of professional development, and 0% of administrators found it to be *of little importance* or *unimportant* (see Figure 7).

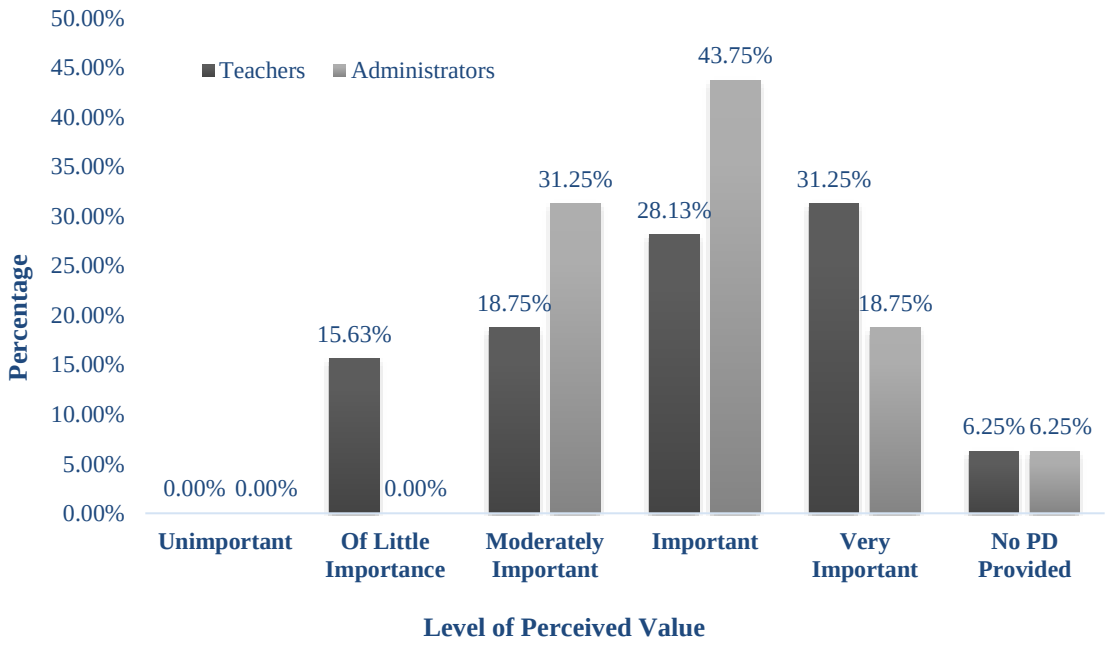

Figure 7. Perceived value of professional development on teaching with textbooks versus incorporating digital content prior to the implementation of a one-to-one technology initiative.

In the seventh category, teachers and administrators reflected on the perceived value of professional development prior to implementation on aligning digital resources with curriculum and standards for one-to-one implementation to be successful. The responses exhibited 56.25% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 21.88% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 37.50% of administrators perceived training in this area as *important* or *very important* as a component of professional development, and 12.50% of administrators found it to be *of little importance* or *unimportant* (see Figure 8).

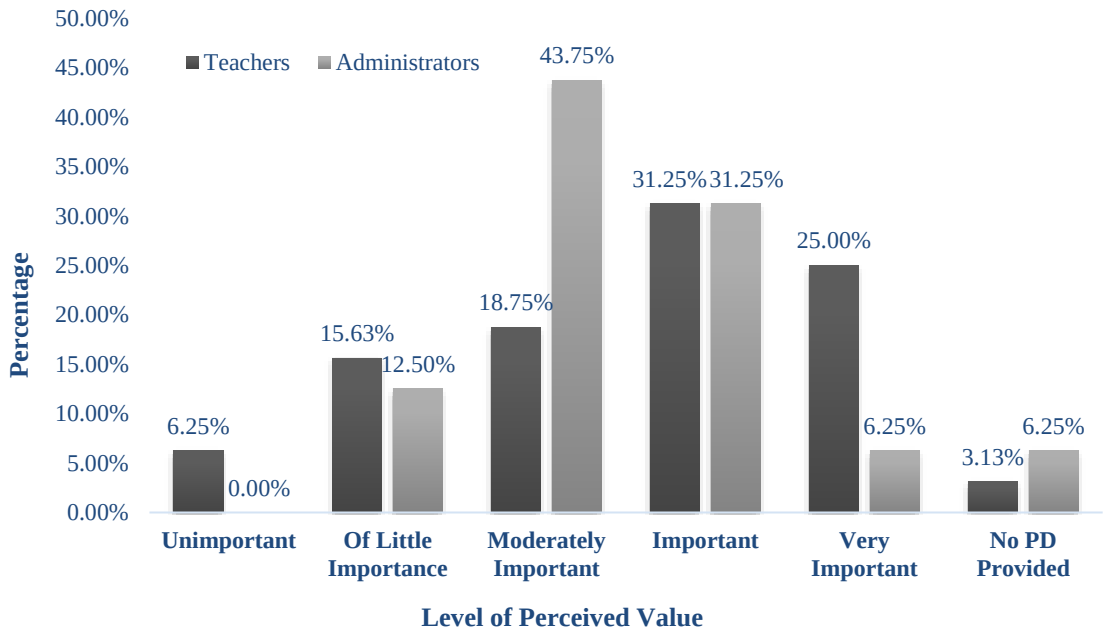

Figure 8. Perceived value of professional development on aligning digital resources with curriculum and standards prior to the implementation of a one-to-one technology initiative.

In the eighth category, teachers and administrators reflected on the perceived value of professional development prior to implementation in the area of the utilization of frameworks for integration (SAMR or TPACK Model) for one-to-one implementation to be successful. The results showed 31.26% of teachers perceived training to be *important* or *very important* as a component of professional development, and 25.01% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 50.00% of administrators perceived training in this category as *important* or *very important* as a component of professional development, and 31.25% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 9).

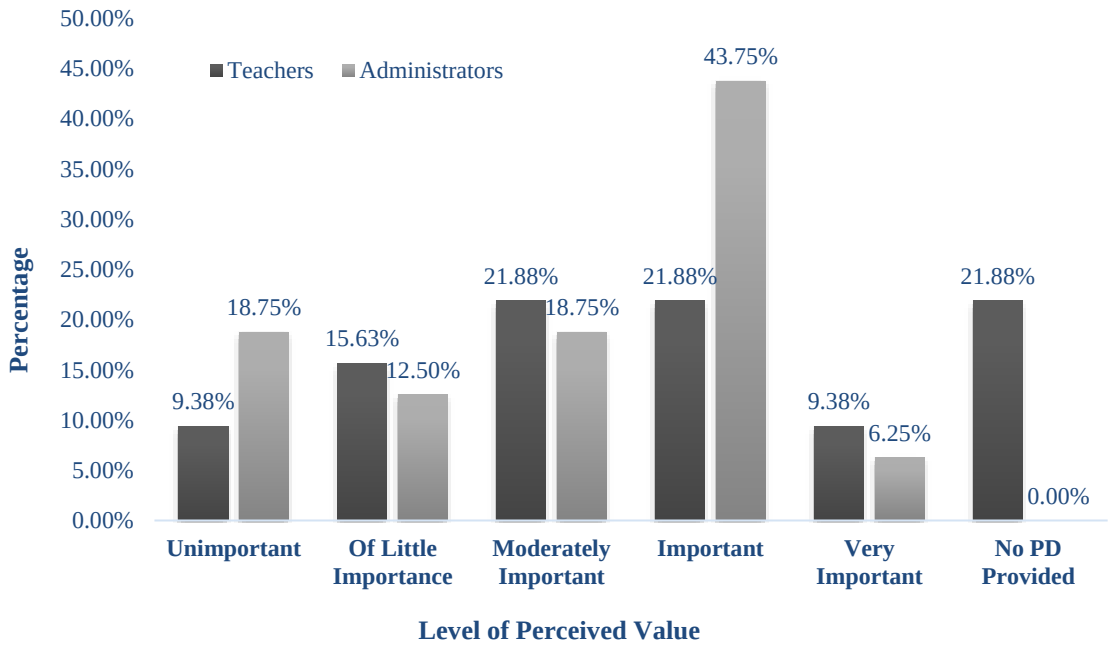

Figure 9. Perceived value of professional development on frameworks for integration prior to the implementation of a one-to-one technology initiative.

In the ninth category, teachers and administrators reflected on the perceived value of professional development in best teaching practices using technology (pedagogy, student-centered/led vs. teacher-led) prior to one-to-one implementation. The responses demonstrated 59.38% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 15.63% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 81.25% of administrators perceived training in best teaching practices prior to implementation as *important* or *very important* as a component of professional development, and 12.50% of administrators found it to be *of little importance* or *unimportant* (see Figure 10).

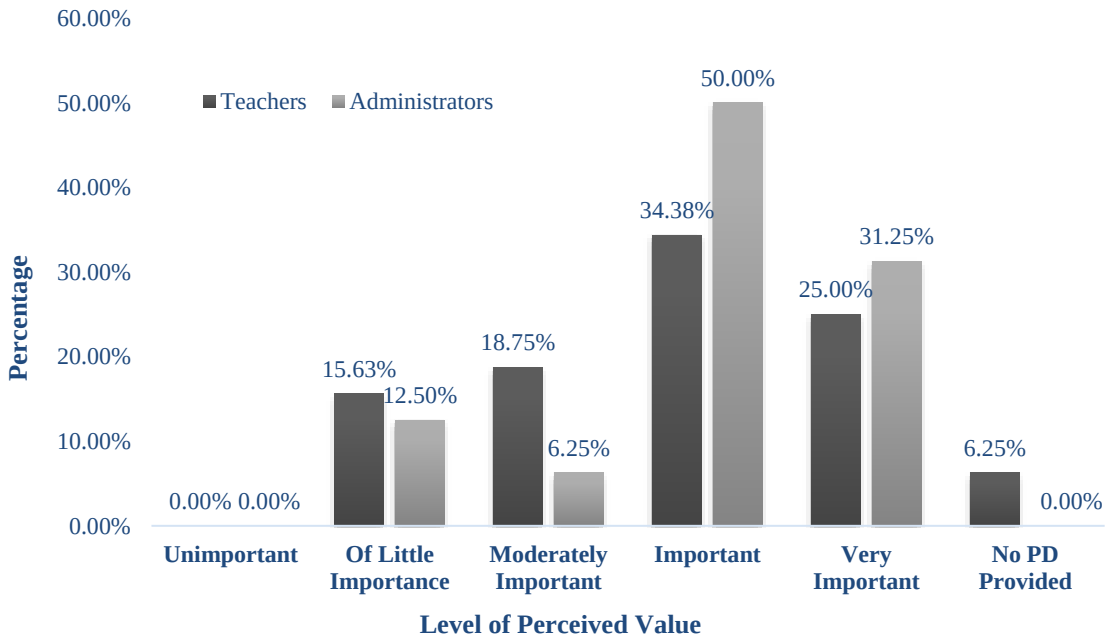

Figure 10. Perceived value of professional development on best teaching practices using technology prior to the implementation of a one-to-one technology initiative.

In the 10th category, teachers and administrators reflected on the perceived value of professional development on incorporating 21st-century skills (collaboration, communication, creativity, critical thinking) prior to one-to-one implementation. Responses exhibited results which showed 68.76% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 12.51% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 68.75% of administrators perceived training on incorporating 21st-century skills as *important* or *very important* as a component of professional development, and 18.75% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 11).

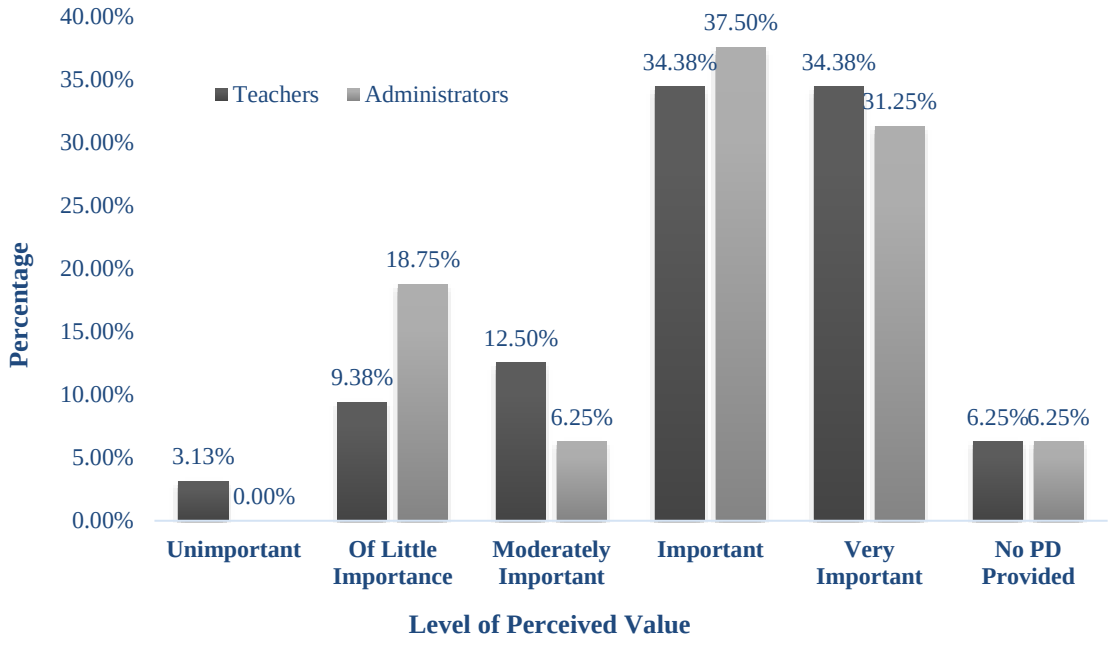

Figure 11. Perceived value of professional development on incorporating 21st-century skills prior to the implementation of a one-to-one technology initiative.

Both administrators and teachers were asked to identify how professional development was delivered in the area of technology integration prior to the implementation of a one-to-one initiative in question eight. The options given for participants to select were as follows: during professional development time reserved within the school year, by experts inside the district, by experts outside the district, online, throughout normal instruction, by instructional coach, and other. The responses of both groups are demonstrated in Figure 12.

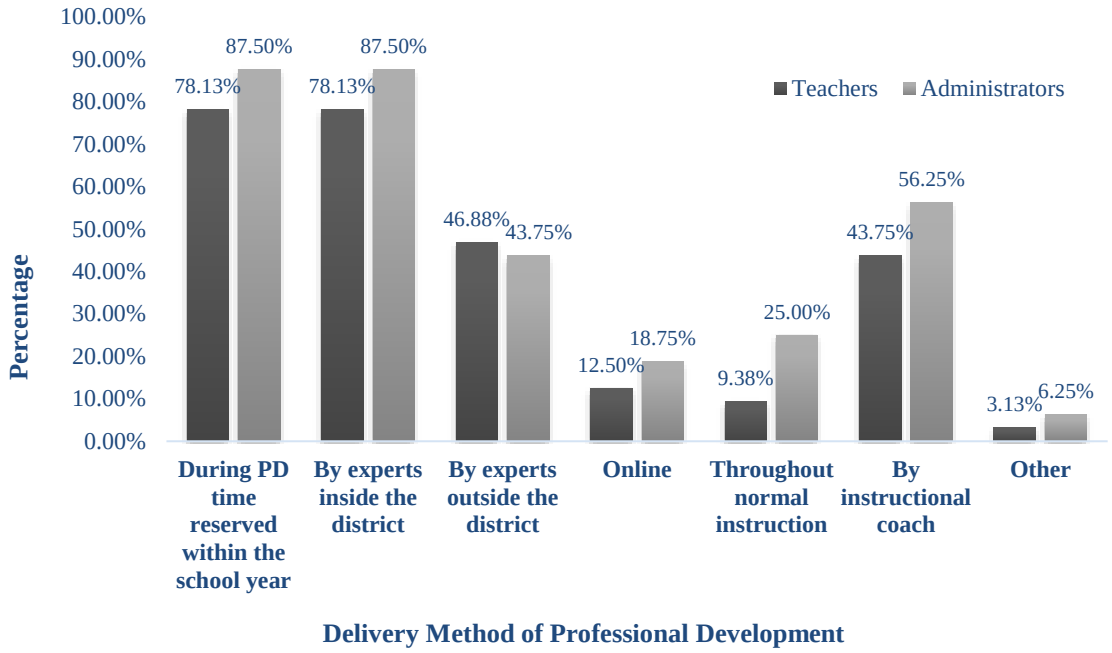

Figure 12. How professional development was delivered in the area of technology integration prior to the implementation of a one-to-one initiative.

In statement nine, both groups described, prior to the one-to-one initiative implementation, their educational background in integrating technology into teaching. Options for selection were as follows: no training in technology integration (college classes or workshops), 1-4 college classes in technology integration, 5-10 college classes

in technology integration, earned a minor or major in the area of technology integration, 1-5 professional development workshops, 6-10 professional development workshops, more than 10 workshops, and other. As depicted in Figure 13, while teachers had more experience in taking college courses in technology integration, administrators had participated in more workshops prior to implementation of one-to-one initiatives.

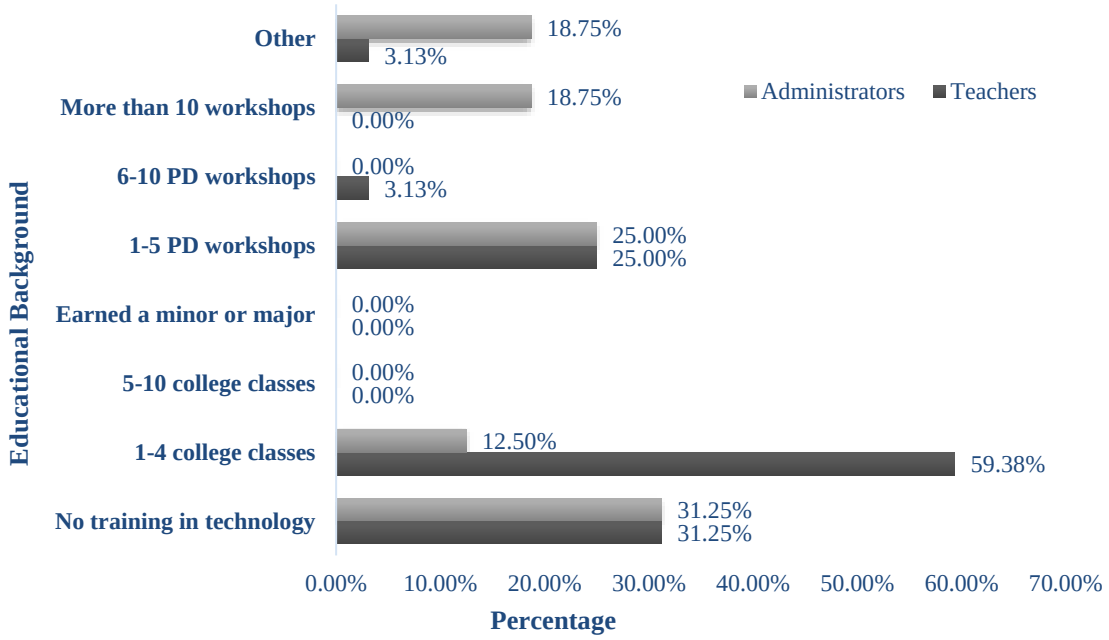

Figure 13. Participants' descriptions of educational backgrounds in integrating technology into teaching prior to the implementation of a one-to-one initiative.

Perceived values of professional development after implementation. Starting with statement 10 of the survey, participants were asked to switch gears. Instead of responding to statements regarding the perceived value of professional development prior to implementation, in statement 10, both teachers and administrators reflected on their perspectives regarding professional development after the implementation of a one-to-one initiative. The areas of professional development included the following categories:

hardware/devices, software programs (Microsoft Office, etc.), Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.), learning management system (Canvas, Schoology, Blackboard, Moodle, etc.), integration of technology into lessons (examples, modeling, etc.), teaching with textbooks versus incorporating digital content, aligning digital resources with curriculum and standards, frameworks for integration (SAMR, TPACK Model), best teaching practices using technology (pedagogy, student-centered/led versus teacher-led), and incorporating 21st-century skills (collaboration, communication, creativity, critical thinking). The results were a reflection on how important the aforementioned areas of professional development were for successful implementation.

Through the instrumentation tool, teachers and administrators were asked to respond to each of the 10 areas of professional development. In the first category of statement 10, both groups reflected on the perceived value of hardware/device training for one-to-one implementation to be successful after the actual implementation. The results showed 75.01% of teachers perceived hardware/device training to be *important* or *very important* as a component of professional development, and 9.38% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 85.72% of administrators perceived hardware/device training to be *important* or *very important* as a component of professional development, and 0% of administrators found it to be *of little importance* or *unimportant* (see Figure 14).

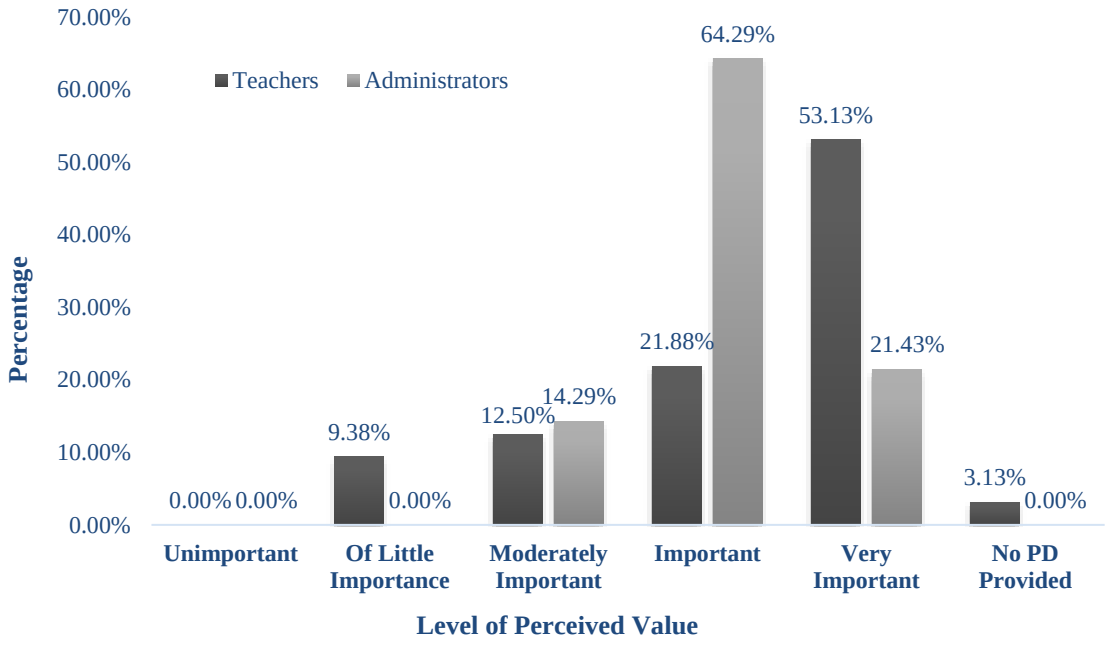

Figure 14. Perceived value of professional development on hardware/devices after the implementation of a one-to-one technology initiative.

In the second category of statement 10, respondents were reflected on the perceived value of software programs training (Microsoft Office, etc.) after implementation for one-to-one implementation to be successful. The results showed 71.88% of teachers perceived software programs training to be *important* or *very important* as a component of professional development, and 3.13% of teachers indicated it to be *of little importance* or *unimportant*. In comparison, results showed 64.29% of administrators perceived software programs training to be *important* or *very important* as a component of professional development, and 7.14% of administrators found it to be *of little importance* or *unimportant* (see Figure 15).

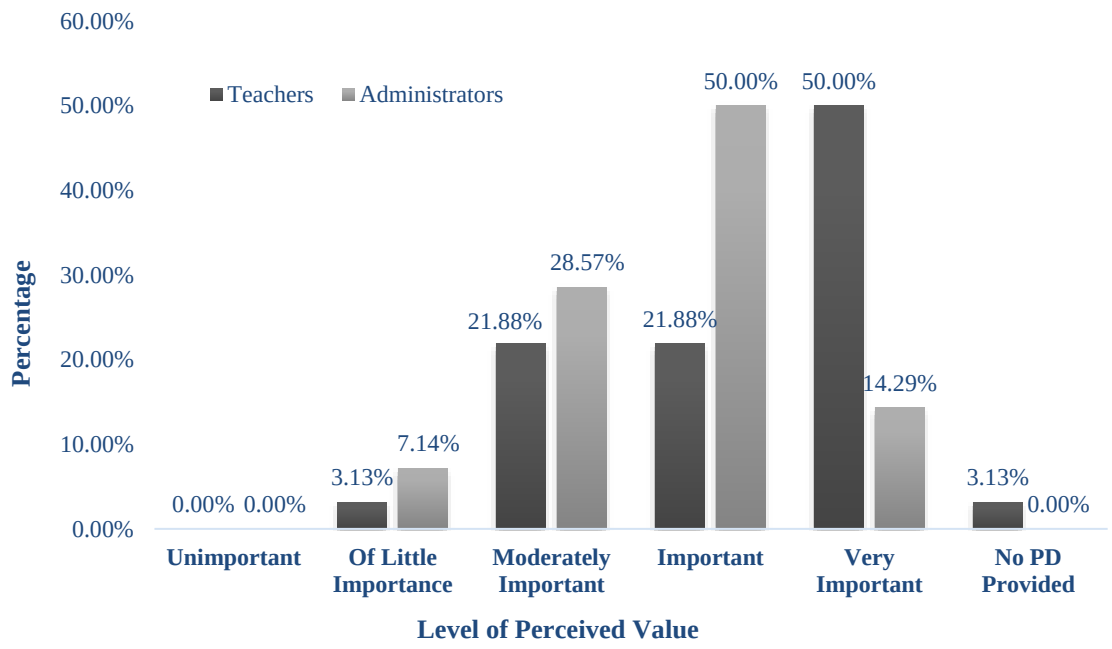

Figure 15. Perceived value of professional development on software programs after the implementation of a one-to-one technology initiative.

In the third category of statement 10, both groups reflected on the perceived value of Google Apps for Education (Docs, Sheets, Slide, Gmail, etc.) training for one-to-one implementation to be successful. The results showed 90.63% of teachers perceived Google Apps for Education training to be *important* or *very important* as a component of professional development, and 0% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 92.86% of administrators perceived Google Apps for Education training as *important* or *very important* as a component of professional development, and 0% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 16).

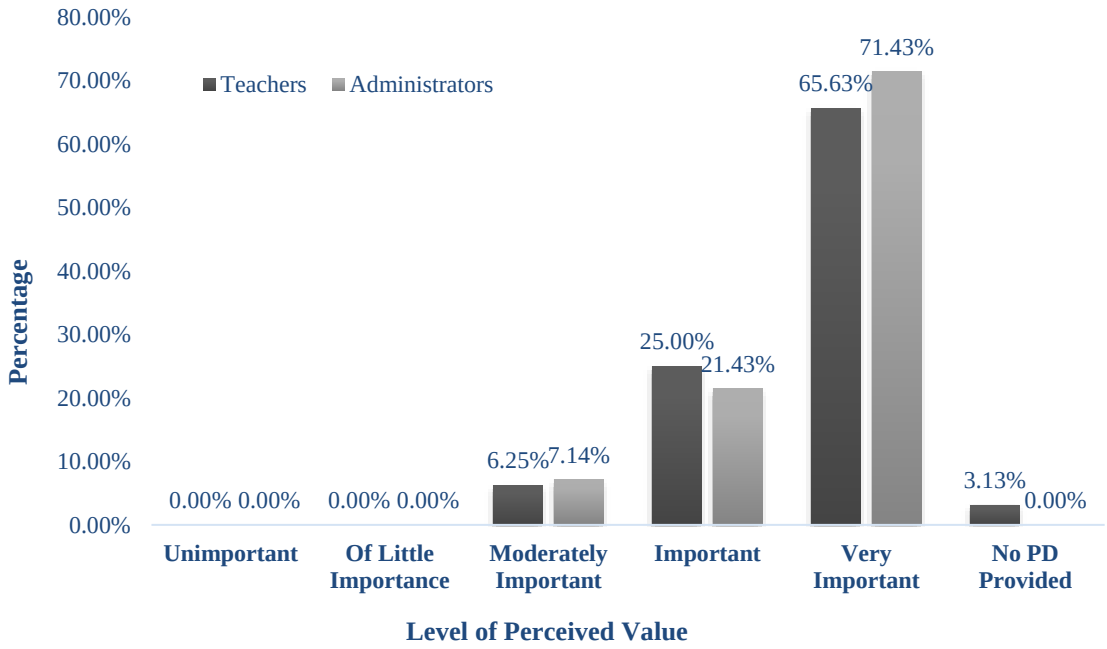

Figure 16. Perceived value of professional development on Google Apps for Education after the implementation of a one-to-one technology initiative.

In the fourth category of statement 10, respondents reflected on the perceived value of learning management system (Canvas, Schoology, Blackboard, Moodle, etc.) training for one-to-one implementation to be successful. The results showed 87.51% of teachers perceived learning management system training to be *important* or *very important* as a component of professional development, and 3.13% of teachers indicated it to be *of little importance* or *unimportant*. In comparison, results showed 85.72% of administrators perceived learning management system training as *important* or *very important* as a component of professional development, and 0% of administrators found it to be *of little importance* or *unimportant* (see Figure 17).

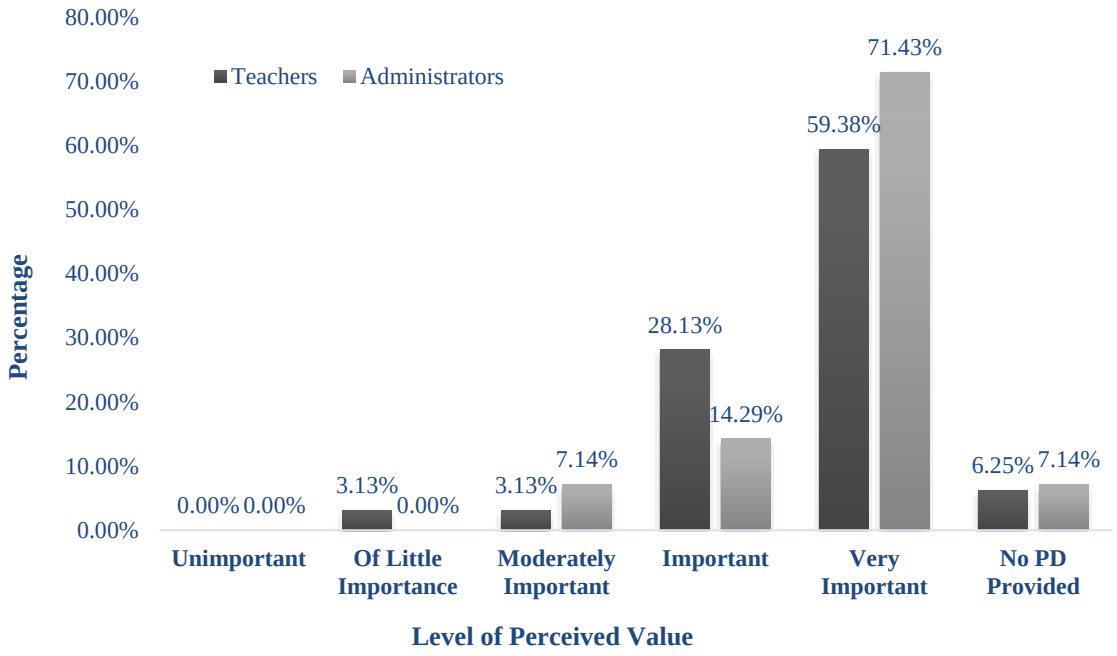

Figure 17. Perceived value of professional development on learning management systems after the implementation of a one-to-one technology initiative.

In the fifth category, both groups reflected on the perceived value of training in the integration of technology into lessons (examples, modeling, etc.) after implementation for the one-to-one initiative to be successful. The results showed 84.38% of teachers perceived training in the integration of technology into lessons to be *important* or *very important* as a component of professional development, and 0% of teachers found it to be *of little importance* or *unimportant*. In comparison, responses showed 85.71% of administrators perceived training in the integration of technology into lessons to be *important* or *very important* as a component of professional development, and 0% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 18).

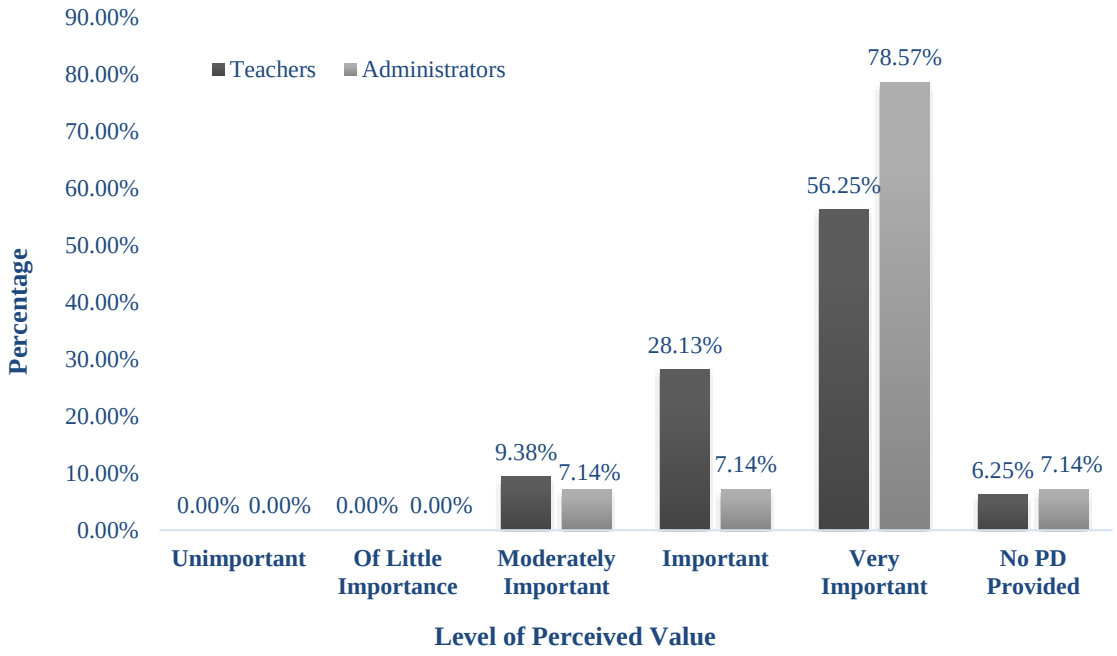

Figure 18. Perceived value of professional development on integration of technology into lessons after the implementation of a one-to-one technology initiative.

In the sixth category of statement 10, teachers and administrators reflected on the perceived value of teaching with textbooks versus incorporating digital content training after one-to-one initiative implementation. The results showed 59.38% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 9.38% of teachers found it to be *of little importance* or *unimportant*. In comparison, responses revealed 64.28% of administrators perceived training as *important* or *very important* as a component of professional development, and 14.29% of administrators found it to be *of little importance* or *unimportant* (see Figure 19).

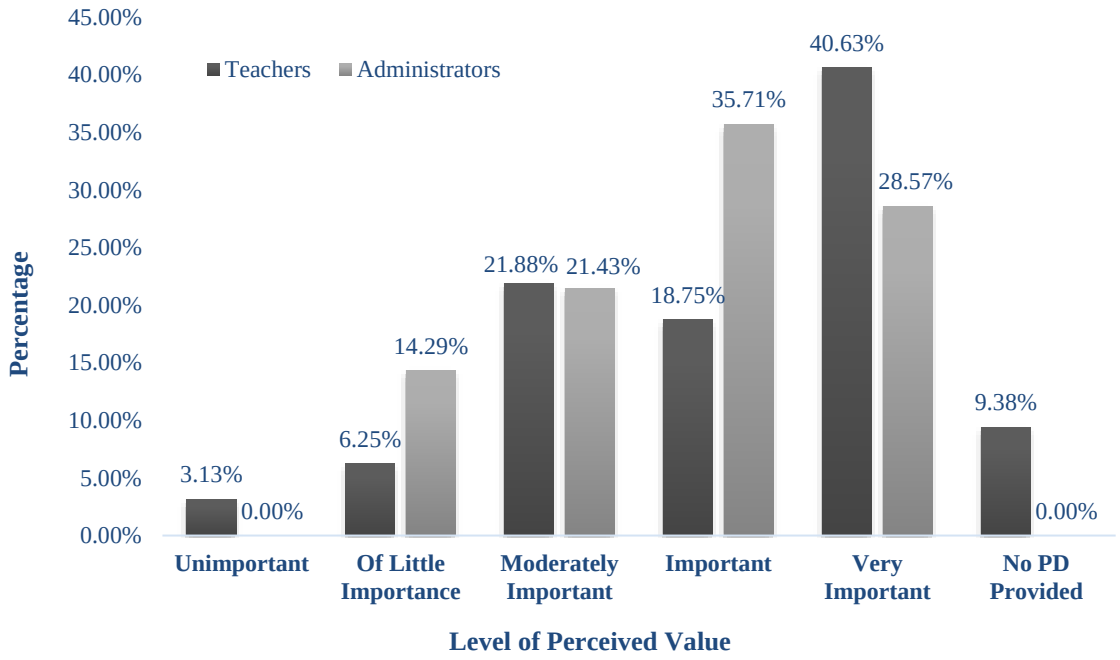

Figure 19. Perceived value of professional development on teaching with textbooks versus incorporating digital content after the implementation of a one-to-one technology initiative.

In the seventh category of statement 10, respondents reflected on the perceived value of professional development after implementation on aligning digital resources with curriculum and standards for one-to-one implementation to be successful. The responses revealed 81.26% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 3.13% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 78.57% of administrators perceived training in this area as *important* or *very important* as a component of professional development, and 0% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 20).

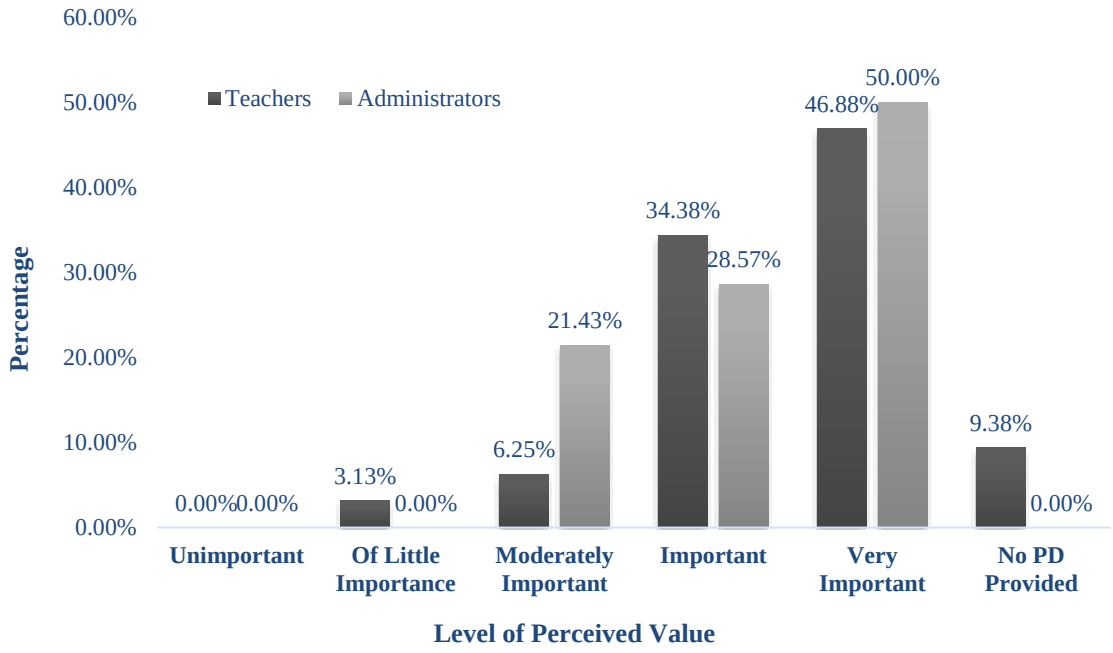

Figure 20. Perceived value of professional development on aligning digital resources with curriculum and standards after the implementation of a one-to-one technology initiative.

In the eighth category, both groups reflected on the perceived value of professional development after implementation in the area of the utilization of frameworks for integration (SAMR or TPACK Model) for one-to-one implementation to be successful. The results showed 53.13% of teachers perceived training to be *important* or *very important* as a component of professional development, and 12.51% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 57.15% of administrators perceived training in this category as *important* or *very important* as a component of professional development, and 7.14% of administrators found it to be *of little importance* or *unimportant* (see Figure 21).

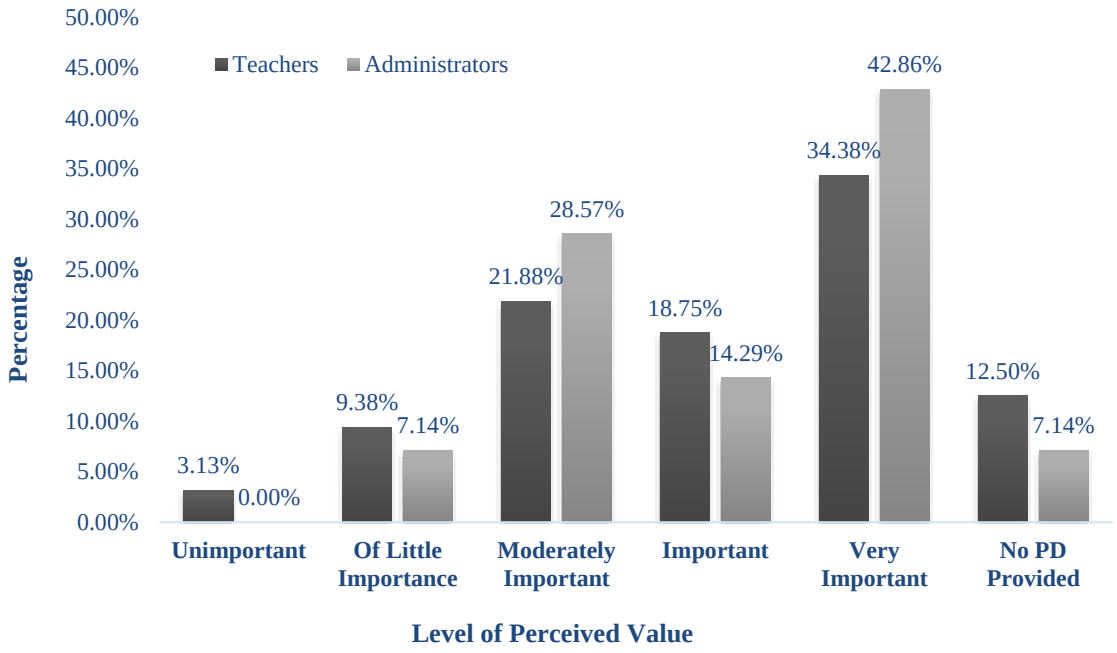

Figure 21. Perceived value of professional development on frameworks for integration after the implementation of a one-to-one technology initiative.

In the ninth category, teachers and administrators reflected on the perceived value of professional development in best teaching practices using technology (pedagogy, student-centered/led vs. teacher-led) after one-to-one implementation. The responses demonstrated 71.88% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 9.38% of teachers established it to be *of little importance* or *unimportant*. In comparison, results showed 85.72% of administrators perceived training in best teaching practices prior to implementation as *important* or *very important* as a component of professional development, and 0% of administrators indicated it to be *of little importance* or *unimportant* (see Figure 22).

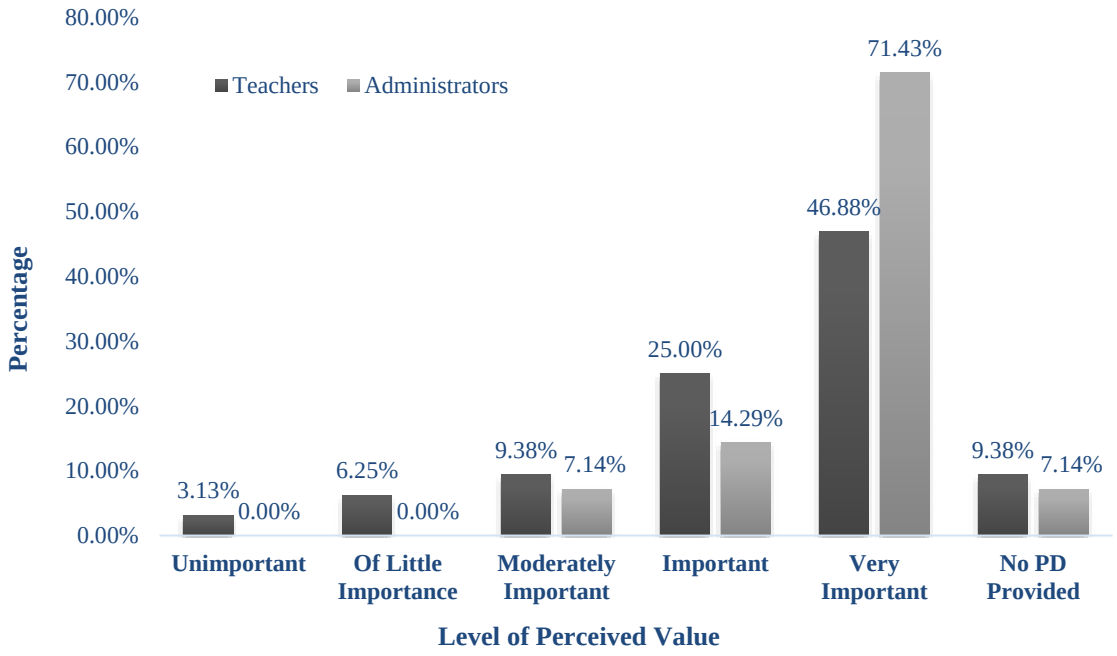

Figure 22. Perceived value of professional development on best teaching practices using technology after the implementation of a one-to-one technology initiative.

In the 10th category, both groups reflected on the perceived value of professional development on incorporating 21st-century skills (collaboration, communication, creativity, critical thinking) after one-to-one implementation. Responses revealed 81.25% of teachers perceived training in this area to be *important* or *very important* as a component of professional development, and 6.25% of teachers found it to be *of little importance* or *unimportant*. In comparison, results showed 85.72% of administrators perceived training on incorporating 21st-century skills as *important* or *very important* as a component of professional development, and 0% of administrators found it to be *of little importance* or *unimportant* (see Figure 23).

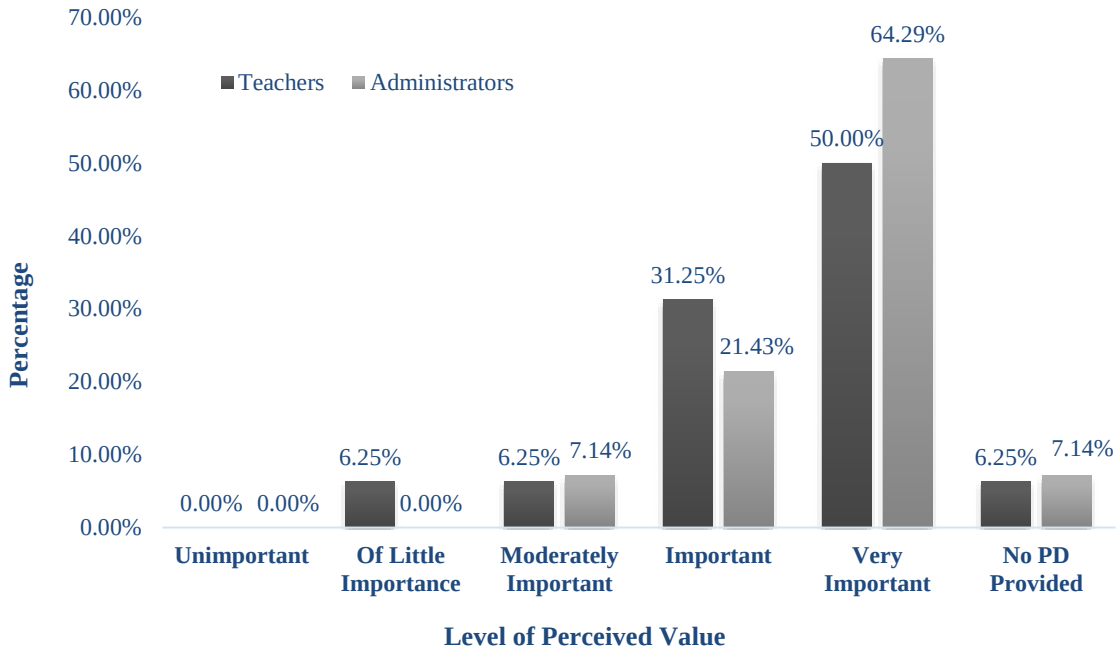

Figure 23. Perceived value of professional development on incorporating 21st-century skills after the implementation of a one-to-one technology initiative.

In question 11 of the instrumentation tool, both administrators and teachers were asked to identify how professional development *should have been* delivered in the area of technology integration in preparation for the implementation of a one-to-one initiative. The options given for participants to select included the following: during professional development time reserved within the school year, by experts inside the district, by experts outside the district, online, throughout normal instruction, by instructional coach, and other. The results of both groups are demonstrated in Figure 24. Administrators' responses indicated professional development should have been offered more throughout normal instruction and by an instructional coach. Teacher responses indicated the preference of professional development during time reserved within the school year and by experts inside the district.

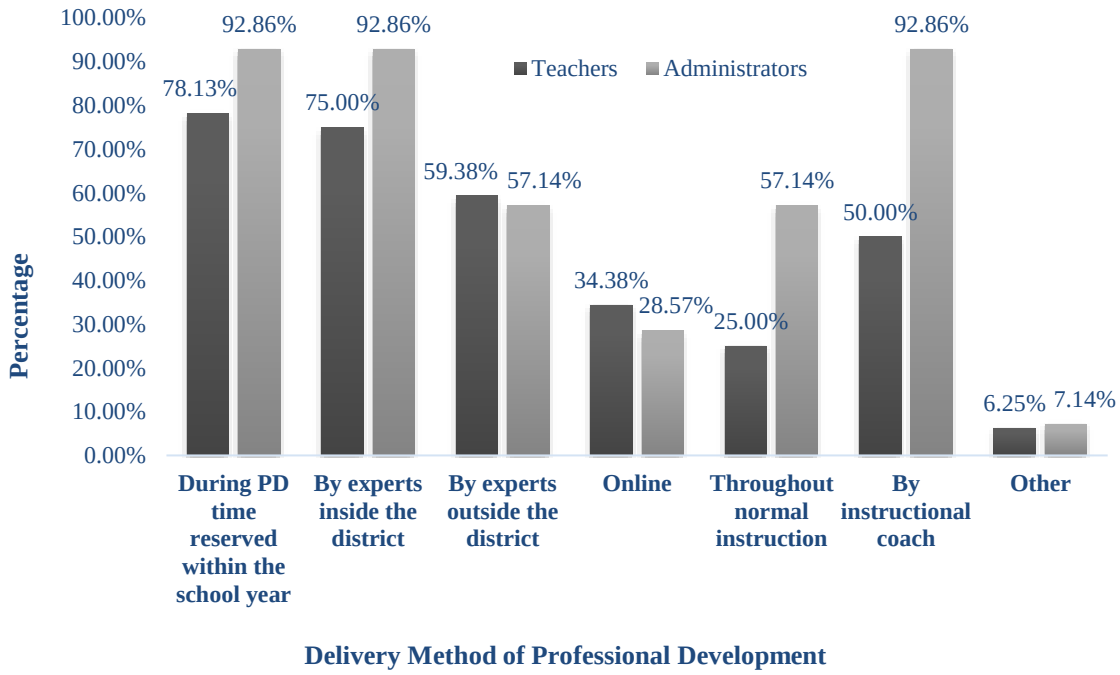

Figure 24. How professional development should have been delivered in the area of technology integration.

In statement 12 of the survey, respondents described, after the one-to-one initiative implementation, their educational backgrounds in integrating technology into teaching. Options for selection were as follows: no training in technology integration (college classes or workshops), 1-4 college classes in technology integration, 5-10 college classes in technology integration, earned a minor or major in the area of technology integration, 1-5 professional development workshops, 6-10 professional development workshops, more than 10 workshops, and other. As depicted in Figure 25, while teachers had more experience with college courses in technology integration, administrators participated in more workshops after implementation of one-to-one initiatives.

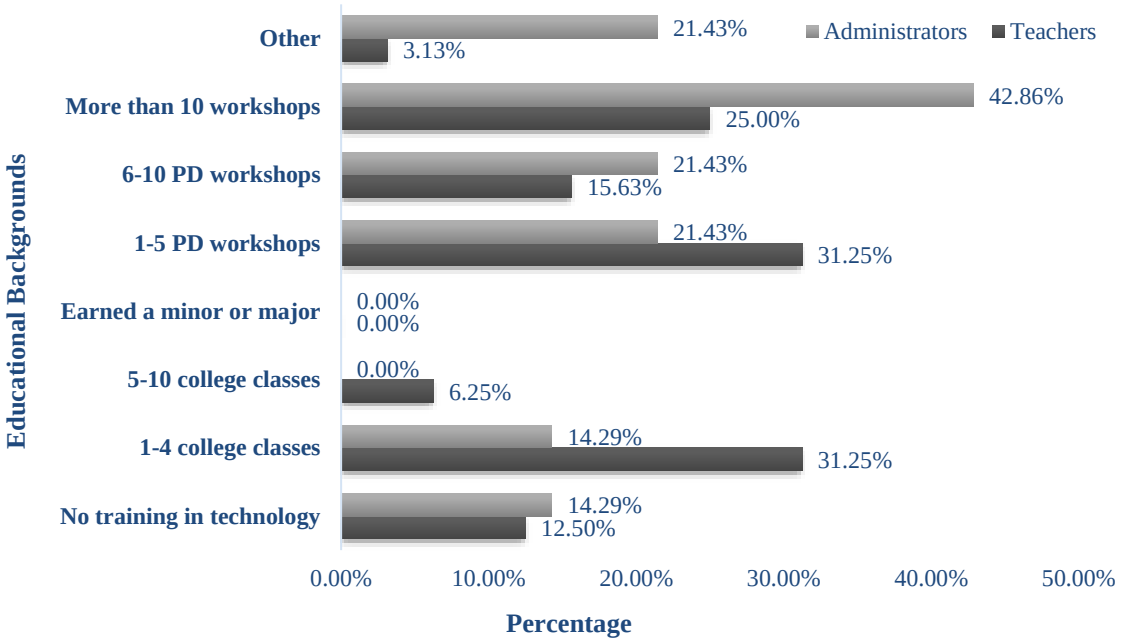

Figure 25. Participants' descriptions of educational backgrounds in integrating technology into teaching after the implementation of a one-to-one initiative.

In question 13, participants were asked to describe what additional training or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom. The responses were easily divided into the following five categories: training on digital resources, curriculum, how professional development was delivered, content, and satisfied with the professional development provided. Out of the 21 responses, only in three of these responses did participants state satisfaction with the professional development provided by their districts prior to the implementation of a one-to-one initiative. One participant specified, "Our school did a good job of rolling out the one-to-one program." The other 18 responses are addressed later in this chapter in response to research question four.

Research Question One

For research question one, the researcher compared teacher responses to survey statement seven in regard to professional development prior to implementation to responses to survey statement 10 in regard to professional development after implementation. When teacher responses were analyzed, differences between responses prior to implementation compared to after implementation were evident. Responses to survey statements seven and 10 were compared in the categories of hardware/devices, software programs (Microsoft Office, etc.), Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.), learning management system (Canvas, Schoology, Blackboard, Moodle, etc.), integration of technology into lessons (examples, modeling, etc.), teaching with textbooks versus incorporating digital content, aligning digital resources with curriculum and standards, frameworks for integration (SAMR, TPACK Model), best teaching practices using technology (pedagogy, student-centered/led versus teacher-led), and incorporating 21st-century skills (collaboration, communication, creativity, critical thinking).

When teachers were asked to reflect on how important professional development was for hardware/devices, prior to implementation 68.76% of teachers perceived professional development to be important or very important in comparison to 75.01% who perceived professional development for hardware/devices to be of the same importance after implementation of a one-to-one initiative. In the area of software program training, 65.63% of teachers valued professional development to be important prior to implementation in comparison to 71.88% after. Google Apps for Education increased in valued importance by 25%. Prior to implementation, 65.63% of teachers

valued professional development in Google Apps for Education as important or very important; however, this percentage increased to 90.63% after implementation.

Training in regard to learning management systems was valued by 68.76% of teachers prior to implementation and 87.51% of teachers after implementation. Prior to implementation, 68.75% of teachers valued professional development in the integration of technology into lessons, and 84.38% valued professional development after implementation. The perceived value of professional development in teaching with textbooks versus incorporating digital content yielded no change in comparisons before or after implementation at 59.38%. However, the value of training in aligning digital resources with curriculum standards increased from 56.25% prior to 81.26% after implementation.

The value of utilizing frameworks for integration also increased from 31.26% prior to 53.13% after implementation. Professional development in best teaching practices using technology increased in value from 59.38% prior to 71.88% after the implementation of a one-to-one initiative. Teacher responses indicated the perceived value of training in incorporating 21st-century skills increased from 68.76% to 81.25% prior to and after implementation, respectively. A summary of these responses is included in Figure 26.

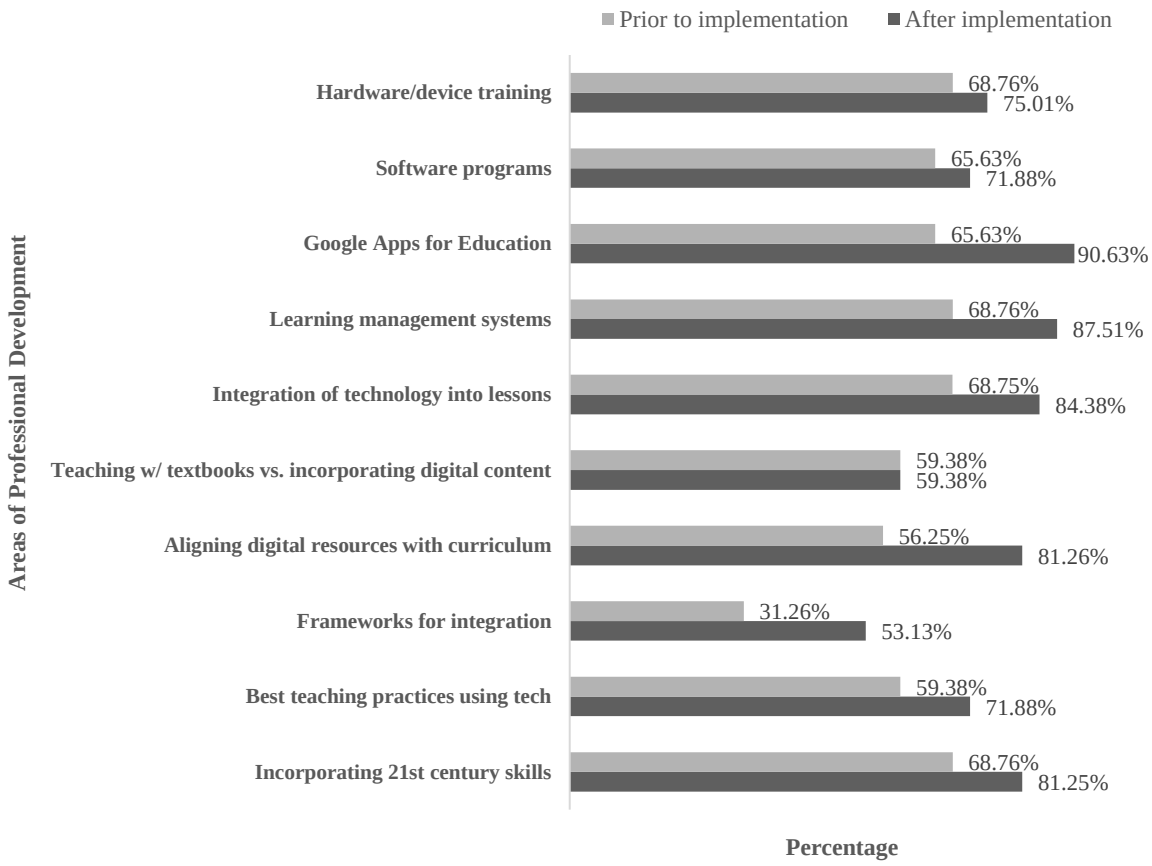

Figure 26. Teachers' responses prior to implementation in comparison to perceived value of importance after implementation of a one-to-one initiative.

Upon further examination, differences between teachers' responses in every area were revealed in Figure 27. The largest differences in teacher responses were in the areas of professional development in Google Apps for Education, which yielded a 25% difference, and in aligning digital resources with curriculum and standards, which yielded a 25.01% increase in the perceived value of importance. The third-largest change in what teachers perceived as an increased value of importance was in the area of utilizing a framework for integration, such as the TPACK or SAMR Models, which was demonstrated by a 21.87% increase. As shown in Figure 27, after the implementation of

a one-to-one initiative, teacher responses indicated an increase in perceived value of professional development in all areas except teaching with textbooks versus incorporating digital content. The survey results demonstrated large changes in what areas of professional development were perceived as important by teachers after the implementation of a one-to-one initiative.

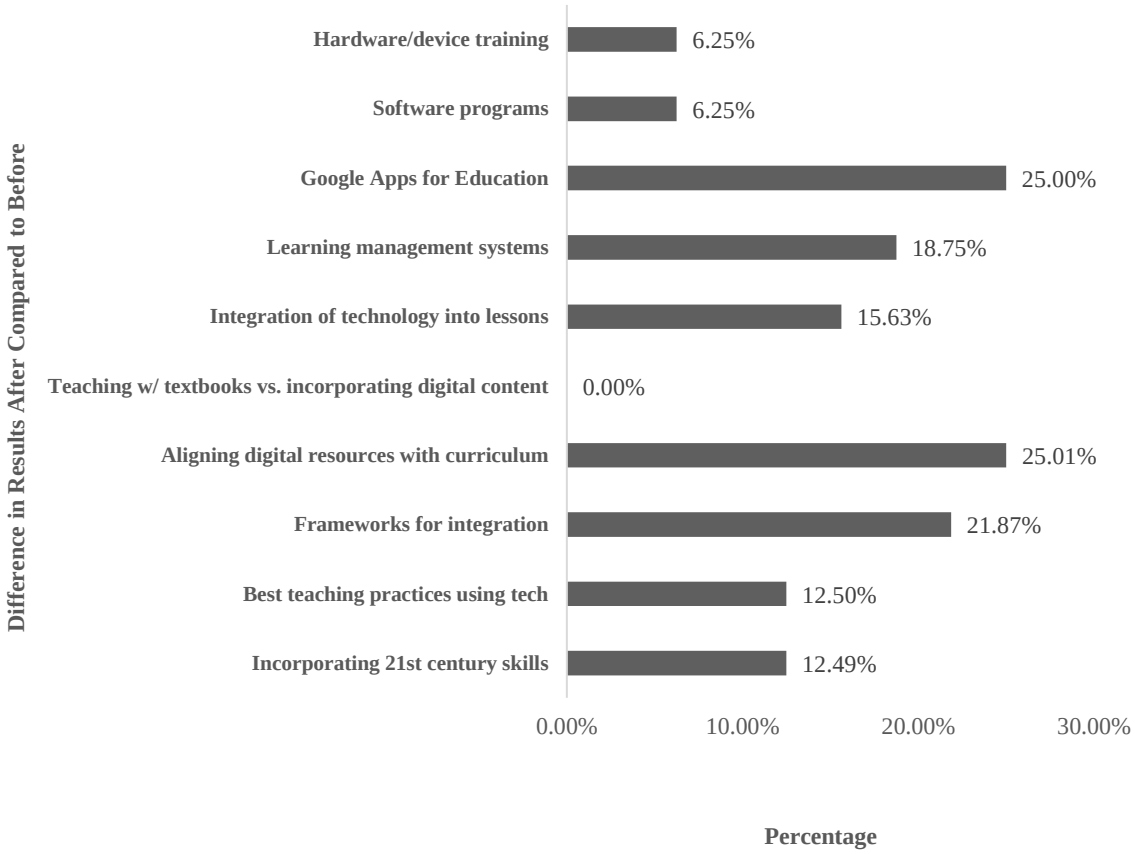

Figure 27. Differences in perceived value of professional development when teachers' responses were compared prior to implementation versus after implementation of a one-to-one initiative.

Research Question Two

For research question two, the researcher compared administrator responses to survey statement seven in regard to professional development prior to implementation to administrator responses to survey statement 10 in regard to professional development after implementation of a one-to-one initiative. Administrator responses were also analyzed to denote changes between perceived values of professional development prior to implementation compared to after implementation. Responses to survey statements seven and 10 were compared in the following categories: hardware/devices, software programs (Microsoft Office, etc.), Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.), learning management system (Canvas, Schoology, Blackboard, Moodle, etc.), integration of technology into lessons (examples, modeling, etc.), teaching with textbooks versus incorporating digital content, aligning digital resources with curriculum and standards, frameworks for integration (SAMR, TPACK Model), best teaching practices using technology (pedagogy, student-centered/led versus teacher-led), and incorporating 21st-century skills (collaboration, communication, creativity, critical thinking).

Administrators were asked to reflect on the importance of professional development in the area of hardware/device training. Prior to implementation, 56.25% of administrators perceived professional development to be important or very important in comparison to 85.72% who perceived professional development to be of the same importance after implementation of a one-to-one initiative. In the area of software program training, 68.75% of administrators perceived professional development to be important prior to implementation in comparison to 64.29% after implementation.

Google Apps for Education increased in valued importance according to administrative responses. Prior to implementation, 81.25% of administrators valued professional development as important or very important. After implementation, 92.86% of administrators valued the importance of professional development.

Training in regard to learning management systems was valued by 62.50% prior to implementation and 85.72% after implementation. Prior to implementation, 68.75% of administrators valued professional development in the integration of technology into lessons, and 85.71% valued it after implementation. The perceived value of professional development in teaching with textbooks versus incorporating digital content yielded a change from 62.50% prior to 64.28% after implementation. However, the value of training in aligning digital resources with curriculum standards increased from 37.50% prior to 78.57% after implementation.

Professional development in best teaching practices using technology increased in value from 81.25% prior to 85.72% after the implementation of a one-to-one initiative. Administrator responses indicated the perceived value of training in incorporating 21st-century skills increased from 68.76% to 85.72% prior to and after implementation, respectively. A summary of these responses is included in Figure 28.

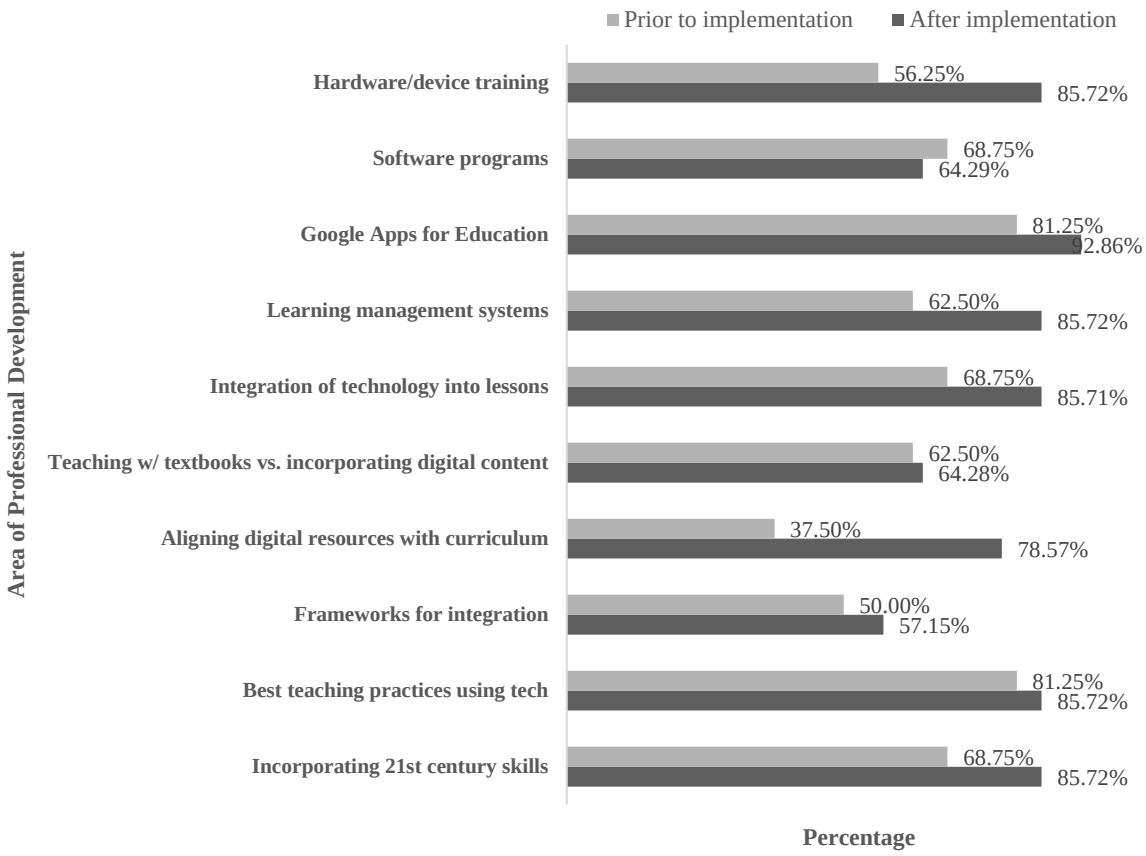

Figure 28. Administrators' responses prior to implementation in comparison to perceived value of importance after implementation of a one-to-one initiative.

Upon further examination, differences between administrator responses in the 10 categories of professional development in survey statements seven and 10 were revealed in Figure 29. The largest differences in responses were in the areas of professional development in aligning digital resources with curriculum and standards, which yielded a 41.07% increase in perceived value, and in hardware/device training, which yielded a 29.47% increase in the perceived value of importance. The third-largest change in what administrators perceived as an increased value of importance was in learning management systems training, which was demonstrated by a 23.22% increase. As shown

in Figure 29, after the implementation of a one-to-one initiative, administrator responses indicated an increase in perceived value of professional development in all areas except two. The perceived value of software program training decreased by 4.46%. The survey results demonstrated large changes in what areas of professional development were perceived as important by administrators after the implementation of a one-to-one initiative.

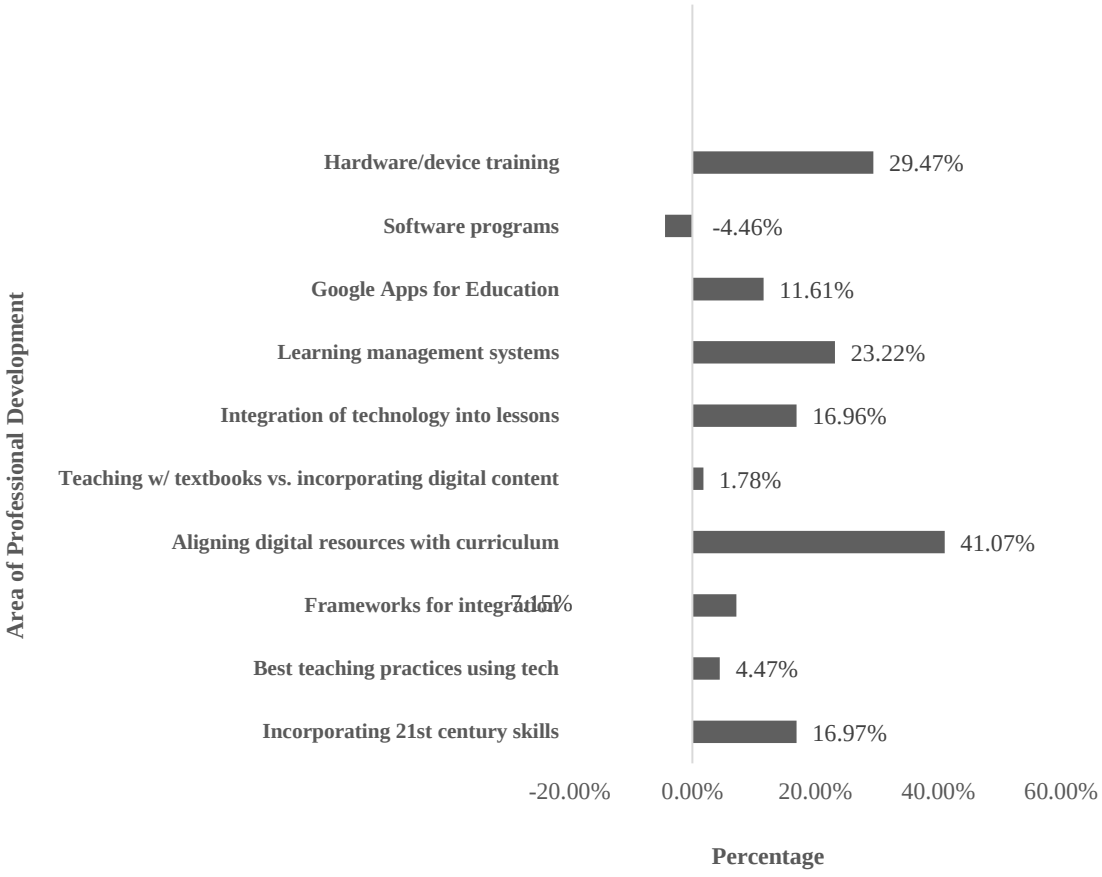

Figure 29. Differences in perceived value of professional development when administrators' responses were compared prior to implementation versus after implementation of a one-to-one initiative.

Research Question Three

Research question three was designed to determine whether or not there was a significant difference between responses of teachers and administrators concerning perceptions of valuable professional development in preparation for a one-to-one laptop initiative. The null hypothesis was stated as: There is no difference between the perceptions of teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative implementation prepared teachers for technology integration.

Teachers and administrators valued most of the areas of professional development approximately the same except in a few categories (see Figure 30). The largest differences in perceived value were in the categories of utilizing frameworks for integration, best teaching practices using technology, Google Apps for Education, and aligning digital resources with curriculum and standards. Administrators valued utilizing frameworks for integration 18.74% more than teachers, best teaching practices using technology 21.87% more than teachers, and Google Apps for Education 15.62% more than teachers. Teachers valued aligning digital resources with curriculum and standards more than administrators by 15.62%.

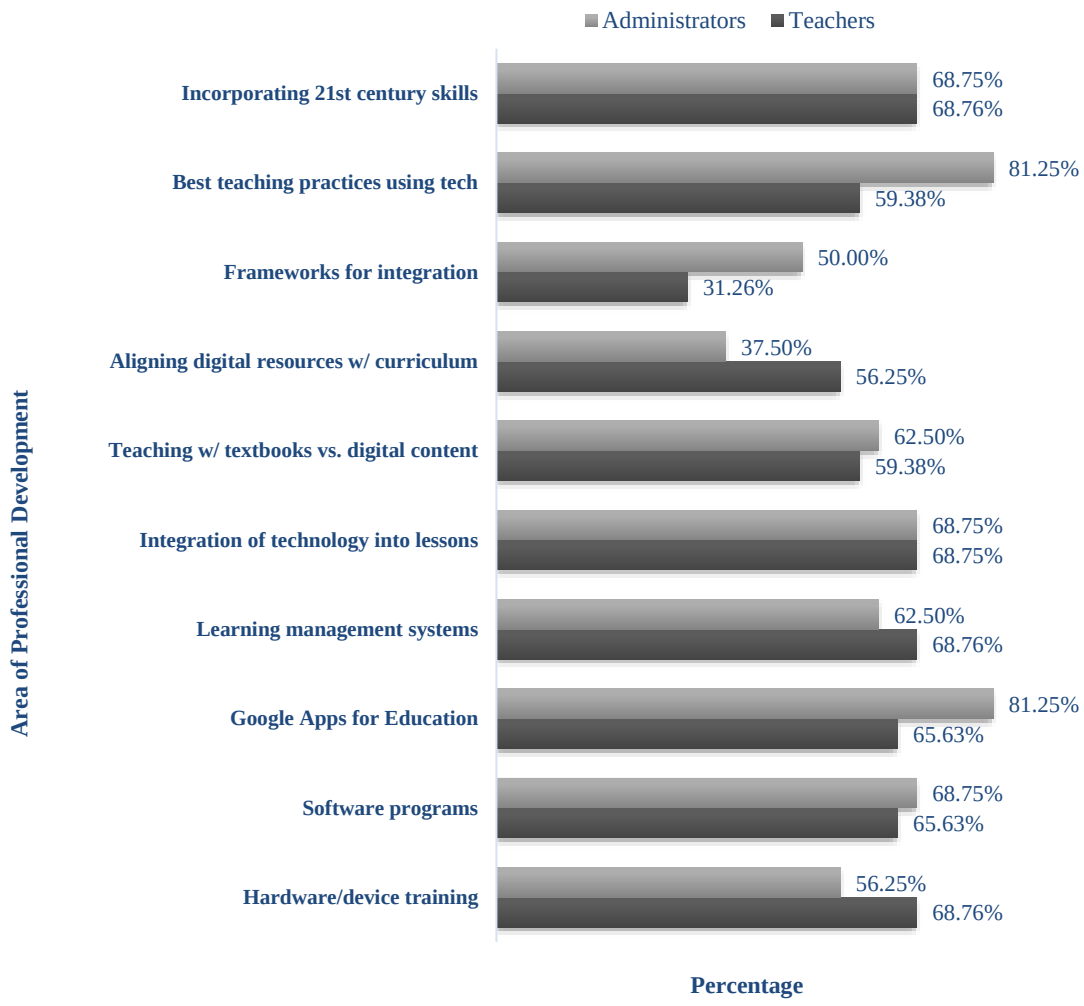

Figure 30. Differences in perceptions of the value of professional development areas among administrators and teachers prior to a one-to-one initiative.

Further analysis of the results displayed in Figure 30 was determined necessary to understand whether or not the differences in perceptions between administrators and teachers were significant. Since survey statement seven resulted in ordinal data, an alternative to the *t*-test was required (Bluman, 2014). The Mann-Whitney *U* test, as a nonparametric alternative, was performed to compare the responses of administrators and teachers in all 10 categories of the question (VassarStats, 2017). This test was chosen to

be most appropriate given the small number of administrator responses and since the number of participants in each group was not the same (VassarStats, 2017). The Mann-Whitney *U* Test assumes $\alpha = .05$ and a significant difference when $p < .05$. The *z* score and probability determinations from the results of the test are summarized in Table 2.

Table 2

Mann-Whitney U Test Results of Administrators' and Teachers' Perceived Value of Professional Development Prior to the Implementation of a One-to-One Initiative

Category	*z*	*p*
Hardware/device	0.64	0.5222
Software programs	0.60	0.5485
Google Apps for Education	0.14	0.8887
Learning management systems	1.11	0.2670
Integration of technology	0.13	0.8966
Teaching w/textbooks vs. incorporating digital content	0.10	0.9203
Aligning digital resources w/ curriculum	1.41	0.1585
Frameworks for integration	-0.94	0.3472
Best teaching practices	-0.86	0.3898
Incorporating 21st-century skills	-0.42	0.6745

All *p* values in Table 2 were found to be greater than .05, which signified there were not any significant differences in the responses between administrators and teachers in regard to perceived value of professional development areas. Since no significant differences were found, the null hypothesis was not rejected.

Research Question Four

For research question four, the researcher sought to identify what additional training or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom. Out of 21 responses, three participants were satisfied with the professional development provided, and 18 participants made recommendations in regard to what professional development could have helped them be more prepared for implementation. The 18 responses were divided into the categories of delivery methods, content, training on resources, and curriculum. Only one participant responded that "more subject-area specific information" would have been helpful.

Eight of the participants gave recommendations based on the method with which professional development was offered. One participant specified, "Visiting teachers in other districts actually utilizing/integrating technology in their classroom" would have helped. Another indicated, "Seeing the implementation during school visits helped more than any other PD provided by the district." Others recommended EdCamp-style professional development, partnering with surrounding districts on professional development days, and implementing an instructional coach.

Six of the participants made comments in regard to digital resources. Participants desired "more time learning how to use online resources," "more specific training on various programs," "more practice," and "less changing between platforms." Another participant stated the one-to-one initiative "could have been implemented without completely eliminating other resources." Three participants made recommendations about curriculum and standards. One participant specified, "More training should have

been provided in the areas of aligning curriculum and standards to digital resources and how to teach without using the formerly required textbooks." Another participant responded, "We could have focused more on our standards alignment to curriculum and instructional practices that would change as a result of the shifts in teaching." Survey question 13 helped to identify four categories of professional development teachers and administrators thought would have proven beneficial prior to implementation of a one-to-one initiative. These areas of professional development included more training in digital resources, the alignment of curriculum, delivery methods of professional development, and applying technology to specific content areas.

Summary

In Chapter Four, the results of the survey data collected were analyzed. The data were first analyzed based upon the responses of both groups, administrators and teachers. Descriptive statistics were then used to analyze the findings for research question one by comparing the teachers' responses prior to and after the implementation of a one-to-one laptop initiative. For research question two, descriptive statistics were utilized to determine the administrators' responses both prior to and after implementation. The results of the application of inferential statistics indicated there was not a significant difference when teachers' responses were compared to administrators' responses. Last, descriptive statistics were used to analyze question 13 of the survey, which was open-ended, to determine findings for research question four.

Chapter Five includes further description of the findings according to the data analysis in Chapter Four. Upon a deeper analysis and interpretation of these results, conclusions are made regarding the findings of the causal-comparative study. The

implications for practice section includes information on how this research can aid in making changes to future professional development programs. Recommendations for future research are also made.

Chapter Five: Summary and Conclusions

As prices in technology have continued to decrease, the gap in access to technology has also decreased (Zheng et al., 2016). With that being said, new issues have arisen with this ease of technological access (Chesley & Jordan, 2012). School districts have been able to implement more technology in the classroom, but whether or not professional development programs have adequately prepared teachers for its integration has been questioned (USDOE, 2016).

Beyond the scope of professional development, the literature review in Chapter Two revealed school leaders and teachers must demonstrate vision, direction, and support of a technology initiative (USDOE, 2016; Whitehead et al., 2013). Professional development should target the integration of technology in all capacities, while ensuring the alignment of curriculum to meet increased expectations of local teaching standards (Chesley & Jordan, 2012; Cydis, 2015; MODESE, 2016). Targeting integration of technology into levels of technological, pedagogical, and content knowledge ensures professional development is designed to meet the needs of teachers at their existing levels of knowledge to ensure growth (Herring et al., 2016).

Throughout this chapter, a review of the findings is presented with detailed information regarding the statistical analysis of data. The conclusions drawn from the analysis provide a deeper interpretation and synthesis of the results. Implications for practice and recommendations for future research are also presented.

Findings

In Chapter Four, the results of the data analysis revealed the perceived value of professional development varied between teachers and administrators. Responses of the

two groups were compared both prior to and after implementation of a one-to-one initiative. Prior to implementation, both administrators and teachers valued the importance of software programs training, learning management systems training, the integration of technology into lessons, professional development on teaching with textbooks versus incorporating digital content, and training on incorporating 21st-century skills.

However, teachers valued hardware/device training and professional development on aligning digital resources with curriculum and standards more than administrators. Administrators valued Google Apps for Education training, professional development on frameworks for integration, and best teaching practices using technology training more than teachers prior to implementation. Responses to question eight revealed most of the professional development prior to implementation was delivered during professional development time reserved within the school year and presented by experts inside the district. Statement nine responses indicated while teachers had more experience in taking college courses in technology integration, administrators had participated in more workshops prior to implementation.

After the implementation of a one-to-one initiative, both administrators and teachers valued the importance of Google Apps for Education training, professional development on learning management systems, integration of technology into lessons training, teaching with textbooks versus incorporating digital content training, professional development on aligning digital resources with curriculum and standards, the utilization of frameworks for integration training, and professional development on incorporating 21st-century skills. However, teachers valued software programs training

more than administrators. Administrators valued hardware/device training and professional development in best teaching practices using technology (pedagogy, student-centered/led vs. teacher-led) more than teachers after the implementation.

In question 11 of the survey, participants were asked how, after the implementation of the initiative, teachers and administrators thought professional development *should have been* delivered. Survey results showed while administrators thought training should have been delivered more by instructional coaches, teachers continued to support professional development being delivered during time reserved within the school year by experts inside the district. Responses to statement 12 of the survey revealed both teachers and administrators had increased participation in workshops, many having participated in more than 10 after the implementation of a one-to-one initiative.

To seek the answer to research question one, the researcher compared teacher responses to survey statement seven in regard to perceived value of professional development prior to implementation to responses to survey statement 10 in regard to professional development value after the implementation of a one-to-one initiative. The results indicated differences among teachers' responses in every area. The largest differences in teacher responses were in the areas of professional development in Google Apps for Education, which yielded a 25% difference, and in aligning digital resources with curriculum and standards, which yielded a 25.01% increase in the perceived value of importance.

The third-largest change in what teachers perceived as of importance was in the area of utilizing a framework for integration, such as the TPACK or SAMR Model,

which was demonstrated by a 21.87% increase. Teacher responses indicated an increase in perceived value of professional development in all areas except teaching with textbooks versus incorporating digital content following the implementation of a one-to-one initiative. The analysis of the survey results from participant responses demonstrated large changes in what areas of professional development were perceived as important by teachers after the implementation of a one-to-one initiative.

To seek the answer to research question two, the researcher compared administrator responses to survey statement seven in regard to perceived value of professional development prior to implementation to survey statement 10 responses in regard to professional development value after the implementation of a one-to-one initiative. The results summarized indicated differences among administrator responses in the 10 categories of professional development. The largest differences were in the areas of professional development in aligning digital resources with curriculum and standards, which yielded a 38.07% increase in perceived value, and in hardware/device training, which yielded a 29.47% increase in perceived value of importance. The third-largest change in what administrators perceived as of importance was in learning management systems training, which was demonstrated by a 23.22% increase.

After the implementation of a one-to-one initiative, administrator responses indicated an increase in perceived value of professional development in all areas except one. The perceived value of software program training decreased by 4.46%. The survey results demonstrated large changes in what areas of professional development were perceived as important by administrators after the implementation of a one-to-one initiative.

Research question three was designed to determine whether there was a significant difference in responses between teachers and administrators regarding valuable professional development in preparation for a one-to-one laptop initiative. The null hypothesis was stated as: There is no difference between the perceptions of teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative implementation prepared teachers for technology integration. Teachers and administrators valued most of the areas of professional development approximately the same except in a few categories.

The largest differences in perceived value were in the categories of utilizing frameworks for integration, best teaching practices using technology, Google Apps for Education, and aligning digital resources with curriculum and standards. Administrators valued utilizing frameworks for integration 18.74% more than teachers, best teaching practices using technology 21.87% more than teachers, and Google Apps for Education 15.62% more than teachers. Teachers valued aligning digital resources with curriculum and standards more than administrators by 15.62%.

Inferential statistics in the form of Mann-Whitney *U* tests were performed in all 10 categories to determine significant differences, and the results were summarized in Table 2. All *p* values in Table 2 were found to be greater than .05, which signified there were not any significant differences in the responses between administrators and teachers in regard to perceived value of professional development areas. Since no significant differences were found, the null hypothesis was not rejected.

To answer research question four, the researcher sought to identify what additional training or professional development activities could have been implemented

to more effectively prepare teachers to implement technology in the classroom. Survey question 13 responses revealed four categories of professional development teachers and administrators thought would have proven beneficial prior to the implementation of a one-to-one initiative. These areas of professional development included more training in digital resources, the alignment of curriculum, the delivery methods of professional development, and applying technology to specific content areas. Eight of the participants gave recommendations based on the method through which professional development was offered. Six of the participants made comments in regard to digital resources, which included more practice and time learning prior to implementation. Three participants made recommendations about curriculum and standards, recommending more focus on the alignment of standards with digital content.

Conclusions

The conceptual framework was based upon the findings of Shulman (1986), who divided content knowledge into the categories of subject-matter content, pedagogical knowledge, and curricular knowledge. Shulman (1987) later identified pedagogical content knowledge as the most important, because it requires both content and pedagogy to be blended together to meet the needs of all learners. Herring et al. (2016) took Shulman's findings and expanded the area of curricular knowledge to include technological knowledge and described the knowledge domains through the TPACK framework. This model explains how to combine technological, pedagogical, and content knowledge together to increase teaching effectiveness (Common Sense Education, TPACK, 2016).

Perceived value of professional development changed from prior to implementation of a one-to-one initiative to after the implementation had occurred. Prior to implementation, teachers valued hardware/device training and professional development on aligning resources with curriculum and standards more than administrators did. After the implementation, teachers valued software programs training more than administrators. Prior to implementation, administrators valued Google Apps for Education training, professional development on frameworks for integration, and training on best teaching practices using technology more than teachers. After the implementation, hardware/device training and professional development in best teaching practices using technology were valued more by administrators. It can be concluded teachers' values shifted from technological content knowledge (TCK) to just technological knowledge, while administrators' values remained the same.

In research question one, the perceptions of teachers regarding professional development prior to implementation of a one-to-one initiative compared to their professional development experiences after implementation were addressed. The largest differences in teacher responses were in the professional development areas of Google Apps for Education (TK), aligning digital resources with curriculum and standards (TCK), and utilizing a framework for integration (TPACK). It can be concluded teachers' perceived value of professional development increased in the areas of how to combine technological knowledge with content knowledge and use of the TPACK Model.

In research question two, the perceptions of administrators regarding professional development prior to implementation of a one-to-one initiative compared to their

professional development experiences after implementation were addressed. The largest differences in administrators' responses were in the areas of aligning digital resources with curriculum and standards (TCK), hardware/device training (TK), and learning management systems (TCK). Administrators' perceived values of professional development increased in the area of technology content knowledge.

In research question three, the differences in perceptions between teachers and administrators regarding whether or not professional development provided prior to a one-to-one initiative prepared teachers for technology integration were addressed. Although when inferential statistical tests were applied, there were not any significant differences between the groups and the null hypothesis was not rejected, differences did still exist. The largest differences in perceived value occurred in the areas of utilizing frameworks for integration (TPACK), best teaching practices using technology (TPK), Google Apps for Education (TK), and aligning digital resources with curriculum and standards (TCK).

In research question four, what additional trainings or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom were identified. Participants recommended more training in digital resources, how to align curriculum with these resources, and different delivery methods of professional development activities.

In conclusion, many differences were found in the area of perceived value of professional development. When integrating more technology in the public school environment, it is of vital importance the vision for use of technology is shared among administrators and teachers (Whitehead et al., 2013). Administrators and teachers should

collaborate together when professional development programs are designed in order to ensure the needs of teachers are being met at all levels (Sauer & McLeod, 2012).

Implications for Practice

The findings of this study were significant in identifying which areas of professional development have proved to be the most beneficial when implementing a one-to-one laptop initiative through the perspectives of educators who have already implemented a one-to-one initiative for at least three years. Their expertise in technology integration provided further insight for schools recently implementing technology initiatives as well as school districts who may be struggling with current implementation practices. This study was significant in narrowing the focus of which professional development practices were valued the most by administrators and teachers.

The survey results showed teachers valued professional development in the areas of Google Apps for Education, aligning digital resources with curriculum and standards, and utilizing a framework for integration. Administrators valued professional development in the areas of aligning digital resources with curriculum and standards, hardware/devices, and learning management systems. However, the value of training in software programs actually decreased in this group.

As a result of these findings, more professional development should be provided in areas of Google Apps for Education, how to align digital resources with curriculum and standards, how to utilize a framework such as TPACK to help with integration, hardware/devices, and learning management systems. As the literature review revealed, teachers are at different levels of knowledge. The results showed teachers and administrators have different perspectives on how valuable certain professional

development areas are when implementing a one-to-one initiative. For example, administrators valued more training on the devices, but teachers did not. Teachers valued understanding how to integrate technology with pedagogy and content.

Future professional development programs should assess levels of teacher knowledge in the areas of technology, pedagogy, and content. The levels of knowledge should be assessed through surveys and classroom observations. Once these levels have been determined, professional programs should be designed to meet the needs of all teachers through the provision of differentiated professional development activities.

Furthermore, increased communication between teachers and administrators should exist. Through surveys and observations, in accordance with teachers' professional development plans, both groups should have a shared understanding of professional development needs. This information should identify levels of knowledge, which should also help administrators understand which teachers could provide professional development to other teachers within the district.

Recommendations for Future Research

In this study, the perceptions of teachers and administrators were elicited in regard to the delivery method of professional development prior to implementation in comparison to how it should have been developed. After the responses and recommendations from participants about allowing teachers to visit and share professional development activities with surrounding districts who had already implemented a one-to-one initiative, the researcher concluded this option should have been a category on the survey for both questions eight and 11. Since this was not an option, the researcher was not able to measure these results in a quantitative format.

A null hypothesis was not created as part of research questions one or two. Descriptive statistics were used to examine pre- and post-implementation results from both teachers and administrators. Should a null hypothesis have been developed, inferential statistical tests could have been performed to test for significance. A Wilcoxon Signed-Ranked Test would have served well as a nonparametric test for further analysis. The results could have further supported the findings for these research questions and demonstrated a significant difference in value of professional development practices.

Research question three was designed to determine the differences in perceptions between teachers and administrators in the assessment of perceived value prior to the implementation of a one-to-one initiative, but a question was not developed to assess the perceived value after implementation. Research questions one and two revealed findings of large differences when teacher and administrator pre- and post-implementation responses were compared. Testing whether or not there were any significant differences when teacher and administrative post-implementation results were compared would have further supported the findings of this study.

Through this study, certain professional development practices were identified as important when implementing a one-to-one technology initiative. However, the question of how districts that have already implemented these initiatives can guarantee new teachers are provided training and professional development for ensured success in integrating technology was not answered. Further research is needed to identify professional development practices for incoming teachers to be successful in schools with one-to-one initiatives.

Summary

In Chapters One and Two, the results of this study indicated one-to-one laptop initiatives are not a trend in the educational world (USDOE, 2016). The price of laptops and other devices will continue to decrease, closing the gap to device access in what has become known as the digital revolution (Delgado et al., 2015). Currently, the education world is struggling to keep up with these changes as they continue to progress rapidly (Machado & Chung, 2015). Chapter Two revealed the importance of ensuring both administrators and teachers are unified in a shared vision of technology's place in schools (Sauers & McLeod, 2012; USDOE, 2016; Whitehead et al., 2013).

Furthermore, supports need to be provided to teachers to guarantee technology is properly incorporated by means of targeted professional development programs. Just as teachers are expected to differentiate lessons and instruction to meet the needs of all students, administrators need to realize the importance of differentiating professional development programs to meet the needs of all teachers. The findings of this study revealed teachers and administrators value specific professional development differently.

Communication between groups needs to increase so professional development programs can be designed to help teachers grow in areas of need. With the provision of targeted professional development which meets the needs of all teachers at all levels, the success of technology integration in the public school environment can increase. This success will continue to become more vital as access to technologies also continues to increase. Teachers cannot develop students' abilities for 21st-century success without support.

Appendix A

One-to-One Technology Implementation Survey

Demographic Information

1. How many years were you employed with the district prior to your district's one-to-one technology initiative implementation?
    a. 2 years or more
    b. At least one year
    c. Less than one year (stop filling out the form)

2. What is your role at the district?
    a. Teacher
    b. Administrator/Director
    c. Other: (stop filling out the form)

3. How many years has your district been implementing a one-to-one technology initiative? Please include the current school year.
    a. One year
    b. Two years
    c. Three years
    d. Four years
    e. Five years
    f. Six years or more

4. How many years of experience do you have in education? Please include the current school year.
    a. First Year
    b. 2-5 Years
    c. 6-10 Years
    d. 11-15 Years
    e. 16+ Years

5. What subject do you primarily teach?
    a. English Language Arts
    b. Mathematics
    c. Science
    d. Social Studies
    e. Fine Arts
    f. Practical Arts
    g. None, I am currently an administrator
    h. Other _____

6. Rate your comfort level in effectively integrating technology into your classroom OR in aiding your teachers in technology integration if you are an administrator. (Select one)

	Completely Uncomfortable	**Little Uncomfortable**	**Moderately Comfortable**	**Mostly Comfortable**	**Completely Comfortable**
Comfort Level					

The following definitions may be useful in answering the remaining survey questions:

The Substitution Augmentation Modification Redefinition (SAMR) Model identifies levels of technology integration and usage according to its purpose using a ladder approach to help educators assess and evaluate integration (Common Sense Education, SAMR, 2016).

The Technological Pedagogical Content Knowledge (TPACK) Model explains how teachers can integrate technology into teaching more effectively by understanding how pedagogy and content, when combined, can increase student engagement (Common Sense Education, TPACK, 2016).

Perceived Value of Professional Development Prior to Implementation

7. Prior to your district's implementation of a one-to-one initiative, reflect on how important you perceived professional development to be in the following areas for the implementation to be successful. (Select one response in each row)

	Unimportant	Of Little Importance	Moderately Important	Important	Very Important	No PD Provided
Hardware Training/Devices						
Software Programs (Microsoft Office, etc.)						
Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.)						
Learning Management System (Canvas, Schoology, Blackboard, Moodle, etc.)						
Integration of Technology into Lessons (Examples, Modeling, etc.)						
Teaching with Textbooks vs. Incorporating Digital Content						
Aligning Digital Resources with Curriculum and Standards						
Frameworks for Integration (SAMR or TPACK Model)						
Best Teaching Practices Using Technology (Pedagogy, Student-Centered/Led vs. Teacher-Led)						
Incorporating 21st-Century Skills (Collaboration, Communication, Creativity, Critical Thinking)						

8. How was professional development delivered in the area of technology integration? (Check all that apply)

    - ☐ During professional development time reserved within the school year
    - ☐ By experts inside the district
    - ☐ By experts outside the district
    - ☐ Online
    - ☐ Throughout normal instruction
    - ☐ By instructional coach
    - ☐ Other: _____

9. Prior to one-to-one initiative implementation, please describe your educational background in integrating technology into teaching. (Check all that apply.)

    - ☐ No training in technology integration (college classes or workshops)
    - ☐ 1-4 college classes in technology integration
    - ☐ 5-10 college classes in technology integration
    - ☐ Earned a minor or major in the area of technology integration
    - ☐ 1-5 professional development workshops
    - ☐ 6-10 professional development workshops
    - ☐ More than 10 workshops
    - ☐ Other: _____

Perceived Value of Professional Development after Implementation

10. Now that your district has implemented a one-to-one initiative, reflect on how important professional development has been in the following areas for the implementation to be successful. (Select one response in each row)

	Unimportant	Of Little Importance	Moderately Important	Important	Very Important	No PD Provided
Hardware Training/Devices						
Software Programs (Microsoft Office, etc.)						
Google Apps for Education (Docs, Sheets, Slides, Gmail, etc.)						
Learning Management System (Canvas, Schoology, Blackboard, Moodle, etc.)						
Integration of Technology into Lessons (Examples, Modeling, etc.)						
Teaching with Textbooks vs. Incorporating Digital Content						
Aligning Digital Resources with Curriculum and Standards						
Frameworks for Integration (SAMR or TPACK Model)						
Best Teaching Practices Using Technology (Pedagogy, Student-Centered/Led vs. Teacher-Led)						
Incorporating 21st-Century Skills (Collaboration, Communication, Creativity, Critical Thinking)						

11. How *should* professional development have been delivered in the area of technology integration? (Check all that apply)

    - ☐ During professional development time reserved within the school year
    - ☐ By experts inside the district
    - ☐ By experts outside the district
    - ☐ Online
    - ☐ Throughout normal instruction
    - ☐ By instructional coach
    - ☐ Other: _____

12. Please describe your educational background in integrating technology into teaching since the implementation of a one-to-one initiative in your school district. (Check all that apply)

    - ☐ No training in technology integration (college classes or workshops)
    - ☐ 1-4 college classes in technology integration
    - ☐ 5-10 college classes in technology integration
    - ☐ Earned a minor or major in the area of technology integration
    - ☐ 1-5 professional development workshops
    - ☐ 6-10 professional development workshops
    - ☐ More than 10 workshops
    - ☐ Other: _____

13. What additional training or professional development activities could have been implemented to more effectively prepare teachers to implement technology in the classroom?

_____

_____

_____

Appendix B

IRB Approval

LINDENWOOD

LINDENWOOD UNIVERSITY ST. CHARLES, MISSOURI

DATE: April 7, 2017

TO: Tara Roberts
FROM: Lindenwood University Institutional Review Board

STUDY TITLE: [1050054-1] Changed Perceptions of Teachers and Administrators on Professional Development After one-to-one Implementation of a one-to-one Technology Initiative

IRB REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: April 7, 2017

REVIEW CATEGORY: Exemption category # *2*
Thank you for your submission of New Project materials for this research study. Lindenwood University Institutional Review Board has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office.

If you have any questions, please send them to IRB@lindenwood.edu. Please include your project title and reference number in all correspondence with this committee. This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Lindenwood University Institutional Review Board's records.

Appendix C

Letter to Superintendents

<Date>

Dear <Title and/or Name of Participant>,

I am writing to request your participation in my doctoral dissertation research project at Lindenwood University. I believe the information gathered in this study will positively contribute to the knowledge about professional development practices regarding the integration of technology.

The purpose of this research is to gain further knowledge from districts that have already implemented one-to-one initiatives regarding professional development practices. The participants are asked to compare the areas of professional development provided prior to one-to-one initiative implementation to the areas one would now perceive as important in the preparation of integrating technology.

Attached is an electronic document survey. Please forward this to your high school teachers, high school administrators, and central office administrators. For the purposes of this study, central office administrators are defined as superintendents; assistant superintendents; directors of technology, instruction, and/or curriculum; and technology instructional specialists. Your participation is voluntary and you may choose to withdraw at any time. Confidentiality and anonymity are assured.

If you have any questions, you can reach me at [redacted], or Dr. Brad Hanson, my dissertation advisor for this research project, may be contacted at [redacted].

Please open the enclosed attachment to view the Informed Consent Form and to complete the survey.

Thank you for your time and participation,

Tara Roberts
Doctoral Candidate
Lindenwood University

Appendix D

LINDENWOOD

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES

Changed Perceptions of Teachers and Administrators on Professional Development after Implementation of a one-to-one Technology Initiative

Principal Investigator ___Tara Roberts_____
Telephone: [redacted] E-mail: [redacted]

Participant_____ Contact info _____

_____

1. You are invited to participate in a research study conducted by Tara Roberts under the guidance of Dr. Brad Hanson. The purpose of this research is to gain further knowledge from districts that have already implemented one-to-one initiatives regarding professional development practices. Participants are asked to compare the areas of professional development provided prior to one-to-one initiative implementation to the areas one would now perceive as important in the preparation of integrating technology.

2. a) Your participation will involve answering 13 online survey questions regarding professional development.

   b) The amount of time involved in your participation will be approximately 5-7 minutes. Approximately 200 subjects will be involved in this research.

3. There are no anticipated risks associated with this research.

4. There are no direct benefits for you participating in this study. However, your participation will contribute to the knowledge about professional development practices regarding the integration of technology.

5. Your participation is voluntary, and you may choose not to participate in this research study or to withdraw your consent at any time. You may choose not to answer any questions that you do not want to answer. You will NOT be penalized in any way should you choose not to participate or to withdraw.

6. We will do everything we can to protect your privacy. As part of this effort, your identity will not be revealed in any publication or presentation that may result from

this study and the information collected will remain in the possession of the investigator in a safe location.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Tara Roberts, at [redacted], or the Supervising Faculty, Dr. Bradley Hanson, at [redacted]. You may also ask questions of or state concerns regarding your participation to the Lindenwood Institutional Review Board (IRB) through contacting Dr. Marilyn Abbott, Provost, at mabbott@lindenwood.edu or 636-949-4912.

I have read this consent form and have been given the opportunity to ask questions. I may retain a copy of this consent form for my records. I consent to my participation in the research described above by completing the survey.

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Vita

Tara Ashley Roberts graduated from Forsyth, Missouri, with honors in 2000. After high school, Tara attended Drury University in Springfield, Missouri, where she obtained her Bachelors of Arts degree in Mathematics. In 2008, she earned her first position in education as a high school mathematics teacher at the Forsyth R-III School District. Tara completed her Master's Degree in Business in 2012 from William Woods University. As the Forsyth R-III School District began its implementation of a one-to-one laptop initiative in 2013, Tara was promoted to be the district's K-12 Technology Instructional Specialist. In 2015, she earned her Educational Specialist Degree in School Administration. Tara was hired by the Taneyville R-II School District as Superintendent in 2016, where she continues to serve.