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Identifying and Interpreting the Technological Self-Efficacy Ratings of Teachers in Midwestern School Districts with 1:1 Technology: A Mixed-Methods Approach

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by:

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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 here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

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Abstract

The purpose of this mixed-methods study, which included 182 teachers across three Midwestern school districts, was threefold. First, the researcher sought to determine the technological self-efficacy ratings of teachers at school districts with 1:1 technology in relation to the ISTE's National Education Technology Standards for Teachers. Based on the study's findings, participants had the lowest mean self-efficacy ratings for ISTE's fifth standard, which focused on teachers' lifelong learning and growing as professionals (ISTE, 2008). Participants had the highest mean ratings for the fourth standard, which related to digital citizenship (ISTE, 2008). Second, the researcher aimed to identify if there was a relationship between teachers' generational identities and their technological self-efficacy ratings. The study's results indicated there was a relationship in which younger generations demonstrated higher technological self-efficacy ratings. Finally, the third purpose was to determine what teachers viewed as the most beneficial professional development opportunities related to incorporating technology in the classroom. Regarding past professional development opportunities, the most prevalent theme was district-specific professional development. The participants wrote they appreciated professional development specifically focused on the devices provided by their school districts. Also, participants wrote they found professional development opportunities offered in-house and geared toward the school districts' specific needs to be beneficial. As for future professional development opportunities, participants indicated they viewed more strategic professional development to be most beneficial. They wrote this type of professional development needed to focus on specific grades, content areas, and skills.

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Chapter One: Introduction to the Study

In 1985, Erik Sandberg-Diment, a columnist for the *New York Times*, predicted laptop computers were merely a fad and would not be mass-produced (Sandberg-Diment, 1985). He viewed laptops as a niche product and wrote it was his belief most people would not purchase these portable computers, even if the price-point decreased and the amount of available software increased (Sandberg-Diment, 1985). Now, 33 years later, Sandberg-Diment's (1985) prediction was so incorrect that multiple kindergarten through 12th-grade school districts throughout the United States and beyond have 1:1 technology initiatives where the school districts have provided one digital device, often a laptop computer, for each student (Richardson et al., 2013). Furthermore, according to Bebell and Kay (2010), the number of school districts with 1:1 technology initiatives has increased substantially over time. As of 2006, approximately 25% of kindergarten through 12th-grade schools in the United States had 1:1 technology initiatives, and the number has continued to grow since that time (Bebell & Kay, 2010; Downes & Bishop, 2015; Richardson et al., 2013). Regarding this type of initiative, Richardson et al. (2013) wrote, "Laptop initiatives are propelling educational change with the intent of providing benefits that include improving academic achievement, increasing equity of access to digital resources, increasing economic competitiveness by preparing students for today's workplaces, and transforming the quality of instruction" (p. 4). Based on Richardson et al.'s (2013) quote alone, it should be clear there have been multiple reasons school districts have considered implementing this type of technology initiative despite Sandberg-Diment's 33-year-old prediction the laptop computer would not have a bright future (Sandberg-Diment, 1985).

Background of Study

It has been noted today's students must be prepared for the challenges associated with the 21st century (Henriksen, Mishra, & Fisse, 2016). According to Henriksen et al. (2016), having creative thinking skills is vital for students in today's society due to the complexities of the global economy. Today's students have needed further developed skills with creativity, critical thinking, and collaboration, and technology has become an integral tool to help students with these issues (Gentry, Baker, Thomas, Whitfield, & Garcia, 2014). Gentry et al. (2014) added, "This shift to ubiquitous technology, coupled with the globalization of our economy, has increased pressure for educators to move beyond the mere integration of technology… and to be more transformative agents of 21st-century teaching and learning" (p. 31). Gentry et al. (2014) noted teachers needed to utilize the technology and then model how teachers used these 21st-century skills in practical settings to best reach their students.

Educators have identified multiple benefits regarding 1:1 technology initiatives and 21st-century skills and learning in general (Kay & Lauricella, 2014; Storz & Hoffman, 2013). For example, scholars have argued 1:1 technology initiatives led to higher levels of student success because devices helped students become more motivated and attentive (Carver, 2016). In a study focusing on perceptions of 1:1 technology, Storz and Hoffman (2013) noted teachers perceived the most common result of the technology was that it allowed students a way to express their creativity, which positively impacted their levels of engagement and motivation. Furthermore, students have been especially motivated when they used their classroom technology and saw practical applications with photos, videos, or other types of media (Housand & Housand, 2012; Preston, Wiebe,

Gabriel, McAuley, Campbell, & MacDonald, 2015). Also, Annan-Coultas (2012) noted students have found classroom technology beneficial as it allowed them to quickly access information they could then utilize for their coursework. Finally, according to Kay and Lauricella (2014), "Data suggested that beneficial active use of computers in the classroom could be organized according to three kinds of activities: research, learning-focused, and collaboration" (p. 15). Based on the above information, educators have argued the benefits of 1:1 technology could potentially allow students to develop 21st-century skills, such as creativity, critical thinking, and collaboration, which Gentry et al. (2014) noted.

Even though the pros of 1:1 technology have been apparent to many, researchers also have identified detriments (Kay & Lauricella, 2014; Storz & Hoffman, 2013). One detriment commonly cited was the ability for students to get off task and to become distracted (Kay & Lauricella, 2014; Storz & Hoffman, 2013). For example, with 1:1 technology, students were able to use social media, peruse the internet, or play games or videos instead of focusing on schoolwork (Kay & Lauricella, 2014). However, Kay and Lauricella (2014) concluded, although distractions existed, the benefits of using technology in the classroom still outweighed the cons. Students may have used the technology inappropriately, but there were still many benefits to incorporating technology into the classroom (Kay & Lauricella, 2014).

To guide educators in using classroom technology to its fullest potential, the International Society for Technology in Education (ISTE, 2008) developed the five National Educational Technology Standards for Teachers (NETS-T). The ISTE (2008) wrote teachers needed to model these standards as they sought to develop appropriate

classroom experiences for their students and better themselves, their students, and their communities. The first of the five standards identified by the ISTE (2008) was to "Facilitate and inspire student learning and creativity" (p. 1). The ISTE (2008) noted this standard covered modeling, collaboration, and problem-solving, among other areas. For this standard, teachers needed to provide students with opportunities to be innovative in their problem solving and learning (ISTE, 2008).

The second standard was to "Design and develop digital age learning experiences and assessments" (ISTE, 2008, p. 1). For this standard, educators needed to consider the individual student's needs and interests, adapt when necessary, and have multiple assessment methods (ISTE, 2008). Next, the ISTE's third 2008 standard was "Model digital age work and learning" (p. 1). For this standard, teachers needed to model behaviors showing the knowledge and skills necessary to be successful and innovative in today's digital world (ISTE, 2008). They needed to show they were knowledgeable about the current technology and applied their skills and knowledge to new technology (ISTE, 2008)

The fourth standard was to "Promote and model digital citizenship and responsibility" (ISTE, 2008, p. 2). Teachers needed to consider both local and global issues, act in an ethical manner, and model this behavior to their students (ISTE, 2008). Finally, the fifth standard was to "Engage in professional growth and leadership" (p. 2). This standard covered how teachers should always seek to better themselves. The ISTE (2008) noted teachers should be lifelong learners and always seek to grow as professionals.

Conceptual Framework

For the purposes of this research project, the researcher chose the conceptual framework of self-efficacy. The researcher's intention was to gauge teachers' perceptions of their own skills and abilities with utilizing technology in the classroom, and this fit with the general concept of self-efficacy. More specifically, the researcher intended to study the perceptions of teachers in 1:1 technology schools in relation to the five teacher technology standards developed in 2008 by the ISTE. In the following, the researcher discussed the concept of self-efficacy as it related to this research project. This concept of self-efficacy was central to the research project as the researcher sought to examine teachers' perceptions of their technology usage in the classroom.

Even if people had the necessary knowledge and skills to be successful in their endeavors, that would not mean their success was guaranteed (Bandura, 1993). Rather, their self-efficacy could have been a key factor in this process (Bandura, 1993). According to Bandura (1993), the term self-efficacy related to a person's beliefs in his or her abilities. Furthermore, it has been found that self-efficacy beliefs can be directly related to a person's attitudes, behavior, and motivation levels (Bandura, 1993). The higher level of self-efficacy a person had, the more likely it was for him or her to see positive results (Bandura, 1993).

Bandura (1977) wrote his seminal article on the topic of self-efficacy in 1977 to expound upon the social learning theory, which explained how people learn by modeling, observing, and imitating. In his article, Bandura (1977) noted the four sources of self-efficacy included: (a) performance accomplishments, (b) vicarious experiences, (c) verbal persuasion, and (d) psychological and affective states. Different sources of self-efficacy

had more significant effects on people, performance accomplishments, or enactive mastery experiences, being the most impactful (Bandura, 1994; Tilton & Harnett, 2016).

Bandura (1977) noted a person's beliefs about his or her skills could directly impact the likelihood of success. Moreover, if a person had a low self-efficacy regarding a specific task, Bandura (1977) wrote that person would be less likely even to attempt the task. It was explained by Bandura (1977), self-efficacy levels could also directly influence people's decision-making and coping skills. If people had low self-efficacy for certain activities, they would be less likely to put themselves in situations where they would have to perform those activities (Bandura, 1977; Kanadlı, 2017). Furthermore, self-efficacy levels have impacted the amount of effort people put forth (Bandura, 1977; Bandura, 1994). Those with higher self-efficacy have put forth more effort so they would be successful (Bandura, 1977).

Bandura (1993) found teachers with lower self-efficacy levels were more likely to give up on students if they did not see immediate success. These teachers criticized students when they failed, and they provided students with fewer opportunities to show their mastery of a topic (Bandura, 1993). When teachers possessed low self-efficacy, they were more likely to create environments with negative effects on students' development and self-efficacy levels (Bandura, 1993; Kanadlı, 2017). Moreover, educators' levels of self-efficacy have been correlated with their levels of workplace burnout and work stress levels (Yu, Wang, Zhai, Dai, & Yang, 2015). Yu et al. (2015) explained, when teachers have viewed themselves negatively, this may have caused them to also view their school environments negatively, feel unable to positively cope with issues, and develop feelings of powerlessness. Also, self-efficacy levels have impacted

classroom activities teachers utilized and the ways they processed what occurred in their classroom environments (Yu et al., 2015).

Considering the prevalence of and need for technology in the classroom, Gentry et al. (2014) identified the five ISTE (2008) standards to measure teachers' self-efficacy specifically in relation to technology and modeling 21st-century skills. Gentry et al. (2014) developed a 50-question survey based on the five 2008 standards coined the Educator Technology Self-Efficacy Survey (ETS-ES). Gentry et al. (2014) noted it was important to specifically focus on teachers' technological self-efficacy, and the authors considered all five of these standards combined to be appropriate categories to gauge teachers' efficacy for the ETS-ES. Also, Gentry et al. (2014) wrote, because of the constant evolution of technology, "It is important for teachers to be able to adapt and adopt a positive disposition for change. Teacher self-efficacy dispositions toward the use of instructional technology are the most crucial factors for meeting the challenges of the 21st-century classroom" (p. 36). Gentry et al. (2014) noted change would happen, and educators needed to accept this and have positive outlooks when considering their technology usage to most benefit their students.

Statement of Problem

A current trend within the field of education has been to incorporate more technology in the classroom (Grundmeyer, 2014). Students have needed to develop 21st-century skills, and technology has been used as a tool to facilitate this development (Gentry et al., 2014; Grundmeyer, 2014). However, not all teachers have recognized the potential benefits of technology (Baker, Lusk, & Neuhauser, 2012; Oriji & Amadi, 2016). Some teachers may have had an apprehension of using the technology, or they may not

have felt comfortable with utilizing these new instructional tools (Gentry et al., 2014). Moreover, Bebell and Kay (2010) wrote, teachers who did not initially value technology were less likely to use it or ever fully understand the multiple benefits other teachers have noted technology has provided them. Also, Oriji and Amadi (2016) noted some teachers may have been saboteurs in their approach to technology and actively attempted to hinder new classroom technology innovations. Similarly, Gentry et al. (2014) wrote some teachers believed they could be effective in the classroom without utilizing technology, but this may have negatively impacted today's students who needed to develop their skills with technology to be successful in the 21st century.

Based on Bandura's (1993) work, the above-mentioned issues could have all directly related to the teachers' low technological self-efficacy, which, according to Gentry et al. (2014), could be detrimental to students' development of 21st-century skills. Gentry et al. (2014) wrote it was important for teachers to have high technological self-efficacy so they could be as effective as possible when utilizing technology in the classroom. If teachers possessed negative or indifferent feelings toward technology, based on Bandura's (1993) writing, their self-efficacy with technology would have suffered. Consequently, they would be less effective when using technology, which would also have a negative impact on their students. Therefore, it was important for the purposes of this study to identify the overall makeup of teachers' technological self-efficacy based on the five teacher standards developed by the ISTE (2008) so school district leaders could then consider the appropriate professional development measures to most benefit teachers in these areas, as was recommended by Gentry et al. (2014).

Purpose of Study

The purpose of this research study was threefold. First, the researcher sought to identify the technological self-efficacy levels for each of the five ISTE (2008) standards, as well as the mean scores, for teachers at three Midwestern school districts with 1:1 technology initiatives. Gentry et al. (2014) wrote, "Once the areas of self-efficacy needs for teachers are identified, improvement within teacher education programs and school districts may commence with a customized focus on the areas in need of improvement" (p. 32). By performing this study, it was possible to ascertain the main standards needing attention for each of the three school districts. Also, any themes with 1:1 technology initiatives and technological self-efficacy needs in all three schools combined could be examined.

The next purpose of the study was to ascertain if any relationship existed based on the participating teachers' identified generation and their technological self-efficacy levels. As will be further discussed in Chapter Two, the four generations that primarily make up today's workforce have possessed different habits in terms of technology (Andrea, Gabriella, & Timea, 2016; Kamber, 2017; Otey, 2013). Furthermore, the two older generations, Baby Boomers and Generation X, have been considered digital immigrants, while Millennials and Generation Z have been considered digital natives (Kamber, 2017). Based on these differences, the researcher sought to provide further insight into the different generations' technological self-efficacy ratings.

Finally, the last purpose was to determine teachers' views on using professional development opportunities to enhance their abilities with incorporating technology in the classroom. More specifically, the researcher sought to determine what teachers viewed

as their most beneficial professional development opportunities in the past related to technology, as well as what they would like to see more of in the future. This data was beneficial to consider as it would allow school district leaders to have a better understanding of what types of professional development they may want to implement once their school districts' specific needs were identified. Also, with this data, the researcher could have potentially determined in what ways the professional development opportunities identified related to the ISTE (2008) teacher technology standards.

Research Questions

For the purposes of this research project, the researcher developed the following research questions.

1. What are the perceived levels of technological self-efficacy possessed by teachers in schools with 1:1 technology in relation to the five separate ISTE (2008) teacher standards, which included:

    a. Enabling students' learning and creativity

    b. Employing appropriate digital age learning and assessment opportunities

    c. Exhibiting proper digital age behaviors when working and learning

    d. Promoting and exhibiting how students should be responsible digital citizens

    e. Taking part in growth and leadership opportunities (ITSE, 2008)?

2. What relationships exist between teachers' perceived technological self-efficacy ratings and their identification of generation?

3. What do educators in schools with 1:1 technology describe as the most beneficial professional development opportunities to enhance their abilities to incorporate technology in the classroom?

Significance of Study

This study was significant primarily because it connected the ETS-ES developed by Gentry et al. (2014) with three school districts that had previously implemented 1:1 technology initiatives. The ETS-ES was not developed specifically for 1:1 technology school districts, but it was relevant in this study. By conducting this study, it was then possible to analyze the overall technological self-efficacy scores of the participating teachers in each of the three schools involved in the study and then use this input from all participants so the researcher could analyze the composite data for individual school districts and all three school districts combined. This data, combined with the teachers' qualitative responses, could have potentially shed light on the technological self-efficacy trends that specifically impact schools with 1:1 technology, as well as the teachers' recommended professional development opportunities moving forward. In addition to this data and its significance, it was possible to identify what relationships existed between the educators' identified generation and their technological self-efficacy scores. It has been noted the generations in the workplace today do not all have the same habits in regard to using technology (Andrea et al., 2016; Kamber, 2017; Otey, 2013). Based on this information, the researcher sought to provide further insight info the different generations' technological self-efficacy ratings. Furthermore, this allowed the researcher to examine what areas the specific generations in this study most needed to improve.

Definition of Key Terms

The following terms will be used throughout this study.

1:1 Learning. The 1:1 learning concept was defined as the concept all students had their own digital devices for learning (Richardson et al., 2013). Thus, the ratio of student to device was 1:1 (Richardson et al., 2013). What constituted a device for 1:1 learning has been debated, but Richardson et al. (2013) wrote the device needed to possess more power than a smartphone. Laptops, netbooks, and tablets were all listed as appropriate devices (Richardson et al., 2013).

Baby Boomers. This term referred to a generation of people born from 1946 to 1960 (Andrea et al., 2016). This generation, in general, was not as willing to accept or utilize technology as later generations (Otey, 2013).

Bring Your Own Device (BYOD). This term referred to the concept students can bring their own digital devices to class to facilitate learning (Parsons & Adhikari, 2016). This has allowed schools to be closer to having 1:1 ratios of students with technology, but it was dependent on students bringing the technology themselves instead of it being provided by the schools (Richardson et al., 2013).

Digital age. This term referred to an era in which major advances were made in the development of technology (Isman & Gungoren, 2014). According to Knight (2015), students had the potential to use a wide variety of technologies in this era.

Digital citizen. The term digital citizen referred to people that have taken part in the digital world and displayed appropriate citizenship traits, such as acting responsibly, ethically, and safely with technology (Isman & Gungoren, 2014).

Digital native. The term digital native referred to the concept someone has had access to digital technology for his or her entire life (Kamber, 2017).

Digital immigrant. This term referred to a person who was not born into a world with technology widely available (Kamber, 2017). This person had to learn about technology as an adult (Kamber, 2017).

Educator technology self-efficacy. This term referred to an educator's perceptions of his or her abilities in terms of classroom technology (Gentry et al., 2014).

Educator Technology Self-Efficacy Survey (ETS-ES). This instrument was created by Gentry et al. (2014) and was based on the International Society for Technology in Education (ISTE) 2008 National Educational Technology Standards for Teachers. It was used to measure educators' technological self-efficacy (Gentry et al., 2014).

Full-time equivalent (FTE). The acronym FTE referred to a classification for employees relating to their man-hours worked in their positions (Bragg, 2017). An FTE employee would have worked full-time, with the standard man-hours for this totaling 2,080 annually (Bragg, 2017). An employee who worked 1,040 hours, or half of the standard full-time equivalency, would have served in a .5 FTE-equivalent position (Bragg, 2017).

Generation X. According to Andrea et al. (2016), this term referred to the generation born from 1960 to 1980. Members of this generation were not digital natives, but, in general, they were still comfortable with using technology when appropriate (Kamber, 2017).

Generation Z. According to Andrea et al. (2016), this term referred to those born from 1995 to 2010. This generation has been heavily reliant on technology and has used it often (Andrea et al., 2016).

Instructional coach. The term instructional coach referred to a person who provided guidance and professional development to teachers regarding the best classroom practices (Wolpert-Gawron, 2016).

Millennials. Also called Generation Y, this term referred to those born from 1980 to 1995 (Andrea et al., 2016). This was the first generation of digital natives (Otey, 2013).

Professional development. Professional development referred to the strategic process of supporting teachers to improve their knowledge, skills, and abilities when providing instruction in the classroom (Suwaed & Rahouma, 2015).

Self-efficacy. Self-efficacy referred to an individual's perceptions of his or her abilities (Bandura, 1993). Even if a person had the skills and abilities necessary to be successful, self-efficacy played a role in the person's success (Bandura, 1993).

Technology coach. This term referred to a person who assisted teachers in the best practices for integrating technology in the classroom (ISTE, 2011).

Limitations and Assumptions of the Study

Some limitations existed in regard to this study. Also, for the purposes of this study, the researcher had to make some basic assumptions. Both areas for consideration will be discussed in the following.

One limitation of this study was only three school districts with 1:1 technology initiatives were surveyed. As the researcher will note in Chapter Three, these three

school districts were selected because they were a convenience sample, and the researcher chose to study schools with 1:1 technology and teachers willing to participate within a certain geographic area. However, including more schools in the study could have potentially provided more comprehensive results. Also, the three schools varied in their student enrollment numbers and amount of full-time faculty members. This possibly led to differences in the numbers of potential respondents between the three schools. Finally, the researcher relied on self-reported data for this study, and Hoskin (2012) noted this should be considered a limitation because researchers must take into consideration the respondents' honesty, their different interpretations of the questions, and their potential biases.

Regarding assumptions, it was first assumed all potential participants for the study received their electronic invitations to take part in the study. Moreover, the assumption was made that all teachers had access to technology to participate if they chose to do so. Similarly, it was assumed the technology utilized to send these invitations and administer the survey was reliable. After that, it was assumed the number of teachers participating, although a convenience sample, was still large enough to yield useful results. Finally, the assumption was made the teachers participating in the study put forth the amount of time necessary to understand the questions before responding, and they responded honestly.

Summary

In Chapter One, the reasoning behind the study was discussed, as well as the research questions outlined to guide the study. The purpose of this study was primarily to explore the perceptions of teachers in school districts with 1:1 technology regarding their technological self-efficacy in relation to the ISTE's five teacher technology standards

developed in 2008. Also, the researcher explained the significance of identifying if teachers' identified generations had any relationship with their technological self-efficacy scores. Chapter One also covered necessary background information for the study, including why the study was significant, what limitations were noted, and what assumptions were made. Chapter Two will explore the main themes presented in literature relevant to this study. Past studies which focused on 1:1 technology and self-efficacy will be discussed along with other related topics.

Chapter Two: Review of Related Literature

One-to-one initiatives where each student has his or her own device have become increasingly popular in schools over the years (Bebell & Kay, 2010; Downes & Bishop, 2015; Richardson et al., 2013). Also, many potential benefits and detriments of these initiatives have been identified (Annan-Coultas, 2012; Carver, 2016; Kay & Lauricella, 2014; Storz & Hoffman, 2013). However, using the technology has not automatically led to success in the classroom (Walker Beesona, Journell, & Ayres, 2014). To go along with knowing how to operate the technology, teachers had to first know how to use it effectively (Walker Beesona et al., 2014). Also, teachers' technological self-efficacy levels impacted the success of utilizing classroom technology (Gentry et al., 2014).

Chapter Two of this study will cover literature related to 1:1 classroom technology, teacher self-efficacy ratings, and other related areas. The chapter will first cover self-efficacy, in general, as well as self-improvement methods for teachers. After that, the ISTE standards for teachers, students, and coaches will be discussed. Then, the next topics will include the benefits and detriments of classroom technology, the concept of Bring Your Own Device (BYOD), and teacher apprehensions to technology. Last, the generational uses of technology and student-centered teaching will be discussed. Each of these elements of the literature review will directly relate to this project's three research questions.

Conceptual Framework

For the purposes of this research project, the researcher selected the conceptual framework of self-efficacy and intended to gauge teachers' perceptions of their technological skills and abilities in the classroom. It was the intention of the researcher

to study teachers' technological self-efficacy in relation to the five teacher technology standards developed by the ISTE in 2008. The researcher sought to determine teachers' perceptions of their abilities based on these five standards to see if any themes emerged among the three separate 1:1 technology school districts in the study or with all three school districts combined. In the following, the framework of self-efficacy will be discussed.

Self-Efficacy

Bandura's formative article on the topic of self-efficacy was published in 1977. Bandura (1977) first wrote on the topic of self-efficacy to expound upon his work related to the social learning theory, which focused on modeling, observing, and imitating. Using this theory as a starting point, Bandura (1977) explained a person's beliefs about his or her skills would impact the likelihood of success. Also, if a person had high self-efficacy regarding a specific task, that person would be more likely to attempt the task than someone with a low self-efficacy (Bandura, 1977). Furthermore, decision-making and coping skills were found to be directly influenced by a person's self-efficacy (Bandura, 1977).

When a person had low self-efficacy for performing certain activities, he or she was less motivated to take part in those activities in the first place (Bandura, 1977; Flores, 2015). Also, the amount of effort exerted by people has been found to relate to their self-efficacy levels (Bandura, 1977; Flores, 2015). People who demonstrated higher self-efficacy were found to put forth more efforts to ensure their success (Bandura, 1977). Regarding individuals with low self-efficacy, Bandura (1994) wrote, "They have low aspirations and weak commitment to the goals they choose to pursue...They will have

slackened their efforts and give up quickly in the face of difficulties" (p. 2). These people will have become stressed, depressed, and feel like failures (Bandura, 1994). In a more recent study, Yu et al. (2015) concurred with Bandura's findings when focusing on teacher self-efficacy. It was found teachers with low self-efficacy identified fewer reasons to continue trying to succeed and were less capable of coping (Bandura, 1994; Yu et al., 2015).

Similarly, Bandura (1993) found teachers with lower self-efficacy ratings gave up on students faster. They were more critical of students and instilled environments that did not allow students to have as many opportunities for success (Bandura, 1993). When teachers had low self-efficacy, students' self-efficacy also potentially suffered (Bandura, 1993). Also, Flores (2015) wrote self-efficacy levels directly impacted "teachers' willingness to adopt innovative teaching strategies, time spent on teaching certain subjects, cultural competence…and classroom management beliefs" (p. 3). Possessing low self-efficacy levels could have led to teachers being less effective in general (Flores, 2015).

Sources of Self-Efficacy

Bandura (1994) noted the four sources of self-efficacy included: (a) enactive mastery experiences, (b) vicarious experiences, (c) verbal persuasion, and (d) psychological and affective states. Each source has been found to potentially impact a person's self-efficacy levels (Bandura, 1994). However, not all four sources have been found to have an equal impact on people (Bandura, 1994). For example, Bandura (1994) noted mastery experiences had the greatest potential to impact a person's self-efficacy. In the following, all four of the potential sources of self-efficacy will be discussed.

Enactive mastery experiences. When people had successful mastery experiences, their self-efficacy levels increased (Bandura, 1994; Flores, 2015; Yüksel, 2014). They were already successful once, so they knew they were more likely to see success again (Bandura, 1994). The better the success, the more the person's self-efficacy levels would have raised (Bandura, 1994). Also, Bandura (1994) explained this was the most convincing means for people to raise their self-efficacy. Bandura (1994) wrote, when people had mastery experiences, they significantly enhanced their self-efficacy moving forward. With that said, it should be noted failure has been detrimental to a person's self-efficacy as well (Vries, 2017). Furthermore, if the success came too easily, people would not have their self-efficacy fully developed (Bandura, 1994). Rather, they needed to be successful in the face of challenging circumstances (Bandura, 1994). By doing so, people would know they already made it through the difficult situations once and were, therefore, more likely to be able to again (Bandura, 1994). More recent studies have also confirmed the impact of mastery experiences on self-efficacy (Flores, 2015; Yüksel, 2014). For example, Flores (2015) concurred this was the case in a study focusing on preservice science teachers' self-efficacy. Additional experiences working in the field with students positively impacted the preservice teachers' self-efficacy levels (Flores, 2015).

Vicarious experiences. Bandura (1994) explained the concept of vicarious experiences referred to when people watched others model or perform a task effectively. When people observed others being successful, it helped them believe they were more likely to also see success (Bandura, 1994). They were able to see what it took to be successful and then felt better able to potentially emulate that behavior (Bandura, 1994).

According to Vries (2017), teachers have been impacted by this source of self-efficacy when observing other teachers be successful, which could have boosted their confidence levels. However, for this source of self-efficacy, Bandura (1994) noted the opposite was also true. If someone saw a person work hard and fail at a task, the observer's self-efficacy may diminish as well (Bandura, 1994).

Furthermore, Bandura (1994) explained the degree of influence modeling would have on a person's self-efficacy would depend on how similar the person was to whom he or she was observing. The more relatable the model was, the better the potential source of vicarious experiences could be (Bandura, 1994; Vries, 2017). With that said, Bandura (1994) did find people often observed and learned from the type of people to which they aspired to be. Also, it should be noted Yüksel (2014) studied preservice teachers and found some of the participants increased their self-efficacy not by watching others perform tasks successfully but rather by visualizing and rehearsing their own success. For example, some of the study's participants rehearsed their lesson plans before implementing them in the classroom, which made them more confident (Yüksel, 2014).

Verbal persuasion. For verbal persuasion, Bandura (1994) noted people might have seen their self-efficacy increase when they were given positive feedback about their abilities. Bandura (1994) explained, "People who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilize greater effort and sustain it than if they harbor self-doubts and dwell on personal deficiencies when problems arise" (p. 3). However, if those people failed, their self-efficacy would quickly diminish (Bandura, 1994). Also, people could have previously been persuaded by others

who did not have the skills and abilities necessary to complete an activity, and this would hinder their self-efficacy development and willingness to take part in the activity (Bandura, 1994). Based on this, Bandura (1994) noted those attempting to raise others' self-efficacy levels needed to put them in situations where they could see progress and improvement instead of having to directly compete against others. They needed to speak positively and put the people in situations that would bring positive outcomes (Bandura, 1994). Additionally, in Flores's (2017) study, it was also found verbal persuasion may have impacted preservice teachers' self-efficacy when they received positive feedback from their peers, as well as when they saw their students positively responding to the class activities. Moreover, Yüksel (2014) noted when mentors provided preservice teachers with feedback to improve, they should have also included supportive language, or the mentors' words may have been viewed solely as criticism, which may have negatively impacted self-efficacy levels.

Psychological and affective states. For the last source of self-efficacy, psychological and affective states referred to a person's emotions and stress levels (Bandura, 1994). For example, when people have been nervous about completing a task, this likely lowered their overall self-efficacy (Bandura, 1994). Bandura (1994) wrote, "People who have a high sense of efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a debilitator" (p. 3). When people had positive moods in these types of situations, their self-efficacy levels typically increased (Bandura, 1994). With negative moods and uncontrolled emotions, it was possible the opposite could have occurred (Bandura, 1994). This concept was also explained by Vries (2017), who noted

teachers who experienced joy when conducting certain classroom activities could have seen their self-efficacy levels increase. Those who felt stress or dread have seen the opposite result (Vries, 2017).

Teachers' Technological Self-Efficacy and Self-Improvement

Some teachers have needed to improve their technological self-efficacy to be more effective in the classroom (Gentry et al., 2014). However, as Gentry et al. (2014) noted, the specific areas for improvement needed first to be identified before the best improvement methods in school districts and education programs for aspiring teachers could take place. Once the areas of need were identified, targeted professional development, Professional Learning Communities (PLCs), and coaches have all been suggested as methods to improve teachers' self-efficacy and their general skill sets in the classroom (Battersby & Verdi, 2015; Brown, 2016; Gentry et al., 2014; Walker Beesona et al., 2014). In the following, literature related to teachers' technological self-efficacy, in general, will first be discussed, followed by methods which have been identified to improve teachers' technological skill sets, as well as their teaching skills in general.

Technological Self-Efficacy. Gentry et al. (2014), developed the Educator Technology Self-Efficacy Survey and published information about this survey in a 2014 article. Gentry and Baker were professors at Tarleton State University, and they worked with the university's preservice teachers (Gentry et al., 2014). Thomas, Whitfield, and Garcia were three of the university's preservice teachers, and they collaborated with Gentry and Baker to develop the survey instrument (Gentry et al., 2014). The purpose of developing the survey instrument was to allow teachers a method to determine their self-efficacy ratings in relation to technology (Gentry et al., 2014). Specifically, the authors

sought to develop a survey that would align with the five teacher technology standards developed by the ISTE in 2008 (Gentry et al., 2014). The authors noted it was beneficial to focus on teachers' technological self-efficacy with this survey so teachers could then use this information and take part in professional development opportunities to better their skills and abilities (Gentry et al., 2014).

According to Gentry et al. (2014), when the authors searched for a survey directly aligned with the ISTE (2008) teacher standards to measure teachers' technological self-efficacy, no such survey met their requirements. Thus, Gentry et al. (2014) developed the ETS-ES. According to Gentry et al. (2014), "Since limited instruments to evaluate this phenomenon existed, researchers worked to develop… an instrument which would provide a measure of self-efficacy with instructional technology for both preservice and working teachers in the field" (p. 34). Gentry et al. (2014) explained an expert panel developed 10 questions for each of the five ISTE (2008) teacher standards. Five of the standards were positive items (PIs) for each standard, and the other five were negative items (NIs) (Gentry et al., 2014). One strength of this survey was it had a Cronbach's alpha of .958 (Gentry et al., 2014). According to Fraenkel, Wallen, and Hyun (2015), the Cronbach's alpha is an alpha coefficient used to determine the reliability of the survey. Also, Gentry et al. (2014) noted this score illustrated the instrument's noteworthy degree of internal consistency.

Gentry et al. (2014) argued utilizing this survey could potentially allow schools to ascertain professional development needs related to technology. Also, it was possible this survey could assist school districts in identifying the best potential candidates to serve as the school districts' technology leaders (Gentry et al., 2014). Furthermore,

preservice teacher programs could use this survey as an assessment to measure their students' growth with pre-and post-tests (Gentry et al., 2014). With that said, Gentry et al. (2014) noted it would be beneficial in the future to pilot a survey with fewer questions so respondents could complete it faster. Gentry et al. (2014) wrote this could increase the survey's functional use for educators.

Next, Tilton and Harnett (2016) studied what influenced the technological self-efficacy of secondary-school teachers in a school with a new 1:1 technology initiative using iPad Minis. The authors conducted a longitudinal study throughout an entire school year and conducted regular interviews with five teachers regarding their experiences with the initiative (Tilton & Harnett, 2016). The main influence of teachers' self-efficacy with utilizing the new devices was their mastery experiences (Tilton & Harnett, 2016). Teachers spent the time necessary to understand how to best use their devices (Tilton & Harnett, 2016). Also, teachers' collective efficacy with their students influenced their self-efficacy ratings. Tilton and Harnett (2016) wrote, teachers and students collaborated to solve problems when issues with the technology emerged, which led to their collective efficacy. These teachers and students were able to work together to better understand the technology and its uses (Tilton & Harnett, 2016). Furthermore, modeling the devices' uses among colleagues influenced self-efficacy, as did the teachers' perceptions of the value of the devices in the classroom (Tilton & Harnett, 2016). Issues often occurring in 1:1 technology programs, such as Internet connectivity and managing students and potential distractions, were identified, but Tilton and Harnett (2016) noted teachers were able to overcome those issues. They wrote, "teachers reported an overall sense of growth in efficacy in using the iPad mini…with some teachers

demonstrating clear growth relating to personal use, and others demonstrating growth in their efficacy in collective classroom use of the device" (Tilton & Harnett, 2016, p. 85). All teachers saw some level of growth throughout the duration of the study (Tilton & Harnett, 2016).

Kent and Giles (2017) examined the technological self-efficacy levels of 62 elementary preservice teachers at a research-intensive university and found many of these future teachers self-reported high levels of technological self-efficacy in general. However, 30% of those surveyed were not confident in their abilities to select and properly evaluate technology before using it in their classes (Kent & Giles, 2017). Kent and Giles (2017) wrote, many of the respondents would be considered digital natives and therefore have a lifetime of experiences with digital technology, which would explain their overall confidence. As for why their confidence in choosing and evaluating classroom technology was lower, Kent and Giles (2017) wrote possible reasons included, among other factors, "lack of knowledge of elements of effective technology, lack of experience with…evaluating technology, lack of teaching experience that would help provide the background knowledge to effectively evaluate the technology, time constraints, or various other factors" (p. 13). The authors noted preservice teachers' colleges needed to further prepare their students to be able to make these decisions and have more self-efficacy in this area (Kent & Giles, 2017). They explained higher education institutions needed to better include opportunities for their students to learn more about these areas and be better prepared (Kent & Giles, 2017). It was also noted when these future teachers had higher technological self-efficacy, they would then be more likely in general to utilize technology in their classrooms (Kent & Giles, 2017).

Finally, Ünal, Yamaç, and Uzun (2017) conducted a mixed-methods study on the technology integration self-efficacy (TISE) levels of 43 Turkish preservice elementary teachers to see how they would compare before and after their teaching practice course, or student teaching. The authors found the preservice teachers' TISE levels raised significantly after completing the teaching practice course (Ünal et al., 2017). The main reason the preservice teachers identified for the TISE increases was their amount of mastery experiences (Ünal et al., 2017). The more successes the preservice teachers had, the more their TISE levels increased (Ünal et al., 2017). Vicarious experiences were the second most cited reason for TISE levels rising (Ünal et al., 2017). As the preservice teachers saw others integrate technology effectively, they were they more confident in their own abilities (Ünal et al., 2017).

Professional development with technology. As has been previously noted, having technology in the classroom will not automatically lead to effective instruction and student success (Walker Beesona et al., 2014). Rather, Walker Beesona et al. (2014) argued teachers' technological pedagogical content knowledge (TPCK) was also directly related, and instituting professional development could help with this. Walker Beesona et al. (2014) conducted case studies of two high school civics classes utilizing 1:1 technology during the 2012 presidential election, and the focus of the study was to ascertain how the 1:1 technology was used and how effective it was in reaching each instructor's pedagogical goals. One class was observed on 30 occasions, while the other class was observed 36 times (Walker Beesona et al., 2014). Both instructors used the 1:1 technology daily in their classrooms, but, according to Walker Beesona et al. (2014), one instructor in the study had clearer pedagogical goals and better aligned his courses and

technology use with those goals. The other instructor "lacked the understanding of how that technology aligned with the content he was teaching, as well as the pedagogical affordances and limitations for using that technology" (Walker Beesona et al., 2014, p. 124). As a result, Walker Beesona et al. (2014) concluded instructors needed to know more than simply how to use their classroom technology. Instead, they needed to know how to use the technology to best complement their classroom instruction (Walker Beesona et al., 2014). To accomplish this, Walker Beesona et al. (2014) argued instructors should have more targeted professional development to help them become more capable of using their TPCK when approaching related issues. Professional development simply covering how to operate the technology was found to be no longer enough (Walker Beesona et al., 2014).

Grundmeyer (2014) also highlighted the importance of well-trained faculty in a study focusing on student perceptions of 1:1 laptop initiatives. Grundmeyer (2014) studied 15 first-year college students to ascertain their perceptions of the efficacy of 1:1 laptop initiatives in relation to college readiness. Grundmeyer (2014) found the students perceived it was important to have technology in the classroom, but instructors must be knowledgeable about the best practices for this technology and cognizant of any technology-related issues that may have impacted the efficacy of their classroom instruction. If instructors were not fully trained and aware of these potential issues, the instructional time was potentially not as effective, and students may have become off-task and not used the technology or class time appropriately (Grundmeyer, 2014).

Furthermore, a 2015 study by Kuyatt, Holland, and Jones supported the notion more technology did not always automatically lead to better results. Kuyatt et al. (2015)

surveyed 23 Texas secondary teachers whose students were proficient in the state's academic achievement exam, as well as another 23 teachers whose classes were not proficient, to examine their classroom technology usage. This article did not solely focus on 1:1 initiatives, but it was still relevant to this literature review since it covered the general use of technology in the classroom. According to Kuyatt et al. (2015), "Students whose teacher did not use technology were more successful on their STAAR exam, as measured by the Teacher Technology Survey, than those whose teacher did use technology" (p. 67). The results by Kuyatt et al. (2015) showed teachers and administrators needed to better evaluate the use of technology and judge how it directly related to assessments. One such way to accomplish this would be further strategic professional development (Kuyatt et al., 2015). According to Kuyatt et al. (2015), it needed to be clear to instructors how the use of technology would actually lead to more effective student learning. At times, classroom technology has been beneficial, but instructors and administrators needed to consider this was not always the case (Kuyatt et al., 2015).

Professional Learning Communities. One more method to improve teachers' instructional practices and efficacy, in general, has been Professional Learning Communities (Battersby & Verdi, 2015). It has been noted these PLCs could be a more targeted version of professional development which met regularly and allowed faculty members to discuss their issues (Battersby & Verdi, 2015). According to Thoma, Hutchison, Johnson, Johnson, and Stromer (2017), PLCs could have also been used to assist with technology integration and planning for classroom use. In general, focused collaboration and conversations have been important components of PLCs (Woodland,

2016). Bates, Huber, and McClure (2016) noted, "Through shared inquiry, educators explore new ideas to improve instructional practice and increase student learning" (pp. 99-100). Even if teachers had trouble with scheduling meeting times, they were still meeting through their technology (Bates et al., 2016). In fact, meeting virtually has been found to be beneficial since it allowed for teachers to further communicate and utilize additional online resources for their meetings (Bates et al., 2016). It should be noted, however, not all PLCs have been successful (Kalkan, 2016). In order to be effective, Kalkan (2016) explained, PLCs needed to have structure and strong relationships built on trust.

Instructional coaches. Many school districts have also utilized instructional coaches to help instructors become stronger in the classroom in general (Wolpert-Gawron, 2016). According to Wolpert-Gawron (2016), instructional coaches have been able to assist teachers who needed to improve their practices or grow as educators and implement new teaching strategies. These coaches were able to model appropriate behavior, help develop teachers' skills, and provide immediate feedback after visiting classrooms and working with instructors (Lia, 2016).

Coaches have been tasked with being agents of change and facilitating teacher growth that ultimately benefitted students (Brown, 2016). Brown (2016) wrote, "Coaching strategies involve the sharing of knowledge and the use of problem-solving techniques to facilitate teachers' implementation of innovative instructional approaches and sustain changes in their practice" (p. 14). According to Brown (2016), coaches needed to support teachers by enhancing their teaching knowledge, allowing for professional development opportunities, and keeping an open line of communication to

make it possible for the teachers and coaches to collaborate with each other and develop strong relationships (Brown, 2016). Coaches needed to observe teachers and provide feedback to help the teachers be stronger in the classroom (Brown, 2016). It was explained coaches should discuss their thoughts with the teachers and allow the teachers to reflect on the observations and assessments in order to refine future teaching strategies (Brown, 2016).

It should also be noted some school districts without official instructional coaches have used their librarians in a similar capacity (Theard-Griggs & Lilly, 2014). Some librarians had the ability to assist instructors with their teaching strategies by modeling new teaching strategies and innovations involving technology. They may not have held the official title of instructional coach, but they have often possessed the skill set and resources necessary to help in this regard (Theard-Griggs & Lilly, 2014).

Furthermore, the ISTE (2011) wrote school districts can also utilize coaches, or facilitators, specifically focusing on technology. Stanhope and Corn (2014) conducted a study on the impact of technology facilitators (TFs), or coaches, on educators at schools with 1:1 technology initiatives. The authors noted, "The TF may help teachers augment their technology-related knowledge and skills, enhance teacher commitment to the initiative, contribute to the school's implementation capacity by fortifying the school infrastructure, and create a culture that is supportive of technology adoption" (Stanhope & Corn, 2014, p. 254). One takeaway from the study was teachers with TFs in their schools had more positive attitudes regarding the technology in their classrooms (Stanhope & Corn, 2014). Stanhope and Corn (2014) noted their study found teachers in schools with a TF were "more positive about the benefits of 1:1 for teaching practice and

student learning, were more positive about the technology infrastructure, had positive normative perceptions about the school infrastructure, and reported higher frequency of technology use for planning" (p. 271). Thus, the authors argued TFs were vital in developing teachers' commitment to 1:1 technology (Stanhope & Corn, 2014).

Essential communication practices. All coaches who focused on improving instruction have needed to possess strong communication skills (Walkowiak, 2016). Due to the importance of effective communication, Walkowiak (2016) explained five essential communication practices instructional coaches should follow to best help instructors. Walkowiak (2016) wrote school districts have recently begun hiring instructional coaches to strengthen their teachers' skills and abilities, and this has led to teachers' utilizing new teaching strategies that could have a higher degree of effectiveness. By having followed the five prescribed communication practices, Walkowiak (2016) argued instructional coaches could have been even more effective with these duties.

The first practice identified by Walkowiak (2016) was: "The instructional coach and school leaders collaborate to define the role of the coach" (p. 15). The roles and goals of the instructional coach needed to be clearly defined (Walkowiak, 2016). Over time, the specific goals may have changed, and this needed to be addressed (Walkowiak, 2016). This has been found to be important because it allowed the teachers and coaches to be on the same page during meetings and frame discussions based on the roles and goals established. Walkowiak (2016) noted clearer definitions could lead to more focused and effective work for the instructional coaches and teachers.

The second practice was: "The instructional coach establishes trust with teachers at the school" (Walkiwiak, 2016, p. 15). Walkowiak (2016) noted building this trust was

important because it helped teachers feel less intimidated by the instructional coaching process. Once relationships have been built, teachers were able to feel more comfortable sharing their issues and working with the coaches to make an impactful change in their classrooms. Regarding this practice, Walkowiak (2016) explained, people may think this practice was common sense, but it was still crucial to the process if coaches wanted to be as effective as possible. Instructional coaches needed to be open, share their own stories, and find ways to connect with their teachers (Walkowiak, 2016).

For the third practice, Walkowiak (2016) wrote, "The instructional coach shows value for teachers' ideas" (p. 15). It was noted coaches should not try to make significant changes overnight (Walkowiak, 2016). They needed to value teachers' perspectives and consider their ideas (Walkowiak, 2016). If instructional coaches made too significant of changes too fast, teachers would have been less likely to accept the changes and may have instead viewed the coach as not truly being collaborative or willing to listen to others' ideas (Walkowiak, 2016). Therefore, instructional coaches needed to use a collaborative approach and allow teachers to feel valued (Walkowiak, 2016).

For the fourth essential practice, Walkowiak (2016) argued, "The instructional coach sets very narrow and focused goals for instructional growth" (p. 16). More focused goals would have allowed teachers and coaches to better understand each other and what they needed to accomplish (Walkowiak, 2016). Walkowiak (2016) wrote, "By narrowing the focus for instructional improvement, the instructional coach gives teachers manageable goals that are less overwhelming than having multiple areas of focus" (p. 16). Also, instructional coaches needed to find a way to measure teachers' progress toward their goals (Walkowiak, 2016). By having a clear idea of what they needed to

accomplish and noting what progress was made, teachers and their coaches were then able to have a stronger idea of what they should do moving forward (Walkowiak, 2016).

The last essential practice covered by Walkowiak (2016) was "The coach focuses instructional conversations on evidence from students and on learning together as professionals" (p. 16). Instructional coaches needed to visit with teachers about student learning that could be identified in ways besides examining test scores (Walkowiak, 2016). Walkowiak (2016) wrote, "The typical protocol should be to talk about the evidence of student understanding, or lack of, when you engage in conversations about implemented lessons" (p. 16). This type of informal assessment allowed teachers and coaches to further consider instructional practices and learn how they could be improved in the future (Walkowiak, 2016).

By utilizing coaches, teachers had mentors who could help guide them with best practices (Wolpert-Gawron, 2016). Teachers were able to ask about education technology techniques or a variety of other topics (Wolpert-Gawron, 2016). These instructional coaches could have led to teachers improving their overall skill set and being more effective in the classroom (Walkowiak, 2016).

ISTE Standards for Teachers, Students, and Coaches

According to Elliot (2010), the International Society for Technology in Education (ISTE) developed the National Educational Technology Standards for Teachers (NETS-T) in 2008, and these standards were meant to be paired with the National Educational Technology Standards for Students (NETS-S) released in 2007. Swallow (2017) wrote these standards gave teachers a framework to further develop their teaching methods to best help them strengthen their students' 21st-century skills. Also, Elliot (2010) noted

these standards demonstrated a change in how educators viewed educational technology. Elliot (2010) wrote, "Until these standards were released, the field of educational technology focused on 'how' to use equipment rather than on 'what' the educational benefits of technology-mediated learning environments could be" (para. 1). In the following, the NETS-T standards will be discussed in more detail since these standards were utilized for the purposes of this study. Then, an overview of the student standards, as well as the technology coach standards, will be provided.

Teacher standards. Regarding the NETS-T standards, which were to be paired with the NETS-S standards, the ISTE (2008) wrote, "Effective teachers model and apply the ISTE Standards for Students as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (ISTE, 2008, p. 1). In total, there were six NETS-S standards and five NETS-T standards developed (ISTE, 2007; ISTE, 2008). To go along with modeling and applying the NETS-S, teachers needed to also follow the five NETS-T standards (ISTE, 2008).

The ISTE (2008) noted the first of the NETS-T standards was to "facilitate and inspire student learning and creativity" (p. 1). Teachers were to model creativity and collaboration (ISTE, 2008). They needed to facilitate students' abilities to be creative and develop innovations (ISTE, 2008). Keengwe and Georgina (2013) discussed digital natives' preferred learning styles and how instructors should approach them in the classroom. According to Keengwe and Georgina (2013), digital natives have been different than past generations of students because they preferred to drive their own learning instead of having instruction-based classroom environments. As a result,

Keengwe and Georgina (2013) argued teachers should take more student-centered approaches. Many digital natives have taken responsibility for their own learning, and instructors needed to help guide students and facilitate this learning (Keengwe & Georgina, 2013). Teachers should have provided their students with learning opportunities and then served as a resource for them to work through the process (Keengwe & Georgina, 2013).

The second standard was to "design and develop digital age learning experiences and assessments" (ISTE, 2008, p. 1). For this standard, educators needed to consider their students' individual interests and needs, make changes to the learning experiences when appropriate, and develop multiple methods for assessment (ISTE, 2008). Regarding today's learners, Kivunja (2014) argued instructors must approach digital natives differently than students of the past. Since teachers needed to acknowledge they must find different learning experiences to reach today's students, they "should appreciate that it is incumbent…to develop a good understanding of how they learn, as this will inform our pedagogical practice so that we can be more effective teachers" (Kivunja, 2014, p. 94). Without teachers fully understanding how the current generation of learners function, Kiruna (2014) compared their efforts to constructing a building atop shifting sand. Also, Sharp (2014) noted many students have come into the classroom understanding certain aspects of technology, but instructors needed to provide their students with opportunities to grow with technology and use it more effectively for academic purposes.

The ISTE's third 2008 teacher standard was to "model digital age work and learning" (p. 1). Teachers needed to have a strong understanding of how to effectively

use the technology and utilize their skills to benefit student learning and the community in general (ISTE, 2008). Walker Beesona et al. (2014) explained teachers should not only know how to operate their classroom technology. Rather, they should know how to use it effectively to reach their instructional goals (Walker Beesona et al., 2014). In order to accomplish this, professional development and further training may have been necessary (Walker Beesona et al., 2014). Also, Vries (2017) argued vicarious experiences were one way to potentially change someone's level of self-efficacy, and, based on this concept, students could potentially have these types of experiences by witnessing their instructors' modeling appropriate behavior.

The fourth 2008 standard was to "promote and model digital citizenship and responsibility" (ISTE, 2008, p. 2). Teachers were to consider local and global issues, act ethically, and model this behavior (ISTE, 2008). Sharp (2014) explained this standard included issues like students' responsible and appropriate conduct. Issues also included cyberbullying, sexting, privacy, and the ethical use of technology (Sharp, 2014). In a study regarding teachers' perceptions of educating digital natives, one issue addressed by Neumann (2016) was plagiarism, which would be an ethical issue and fit with this standard. Neumann (2016) noted, "While digital natives have familiarity with technology, it does not mean that they do not have misunderstandings with the use of technology" (p. 101). Without stronger skills in this area, students' performances would suffer as a result of their bad habits (Neumann, 2016). Thus, the teachers in Neumann's (2016) study believed they needed to reinforce students' understanding of information literacy (Neumann, 2016). They needed to explain how to cite sources properly and how to ascertain if sources should be considered credible (Neumann, 2016).

Finally, the last standard the ISTE (2008) covered was to "engage in professional growth and leadership" (p. 2). Teachers needed to always attempt to better themselves and be lifelong learners (ISTE, 2008). They needed to be leaders and grow professionally in terms of technology (ISTE, 2008). Regarding this standard, Sharp (2014) wrote, "Professional growth derives from the consultation of current research coupled with the evaluation and reflection of teaching practices" (p. 77). Furthermore, Walker Beesona et al. (2014) wrote when teachers grew professionally and increased their TPCK, their students benefitted (Walker Beesona et al., 2014).

Student standards. The first of the six NETS-S standards was "creativity and innovation" (ISTE, 2007, p. 1). For this standard, the ISTE (2007) noted students should think critically and apply their knowledge to create technological innovations. The next ISTE (2007) student standard was "communication and collaboration" (p. 1). Students needed to work together and express their thoughts and ideas in an effective manner. For this standard, the ISTE (2007) noted, "Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others" (p. 1). After that, the third standard was deemed "research and information fluency" (ISTE, 2007, p. 1). This standard focused on information literacy and how students should research and evaluate information using digital resources (ISTE, 2007).

The fourth ISTE (2007) NETS-S standard was "critical thinking, problem-solving, and decision making" (p. 1). Students were to use their available resources to analyze problems and make logical decisions based on the information available (ISTE, 2007). For this standard, the ISTE (2007) wrote, "Students use critical thinking skills to

plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources" (p. 1). Next, the fifth standard was "digital citizenship" (ISTE, 2007, p. 2). Students needed to use their technology in a safe, appropriate manner and be lifelong learners (ISTE, 2007). Finally, the sixth standard was "technology operations and concepts" (ISTE, 2007, p. 2). The ISTE explained students should know how to operate their technology (ISTE, 2007). They needed to understand basic troubleshooting and be able to transfer their operational skills to assist them in understanding new technologies (ISTE, 2007).

It should be noted, in 2016, the ISTE updated the student standards so they would have even more of a focus on student-centered learning and student empowerment (Aglio & Gusky, 2017). In mid-2017, new standards for educators also emerged (ISTE, 2017). Both sets of standards were similar to their preceding sets but included more language on student empowerment (ISTE, 2016; ISTE, 2017). To elaborate, the seven new standards for students included "Empowered learner; digital citizen; knowledge constructor; innovative designer, computational thinker; creative communicator; and global collector (ISTE, 2016, pp. 1-2). With these standards, the ISTE (2016) noted students would be able to succeed in the 21st-century world, and they would be more responsible for their own learning. The standards focused on students' critical thinking, ability to collaborate, and work with diverse groups (ISTE, 2016). As for the recently-updated educator standards, they included, "Learner; leader; citizen; collaborator; designer; facilitator; and analyst" (ISTE, 2017, pp. 1-2). Regarding these standards, ISTE (2017) wrote, "The ISTE Standards for Educators are your roadmap to helping students become empowered learners" (p. 1). Instead of using technology to support student learning,

these standards focused on allowing students to be empowered with the technology to drive their own learning (ISTE, 2017).

Technology coach standards. The ISTE (2011) also developed six standards for technology coaches to guide them in their practices. The first of these standards was "visionary leadership" (p. 1). This standard covered how coaches should be transformational agents for their organizations and have a shared vision to promote the use of technology. For this standard, the ISTE (2011) wrote, "Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment" (p. 1). The second standard was "teaching, learning, and assessments" (ISTE, 2011, p. 1). For this standard, coaches should have assisted teachers in effectively utilizing technology for those purposes. Next, the third standard was "digital age learning environments" (ISTE, 2011, p. 2). The ISTE (2011) noted this standard covered how coaches should establish environments that lead to the most student success.

The fourth ISTE (2011) standard was "professional development and program evaluation" (p. 2). Technology coaches were to assess what issues their teachers faced, implement appropriate professional development, and later judge the efficacy of the professional development (ISTE, 2011). Fifth was "digital citizenship" (ISTE, 2011, p. 2). This standard covered how coaches should model safe, appropriate, and culturally sensitive use of the technology (ISTE, 2011). Finally, the sixth standard was "content knowledge and professional growth" (ISTE, 2011, p. 2). Lifelong learning was the main theme of this standard (ISTE, 2011). The ISTE (2011) noted, "Technology coaches

demonstrate professional knowledge, skills, and dispositions in content, pedagogical, and technological areas, as well as adult learning and leadership, and are continuously deepening their knowledge and expertise" (p. 2). With this standard, technology coaches needed to never cease to learn and improve themselves (ISTE, 2011).

Benefits and Detriments of 1:1 Technology

According to Richardson et al. (2013), the amount of digital technology now available throughout the world has changed what can be accomplished in the field of education. Richardson et al. (2013) noted laptop initiatives have become increasingly prevalent throughout the world, and many benefits have been identified. More specifically, the implementation of 1:1 technology initiatives has continued to grow in popularity over time (Richardson et al., 2013). One reason this trend has emerged is because classroom technology, if utilized properly, can help develop students' 21st-century skills (Gentry et al., 2014). Collaboration, creativity, and critical thinking have all been identified as necessary skills for today's students, and technology—when utilized in the classroom appropriately—has helped with this (Gentry et al., 2014). In the following, multiple potential benefits and detriments of utilizing classroom technology—and more specifically 1:1 technology initiatives—will be discussed.

Benefits. Multiple potential benefits of classroom technology have been identified in previous research (Annan-Coultas, 2012; Carver, 2016; Kay & Lauricella, 2014; Storz & Hoffman, 2013). For example, it was found using technology in the classroom could have potentially led to higher levels of student engagement and motivation (Carver, 2016; Storz & Hoffman, 2013). Storz and Hoffman (2013) conducted a qualitative case study at a Midwestern middle school which implemented a

1:1 laptop initiative. Students and teachers were interviewed both before the implementation of the laptop initiative and then two months after it started. Storz and Hoffman's (2013) interview questions focused on the teachers' and students' general perceptions of using laptops in the classroom. To go along with identifying higher levels of engagement as a benefit, Storz and Hoffman (2013) also noted most of the students in the case study preferred utilizing more technology, and teachers also recognized its value for allowing more project-based assignments and critical thinking.

According to Annan-Coultas (2012), another benefit of 1:1 technology has been this technology has allowed students to have a world of information available at their fingertips. Annan-Coultas (2012) found this to be the case in a mixed-methods study of students in a college health professions program at a southern medical university. Being able to quickly access large amounts of information, as well as the Internet in general, in the classroom was beneficial for the students in Annan-Coultas's (2012) study since it allowed them to utilize forms of media they could otherwise not individually access during class. Also, the laptops were beneficial when it came to notetaking and helping students stay organized as this allowed students to have easier access to course materials (Annan-Coultas, 2012). Furthermore, a study by Kay and Lauricella (2014) yielded similar results. Kay and Lauricella (2014) used a mixed-methods approach and surveyed 156 university students taking either education or communication courses that utilized laptops and found the technology aided in students' ability to collaborate and conduct research. In Kay and Lauricella's (2014) study, it was found, by having laptops in the classroom, students could have easily looked up relevant information, actively taken notes, and worked with each other online.

Wyatt (2017) reflected on a newly-implemented 1:1 program at a faith-based high school and found survey results from parents, faculty, and students noted multiple benefits. These benefits included everything from fast access to the Internet and researching sources to allowing students to have lighter backpacks (Wyatt, 2017). According to Wyatt (2017), "teachers felt that having iPads for all students provided creative tools for project-based learning, communication tools for collaboration, and ways to engage students differently" (p. 229). The technology provided students multiple opportunities they would not have otherwise in the classroom (Wyatt, 2017).

Carver (2016) studied teacher perceptions regarding the barriers and benefits of technology in the classroom and found a common benefit cited by teachers was technology potentially increased student engagement. Carver's (2016) study focused on qualitative data obtained from 68 educators enrolled in a graduate program in the southeast region of the United States. Most of the respondents were elementary teachers, but there were also representatives from middle schools and high schools. Carver (2016) noted most respondents viewed technology as a way to support students' engagement and understanding. According to Carver (2016), once teachers had more knowledge in terms of utilizing technology for engagement and differentiated instruction, it would then also be effective to use technology for more evaluation and research purposes.

Detriments. Even though clear benefits were noted in the aforementioned articles, the authors also identified detriments to using technology in the classroom (Annan-Coultas, 2012; Carver, 2016; Kay & Lauricella, 2014; Storz & Hoffman, 2013). One theme noted in multiple articles was technology potentially led to students being distracted, which could have negatively impacted their learning environments (Annan-

Coultas, 2012; Kay & Lauricella, 2014; Storz & Hoffman, 2013; Wyatt, 2017). For example, with this technology, students may have used social media, perused the internet, or played games or videos instead of focusing on schoolwork (Kay & Lauricella, 2014). Furthermore, Wyatt (2017) noted, "Students playing games, visiting social network sites such as Pinterest, Facebook, and Instagram, surfing the web, sending and reading emails, and instant messaging were identified as practices that left some teachers feeling unprepared and even overwhelmed" (p. 229). Different solutions to address these distractions were discussed in the articles, but in Annan-Coultas's (2012) study, which focused on college students, it was concluded not being distracted was a matter of personal responsibility. In Wyatt's (2017) study, it was determined more professional development would be beneficial, as well as stronger restrictions for students' technology usage, such as only allowing students to complete specific downloads on the devices.

Another detriment identified by Wyatt (2017) was teachers found it more difficult to develop relationships with their students due to their increased technology usage. Wyatt (2017) compared developing relationships in this environment to "getting to know someone at a crowded party" (p. 229). Technology hindered the development of this important student-teacher dynamic (Wyatt, 2017). The student-teacher relationships could still be developed, but this took longer than before (Wyatt, 2017). Teachers needed to have additional contact with students to see the relationships fully developed (Wyatt, 2017).

Other detriments included standard technology issues, such as Wi-Fi connectivity, battery life, and compatibility issues with computers and files (Annan-Coultas, 2012). In addition to those issues, the focus groups in Annan-Coultas's (2012) study found some

students also felt too reliant on the laptops due to how often they were required to use them for school (Annan-Coultas, 2012). Some students felt as if they received too many emails and felt like email was their only form of communication (Annan-Coultas, 2012). As a result, Annan-Coultas (2012) suggested additional faculty support could help improve some of the students' perceived issues. Taking all of the detriments of classroom technology into consideration, Kay and Lauricella (2014) still came to the conclusion the pros of technology outweighed the cons. Students may have used the technology inappropriately, but there were many benefits to incorporating it into the classroom (Kay & Lauricella, 2014).

Bring-Your-Own-Device

The concept of Bring-Your-Own-Device, or BYOD, started in the private sector and, due to its many benefits, eventually found its way into the field of education (Burns-Sardone, 2014). In the private sector, it was found BYOD initiatives lowered costs for the organization and improved productivity, and these same reasons have led to its implementation in the classroom (Burns-Sardone, 2014). Cho (2017) noted 1:1 technology did not always have to be provided by the school district. According to Cho (2017), BYOD initiatives would have also worked as a form of 1:1 technology. Furthermore, BYOD initiatives "allow students and families to make personal decisions about device selection and ownership. These approaches also may result in a broader diversity of devices in any given classroom" (Cho, 2017, p. 178.). Cho (2017) noted families could select the devices they wanted, which meant not every student would use the same technology.

Cho (2017) studied a BYOD initiative at a Catholic school to see how the initiative aligned with the Catholic school vision and mission. Overall, the results were positive and showed educators saw benefits to the BYOD initiatives (Cho, 2017). One benefit identified was the cost savings for the school (Cho, 2017). Instead of purchasing laptop carts, students brought their own devices, and the cost savings from not purchasing the carts were still available for families needing financial support to purchase a device (Cho, 2017).

It was also noted by Cho (2017) educators were able to use the BYOD initiative to help students develop their digital citizenship skills. According to Cho (2017), educators "saw technology as intertwined with students' personal and social development. With this in mind, educators helped students navigate such issues by fostering digital citizenship and by turning toward the school's vision and mission" (p. 189). Cyberbullying, inappropriate content, reputation management, and appropriate technology use were all able to be covered (Cho, 2017). Finally, Cho (2017) noted teachers in the study viewed technology as a positive, but they still needed to make an effort to always use the technology strategically in the classroom. To summarize, having clear goals and priorities were found to be important for teachers utilizing this type of technological initiative (Cho, 2017).

In Parsons and Adhikari's (2016) study focusing on teacher, parent, and student perceptions of BYOD in a New Zealand school, they also found teachers identified benefits of the technology and noted it was becoming increasingly necessary. Parsons and Adhikari (2016) wrote, "There is the recognition that education must adapt to technological changes in wider society. As the everyday use of digital tools by school

students grows, so does the need for schools to integrate digital technologies to remain relevant." (p. 66). However, teachers may still have been warier of this type initiative than their students (Parsons & Adhikari, 2016). It was suggested this was the case because teachers had to consider how to best use the technology in the classroom and transform their practices (Parsons & Adhikari, 2016). The skill set necessary for teachers to effectively implement the technology was greater than the skills for students to operate the technology (Parsons & Adhikari, 2016). Also, Parsons and Adhikari (2016) found parents had more reservations about the technology partially because some may not have been able to assist their children as much with the devices and, therefore, felt more excluded in the process. Last, Parsons and Adhikari (2016) also noted in their study that BYOD initiatives can benefit students' overall digital skills and ability to collaborate effectively.

Kiger and Herro (2015) conducted a study focused on parental perceptions of BYOD initiatives and found parents identified benefits of BYOD but also noted some issues. For example, "Parents suggested making school-owned devices available to students who do not have a personal device, secure storage options for students who bring their technology to school, a robust wireless network, and appropriate use guidelines" (Kiger & Herro, 2015, p. 57). Moreover, Kiger and Herro (2015) noted, it was important to have parent buy-in, so they were more likely to allow their students to bring their own devices. If parents had a negative perception of the school and did not feel like partners in the process, the likelihood of their students bringing devices decreased (Kiger & Herro, 2015). Kiger and Herro (2015) wrote, "This implies schools would be well served to shape positive perceptions towards the overall school

environment and find ways to include parents as partners to increase technology education and access" (p. 58). Thus, it was argued schools should include parents on advisory boards, allow for parental volunteer opportunities, and have fundraisers to assist students needing financial support for the technology (Kiger & Herro, 2015). Furthermore, Kiger and Herro (2015) noted it was important for teachers to have strategic professional development considering the contexts of their specific situations.

Teachers' Technology Apprehensions

Even considering the many benefits of technology, some teachers have still been resistant to change (Oriji & Amadi, 2016; Gentry et al., 2014). Some teachers have believed they could be successful without incorporating classroom technology (Gentry et al., 2014). However, today's students have especially needed this technology in the classroom to develop the skills necessary for life in the 21st century (Gentry et al., 2014; Grundmeyer, 2014). In the following, these teachers' apprehensions to technology will be discussed.

A study by Baker et al. (2012) focusing on the collegiate level of education argued instructors, in general, have been more resistant to classroom technology than students. Baker et al. (2012) surveyed students and professors at three public universities about technology in the classroom; a total of 978 surveys were completed, with 882 of the surveys from students and 96 from faculty members. Baker et al. (2012) found 80% of students agreed utilizing laptops in general in the classroom can be appropriate and beneficial, while only 62% of faculty members agreed with this. A higher percentage of graduate students supported the rights of faculty to ban laptops, and more female students than males agreed the technology could be a distraction (Baker et al., 2012). As for cell

phones, 90% of faculty responded it was never appropriate for students to use them to check messages or to call someone during class, while only 58% of students felt this way (Baker et al., 2012). Feelings regarding personal music devices were also discussed, but the clear majority of both faculty and students were in agreement they should not be used during class (Baker et al., 2012).

Based on this study, Baker et al. (2012) concluded students were more accepting of the idea of using technology in the classroom, and more instructors should find a way to reach students with these devices. Baker et al. (2012) wrote, "Therefore, it is incumbent on instructors…to adapt to these technologies…to deliver courses in a way that reflects these oftentimes conflicting views concerning the use and usefulness of these technologies" (p. 288). Even if a large number of instructors did not prefer students using technology in the classroom, the authors recommended adapting their instruction to students' preferred methods, which may help them be more successful (Baker et al., 2012).

Oriji and Amadi (2016) explained several reasons why teachers may have been apprehensive to implement technology in the classroom. The authors' study focused on teachers in Nigeria, where the authors noted, computers were not yet as ingrained in the field of education as they were in other parts of the world. Oriji and Amadi (2016) listed multiple reasons that may have affected teachers' technology usage. However, many of their reasons revolved around teachers not having a full grasp of how to operate the technology, in general (Oriji & Amadi, 2016). For example, some potential reasons included possible embarrassment, a lack of time, a lack of skills, a fear of failure—both personal and with the technology crashing, and having to do more work in general (Oriji

& Amadi, 2016). Also, some teachers felt as if they did not have enough training or support after the technology was implemented, and this may have allowed them to develop long-lasting negative feelings toward the technology (Oriji & Amadi, 2016). When teachers were not given the resources and support necessary to succeed with the new technology, it was logical some may have found it easier to revert back to their old, already established methods in the classroom (Oriji & Amadi, 2016).

Aflalo (2014) conducted a mixed-methods study on 47 science teachers in Israeli elementary schools who have included technology in their classrooms for several years. It was found the teachers in the study viewed technology in a positive manner but also did not believe it was necessary to facilitate students' meaningful learning (Aflalo, 2014). Teachers in the study expressed positive thoughts regarding incorporating technology in the classroom, but the technology they used often only included basic applications (Aflalo, 2014). Aflalo (2014) noted, "The perception that the use of computers will raise the teachers' professional prestige motivates them…while the position that the computer is not essential to their work leads them to use basic applications that do not alter their role" (p. 129). Since teachers viewed the technology was not entirely necessary for them to be effective in the classroom, they did not use it to its fullest potential (Aflalo, 2014). They were not resistant to technology, but they did not use it for its most beneficial purposes (Aflalo, 2014).

Generational Uses of Technology

According to Kamber (2017), "a digital native is someone who grew up with digital culture and never knew a time before phones had screens. Digital immigrants, in contrast, had to learn technology as adults and adjust to a world changing beneath their

feet" (p. 48). Therefore, today's generation of students has been considered digital natives, as would most individuals born after 1980 (Kivunja, 2014). Kamber (2017) noted digital immigrants and digital natives have used technology differently, as have different generations. The following will include general information about the different generations, as well as how they have utilized technology. Not all studies have been consistent with the year ranges for the different generations, but for the purposes of this literature review, Andrea et al.'s (2016) classifications will be used. Andrea et al. (2016) noted the birth years as (a) Baby Boomers, 1946 through 1960, (b) Generation X, 1960 through 1980, (c) Generation Y, or Millennials, 1980 through 1995, and (d) Generation Z, 1995 through 2010.

Baby Boomers. The Baby Boomer generation was the byproduct of the boom in the economy after World War II, which also led to a boom in births (Kane, 2017a). Members of this generation, in general, have been centered on their work and have regularly put in long hours (Kane, 2017a). Many members of this generation have valued structure in the workplace, clear goals, and working in team environments (Pappas, 2016). Overall, Baby Boomers have also appreciated competition and have been intrinsically motivated to succeed (Pappas, 2016). Also, in general, they have been resourceful, which may have been due to the fact their parents were alive during the Great Depression (Pappas, 2016). Furthermore, many members of this generation have developed a great amount of attention to detail and have been able to fully focus on a single activity before moving on to something new (Pappas, 2016). Boveda and Metz (2016) noted many Baby Boomers were still in the workforce, but some members of this

generation were at a stage in their lives when they needed to consider retiring or transitioning to different roles in the labor market.

Regarding technology usage, in general, Baby Boomers generally have not been as fast to accept and use technology the later generations (Otey, 2013). Oppawsky (2016) wrote it had been found many Baby Boomers were not as technologically literate as the generations that came after. Some members of this generation have not viewed technology as something that must always be used (Otey, 2013). Baby Boomers, in general, have been found to easily consider other solutions to problems besides technology, and they have been able to consider potential disadvantages of technology without difficulty (Otey, 2013). Technology was an option, but many Boomers have regularly used other tools at their disposal instead (Otey, 2013).

However, even if they did not grow up with the Internet and may not utilize technology as often as other generations, a 2017 survey by the Public Interest Registry (PIR) found Baby Boomers had higher levels of general knowledge about the Internet than other generations. The PIR (2017) explained the survey's respondents represented a "demographically representative U.S. sample of 1,000 adults 18 years of age and older" (p. 8). According to a PIR (2017) infographic for the survey, Baby Boomers scored higher than Millennials in terms of basic Internet knowledge. For example, 47% of Baby Boomers were able to identify a safe website, which was a higher percentage than Generation X at 46% and Millennials at 40%.

Generation X. According to Raphelson (2014), the generation that came after Baby Boomers was labeled Generation X due to the members' unknown or undefinable nature. Although the label had been used in the past, it was not fully embraced as the

name for this generation until after Douglas Coupland's 1991 novel *Generation X: Tales for an Accelerated Culture* was published (Raphelson, 2014). In general, members of Generation X have been referred to as latch-key children since they were in adolescence during a time when both of their parents were commonly in the workforce and, therefore, often unsupervised after school (Blakemore, 2015). This led to members of this generation, in general, having a sense of independence (Blakemore, 2015). Furthermore, many members of this generation have placed more value on a work/life balance than Baby Boomers (Kane, 2017b). They have attempted to have a distinction between their work time and play time, and they also appreciated flexibility in their work responsibilities (Otey, 2013).

Kamber (2017) noted members of Generation X might not have been digital natives, but many people of this generation still held a strong appreciation for technology. Members of Generation X had experiences in a world without the current amount of technology, but most were still young enough to adapt quickly (Kamber, 2017). Those who were part of Generation X typically have used technology similarly to Millennials in terms of communication, social media, and information management (Kamber, 2017). However, "to the extent that there is a tension between technology skill and subject matter expertise, we are on the side of the latter" (Kamber, 2017, p. 53). To summarize, Kamber (2017) argued this generation has held dual digital citizenship and has been effective with technology even though they are not digital natives.

According to Fishman (2016), many members of Generation X wanted their voices to be heard in the workplace regardless of their positions or ranks within the organization. This was credited to members of this generation's original approach to the

Internet. Fishman (2016) wrote the reason for this was, "Xers are into Internet thinking – a sort of blind approach. Growing up, they were the first generation to understand the anonymity of Internet chatrooms, where no one knows the age, sex, education or experience of the other person" (p. 255). Many members of this generation were able to engage anonymously on the internet, and, in general, they wanted to share their thoughts in the workplace in a productive manner (Fishman, 2016).

Millennials. According to Raphelson (2014), the Millennial generation's label came from the Neil Howe and William Strauss in their 1991 book titled *Generations*. The name was based on the fact many members of this generation would be the first to finish high school after the turn of the century, which was also the start of the new millennium (Raphelson, 2014). This generation, in general, has valued teamwork and collaboration (Oten, 2013). However, according to Otey (2013), some members of this generation have actually valued working in groups to such an extent that it has negatively impacted their abilities to be successful in their independent endeavors. Also, many members of this generation have appreciated flexibility in the workplace and have often combined the times they spent for their work lives and personal lives by using technology (Otey, 2013).

Millennials, who have also been called Generation Y, were the first generation of digital natives, and, in general, technology has come more naturally to them than past generations (Andrea et al., 2016; Otey, 2013). Millennials have been classified by Andrea et al. (2016) as being born between 1980 and 1995. Due to the timeframe in which they were born, members of this generation, in general, did not remember a time without digital technology, and this has impacted their everyday lives and decision

making (Otey, 2013). As a result, they have used technology often (Otey, 2013). As students, many members of this generation expected faculty members to communicate electronically, have online resources available, and that online multimedia tools would be utilized in the classroom (Blue & Henson, 2015).

Furthermore, Millennials, in general, have been found to be more open to using technology without questioning its implications (Otey, 2013). Otey (2013) explained, "Millennials may become anxious to employ new technologies that their Baby Boomer or Gen-X supervisors are unwilling to adopt. Because they are digital natives, Millennials will often trust and rely on new and upcoming technologies" (Otey, 2013, p. 205). Also, Otey (2013) noted other generations might have considered other alternatives or sometimes have been more hesitant when utilizing technology, but for most Millennials, using the technology was often their first choice. Furthermore, as they were the first generation born into the digital age, they generally had a high aptitude for technology in general and were quick learners (Andrea et al., 2016). Also, Otey (2013) concurred this generation typically had a strong handle on technology and used it regularly.

Generation Z. Members of the generation after Generations X and Y have been labeled by many as Generation Z (Andrea et al., 2016). However, other labels related to technology have also been used for this generation (Andrea et al., 2016). This generation has been found, in general, to have been more intrinsically motivated in the workplace and have cleared their own paths based on their own desires. Due to growing up during the Great Recession, many members of Generation Z have greatly valued a stable work environment with job security (Passy, 2017). With that said, in general, Andrea et al. (2016) wrote, they have lived more in the moment instead of thinking long term. Also, it

should be noted, since this generation was classified as being born from 1995 through 2010, only a small part of people classified as those in Generation Z have become members of the workforce (Andrea et al., 2016).

In terms of technology, members of Generation Z have been surrounded by digital devices throughout their lifetimes (Andrea et al., 2016). Andrea et al. (2016) noted this generation was, in general, almost always connected to the internet and utilized a digital device. Moreover, communicating via technology has typically come easily to this generation, and many have struggled with non-technological socialization (Andrea et al., 2016). For example, when teamwork has been necessary in the workplace, many members of this generation have preferred to work in a virtual environment (Andrea et al., 2016). Also, social media has served as the main form of socialization for many members of Generation Z instead of simply being a supplement to face-to-face communication, which has led to issues with some members of this generational cohort interacting in social settings and resolving interpersonal conflicts (Marron, 2015).

In general, individuals who have been identified in Generation Z have taken comfort in the convenience and benefits of technology and, typically, have had technology nearby to serve a variety of purposes (Andrea et al., 2016). Also, most people in this generation have regularly used the Internet to help solve their problems, and they have wanted to see more instant results than past generations (Andrea et al., 2016). Wiedmer (2015) also noted similar themes when discussing this generation. Wiedmer (2015) wrote members of Generation Z were "highly connected to having the lifelong use of communication and technology such as the World Wide Web, instant messaging, text messaging, MP3 players, mobile phones, and tablets" (p. 55). However, even though

they have, in general, regularly used technology, it should be noted members of Generation Z have been lacking in terms of assessing the reliability of data they found online (Wiedmer, 2015).

Student Centeredness

As previously noted, today's students have learned differently than past generations and have expected more in terms of technology (Neumann, 2016). Lasry, Charles, and Whittaker (2014) wrote a student-centered approach when using technology has been more effective for reaching today's students. Instead of a teacher-centered approach where the teacher lectures in the front of the classroom with all students facing forward, it has been more effective to have classrooms set up in ways that will facilitate student-centered learning (Lasry et al., 2014). Furthermore, Lasry et al. (2014) argued, "Sociotechnological classrooms facilitate student collaboration, making peer interactions substantially easier than in conventional classrooms. Additionally, they make use of technologies that facilitate peers working together on shared problems" (p. 1). Having classrooms with student-centered technology and ascetics has been found to be effective, but teachers needed to have pedagogical approaches that support this type of learning (Lasry et al., 2014).

Tucker (2014) also noted benefits of the student-centered learning model. According to Tucker (2014), "The challenge now becomes how to deliberately incorporate the integration of 21st-century learning skills and technology into classrooms strategically and broadly" (p. 167). Students have grown up with vast technological resources and are therefore able to work together and communicate in ways previous generations could not even fathom (Tucker, 2014). Thus, Tucker (2014) recommended

instructors utilize student-centered approaches to teaching. Instead of focusing on traditional learning strategies, Tucker (2014) explained, teachers needed to emphasize collaborative learning. It was beneficial for students to work together to learn new concepts and find solutions to issues (Tucker, 2014). Tucker (2014) argued students needed to develop strong 21st-century skills with collaboration and creativity since a global economy has emerged and technology was constantly changing, and the collaborative learning theory could help with this.

Tom (2015) developed the Five C Framework, which was based on student-centeredness, as well as constructivist and collaborative learning theories, to support graduate students in Australia. The five Cs included: (a) consistency, (b) collaboration, (c) cognition, (d) conception, and (e) creativity (Tom, 2015). In terms of the first aspect of the framework, which was consistency, Tom (2015) referred to instructors' basic practices. Next, collaboration referred to students working together to solve problems and construct knowledge (Tom, 2015). Cognition meant facilitating students' development of higher-order thinking (Tom, 2015). Conception, according to Tom (2015), referred to helping students "understand concepts through elaboration, assimilation, and examples" (p. 25). Finally, creativity meant assisting students in applying their knowledge to develop creative solutions to issues (Tom, 2015. Tom (2015) wrote, "Use of this framework transforms the learning to an enriching and enjoyable experience, developing a deeper understanding with improved cognitive skills, and development of soft skills such as teamwork, communication, and oral presentation" (p. 34). The Five Cs Framework has provided instructors a teaching model which has

been found to help students to have stronger skills and be successful in their courses (Tom, 2015).

Conclusion

One-to-one initiatives have continued to grow in popularity in school districts across the country (Bebell & Kay, 2010; Downes & Bishop, 2015; Richardson et al., 2013), and there have been multiple potential benefits and detriments related to these programs to consider (Annan-Coultas, 2012; Carver, 2016; Kay & Lauricella, 2014; Storz & Hoffman, 2013). Technology has been found to benefit students' learning, but this success has not been guaranteed (Walker Beesona et al., 2014). Multiple factors, including the teachers' skill set and self-efficacy, have come into play (Bandura, 1994).

Chapter Two covered literature related to 1:1 technology and teacher self-efficacy. More specifically, areas such as self-efficacy and self-improvement, the ISTE standards, and the benefits and detriments of classroom technology were discussed. Also, the concept of BYOD, as well as teacher apprehensions to technology were noted. Finally, the last topics covered included generational approaches to technology and student-centered approaches to teaching. All of these areas related to the study's three research questions, which focused on teachers' technological self-efficacy in relation to the five teacher technology standards developed by the ISTE in 2008, the different generations' self-efficacy ratings, and teachers' perceptions of the most beneficial professional development opportunities in relation to incorporating classroom technology. In Chapter Three, the researcher will share the mixed-methods design used with the intention of answering these three questions.

Chapter Three: Research Design and Methodology

According to Bandura (1994), a person's level of self-efficacy directly related to his or her likelihood of success. Possessing the necessary skills and abilities to perform a function was shown to be important, but these variables were not enough if the person had a low level of self-efficacy (Bandura, 1994). When applying this concept to education, it was found teachers with low self-efficacy scores were more likely to experience higher stress levels and workplace burnout (Yu et al., 2015). Also, it was found when teachers held higher degrees of self-efficacy, students have typically performed better in the classroom (Huber, Fruth, Avila-John, & Lopez-Ramirez, 2016). Since Gentry et al. (2014) noted the utilization of technology has become critical in the transformation of 21st-century learning, these authors developed the Educator Technology Self-Efficacy Survey (ETS-ES) specifically to determine teachers' self-efficacy scores in relation to the five National Educational Technology Standards for Teachers developed in 2008 by the ISTE. According to Gentry et al. (2014), teachers' levels of technological self-efficacy have been critical in terms of being effective in the 21st-century classroom environment. If teachers possessed low technological self-efficacy, based on Bandura's (1994) writing, they would have been less likely perform at a high level with technology in the classroom.

In this study, the researcher attempted to identify the technological self-efficacy levels for the five ISTE (2008) standards, as well as the mean scores, for teachers at three Midwestern school districts that implemented 1:1 technology initiatives. The researcher also sought to determine what relationship teachers' identified generations had with technological self-efficacy ratings. Finally, the researcher aimed to determine teachers'

views on using professional development opportunities to enhance their abilities with incorporating technology in the classroom. The researcher attempted to identify what teachers viewed as their most beneficial professional development opportunities in the past related to technology, as well as what they wanted to see more of in the future. By identifying all of the above information, school district leaders could have potentially known which of the five standards they needed to focus on and what professional development opportunities to consider.

This chapter will outline the research methodology and design utilized to identify and explore the impact of the above information. The first areas to be discussed will include the research problem, purpose of the study, and research questions. In addition, the research design, participants, and instrumentation used for the study will be explained. Finally, a description will be provided of the process used to analyze the collected data.

Problem and Purpose

Not all teachers have been able or willing to recognize the potential benefits of using technology in the classroom (Baker et al., 2012; Oriji & Amadi, 2016). Some teachers may have been resistant to the change in teaching styles or even taken on a saboteur approach and attempted to actively hinder classroom teaching innovations (Oriji & Amadi, 2016). Similarly, some teachers may have been of the belief teaching can be just as effective without technology, but it has been found this is not the case when considering the skill set students needed to be successful in the 21st century (Gentry et al., 2014). Based on Bandura's (1993) work, this could all have potentially been attributed to the teachers' technological self-efficacy levels. Furthermore, a low self-

efficacy rating has been found to correlate with teachers experiencing workplace burnout and stress (Yu et al., 2015). Low self-efficacy scores could have come from multiple sources, but a common solution for many of the issues would be to provide faculty members with additional support and professional development opportunities (Oriji & Amadi, 2016). Based on this information, it would be logical to conclude there was a need to identify teachers' technological self-efficacy and ascertain specific areas that could be improved.

As a result of the aforementioned issues, the purpose of this study was to identify the technological self-efficacy levels for the five ISTE (2008) standards for teachers at three Midwestern school districts with 1:1 technology initiatives. In addition, another purpose was to determine what relationship the teachers' identified generations had with their self-efficacy ratings. The researcher included this purpose because it has been found different generations have different workplace habits with technology (Andrea et al., 2016; Kamber, 2017; Otey, 2013). Based on this information, the researcher aimed to provide additional insight on the generational impact of teachers' technological self-efficacy ratings. Finally, the researcher in this study also sought to identify what teachers in schools with 1:1 technology viewed as the most beneficial professional development opportunities related to incorporating technology in the classroom. Teachers were asked what they viewed as their most beneficial past professional development opportunities, as well as what type of professional development they wanted to have offered in the future. The researcher aimed to collect this data related to professional development so school district administrators could then use this information as a starting point when addressing their areas for improvement.

Research Questions

The researcher developed the following research questions to guide this study.

1. What are the perceived levels of technological self-efficacy possessed by teachers in schools with 1:1 technology in relation to the five separate ISTE (2008) teacher standards, which included:

a. Enabling students' learning and creativity

b. Employing appropriate digital age learning and assessment opportunities

c. Exhibiting proper digital age behaviors when working and learning

d. Promoting and exhibiting how students should be responsible digital citizens

e. Taking part in growth and leadership opportunities (ITSE, 2008)?

2. What relationships exist between teachers' perceived technological self-efficacy ratings and their identification of generation?

3. What do educators in schools with 1:1 technology describe as the most beneficial professional development opportunities to enhance their ability to incorporate technology in the classroom?

Research Design

This study utilized a mixed-methods approach. Thus, both qualitative and quantitative data were collected (Fraenkel et al., 2015). The study focused on teachers at three Midwestern school districts which will be described in the next section. Using a mixed-methods approach has been found to be advantageous because "researchers are better able to gather and analyze more and different kinds of data than they would by

using just one approach" (Fraenkel et al., 2015, p. 11). Therefore, this approach was taken for the purposes of this study.

Quantitative research. Quantitative research focuses on statistics and relies on empirical data (Fraenkel et al., 2015). The quantitative data for this study was collected via an electronic survey (see Appendix A). The first section of questions in the survey instrument asked demographic questions. These questions included the following: (a) years of experience, (b) identified generation, (c) gender, (d) level of education, (e) grade level taught, (f) content area taught, and (g) technological device used. Also, participants were asked a yes/no question regarding if they were satisfied with their 1:1 technology. After that, the next set of questions was derived from the ETS-ES developed by Gentry et al. (2014). These questions were used to determine the teachers' technological self-efficacy for the five teacher technology standards developed in 2008 by the ISTE.

Qualitative research. Qualitative research focuses on finding meaning for the data (Maxwell, 2013). Instead of strictly analyzing numbers, the qualitative researcher examines themes from the participants' responses (Fraenkel et al., 2015). This type of research was conducted by including two open-ended questions at the end of the survey. The two questions asked included: 1) What past professional development opportunities have helped you most in terms of incorporating technology in the classroom? and 2) What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future? The purpose of these questions was to ascertain how teachers described what they considered to be the most beneficial professional development opportunities to enhance their ability to incorporate technology into the classroom effectively.

Population and Sample

Three school districts were selected because they were all located in the same Midwestern region, within 100 miles of each other, and they all used 1:1 technology across multiple grade levels. They were also selected because they were a convenience sample since the researcher was within close proximity to the school districts. A convenience sample has been defined as one in which the sample was convenient to access and willing to take part in the research (Fraenkel et al., 2015). Between the three school districts, a total of approximately 603 teachers were invited to participate in the study (see Table 1). This number was based on the 2017 "District Faculty Information" document on the Missouri Department of Elementary and Secondary Education's website (MoDESE, 2017c). The MoDESE (2017c) document listed the number of full-time equivalent (FTE) teachers for each district, which led to there being some decimals for the number of teachers in each district since some teachers were not in the classroom 100% of the day. For example, School District A had 300.59 FTE teachers according to the document, School District B had 132.45 FTE teachers, and School District C had 168.31 FTE teachers (MoDESE, 2017c). Each school district's number of teachers was rounded up to the nearest whole number, which led to a total of 603 potential respondents for the study. For the purposes of Lindenwood University Institutional Review Board (IRB) approval, the researcher set the minimum number of respondents at 60, but a higher number of respondents was anticipated.

District Information

School District A. According to 2017 reports from MoDESE, the school district's total PK-12 projected 2017 enrollment was 4,070, and there were 300.59 FTE

teachers and 20.39 administrators (MoDESE, 2017b; MoDESE, 2017c). The U.S. Census Bureau data for 2010, which was the most recent Census, listed the population for the district's community at around 14,000. Also, 30.5% of the school district's kindergarten through 12th-grade students had free and reduced lunch prices, and 94.65% of the students enrolled were white (MoDESE, 2017a). According to an administrator from the school district, the school district had 1:1 technology in third through 12th-grade. Students in grades fifth through 12 used Chromebook laptops they were allowed to take home, while students in third and fourth grades used Windows laptops that were required to remain at the school. Students in grades kindergarten through second used Windows laptop carts teachers could check out as needed for their classrooms and allow for these classes to have a 1:1 ratio with the technology. If all of the kindergarten through second-grade classes needed to use carts at the same time, the ratio was not 1:1, but it still was 1:1 when teachers checked out the carts for their individual classes as necessary. The school district's 1:1 technology initiative was first implemented during the fall of 2015.

School District B. Per the 2017 MoDESE reports, School District B had an enrollment of 1,837 for the 2017 school year, and there were a total of 132.45 FTE teachers and 7.5 administrators (MoDESE, 2017b; MoDESE, 2017c). The U.S. Census Bureau data for 2010, which was the most recent Census, listed the population for this school district's community at about 4,200. A total of 59.4% of the school district's kindergarten through 12th-grade students had free and reduced lunch prices, and 93.02% of the student population was white (MoDESE, 2017a). According to a school district administrator, the school district had 1:1 technology in grades two through 12. Grades

three through 12 used MacBook Air laptops, and at the second-grade level, there was one tablet available per student, which still fell under the auspices of being 1:1 technology. The lower grades also used tablets, but their ratio was 2:1. The school district started its 1:1 initiative in the fall of 2013, with more grades expected to obtain the devices each year.

School District C. The enrollment for School District C for 2017 was 2,286, and there were 168.31 FTE teachers and 14 administrators (MoDESE, 2017b; MoDESE, 2017c). U.S. Census Bureau data for 2010, which was the most recent Census data available, listed the population for this school district's community at almost 4,700. A total of 54.2% of kindergarten through 12th-grade students had free and reduced lunch prices, and 95.27% of the student body was white (MoDESE, 2017a). According to a school district administrator, the school district used 1:1 technology across all grade levels. All grades used Chromebooks, but this was not originally the case. Initially, the school district purchased Nexus tablets for kindergarten through first grade for the first year of the initiative, but due to some issues with the device's functionality, these devices were replaced with Chromebooks. This school district's initiative started in January of 2014.

Table 1

Demographic Information for School Districts A, B, and C

	School District A	School District B	School District C
PK-12 Enrollment	4,070	1,837	2,286
FTE Teachers	300.59	132.45	168.31
FTE Administrators	20.39	7.5	14
2010 Population	14,000	4,200	4,700
Free/Reduced Lunches	30.5%	59.4%	54.2%
Student Ethnicity	94.65% White	93.02% White	95.27% White

Note. This information was adapted from data provided by MoDESE, 2017a; MoDESE, 2017b; MoDESE, 2017c; and U.S. Census Bureau, 2017.

Instrumentation

The Educator Technology Self-Efficacy Survey (ETS-ES) developed by Gentry et al. (2014) was used for this study (see Appendix A). As an addition to the survey, the researcher added demographic questions asking respondents about their: (a) years of experience, (b) identified generation, (c) gender, (d) level of education, (e) grade level taught, (f) content area taught, and (g) technological device used. Participants were also asked directly if they were satisfied with their 1:1 technology. This was a yes/no question. Furthermore, years of experience were listed in five-year spans. Identified generations included Baby Boomer (1946 to 1960), Generation X (1960 to 1980), Millennial (1980 to 1995), and Generation Z (1995 to 2010). The gender options included male or female, and level of education options were bachelor's degree, master's

degree, specialist degree, or doctoral degree. The options for grade level taught were pre-kindergarten through fourth grade, fifth through eighth grade, and ninth through 12th grade. Content area taught included core (English, math, science, and history), non-core (electives and specials), and other (coach, therapist, counselor, etc.). Finally, technological devices used included Mac laptop, Windows laptop, Chromebook, tablet, other, or none.

The ETS-ES created by Gentry et al. (2014) had a total of 50 Likert scale questions and was based on the International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers developed in 2008. A total of 10 questions were dedicated to each of the five standards. Of the 50 total questions, 25 were positive items (PIs), and the other 25 were negative items (NIs) (Gentry et al., 2014) (see Table 2). The 25 PIs were scored from a range of 1 to 5, with a score of 1 being Strongly Disagree and a score of 5 being Strongly Agree (Gentry et al., 2014). The opposite was true for the 25 NIs (Gentry et al., 2014). For these items, a Strongly Disagree was scored at 5, and a Strongly Agree was scored at 1 (Gentry et al., 2014). To elaborate, based on this scoring method, the minimum score for each of the five separate standards was 10, and the maximum score per standard was 50 (Gentry et al., 2014). The minimum score overall was 50, and the maximum possible score was 250 (Gentry et al., 2014). According to Gentry et al. (2014), higher scores on the survey were associated with higher levels of technological self-efficacy, but no specific benchmarks for the scores were provided. The five standards used to develop this survey included: (a) enabling students' learning and creativity, (b) employing appropriate digital age learning and assessment opportunities, (c) exhibiting proper digital age behaviors when working

and learning, (d) promoting and exhibiting how students should be responsible digital citizens, and (e) taking part in growth and leadership opportunities (ITSE, 2008).

It should be noted, this survey had a Cronbach's alpha of .958, which demonstrated its level of internal consistency was significant (Gentry et al., 2014). Furthermore, permission was granted by Gentry via e-mail for the researcher to utilize this survey (see Appendix B). In addition to utilizing the ETS-ES and demographic questions, the researcher also added two open-ended questions to allow respondents to identify what they would consider the most beneficial professional development opportunities for incorporating technology in the classroom. They were specifically asked what professional development had been most beneficial in the past and what types of professional development opportunities they would like to see in the future. There was no character limit for the respondents' answers to these questions, and respondents were able to type their answers directly into the browser. The two prompts included: 1) What past professional development opportunities have helped you most in terms of incorporating technology in the classroom? and 2) What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future?

Data Collection

The Google Forms online survey tool was used to administer the survey. The researcher developed the survey using the aforementioned demographic questions, the 50 ETS-ES questions, and the two open-ended questions. An e-mail requesting permission to allow teachers to take part in the study was sent to the superintendents of the school districts included in the study the summer before the researcher anticipated the study

taking place, and all three superintendents granted permission (see Appendix C; see Appendix D). After that, the researcher contacted school district administrators to acquire the most up-to-date information regarding each district's 1:1 technology initiatives.

The school district superintendents were asked to assist the researcher in distributing the researcher's correspondence to the teachers. An e-mail was sent to teachers in each of the three school districts explaining the purpose of the research and asking them to participate in the study (see Appendix E). A link to the survey was also provided. Different links were used to collect data for each of the participating school districts to initially keep the results separate. The school districts' teachers at all levels—even those without 1:1 technology—were invited to participate. This was the case because only a few grade levels did not have 1:1 technology in each of the school districts, but those teachers still had access to the devices for their classes as needed, and they were still part of the school districts in which students would later have the 1:1 ratio. Also, participants were given two weeks to respond to the survey. One week after the survey link was sent, the researcher sent another e-mail reminding teachers of the deadline and requesting their participation if they had not yet completed the survey (see Appendix F).

Ethical Considerations

Since the study involved human subjects, no data was collected or analyzed until IRB approval was granted for this study. The Lindenwood University IRB guidelines were strictly followed throughout the entire study. Also, the researcher completed the National Institutes of Health Protecting Human Research Participants training as was

required by the university (see Appendix G). Furthermore, all respondents were kept anonymous and did not have to provide their names for this study. Participation was voluntary, and there was no potential for harm to the respondents. The first page of the electronic survey contained the Lindenwood IRB informed consent information sheet (see Appendix H). It was explained on this page respondents gave their implied consent by clicking the button to continue and then completing the survey. Once the survey's two-week window closed, all response data was printed and secured in a locked cabinet where it was to be stored for three years before being destroyed.

Another ethical issue to be considered was the researcher's potential biases. The researcher taught middle school for one year in a school district that did not have 1:1 technology but did have laptop carts when necessary. After teaching middle school, the researcher went on to teach at the college level and served on his institution's Technology Committee. Also, potential biases existed since the researcher lived within close proximity to the three school districts studied. As was previously noted, though, this was because the school districts were part of a convenience sample. Due to these potential biases, the researcher standardized the data collection for study as was recommended by Fraenkel et al. (2015). All school districts were sent the same basic correspondence. Moreover, all quantitative and qualitative data were collected and analyzed using the specific procedures explained in this chapter.

Data Analysis

This research project was a mixed-methods study, which meant both quantitative and qualitative data were obtained. The quantitative data were obtained from both the 50-question ETS-ES instrument using a Likert scale ranging from Strongly Disagree to

Strongly Agree and the demographic questions. As previously noted, 25 of the ETS-ES questions were PIs with scores ranging from 1 for Strongly Disagree to 5 for Strongly Agree (see Table 2). The scoring scale was reversed for the NI questions (see Table 2). The qualitative data included the open-ended questions at the end of the survey. In order to analyze the quantitative data, the results were exported from Google Forms into three separate Microsoft Excel spreadsheets or one sheet per school district.

Quantitative Analysis

The quantitative data were first analyzed based on the five separate ISTE (2008) teacher technology standards for each school district separately, and then a mean total score for each school district was determined. Then, the three schools' scores were combined to analyze the composite scores for the five standards, as well as the mean total score. This all fell under the realm of the first research question, which was posed to identify the perceived levels of technological self-efficacy possessed by teachers in schools with 1:1 technology in relation to the five separate ISTE (2008) teacher standards. After that, the scores were analyzed to determine what relationships, if any, existed between the technological self-efficacy scores and the respondents' identified generations, which was the focus of the second research question. Also, all of the scores were then analyzed in relation to the other demographic questions to see if any trends emerged.

To further elaborate on the quantitative data scoring and analysis process, in Microsoft Excel, the researcher first selected and highlighted all of the PI questions and response rows for School District A so they were the only cells that could be edited. Then, the researcher used the find and replace option in Microsoft Excel. All highlighted

responses that were Strongly Disagree were replaced with a score of 1. Then, all Disagree responses were replaced with a score of 2. After that, all Neutral responses were replaced with 3, all Agree responses were replaced with 4, and the Strongly Agree responses were replaced with 5. This same process was repeated for School Districts B and C.

The researcher's next step was to set up the scoring for the NI questions. The opposite scoring was utilized for these questions. The researcher only selected and highlighted the NI question and response rows for School District A and once again used the find and replace feature. From there, all Strongly Disagree responses were scored at 5, all Disagrees were 4, all Neutrals were 3, Agrees were 2, and Strongly Agrees were 1. This same process was again repeated for the other two school districts. As previously noted, based on this scoring, the minimum total scores for all five categories per respondent was 50, and the maximum was 250.

Table 2

ETS-ES Positive Item and Negative Item Questions

ISTE Standard	PI Question Numbers	NI Question Numbers
1	1, 2, 3, 7, 10	4, 5, 6, 8, 9
2	12, 13, 15, 18, 19	11, 14, 16, 17, 20
3	21, 22, 25, 27, 29	23, 24, 26, 28, 30
4	33, 36, 37, 38, 40	31, 32, 34, 35, 39
5	41, 42, 46, 49, 50	43, 44, 45, 47, 48

Note. This information was adapted from Gentry et al.'s (2014) article focusing on the development of the ETS-ES instrument.

Once the scoring was set up, the researcher then used the Microsoft Excel feature to find the means for each of the five standards for the three schools individually. In order to accomplish this, the researcher first added an extra row between each of the five standards' questions in each Microsoft Excel spreadsheet and used this row as a location to total the individual respondents' scores for each category. Then, the researcher highlighted the total rows for each standard individually and used the Microsoft Excel function to find their means. After that, focusing on one school district at a time, the researcher selected all five mean scores and used the Microsoft Excel functions to add the scores together and then find each school district's overall mean score.

Once the school districts' individual scores were determined, the researcher then combined the numbers for the three school districts into composite scores. To accomplish this, the researcher moved all of the responses into a single spreadsheet. The combined scores for each standard were then examined, as well the overall mean. In order to examine relationships between the respondents' identified generations and their scores, the researcher used Microsoft Excel's filter option to view scores from each generation separately. This same feature was applied to analyze the scores in relation to the other demographic data collected.

Qualitative Analysis

The study's third research question asked: "What do educators in schools with 1:1 technology describe as the most beneficial professional development opportunities to enhance their ability to incorporate technology in the classroom?" To answer this question, teachers were asked two open-ended questions at the end of the survey. These questions included 1) What past professional development opportunities have helped you

most in terms of incorporating technology in the classroom? and 2) What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future? Fraenkel et al. (2015) noted qualitative research should be processed by "analyzing, synthesizing, and reducing the information the researcher obtains…into a coherent description" (p. 429). The researcher attempted to follow this guidance in the study and employed a thematic analysis of the data.

For the purposes of this study, the researcher used Braun and Clarke's (2006) six steps for thematic analysis. The steps identified by Braun and Clarke (2006) included:

1. The researcher became familiar with the qualitative data. This step involved actively reading the data several times to search for meaning.

2. The researcher developed a list of codes from the data.

3. The researcher sorted the codes and organized them into potential themes.

4. The researcher then reviewed the themes in relation to the entire data set. According to Braun and Clarke (2006), this step was important as it allowed the researcher to make sure the themes identified fit well with the data set.

5. The researcher clearly defined and further refined the themes. Part of this process involved identifying if any potential sub-themes existed.

6. The researcher produced the report of the themes based on the data analysis completed in the proceeding steps.

Summary

The world has changed, and students have needed to further develop 21st-century skills including creativity, collaboration, and critical thinking to keep up in the global economy (Henriksen et al., 2016; Gentry et al., 2014). As a result, teachers have needed

to possess high levels of technological self-efficacy to be as effective as possible when helping students develop 21st-century skills (Gentry et al., 2014). However, not all teachers have fully embraced technology or acknowledged its potential benefits (Gentry et al., 2014; Baker et al., 2012; Oriji & Amadi, 2016). Also, when people experienced low self-efficacy, they have been less likely to find success in their endeavors (Bandura, 1994). Furthermore, workplace burnout and stress levels have been found to relate to teachers' self-efficacy scores (Yu et al., 2015). Regardless of the reasons teachers may have low technological self-efficacy or decide not to fully embrace technology, further faculty support or professional development has been a common solution (Oriji & Amadi, 2016). Assessing the technological self-efficacy of teachers in 1:1 technology school districts in relation to ISTE's (2008) teacher technology standards had clear potential benefits, with the primary benefit being school leaders could better determine how to approach future faculty support and professional development. Also, it was beneficial to determine if different generations have different levels of technological self-efficacy. Finally, directly asking teachers what professional development opportunities related to incorporating technology in the classroom they found most beneficial was of merit since it could potentially allow administrators to have a strong starting-point when planning for future professional development opportunities.

This chapter outlined the research methodology and mixed-methods design utilized to identify this information. The researcher further discussed the research problem, purpose of the study, and research questions. The research design, participants, and instrumentation used for the study were described as well. Finally, the researcher

explained the methods used for data collection and analysis. Chapter Four of this study will include the analysis of the data collected.

Chapter Four: Results

This chapter will include an analysis of the data collected based on the research questions and research methodology described in Chapter Three. The purpose of this study was to identify the technological self-efficacy ratings of teachers in school districts with 1:1 technology in relation to the five teacher technology standards developed in 2008 by the International Society for Technology in Education. These five standards included: (a) enabling students' learning and creativity, (b) employing appropriate digital age learning and assessment opportunities, (c) exhibiting proper digital age behaviors when working and learning, (d) promoting and exhibiting how students should be responsible digital citizens, and (e) taking part in growth and leadership opportunities (ITSE, 2008). Also, the researcher sought to identify what relationships existed between teachers' perceived technological self-efficacy ratings and their identifications of generation. Furthermore, the researcher aimed to determine what educators in school districts with 1:1 technology described as the most beneficial professional development opportunities to enhance their abilities to incorporate technology in the classroom. In order to accomplish this, the researcher utilized the ETS-ES instrument developed by Gentry et al. (2014) to explore the perceptions of teachers in the participating school districts. Also, the researcher imported the ETS-ES into the Google Forms online survey tool, so it could be widely distributed to the study's participants. To go along with the ETS-ES questions, the researcher also added demographic questions and two open-ended questions. In this chapter, the researcher first will cover the demographic data of the three participating school districts. After that, the researcher will review the study's three research questions and then present and analyze the survey results.

Background

The researcher invited teachers from three school districts to participate in this study, and superintendents from all three school districts granted the researcher permission (see Appendix D). Approximately 603 teachers from the participating school districts were invited, and 30.18% (n=182) chose to respond to the survey. First, the researcher examined each school district's results separately and then analyzed the composite data for all three school districts combined. When focusing on the individual school districts, the researcher began the analysis by examining the demographic data provided by the survey respondents. The demographic data of the participants collected included: (a) years of experience, (b) identified generation, (c) gender, (d) level of education, (e) grade level taught, (f) content area taught, and (g) technological device used. Moreover, the survey asked participants a yes or no question regarding if they were satisfied with the 1:1 technology devices implemented in their schools. The researcher imported this data, as well as the rest of the survey responses, from Google Forms into Microsoft Excel in order to complete the analysis. The researcher used Microsoft Excel's statistical functions to analyze the quantitative data and then analyzed the qualitative data collected based on Braun and Clark's (2006) approach to thematic analysis.

Demographic Data

School District A. A total of 86 of the respondents for this study were faculty members of School District A, which represented approximately 29% of the school district's teachers and 47% of the total respondents from the three school districts combined. Only 18.6% (n=16) of School District A's respondents were male, and the other 81.4% (n=70) respondents were female. Moreover, 81.4% (n=70) of the

respondents were satisfied with their digital devices, while 18.6% (*n*=16) indicated they were dissatisfied. In terms of years of experience, 27.91% (*n*=24) of the respondents had worked in education for 11 to 15 years. After that, listed in descending order, a total of 23.26% (*n*=20) of the teachers had over 20 years of experience, 19.77% (*n*= 17) had six to 10 years, 18.6% (*n*=16) had 16 to 20 years, and 10.47% (*n*=9) had one to five years. See Table 3 for an illustration of this data.

Table 3

School District A: Participants' Years of Experience

	1-5 Yrs.	6-10 Yrs.	11-15 Yrs.	16-20 Yrs.	More than 20 Yrs.	Total
N	9	17	24	16	20	86

Note. Data provided by survey.

Regarding the generational identities of School District A's respondents, Generation X made up 51.16% (*n*=44) of the responses. After that, 43.02% (*n*=37) of the respondents were Millennials. Furthermore, 5.81% (*n*=5) of the respondents were Baby Boomers. Finally, zero of School District A's respondents indicated they were part of Generation Z. See Table 4 for an illustration of this data.

Table 4

School District A: Participants' Generational Identities

	Baby Boomer	Generation X	Millennial	Generation Z	Total
N	5	44	37	0	86

Note. Data provided by survey.

As for levels of education, the majority of the respondents had master's degrees. Of the 86 respondents, 73.26% (*n*=63) indicated they had this degree. The next most common response was the bachelor's degree option, which made up 15.12% (*n*=13) of the respondents. Furthermore, 10.47% (*n*=9) of School District A's respondents selected the specialist degree option, while one respondent, or 1.16%, possessed a doctoral degree. See Table 5 for an illustration of this data.

Table 5

School District A: Participants' Levels of Education

	Bachelor's	Master's	Specialist	Doctorate	Total
N	13	63	9	1	86

Note. Data provided by survey.

In terms of technological devices used in the classroom, 47.67% (*n*=41) of the school district's respondents selected the Chromebook option. Next, Windows laptops came in second with 29.07% (*n*=25) of the responses. After that, 19.77% (*n*=17) of the

respondents chose the "Other" option. Also, 3.49% (*n*=3) of the respondents reported using Mac laptops. See Table 6 for an illustration of this data.

Table 6

School District A: Participants' Digital Devices Used

	Mac laptop	Windows laptop	Chromebook	Tablet	Other	None	Total
N	3	25	41	0	17	0	86

Note. Data provided by survey.

The high school grade level had the most representation for School District A. A total of 41.86% (*n*=36) of the respondents taught at this level. Next, 36.05% (*n*=31) of the respondents were elementary school teachers. Finally, the middle school level had the fewest respondents with only 22.09% (*n*=19). See Table 7 for an illustration of this data.

Table 7

School District A: Participants' Grade Levels Taught

	Elementary	Middle School	High School	Total
N	31	19	36	86

Note. Data provided by survey.

Finally, for the last set of demographic data for School District A, most of the respondents taught core subjects, which included English, math, science, and history. A

total of 55.81% (*n*=48) of the school district's 86 respondents fit in this category. After that, the second most common response was non-core with 26.74% (*n*=23) of the responses. The non-core option included specials and electives. Last, 17.44% (*n*=15) of the respondents selected the "Other" option for their content areas taught. This option was for educators who indicated they were coaches, therapists, or counselors. See Table 8 for an illustration of this data.

Table 8

School District A: Participants' Content Areas Taught

	Core	Non-core	Other	Total
N	48	23	15	86

Note. Data provided by survey.

School District B. A total of 52 of the respondents for this study were faculty members of School District B. This represented approximately 39% of the school district's teachers and 29% of the total respondents from the three school districts combined. Of the 52 respondents in School District B, 73.08% (*n*=38) were female, and 26.92% (*n*=14) were male. Also, only 9.62% (*n*=5) of the respondents were dissatisfied with their primary digital device. Furthermore, in terms of the teachers' experiences, 28.85% (*n*=15) of the teachers had 11 to 15 years of experience. After that, listed in descending order, a total of 25% (*n*=13) of the teachers had six to 10 years of experience, 23.08% (*n*=12) had one to five years, 13.46% (*n*=7) had over 20 years, and 9.62% (*n*=5) had 16 to 20 years. See Table 9 for an illustration of this data.

Table 9

School District B: Participants' Years of Experience

	1-5 Yrs.	6-10 Yrs.	11-15 Yrs.	16-20 Yrs.	More than 20 Yrs.	Total
N	12	13	15	5	7	52

Note. Data provided by survey.

As for the generational identities of the School District B's respondents, 50% (*n*=26) of the teachers identified as Millennials. Then, Generation X made up 38.46% (*n*=20) of the respondents. After that, 9.62% (*n*=5) of the respondents identified as Baby Boomers. Finally, 1.92% (*n*=1) of the respondents for School District B identified as a member of Generation Z. See Table 10 for an illustration of this data.

Table 10

School District B: Participants' Generational Identities

	Baby Boomer	Generation X	Millennial	Generation Z	Total
N	5	20	26	1	52

Note. Data provided by survey.

Regarding levels of education, there was an even split among respondents with bachelor's degrees and respondents with master's degrees in School District B. Of the 52 total respondents, 46.15% (*n*=24) had bachelor's degrees, and another 46.15% (*n*=24) had

master's degrees. A total of 7.69% (*n*=4) had specialist degrees. Finally, zero respondents had doctorates. See Table 11 for an illustration of this data.

Table 11

School District B: Participants' Levels of Education

	Bachelor's	Master's	Specialist	Doctorate	Total
N	24	24	4	0	52

Note. Data provided by survey.

Respondents in School District B primarily used Mac laptops. Of the 52 respondents, 84.62% (*n*=44) utilized this device. Only 7.69% (*n*=4) of the respondents used a tablet, and 5.77% (*n*=3) of the respondents used another non-identified device. Also, 1.92% of the respondents (*n*=1) reported not using any digital device. See Table 12 for an illustration of this data.

Table 12

School District B: Participants' Digital Devices Used

	Mac laptop	Windows laptop	Chromebook	Tablet	Other	None	Total
N	44	0	0	4	3	1	52

Note. Data provided by survey.

School District B's respondents primarily came from the high school level. A total of 40.38% (*n*=21) of the school district's 52 respondents taught at this level. Next,

the elementary level had a total of 36.54% (*n*=19) of the responses. Finally, the middle school had significantly less representation with only 23.08% (*n*=12). See Table 13 for an illustration of this data.

Table 13

School District B: Participants' Grade Levels Taught

	Elementary	Middle School	High School	Total
N	19	12	21	52

Note. Data provided by survey.

Finally, for the last set of demographic data for School District B, the majority of the respondents taught core subjects. In total, 65.38% (*n*=34) of the respondents taught in this area. After that, 26.92% (*n*=14) of the respondents selected the "Non-core" option. Furthermore, 7.69% (*n*=4) of the respondents identified as "Other." See Table 14 for an illustration of this data.

Table 14

School District B: Participants' Content Areas Taught

	Core	Non-core	Other	Total
N	34	14	4	52

Note. Data provided by survey.

School District C. A total of 44 of the respondents for this study were faculty members of School District C. This represented approximately 26% of the school

district's teachers and 24% of the total respondents from the three school districts combined. Of the 44 respondents in School District C, 79.55% (*n*=35) were female, and 20.45% (*n*=9) were male. Also, 18.18% (*n*=8) of the respondents in the survey indicated they were not satisfied with their digital device. Regarding the teachers' experience, 29.55% (*n*=13) of the teachers had one to five years of experience. After that, listed in descending order, 25% (*n*=11) had 11 to 15 years of experience, 18.18% (*n*=8) had over 20 years, 15.91% (*n*=7) had six to 10 years, and 11.36% (*n*=5) had 16 to 20 years. See Table 15 for an illustration of this data.

Table 15

School District C: Participants' Years of Experience

	1-5 Yrs.	6-10 Yrs.	11-15 Yrs.	16-20 Yrs.	More than 20 Yrs.	Total
N	13	7	11	5	8	44

Note. Data provided by survey.

In terms of School District C's generational identities, more respondents were Generation X than any other generation. A total of 45.45% (*n*=20) of the 44 respondents selected this category, while 43.18% (*n*=19) identified as Millennials. Next, 6.82% (*n*=3) of the respondents chose the Baby Boomer option. Finally, the Generation Z option had the lowest response rate with only 4.55% (*n*=2). See Table 16 for an illustration of this data.

Table 16

School District C: Participants' Generational Identities

	Baby Boomer	Generation X	Millennial	Generation Z	Total
N	3	20	19	2	44

Note. Data provided by survey.

Regarding School District C's levels of education, over half of the respondents had master's degrees. In total, 56.82% (*n*=25) of the participating teachers had this degree. Next, 34.09% (*n*=15) of the respondents possessed bachelor's degrees. Finally, 6.82% (*n*=3) of the respondents had specialist degrees, and 2.27% (*n*=1) had a doctorate. See Table 17 for an illustration of this data.

Table 17

School District C: Participants' Levels of Education

	Bachelor's	Master's	Specialist	Doctorate	Total
N	15	25	3	1	44

Note. Data provided by survey.

In terms of the digital devices utilized in School District B, most of the respondents used Chromebooks. A total of 70.45% (*n*=31) of the respondents used this device. Next, 15.91% (*n*=7) of the respondents used another non-identified device. After

that, 9.09% (*n*=4) used Windows laptops, 2.27% (*n*=1) used a tablet, and 2.27% (*n*=1) reported not using a digital device. See Table 18 for an illustration of this data.

Table 18

School District C: Participants' Digital Devices Used

	Mac laptop	Windows laptop	Chromebook	Tablet	Other	None	Total
N	0	4	31	1	7	1	44

Note. Data provided by survey.

As for grade levels taught, more of the respondents taught at the high school level than any other category. A total of 38.64% (*n*=17) of the participating teachers selected this option. Next, the middle school level was represented with 34.09% (*n*=15) of the respondents. Finally, 27.27% (*n*=12) of the teachers indicated they taught at the elementary school level. See Table 19 for an illustration of this data.

Table 19

School District C: Participants' Grade Levels Taught

	Elementary	Middle School	High School	Total
N	12	15	17	44

Note. Data provided by survey.

Finally, for the last set of demographic data for School District C, the majority of the participating teachers taught core subjects. The school district had 44 total

respondents, and 65.91% (*n*=29) indicated they taught core subjects. Next, another 25% (*n*=11) of the respondents selected the "Non-core" option. Moreover, 9.09% (*n*=4) of the teachers identified with the "Other" option. See Table 20 for an illustration of this data.

Table 20

School District C: Participants' Content Areas Taught

	Core	Non-core	Other	Total
N	29	11	4	44

Note. Data provided by survey.

School districts combined. When combining the data from all three participating school districts, there were 182 respondents, which equaled 30.18% of the 603 teachers invited to participate. Of the 182 respondents, 21.43% were male (*n*=39), and 78.57% (*n*=143) were female. A total of 84.07% (*n*=153) indicated they were satisfied with their digital devices used, while 15.93% (*n*=29) noted they were dissatisfied. Regarding years of experience, 27.45% (*n*=50) had taught for 11 to 15 years. After that, listed in descending order, 20.33% (*n*=37) had six to 10 years of experience, 19.23% (*n*=35) had over 20 years, 18.68% (*n*=34) had one to five years, and 14.29% (*n*=26) of the teachers indicated they had worked in education for 16 to 20 years. See Table 21 for an illustration of this data.

Table 21

School Districts Combined: Participants' Years of Experience

	1-5 Yrs.	6-10 Yrs.	11-15 Yrs.	16-20 Yrs.	More than 20 Yrs.	Total
N	35	37	50	26	35	182

Note. Data provided by survey.

When combining all three school districts, the generation with the most respondents was Generation X. This generation made up 46.15% (*n*=84) of the 182 respondents. After that, the Millennial generation had 45.05% (*n*=82) of the responses. Beyond that, the Baby Boomer generation was represented with 13 respondents, or 7.14% percent of the total. Finally, Generation Z made up 1.64% (*n*=3) of the respondents. See Table 22 for an illustration of this data.

Table 22

School Districts Combined: Participants' Generational Identities

	Baby Boomer	Generation X	Millennial	Generation Z	Total
N	13	84	82	3	182

Note. Data provided by survey.

In terms of the participants' levels of education, a total of 61.54% (*n*=112) possessed master's degrees. After that, 28.57% (*n*=52) of the teachers had bachelor's

degrees. Then, 8.8% (*n*=16) possessed specialist degrees, and two respondents, or 1.1%, earned doctoral degrees. See Table 23 for an illustration of this data.

Table 23

School Districts Combined: Participants' Levels of Education

	Bachelor's	Master's	Specialist	Doctorate	Total
N	52	112	16	2	182

Note. Data provided by survey.

As for digital devices used, 39.56% (*n*=72) of the participants indicated they used Chromebooks. After that, 25.82% (*n*=47) used Mac laptops. Then, 15.93% (*n*=29) used Windows laptops. Beyond that, 14.84% (*n*=27) selected the "Other" option, 2.75% (*n*=5) indicated they used tablets, and 1.1% (*n*=2) indicated they did not use a digital device. See Table 24 for an illustration of this data.

Table 24

School Districts Combined: Participants' Digital Devices Used

	Mac laptop	Windows laptop	Chromebook	Tablet	Other	None	Total
N	47	29	72	5	27	2	182

Note. Data provided by survey.

Of the 182 total respondents for this study, more participants taught at the high school level than elementary or middle school. To elaborate, 40.66% (*n*=74) of the

participants were high school teachers. After that, 34.07% (*n*=62) of the respondents indicated they taught at the elementary level. Finally, 25.27% (*n*=46) were middle school teachers. See Table 25 for an illustration of this data.

Table 25

School Districts Combined: Participants' Grade Levels Taught

	Elementary	Middle School	High School	Total
N	62	46	74	182

Note. Data provided by survey.

Regarding content area taught, most of the respondents indicated they taught core subjects. A total of 60.99% (*n*=111) selected this option. Then, 26.37% (*n*=48) of the participating teachers indicated they taught non-core subjects. Finally, 12.64% (*n*=23) selected the "Other" option. See Table 26 for an illustration of this data.

Table 26

School Districts Combined: Participants' Content Areas Taught

	Core	Non-core	Other	Total
N	111	48	16	182

Note. Data provided by survey.

Results

Once the two-week window for participants to complete the technological self-efficacy survey closed, the researcher downloaded all of the data from Google Forms and

saved everything in Microsoft Excel files. Separate files were saved for each school district. The participants' responses to the 50 ETS-ES questions were scored on a five-point Likert scale, with half of the questions being positive items (PIs) and half being negative items (NIs). The 25 PIs were scored from a range of 1 to 5, with a score of 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree (Gentry et al., 2014). The 25 NI questions were scored in the opposite manner (Gentry et al., 2014). That meant the minimum score for each of the five separate standards was 10, and the highest score possible per standard was 50 (Gentry et al., 2014). The lowest score possible for all five standards combined was 50, and the maximum score was 250 (Gentry et al., 2014). Higher scores indicated higher levels of technological self-efficacy (Gentry et al. 2014). The researcher set up the scoring for the survey in Microsoft Excel and analyzed the quantitative data in this program as well. This data, as well as the qualitative data, was printed to provide the researcher another means to conduct the analysis.

Research Question One. For the purposes of this study, the researcher first aimed to answer the following question: *What are the perceived levels of technological self-efficacy possessed by teachers in schools with 1:1 technology in relation to the five separate ISTE (2008) teacher standards, which included:*

a. enabling students' learning and creativity

b. employing appropriate digital age learning and assessment opportunities

c. exhibiting proper digital age behaviors when working and learning

d. promoting and exhibiting how students should be responsible digital citizens

e. taking part in growth and leadership opportunities (ITSE, 2008)?

The ETS-ES instrument developed by Gentry et al. (2014) was utilized by the researcher to collect this data. The scores from this instrument for the three school districts involved in the study are below.

School District A. The respondents for School District A had the highest mean self-efficacy score for Standard 3, which related to teachers' modeling of appropriate digital age behaviors (ISTE, 2008). The mean score for this standard was 36.41 (SD=5.79). The ISTE standard with the lowest mean self-efficacy score was Standard 5, which related to teachers' lifelong learning and growth as professionals (ISTE, 2008). The mean score for Standard 5 was 34.19 (SD=6.56).

Next, Standard 2, which revolved around appropriate learning and assessment methods for the digital age (ISTE, 2008), was the standard with the second-highest mean self-efficacy ratings. The mean score for this standard was 35.95 (SD=6.95). After that, Standard 4, which related to teachers' advocacy for students to be responsible digital citizens (ISTE, 2008), had a mean score of 35.77 (SD=6.47). Finally, the second-lowest mean self-efficacy score was for Standard 1, which focused on teachers enabling students to have experiences that would lead to innovation and creativity (ISTE, 2008). The mean score for this standard was 34.90 (SD=6.45). Also, the mean score for all five standards combined was 177.21 out of a possible 250 points. See Table 27 for an illustration of this data.

Table 27

School District A: Mean Scores for Five ISTE Standards

ISTE Standard	Mean	Standard Deviation
1	34.90	6.45
2	35.95	6.95
3	36.41	5.79
4	35.77	6.47
5	34.19	6.56

Note. Data provided by survey.

School District B. For School District B, the respondents perceived themselves to have the highest levels of self-efficacy in Standard 4, which focused on promoting and exhibiting how students should be responsible digital citizens (ISTE, 2008). The mean score for this standard was 37.02 (SD=5.56). The area in which the respondents had the lowest levels of self-efficacy was Standard 5. This standard covered teachers taking part in growth and leadership opportunities (ISTE, 2008). For this standard, the mean score was 33.52 (SD=6.09).

The scores for the other three standards were all within close range to each other. For example, listed in descending order, Standard 2, which covered employing appropriate digital age learning and assessment opportunities (ISTE, 2008), had a mean score of 35.4 (SD=7.19). Next, the mean score for Standard 3, which focused on exhibiting proper digital age behaviors when working and learning (ISTE, 2008), was 35.31 (SD=5.95). Furthermore, the mean score for Standard 1, which related to enabling

students' classroom creativity (ISTE, 2008), was 34.94 (SD=6.37). Also, the mean total score for all five standards combined was 176.19 out of 250 points. See Table 28 for an illustration of this data.

Table 28

School District B: Mean Scores for Five ISTE Standards

ISTE Standard	Mean	Standard Deviation
1	34.94	6.37
2	35.40	7.19
3	35.31	5.95
4	37.02	5.56
5	33.52	6.09

Note. Data provided by survey.

School District C. Standard 4 had the highest mean score for the respondents in School District C. This standard related to promoting digital citizenship (ISTE, 2008). The mean score for this standard was 38.05 (SD=6.53). The standard with the lowest mean score was Standard 5, which related to lifelong learning and professional growth (ISTE, 2008). The mean score for this standard was 35.05 (SD=7.12).

As for the other three standards, listed in descending order, the mean score for Standard 3, which related to proper digital age behaviors for working and learning (ISTE, 2008), was 37.68 (SD=4.88). Next came Standard 2. This standard covered learning and assessment opportunities in the digital age (ISTE, 2008). The mean score for the standard was 36.86 (SD=7.65). After that, Standard 1, which revolved around enabling

students' creative thinking (ISTE, 2008), had a mean score of 35.28 (SD=6.19). Also, it should be noted the mean total score for all five standards combined was 182.82 out of 250 points. See Table 29 for an illustration of this data.

Table 29

School District C: Mean Scores for Five ISTE Standards

ISTE Standard	Mean	Standard Deviation
1	35.18	6.19
2	36.86	7.65
3	37.68	4.88
4	38.05	6.53
5	35.05	7.12

Note. Data provided by survey.

School districts combined. Once the researcher analyzed the individual school districts' quantitative results, the data for all three school districts were then combined. The ISTE standard with the highest mean self-efficacy score was Standard 4. The mean score for this standard was 36.68 (SD=6.27). Then, the standard with the lowest score was Standard 5. The mean score for this standard was 34.20 (SD=6.56). Furthermore, the total of the mean scores for all five standards combined for all three school districts was 178.27 out of 250 points. See Table 30 for a representation of this dataset. Also, it should be noted a pattern emerged between all three school districts. When analyzing all three school districts individually, Standard 5, which focused on lifelong learning, was always rated the lowest among the respondents.

Table 30

Combined Means of School Districts A, B, and C

ISTE Standard	Mean	Standard Deviation
1	34.98	6.33
2	36.02	7.17
3	36.4	5.67
4	36.68	6.27
5	34.20	6.56

Note. Data provided by survey.

Research Question Two. For the purposes of this research project, the second research question the researcher sought to answer asked: *What relationships exist between teachers' perceived technological self- efficacy ratings and their identification of generation?* To answer this question, the researcher used Microsoft Excel to filter the responses from all three school districts to only show one generation at a time. From there, the researcher calculated the mean self-efficacy ratings for each of the five ISTE standards for each generation and then combined the mean scores for each of the five standards, so it was possible to have one total score out of 250 points for each generation.

The generation with the highest mean score was Generation Z with a total combined score of 203.33 out of 250. However, it should be noted only 1.65% (n=3) of the 182 total respondents identified as members of Generation Z. Furthermore, of those three respondents, one had one to five years of experience, another had 11 to 15 years, and the final respondent had 16 to 20 years. Since the birth years for this generation were

from 1995 to 2010, it was likely two of the three respondents either selected the wrong generation or were incorrect in their years of experience selection. See Figure 1 for a graphic representation of this data.

After that, Millennials had the second-highest self-efficacy ratings. This generation was represented by 45.05% (*n*=82) of the study's respondents, and their mean rating for all five standards combined was 181. Then, the 46.15% (*n*=84) of respondents who indicated they were part of Generation X had an average score of 175.81 for all five standards combined. Finally, the study's Baby Boomers made up 7.14% (*n*=13) of the respondents and came in last with a mean combined score of 171.23. Overall, this data indicated a pattern in which younger generations had higher technological self-efficacy ratings.

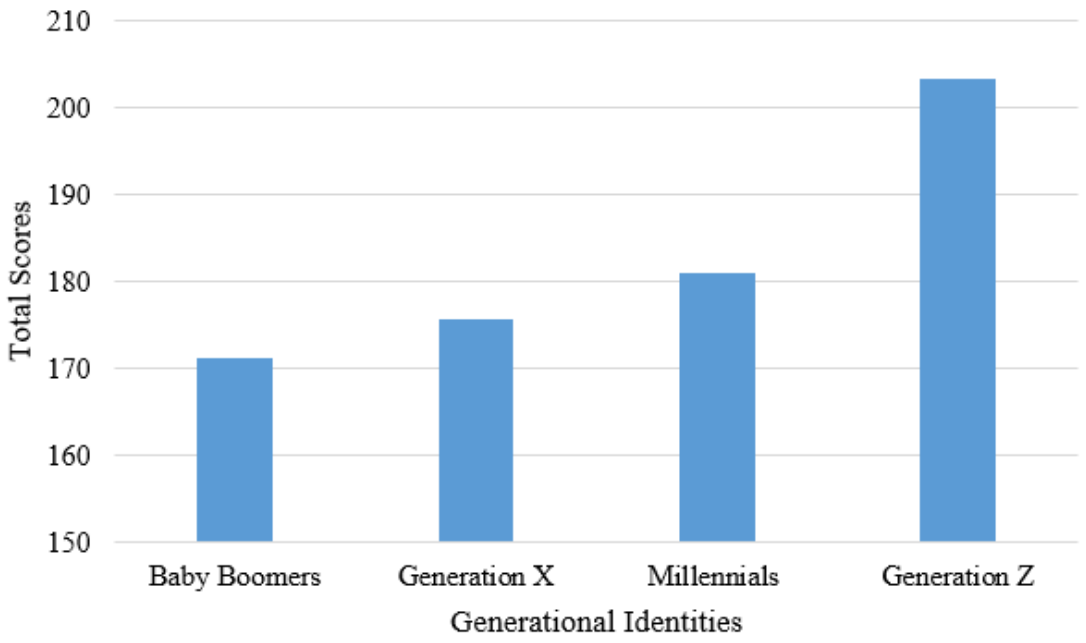

Figure 1. Mean combined scores for each generation. The graphic showed the mean combined score for Generation Z was the highest at 203.33 out of 250, followed by Millennials at 181, Generation X at 175.81, and Baby Boomers at 171.23.

Research Question Three. The third question posed by the researcher for this study asked: *What do educators in schools with 1:1 technology describe as the most beneficial professional development opportunities to enhance their abilities to incorporate technology in the classroom?* The researcher intended to answer this question by posing two open-ended questions at the end of the ETS-ES instrument. To keep the information organized, and to acknowledge the potential differences between the three school districts' professional development needs, this information was segregated by school district. After that, the researcher combined and analyzed the responses from all three school districts. Also, the researcher based the thematic analysis of the data on the process outlined by Braun and Clarke (2006).

School District A: First open-ended question. School District A's responses to the first open-ended question can be broken down into four distinct themes. This first open-ended question asked: *What past professional development opportunities have helped you most in terms of incorporating technology in the classroom?* A total of 76.74% (*n*=66) of the school district's 86 respondents answered this question. Also, some of the responses contained information that correlated with more than one of the four themes and were, therefore, cross-coded. The themes, which were identified across all four school districts, included: (a) district-specific professional development, (b) coursework and conferences, (c) observing and collaborating, and (d) frustration with previous professional development. In the following, these four themes will be addressed for School District A.

District-specific professional development. School District A's most prevalent theme was the respondents noted the benefit of district-specific professional development opportunities. This theme entailed professional development opportunities directly related to the school district's main types of classroom technology, as well other district-provided opportunities. Of the school district's 66 responses to this question, 45.45% (*n*=30) of the responses contained information that fit with this theme. The main sub-themes that emerged related to Google, general technology applications, and guest presenters provided by the school district. Of these sub-themes, Google was the most prevalent.

Regarding the first sub-theme, School District A's main technological device was the Google Chromebook, and 70% (*n*=21) of the school district's 30 responses for the district-specific professional development theme were related to Google. Many of the

responses were relatively short and did not include any explanation. For example, some of the responses included: (a) Google Chrome, (b) Google Classroom training, (c) Google and Schoolology training, and (d) Google Classroom and Schoolology workshops. Other responses included more detail. For example, one of the survey respondents wrote, "Google Summits are amazing with a wide variety of integration tips to help teachers of all classrooms and content." Furthermore, another respondent expressed gratitude for the Google and Schoolology training because she said this type of training was easy to access and utilize. Also, yet another respondent wrote the professional development he found to be most beneficial was "a professional development class on Google Apps and other websites you can use for your classroom."

For the second sub-theme, a total of 23.33% (n=7) of the 30 responses related to the general technology applications. Some of these responses were lacking in specificity, but many of them still noted district-provided professional development was beneficial. For example, one of the respondents wrote she found it beneficial "when we had courses specifically designed to show us technology opportunities in our classroom." Furthermore, another respondent wrote, "We have had numerous technology PD, and I try to take at least one new class a year." Keeping with the theme of general responses, yet another respondent only wrote, "Technology PD." Finally, two respondents cited School District A's technology leadership academy.

Finally, for the third sub-theme, four of School District A's teachers, or 13.33% of the responses related to district-specific professional development, noted the benefit of the school district providing professional development ran by educators outside of the school district who had experience with 1:1 technology. More specifically, one

respondent explained this type of professional development was facilitated by educators from the Mooresville Graded School District, in Mooresville, N. C. That respondent wrote the training from the Mooresville educators was "by far the best tech training I have had in the district." Another respondent explained this training by writing, "We had teachers from another school district model some tried and true activities from their 1:1 classrooms."

Coursework and conferences. The second most prevalent theme for School District A was coursework and conferences. A total of 28.79% (*n*=19) of the school district's 66 respondents for the first open-ended question noted the benefit of the education they received outside of the school district. For this theme, one teacher wrote, "Getting my specialist degree in Educational Technology" was the most beneficial professional development related to technology she has experienced. Another wrote, "University coursework." Moreover, yet another respondent noted specific college courses that were beneficial. The respondent wrote, "I have taken college classes in Smartboard, WEB2.0, and technology in general, as well as technology PD whenever it is offered in our district." Furthermore, four more respondents noted their specific graduate degrees but did not cite any specific courses they found beneficial. Also, other respondents for this theme cited national conferences, webcasts, and workshops as having benefits.

Observing and collaborating. A total of 18.18% (*n*=12) of School District A's responses to the first open-ended question contained language citing the benefit of observing and collaborating as a form of professional development. These respondents noted the benefit of working with others, sharing ideas, and discussing strategies. For

example, one respondent wrote what she found beneficial was, “Project Based Learning, and, well, I just learn from observation of other teachers.” Another respondent noted she benefitted from discussions with colleagues. This respondent wrote what was most beneficial in the past was “talking with cooperating teachers in PD discussions about our uses of technology.” Moreover, other respondents cited specific professional development cohorts and PLCs of which they were members as being beneficial.

Frustration. The last theme identified for School District A was one of frustration. A total of 15.15% (n=10) of the 66 respondents either indicated they were frustrated with their previous professional development opportunities or have simply not had any opportunities to develop their technological skills. One respondent was frustrated because she said the professional development offered was typically at a novice level. Another was frustrated with the lack of classroom resources and noted she only had two student computers. Moreover, another respondent wrote the professional development opportunities were usually not meaningful. This person wrote, “The library media specialist is the only person who has ever really provided meaningful tech PD. Our PD is done in-house. It’s usually a joke.”

Another respondent expressed frustration with technology in general. This person wrote the following:

> I teach kindergarten and do not believe that the classroom should have a large technology component. We need to focus on social skills in person when most students come in used to being on a tablet and lack social skills and problem-solving skills. Technology, in my opinion, is over-used, and our younger generation needs to learn to be social with actual people.

Finally, other respondents noted frustration with technological problems the school district—and its professional development programs—faced. One teacher wrote, "The few PD training classes I have attended had problems with the technology, making it very hard to learn by not seeing skills being used but rather listening to someone talking about how to use certain devices. Very frustrating." This respondent made it clear it was difficult to learn about technology when that technology was not being effectively utilized in the professional development sessions.

School District A: Second open-ended question. From the responses of participants in School District A, three main themes emerged for the second open-ended question. This question asked: *What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future?* A total of 74.42% (*n*=64) of School District A's 86 respondents answered the second open-ended question, and the three themes that emerged included: (a) a desire to have more strategic and focused professional development, (b) broad goals, and (c) a need for more time. The researcher also identified sub-themes that corresponded with the main themes.

Strategic professional development. The most prevalent theme for School District A in relation to the second open-ended question was a desire for more strategic professional development. A total of 43.75% (*n*=28) of the responses fit within this theme. From this theme, there were a total of three sub-themes. The first sub-theme was teachers hoped to learn specific technological skills to implement in their classrooms. Next, the respondents wrote they would like professional development that was more directly targeted toward their students' grade levels and ages. Finally, although this

could be considered an outlier, one respondent who wanted more strategic professional development noted he did not think the professional development, in general, should focus on utilizing technology.

Regarding the first sub-theme, a total of 64.29% (*n*=18) of the 28 responses within the strategic professional development theme had information noting teachers' desires to learn specific skills, which varied greatly. For example, one respondent wanted to learn about "finding and evaluating new digital tools with an emphasis on usefulness and user rights." Another participant was interested in data organization. Moreover, yet another respondent wanted to learn the best strategies to keep students focused and not playing online games during class. One more teacher noted the following:

> I think we have to be on top of our games when it comes to technology. It's not going away, so we have to work with it and use it as best we know how. I REALLY want to do Google Expeditions. I don't know if I can figure it out by myself, but I am trying.

Other skills included: (a) digital escape rooms, (b) specific web resources, (c) MOREnet, (d) safe website browsing for research, and (e) web design, among other areas.

The next sub-theme related to the respondents wanting more professional development targeted toward their specific content areas and grade levels taught. Of the theme's 28 response, 32.14% (*n*=9) fit with this sub-theme. Multiple respondents expressed a desire to have professional development more tailored to the special education environment. Others wanted to see professional development in their specific core subject areas. Then, some respondents focused on the lack of professional

development specific to specials courses, such as physical education. In regard to specificity, one respondent wrote the following:

> The best PD in any subject is not information and statistics! It is hands-on; it is relevant to the EXACT subject matter— not "find a way to incorporate this history curriculum to your health curriculum." Specific lesson plans that would be totally set up and easy for a teacher to follow and use in the classroom, so the teacher would become more familiar with the entire process enabling them to design their own lesson plans.

The general takeaway from this sub-theme was teachers wanted to see how technology specifically could be utilized in their own classroom environments.

For the final sub-theme, although this could be considered an outlier, one respondent viewed technology in a negative light and wrote the best strategy to implement would be to use less technology. This person wrote students were overly reliant on technology, and this was hurting their face-to-face interaction skills. Moreover, this respondent wrote, "The love affair with technology has resulted in lame (passive) education techniques, while at the same time glorifying technology." This person wrote he would like to see professional development that covered how to step away from technology and instead focus on more student-centered teaching methods.

Broad goals. The next theme was that some of the respondents either had broad goals not focusing on one specific skill, or they identified no goals whatsoever. A total of 39.06% (*n*=25) of the school district's 64 responses to the second open-ended question fit within this theme. Sixteen of these 25 respondents, or 64%, had broad responses, such as "the latest trends in classroom tools" and "teachers showing different ways they use

technology." Moreover, yet another respondent wrote she hoped for "incorporating training during professional development time."

Then, 10 respondents, or 40%, identified no goal whatsoever. Many of these respondents simply wrote "Not sure" or "Unsure." Others gave more detailed responses regarding their lack of certainty. For example, one respondent wrote, "I can't answer what I don't know. There are new advancements every day. I'm sure there is much out there that I am unaware of but would use if I had the knowledge and training." Furthermore, another person wrote she did not have a clear goal due to her imminent retirement.

Time. The last theme identified for School District A related to teachers' desires for more time and support when working with technology. Also, the researcher classified a desire for more funding for national conferences and classroom resources as a sub-theme. Of the school district's 64 responses to the second open-ended question, 15.63% (n=10) fit within this general theme.

Six of the 10 responses for this theme, or 60%, wrote they wanted more time to work with new technology before implementing it in the classroom. They also wrote they wanted to be briefed on the new technology and then have time to practice using it. Also, due to teachers' general lack of time, two respondents recommended having more online professional development that teachers could work on during the contracted work day. For example, one respondent wrote the following:

> At this point, unless teachers are getting paid for their time, they rarely seek out professional development in regards to technology. (I am currently a PD technology facilitator). However, if we could offer more online options that

would walk teachers through and allow for collaboration, I believe this would be beneficial in the future. Webinars, online PD courses, and collaborative discussion boards or reflection boards would help take PD to the next level.

Beyond that, four respondents, or 40%, wrote they wanted more support in terms of funding and classroom resources. Two of these respondents wrote they would like funding to attend conferences related to technology. Then, two other respondents had issues with their current lack of classroom technology. One respondent wrote her classroom did not have enough computers to adequately meet students' needs. The other respondent wrote she had a small amount of computers in the classroom and had to personally purchase three iPads for students to use during class.

School District B: First open-ended question. The first open-ended question School District B's respondents answered was broken down into four distinct themes. The purpose of this question was to determine what teachers viewed as their most beneficial professional development experiences in the past related to incorporating technology in the classroom. Of the school district's 52 respondents, 86.45% (*n*=45) responded to this question, and some participants' responses addressed more than one theme. The themes, which were the same across all three school districts, included: (a) district-specific professional development, (b) observing and collaborating, (c) coursework and conferences, and (d) frustration.

District-specific professional development. The most prevalent theme for School District B was that teachers found the professional development specific to their school districts and the technology to be the most beneficial. Of the 45 responses to the survey's first open-ended question, 33.33% (*n*=15) alluded to the benefit of this type of

professional development. For the purposes of this analysis, the researcher divided this theme into two separate sub-themes. Those two areas included Tiger Tech Academy and Apple training.

For the first sub-theme, eleven of the 15 responses, or 73.33%, mentioned the Tiger Tech Academy in a positive manner. Regarding this academy, one respondent noted, "We have had personal 'academies' where you picked a tech idea and learned how a colleague was using it. Then try to incorporate into our own classroom." Also, another respondent noted she found the Tiger Tech Academy to be beneficial because the program allowed other teachers within the school district to model their successful approaches to utilizing classroom technology. Most of the other responses in which the academies were noted were relatively short with several stating only the name of this professional development opportunity and nothing else.

Because many of the respondents did not provide details about the Tiger Tech Academy, the researcher followed up with the school district's technology director to learn more about this academy. The director explained the Tiger Tech Academy was an in-house initiative in which teachers shared technology-related topics with their colleagues. The presentations lasted for one hour, and the teachers explained how to effectively utilize specific technology in the classroom. Administrators also incorporated more time for teachers to ask questions and work with the technology.

Next, the other sub-theme identified was Apple Teacher Training. The majority of the survey respondents for School District B used Mac laptops produced by Apple, and many respondents found Apple training to be beneficial. To elaborate, six of the 15 responses, or 40%, noted this type of professional development. Again, many of the

responses provided little explanation. As a result, the researcher once more followed up with the school district's technology director, who explained Apple training consisted of teachers earning Apple Teacher Certification in a self-paced and online environment. This certification covered the effective use of Apple devices and their applications. According to the director, teachers were encouraged—but not required—to complete this professional development.

Observing and collaborating. Observing and collaborating with colleagues was the second-most prevalent theme for School District B. Also, one sub-theme that emerged from this was related to Professional Learning Communities (PLCs) and working with instructional coaches in regard to technology. A total of 28.89% (*n*=13) of the 45 respondents noted they found this type of professional development to be beneficial for enhancing their skills with classroom technology. For this theme, one respondent noted she found benefit in "seeing demonstrations of how other teachers specifically utilize technology in the classroom." Furthermore, some teachers noted they found this type of professional development specifically tailored to their subject areas to be most beneficial. For example, one respondent wrote his skills grew "by observing other music educators and how they use technology in their class." Another respondent concurred with this by noting this type training that specifically related to Individual Education Plans (IEPs) was most beneficial.

Furthermore, of the 13 responses related to the theme of observing and collaborating, 30.77% (*n*=4) of the responses specifically addressed technology related to PLCs, instructional coaches, and small group meetings. However, none of the responses covered what exactly the respondents found beneficial about this type of professional

development. They all only stated this type of development enhanced their skills, and they found it to be most beneficial. For example, one of the responses stated, "PLC Groups/Meetings." Another wrote, "our instructional coaches meetings." Yet another wrote, "Trainings from our instructional coaches."

Coursework and conferences. The next theme identified for School District B's participants' responses was coursework and professional conferences. A total of 26.67% (n=12) of the school district's 45 responses to the first open-ended question noted these areas. Four of the respondents, or 33.33%, wrote their college classes and advanced degrees in education technology were beneficial. Also, other respondents noted specific professional conferences, which included the Missouri Business Educators Conference, the Using Google Applications for Education Conference, the Consortium for School Networking Conference, and the National Art Education Conference.

Frustration. Instead of listing specific professional development opportunities related to technology, 17.78% (n=8) of the respondents either expressed frustration with their past professional development experiences or indicated they had not previously taken part in these types of initiatives. Three of this theme's eight respondents, or 37.5%, were frustrated with their school district's perceived lack of support. One respondent wrote, "My school provides many PD days to learn about technology but little follow up for actual classroom implementation." Another explained the school district had workshops when the 1:1 initiative was first launched, but the "guidance, integration suggestions have severely dropped off" since that time. Furthermore, 37.5% (n=3) of the respondents within this theme wrote "non-applicable" for this question. These respondents indicated they have had zero professional development experiences related to

technology in the past they would consider beneficial, which was considered to reflect frustration. Moreover, two respondents, or 25%, noted frustration with the lack of time they have had to learn about and then implement new technology. Although the respondents' exact causes for frustration were not the same, they all still used words expressing the sentiment.

School District B: Second open-ended question. For the study's second open-ended question, three main themes emerged from School District B's participants' responses. The second question focused on what types of technological professional development teachers hoped to see in the future. A total 80.77% (*n*=42) of School District B's 52 participants responded to this question, and some of the responses covered more than one of the school district's main themes. Overall, teachers in this school district expressed they wanted to: (a) keep the status quo, (b) have more strategic professional development, and (c) have more time to practice using technology.

Status quo. Most teachers for School District B expressed their desire to maintain the status quo, or to continue with their school district's current professional development plans for technology. A total of 16 of the 42 teachers, or 38.1%, who responded to the second question used language expressing this point. For example, five of these respondents, or 31.25%, used the word "continue" in their responses, indicating they hoped the school district would not end these professional development initiatives. Many of these responses were related to the Tiger Tech Academy. To illustrate this, one respondent wrote, "Continue workshops by teachers and other professionals using technology in their classrooms." Referring to the Academy, another respondent concurred. This respondent wrote she hoped to continue "seeing demonstrations of how

other teachers specifically utilize technology in the classroom." Also, another respondent expressed gratitude for the professional development opportunities related to technology the school district has already provided. This teacher explained, "I appreciate our local professional development because it is directly related to what I am teaching and what devices and access my students have."

Strategic professional development. The second-most prevalent theme for School District B in relation to the second open-ended question was the desire for more targeted and strategic professional development. Of the 42 total responses for School District B for this question, 33.33% (*n*=14) fit within this theme. These respondents expressed a desire to have professional development that more directly fit their specific needs. Four of the 14 respondents, or 28.57%, were concerned with how to best implement technology in a way that would fit the age group of their students. One of these teachers wanted to see "courses geared towards each grade level. It is hard to integrate technology [with] first graders. There need to be experts coming in that have ideas that pertain to our age group."

Others concurred with similar statements. Furthermore, a music teacher noted it would be beneficial to have "things that will help me assess my students' sight reading and music performance." Also, multiple teachers wrote they hoped for more training related to special education.

Time. The final theme for School District B was time. Nine of the school district's 42 responses, or 21.43%, covered this theme. Respondents noted they took part in professional development opportunities to learn about potential technological

applications, but they were then given little time to practice the implementation of these tools. For example, one teacher wrote:

> So often, we are told about a new program and then told to just start using it with students, but I haven't had an opportunity to familiarize myself with the program, and the students suffer through my long period of misunderstanding or lack of knowledge.

Others expressed the same basic feeling. The respondents indicated learning about technology was not as beneficial if teachers did not also have time to understand how to best utilize it in their classrooms. One teacher illustrated this point by writing:

> Having time to actually use and work with them. Just learning about tools is pointless unless you have the time built-in to practice with them and create with them. Particularly when you have someone there who has used it before to help troubleshoot.

Most of the other responses directly concurred with this point. The consensus among these responses was that, without time to practice new skills, learning them in professional development workshop settings was futile. Also, it should be noted this theme may have had the smallest number of occurrences for School District B, but it did, by far, have the longest responses. For the status quo theme, which was the most prevalent, the total word count was only 158. Then, for the strategic professional development theme, the total word count was 225. Finally, for the theme related to time, although fewer people addressed this topic, the total word count was 262.

School District C: First open-ended question. School District C's responses to the first open-ended question primarily fit within four themes. The researcher asked the

first open-ended question to identify what teachers viewed as their most beneficial previous professional development experiences related to effectively utilizing classroom technology. Of School District C's 44 participants, 81.82% (*n*=36) responded to the first open-ended question. Also, some of the responses covered more than one of the school district's four themes. Furthermore, as previously noted, these four themes were the same across all three school districts. The themes included: (a) district-specific professional development, (b) observing and collaborating, (c) coursework and conferences, and (d) frustration.

District-specific professional development. The most prevalent theme by far for School District C was district-specific professional development. Of the 36 total responses, 47.22% (*n*=17) addressed this theme. The school district's primary technological device in the classroom was the Google Chromebook, and 46.67% (*n*=15) of the responses contained the word "Google." Most of the responses related to Google were relatively short but still directly addressed Google-related training to be the most beneficial professional development. For example, some of the responses included: (a) Google Academy, (b) Google Summit, (c) Google training, (d) Google, and (e) Google training specific to Google Forms and Sites.

Furthermore, one respondent noted she appreciated working with staff certified in Google programs, and she aspired to earn this certification. The respondent wrote, "Being able to work alongside Google certified staff. I wish I was one of them, but they help me to understand this so much better." Also, two other respondents indicated they saw benefit in district-provided professional development but did not directly identify Google training.

Frustration. Frustration, or the frustration in a lack of professional development, was tied as the second most prevalent theme for School District C. A total of 22.22% (*n*=8) of the school district's 36 responses fit within this theme. Of those eight responses, 50% (*n*=4) indicated they received little or no professional development, while the other four were frustrated or dissatisfied with this type of professional development in general. Illustrating this theme, one respondent wrote, "I have not been offered any useful PD for incorporating technology in my classroom. I have talked to one person about the programs used in my district, and none of them work well with my subject material."

Another respondent noted she had taken part in zero formal professional development opportunities related to technology but has received help from colleagues. Yet another expressed the same sentiment, but this teacher noted she had visited with an instructional coach. Similarly, one more respondent had similar feelings and noted she has instead needed to learn about technology "on the fly" or in discussions with her peers.

Another respondent who expressed feelings of frustration noted the difficulty of implementing technology initiatives in the classroom after learning about them during professional development sessions. The respondent wrote, "We have had several short PD presentations on various technology tools, but most of the time they are difficult to apply to my classes." Also, another teacher wrote a general lack of funding was the crux of her frustrations with professional development related to technology. The respondent wrote, "I have limited access to devices that would enhance technology in my early childhood special education classroom. We have limited funds, so we do not have iPads, Chromebooks, or whiteboards." For this person, it appeared to be difficult to have beneficial professional development related to technology when classroom technology

was not easily accessible. Finally, one more respondent noted the benefit of Google training but still expressed frustration in his response. The respondent wrote, "Google Classroom training and USA Testprep training have proven the most beneficial in my teaching area. Most technology in education vastly overpromises and under-delivers."

Observing and collaborating. Observing and collaborating with colleagues tied as the second most prevalent theme for School District C. Eight of School District C's 36 responses, or 22.22%, fit within this theme. One respondent wrote she found it beneficial that "resources and ideas have been shared." Another respondent noted collaboration can take place in multiple areas, including online and with social media. This response also partially fit with the district-specific professional development theme:

> Professional literature (magazines), Twitter, teacher Facebook groups, Google search, my schools PD days promoting teacher training in this area, multiple workshops, sessions at conferences, collaboration with my colleagues, collaboration with the librarian/media specialist, collaboration with the building tech coach, our weekly teacher meetings often have 5-10 minutes (sometimes more) about technology, and a general atmosphere to try it, embrace it, but don't use it for the sake of using it.

Other respondents shared similar sentiments. For example, participants noted value in discussions with peers, as well as regular meetings where teachers explained their personal uses of technology in the classroom. One respondent explained this by writing, "Our school has our teachers present every Thursday morning on things they are using. This helps the most because it is things that are working for my students."

Coursework and conferences. The final theme identified for School District C was coursework and conferences. Four of the survey's participants, or 11.11%, had responses that fit into this category. Specific conferences noted included ISTE and the Midwest Education Technology Conference. Other responses within this theme were broader and did not identify specific coursework or conferences. Moreover, one respondent noted an online professional development program that was offered through another state. Furthermore, one respondent, who was a first-year teacher, noted his or her student teaching as a benefit. The respondent wrote the following:

> This is only my first year of teaching, so I do not have much PD built up yet. I would say my student teaching was the best in terms of incorporating technology because I was able to practice using technology in the classroom daily in a learning environment. I learned more and more from a mentor each day and saw the variety of tools I can implement in the classroom. This year, our librarian has briefly reviewed a variety of Google options with us in PD meetings.

This quotation contained information that fit with other themes as well, but the researcher elected to publish the entire quotation as part of this theme since student teaching was a course requirement for students to obtain their teacher certification as part of a university's education program. To summarize this theme, 11.11% (n=4) of School District C's respondents indicated they saw value in professional development opportunities related to coursework they completed and conferences they attended related to technology.

School District C: Second open-ended question. In response to the second open-ended question, School District C had three main themes emerge. The second open-

ended question focused on what types of professional development related to technology teachers hoped to see in the future. In total, 34 of School District C's 44 respondents, or 77.27%, answered this question. The specific themes that emerged from their responses included: (a) strategic professional development, (b) time, and (c) broad goals.

Strategic professional development. The most prevalent theme for School District C in relation to the second open-ended question was the desire for more strategic professional development. Of the 34 responses to the second question, 47.06% (*n*=16) had information relevant to this theme. Also, from this theme, a total of three sub-themes emerged. Those sub-themes were content area/grade-specific professional development, specific skill attainment, and general frustrations and warnings related to technology professional development.

Within the larger theme of strategic professional development, the most prevalent sub-theme was many respondents expressed wanting to develop skills specifically focused on their content areas and/or grade levels taught. A total of eight responses, or 50% of the total for the strategic professional development theme, fit in this sub-theme. Instead of having across-the-board professional development sessions for a wide range of teachers and subjects, they hoped to have more targeted sessions focusing on their specific subjects and grades. To illustrate this, one respondent wrote she would like to see the following:

> Ways to improve and use Google Classroom. Right now, it's not that useful because answering math problems online is difficult and messy. My subject uses a lot of math and graphs. There are only slightly useful programs for this, and

they can be hard to use. Not to mention, in my district, there are many kids who don't have Internet access in the home.

Other respondents wrote similar comments. For example, one teacher hoped for professional development specific to physical education, while a core teacher wanted to see professional development focused on virtual field trips to museums. Furthermore, yet another respondent wrote any professional development related to technology should be "grade level and subject area specific for me to find it extremely beneficial. It would also need to take into consideration my district's current subject area curriculum and how the integration of new/old/any technology would work with that curriculum."

For the next sub-theme, 37.5% (*n*=6) of the 16 responses for this theme focused on specific skill attainment. However, the exact skills desired varied greatly. For example, two respondents hoped to learn more about incorporating social media in their classrooms. Another person responded by writing she would like to see "data analysis programs for student work and assessing student knowledge." Yet another participant wanted to learn about the Classflow tool and how to monitor what students were doing during class on their digital devices. Finally, one respondent hoped to develop more skills in relation to having a flipped classroom.

Finally, for the last sub-theme, 12.5% (*n*=2) of the respondents for the strategic professional development theme made it clear any professional development related to technology should have a clear purpose, but even then, it may not be effective. One of the respondents noted technology had the potential to be beneficial, but teachers needed to follow a specific, strategic process before it is fully implemented in the classroom. To elaborate, this respondent recommended teachers "pilot programs, work through the

problems, and then present a complete picture of how to use technology." However, the respondent expressed frustration that even when doing this, the technology may not ultimately benefit instruction. This respondent indicated he felt a "good teacher" was effective regardless of the technology available. This person concluded his remarks by writing, "We have had some excellent experiences with new tech. We have also been mandated to use items that don't always improve student outcomes, just so one of the "Bobs" (admin.) can put it on his or her resume."

The second respondent for this sub-theme noted a degree of personal conflict with using technology. This respondent wrote the following:

> I am conflicted as I feel it is hindering them from being able to actually hold a book in their hands. One of the big complaints from the students is they constantly complain of headaches and wanting to have paper and pencil again.

This person indicated she understood the value or technology but was also aware of the above-mentioned issues. Moreover, this respondent wrote she hoped to have professional development related to online grading and general student engagement.

Broad goals. The second most prevalent theme for School District C's second open-ended question was broad goals. The average response length for this theme was nine words, and little explanation was given. A total of 26.46% (*n*=9) of School District C's 34 respondents for the second open-ended question identified broad areas they would like to learn more about. For example, one respondent wrote, "Technology PD days." Another wrote, "Any hands on." Moreover, yet another only wrote "Google" without any elaboration. Most of the responses were lacking in specifics but noted one broad category. Other responses included: "Any new things that I may not know about" and "A

collection of educational sites to use in the classroom." Overall, the general takeaway from this theme was that it lacked in specifics.

Time. The last theme for School District C's second open-ended question was a lack of time and a desire to see this addressed. Seven of the 34 responses, or 20.59%, related to this theme. Also, there was a sub-theme of a desire for more support. Moreover, it should be noted this theme had significantly longer responses than School District C's other two themes, which may have indicated the respondents' passion for this topic. The mean response length for this main theme was 60 words, while strategic professional development averaged 39 words, and broad goals averaged nine words.

Of the seven responses, 85.71% (*n*=6) directly indicated the importance of extra time to fully grasp the technology being presented and then incorporate into the classroom. The responses indicated most of the participants in this theme acknowledged the potential benefit of incorporating technology in the classroom but felt like they needed more time to work with the technology and fully grasp its functions before presenting it to students. For example, one respondent who had concerns with time and also questioned the benefit of technology wrote the following:

> Perhaps training that allows time to sort through myriad platforms. The challenge is not finding technology for the classroom. It is by the time I choose technology for the classroom, someone comes along to tell me there is a better way. I was successful with limited technology. If technology integration is so wonderful, why have we not seen a corresponding jump in performance? I do not believe it is poor pedagogy.

Another respondent cut straight to the point, and his response was, "[I need] just more time, need more time." Other respondents further emphasized the need to have additional time to further explore the technological resources.

Furthermore, to go along with needing more time, participants also indicated a need for more support. After learning about new technology, they wanted to have people follow up with them and help them fully understand what they were doing. To illustrate this sub-theme, one respondent wrote, "It is cool to learn of the variety of tools we can use, but I want a little more… I want someone to go through it with me and also discuss ways to implement that specific technology." This respondent noted she was a Millennial, but it was still challenging to keep up with the challenges associated with successfully implementing new technology initiatives in the classroom. Also, another respondent wanted to see more professional development events that only covered one or two items. After that, she said it would be beneficial to have time to implement those tools and have on-campus support throughout the process to help for a smoother execution.

Participants' combined responses to the first open-ended question. Between the study's three school districts, there was a total of four common themes for the first open-ended question. This question asked: *What past professional development opportunities have helped you most in terms of incorporating technology in the classroom?* The four themes included: (a) district-specific professional development, (b) coursework and conferences, (c) observing and collaborating, and (d) frustration. Of the 182 total respondents for this study, 80.77% (n=147) answered this question. Also, it should be noted some of the responses directly addressed more than one theme.

District-specific professional development. The most prevalent theme for all three school districts combined was district-specific professional development. Between the three school districts, 42.18% (*n*=62) of the 147 responses contained information related to this theme. This theme related to teachers expressing the benefit of professional development provided by their school district that focused on the school district's specific technology and its needs. To illustrate this theme, multiple teachers addressed training related to Google or Apple devices in their responses, and Google Chromebooks and Mac laptops produced by Apple were the two devices most teachers used in this study.

Coursework and conferences. The next common theme was coursework and conferences. A total of 23.81% (*n*=35) of the responses contained language covering this theme. For example, teachers wrote they found benefit in their college courses and conferences related to technology. Several of the participants noted they found their specific graduate degrees related to technology to be beneficial. Other teachers cited specific conferences, including: (a) the Consortium for School Networking Conference, (b) the Missouri Business Educators Conference, (c) the Using Google Applications for Education Conference, and (d) the Midwest Education Technology Conference, among others.

Observing and collaborating. Another theme identified for all three school districts was observing and collaborating. This theme made up 22.45% (*n*=33) of the responses for the second open-ended question. For this theme, teachers noted the benefit of sharing ideas with their colleagues, discussing strategies, and observing others utilizing classroom technology. After watching other teachers effectively utilize

technology, they were then able to implement new strategies in their own classrooms. Also, many respondents wrote they found PLCs, instructional coaches, and meetings related to technology with small groups of their colleagues to be beneficial.

Frustration. The last theme for all three school districts combined was one of frustration. A total of 17.69% (*n*=26) of the responses included some wording that demonstrated the respondents' frustrations with past professional development opportunities. The specific reasons respondents expressed this sentiment varied. For example, some respondents indicated past professional development opportunities were not meaningful or focused on their needs. Others were frustrated with a perceived lack or guidance and support. Beyond that, others expressed frustration by writing they had taken part in zero professional development opportunities related to technology they found beneficial.

Participants' combined responses to the second open-ended question. Between the study's three school districts, there was a total of four themes for the second open-ended question. The second open-ended question asked the following: *What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future?* Responses from School District A and School District C were similar in themes, which included: (a) strategic professional development, (b) broad goals, and (c) time. School District B also had themes related to strategic professional development and time, but in place of the broad goals' theme, participants from this school district also expressed a different theme related to maintaining the status quo. Furthermore, it should be noted 76.92% (*n*=140) of the 182 participants in this study answered this question.

Strategic professional development. The most prevalent theme for all three school districts combined was strategic professional development. A total of 41.43% (*n*=58) of the 140 responses to the second open-ended question addressed this theme. For this theme, participants expressed a desire to have professional development more directly related to their specific content areas and grade levels taught. Many respondents indicated technology was difficult to effectively utilize in the classrooms environments, and they would like training related to their specific needs. Also, other respondents wrote they desired to learn specific skills to implement in their classrooms. For example, some teachers wanted to develop their skills in relation to specific applications and teaching strategies with technology.

Broad goals. Next, 25.71% (*n*=36) of the respondents indicated broad goals in their responses. Instead of citing specific types of professional development they would like to see, they used more general language in their responses. For example, most of these respondents indicated they wanted to learn about new technology or trends, but they did not provide any specific examples. Also, another common response was the participants were unsure what type of professional development they would like to see. Instead of having clear goals with technology, these respondents wrote they did not know exactly what type of professional development they would like to take advantage of in the future.

Time. A total of 18.57% (*n*=26) of the respondents addressed the need for more time and support. Many of these respondents indicated they would benefit from having more time to practice implementing new technology in their classrooms. Also, after learning about new technology, they expressed a desire to have further support from the

school district. Moreover, respondents wrote they hoped to receive more support in the form of additional funding or resources. These respondents indicated this additional time and support was necessary for any future professional development to be most effective.

Status quo. The last theme was to maintain the status quo. A total of 11.43% (*n*=16) of the 140 responses related to this them. However, it should be noted the participants from School District B wrote all of these responses. Five of the 16 participants, or 31.25%, included the word "continue" in their responses. These respondents indicated they saw the benefit of the school district's past professional development initiatives. Many of these respondents also noted the school district's Tiger Tech Academy and wrote they would like to continue attending this type of professional development in the future.

Summary

Based on the study's qualitative and quantitative data, the researcher was able to identify common themes and patterns between the three school districts' participants' responses to the ETS-ES instrument and its open-ended questions regarding technology. Furthermore, a trend emerged showing a relationship with the self-efficacy ratings of the different generations. In Chapter Five, the researcher will expound upon the study's data analysis and findings from Chapter Four. The researcher also will make connections between this study and other literature on the topic of self-efficacy. Furthermore, the researcher will suggest what future research on this topic could be conducted, as well as this study's implications for practitioners.

Chapter Five: Discussion and Reflection

Today's students have needed to be prepared for the challenges associated with the 21st century (Henriksen et al., 2016). It has been noted these students needed to develop skills with creativity, critical thinking, and collaboration in relation to technology due to the demands of living in a global economy (Gentry et al., 2014). Thus, the International Society for Technology in Education (ISTE) developed the National Educational Technology Standards for Teachers in 2008 to guide teachers in their use of classroom technology (ISTE, 2008). These five standards for technology included: (a) enabling students' learning and creativity, (b) employing appropriate digital age learning and assessment opportunities, (c) exhibiting proper digital age behaviors when working and learning, (d) promoting and exhibiting how students should be responsible digital citizens, and (e) taking part in growth and leadership opportunities (ITSE, 2008).

Even though studies have indicated teachers needed to utilize technology to be most effective in developing students' 21st-century skills, not all teachers have fully embraced or recognized the potential benefits associated with classroom technology (Baker et al., 2012; Oriji & Amadi, 2016). Furthermore, some instructors have served as saboteurs and hindered the implementation of new technologies (Oriji & Amadi, 2016). Also, some instructors have thought they could be equally as effective in the classroom without using technology, but Gentry et al. (2014) noted this was not actually the case considering the skill set students must possess to be successful in the 21st century. Based on Bandura's (1993) writings on self-efficacy, all of the above-mentioned issues could have potentially been directly related to the teachers' low technological self-efficacy levels.

Therefore, for the purposes of this study, the researcher aimed to identify the technological self-efficacy ratings of teachers in three Midwestern school districts with 1:1 technology initiatives in relation to the ISTE's five standards. Furthermore, the researcher sought to determine if any relationships existed between teachers' perceived technological self-efficacy ratings and their identifications of generation. Finally, the researcher also intended to find what educators in schools with 1:1 technology described as the most beneficial professional development opportunities to enhance their ability to incorporate technology into the classroom. Throughout the study, the researcher collected and analyzed a total of 182 surveys from the participating teachers. Approximately 603 teachers from the participating school districts were invited to take part in this study, which meant the participation rate was 30.18%.

Findings

Research Question One. For the study's first research question, the researcher discovered teachers in all three school districts had the lowest mean self-efficacy ratings for Standard 5 of the ISTE's 2008 standards for teachers, which related to teachers' growing as professionals and being lifelong learners (ISTE, 2008). The mean score for this standard for all three school districts combined was 34.20 out of 50 (SD=6.56). Gentry et al. (2014) did not include specific benchmarks for how to interpret these scores out of 50, but it was noted higher scores indicated higher levels of technological self-efficacy. After that, in ascending order, was Standard 1, which focused on teachers enabling students' creativity in the classroom (ISTE, 2008), with a score of 34.98 (SD=6.33). Next came Standard 2 at 36.02 (SD=7.17). Standard 2 involved appropriate strategies related to students' learning and the assessment of their progress in the digital

age (ISTE, 2008). Then, Standard 3 was next at 36.4 (SD=5.67), followed by Standard 4 with a score of 36.68 (SD=6.27). Standard 3 related to teachers exhibiting proper digital age behaviors, and Standard 4 covered digital citizenship (ISTE, 2008).

Research Question Two. Based on the composite data for all three school districts combined, it appeared there was a relationship between teachers' identified generations and their technological self-efficacy ratings. To summarize this trend, the younger the generation, the higher the technological self-efficacy levels. For example, Generation Z had a mean score of 203.33 out of 250 for the ETS-ES, followed by the Millennial generation with a score of 181 out of 250. The birth years for Generation Z were 1995 to 2010, while the years for the Millennial generation were 1980 to 1995 (Andrea et al., 2016). After that, Generation X had a mean combined score of 175.81 out of 250, and the Baby Boomer generation's mean combined score was 171.23. Birth years for Generation X included 1960 to 1980, and the Baby Boomer generation was from 1946 to 1960 (Andrea et al., 2016). Again, based on Gentry et al.'s (2014) explanation that higher scores on the survey were associated with higher levels of technological self-efficacy, this data indicated participants from younger generations, such as Generation Z and the Millennial generation, responded with higher levels of self-efficacy when using technology in their classrooms.

Research Question Three. Several themes emerged from the two open-ended questions posed in the survey to address the third research question. Regarding what teachers viewed as their most beneficial past professional development experiences related to incorporating technology in the classroom, four common themes emerged from the responses from the teachers in the three participating school districts. These themes

included: (a) district-specific professional development, (b) coursework and conferences, (c) observing and collaborating, and (d) frustration. As for what type of professional development related to technology teachers thought would be most beneficial moving forward, two of the school districts shared three common themes, which were strategic professional development, broad goals, and time. The other school district shared two of these themes, which were strategic professional development and time, but also had an additional emerging theme of maintaining the status quo.

First open-ended question. As previously noted, the four themes emerging related to teachers' most beneficial past technology professional development experiences included: (a) district-specific professional development, (b) coursework and conferences, (c) observing and collaborating, and (d) frustration. First, many participants from the three school districts found past professional development instigated by their school districts and focused on district-specific technology to be beneficial. Next, several respondents noted the benefit of past coursework they had completed and conferences they had attended related to technology. For example, some respondents wrote their specific graduate and/or advanced degrees in education benefitted their technological skills, while others appreciated national conferences related to technology, as well as workshops and webinars.

Another common theme was related to observing and collaborating. Many teachers wrote they saw benefits in observing the technology uses of other teachers and then implementing these uses in their own classrooms. Similarly, teachers also cited the benefit of simply discussing topics related to technology with their colleagues and then collaborating to further develop their skills. Finally, instead of noting what professional

development opportunities participants found to be beneficial, several teachers wrote they were frustrated with the process in general. Some participants found the professional development was not practical to implement in their own classrooms, while others were frustrated with the lack of time, support, or resources provided by their school district.

Second open-ended question. Regarding the second open-ended question, which focused on future professional development opportunities, the four emerging themes included: (a) strategic professional development, (b) broad goals, (c) time, and (d) maintaining the status quo. School Districts A and C shared the themes of strategic professional development, broad goals, and time. School District B did not have broad goals emerge as a theme and instead had the theme of maintaining the status quo. In terms of strategic professional development, teachers expressed a desire to have professional development that fit their specific grade levels and content areas taught. Moreover, other teachers stated they wanted strategically to learn specific skills to most improve their instruction. Next, broad goals referred to the general lack of specificity some teachers expressed. Some teachers indicated they hoped to have more technology professional development, but they did not explain what types of sessions they thought would be beneficial. Beyond that, other teachers wrote they were unsure what they wanted to learn more about.

The third theme to emerge from the teachers' responses was a desire for more time to learn about and work with new technological innovations. Teachers also wrote they hoped for more resources and general support. Finally, the last theme that emerged was to maintain the status quo. Teachers in School District A wrote they hoped to

continue with many of the school district's current professional development offerings related to technology.

Limitations and Assumptions

The researcher attempted to minimize limitations that would impact the study, but some issues were noted nonetheless. Limitations impacting this study included the following:

1. The number of participants for this study was limited to a convenience sample made up of teachers from three Midwestern school districts that had 1:1 technology initiatives.

2. The three participating school districts varied in their student enrollment numbers and numbers of full-time faculty members, which led to differences in the number of potential respondents for each school district.

3. The study was limited in the sense it relied on self-reported data from the participants, so the researcher had to assume the participants were honest and unbiased in their responses.

4. The study was limited because the researcher assumed all potential participants received their electronic invitations for the study, and they all had the technology necessary to complete the survey within its two-week window. Furthermore, the assumption was made the technology utilized for sending the survey invitation, as well as the software used for administering the survey, were both reliable.

5. The study was limited based on the assumption teachers put forth an adequate amount of time to complete the survey and wrote honest and thoughtful responses.

6. In terms of potential biases, which may be considered a limitation, the researcher previously taught at the middle school level but did not work for any of the three school districts involved in the study. Also, the researcher's former school district did not have a 1:1 technology initiative, but laptop carts were available for checkout. Furthermore, the researcher taught at the college level after that and served on a college's Technology Committee.

Discussion

Research Question One. In the study's first research question, the researcher hoped to identify teachers' levels of technological self-efficacy based on the five teacher technology standards developed by the ISTE in 2008. Those five standards included: (a) enabling students' learning and creativity, (b) employing appropriate digital age learning and assessment opportunities, (c) exhibiting proper digital age behaviors when working and learning, (d) promoting and exhibiting how students should be responsible digital citizens, and (e) taking part in growth and leadership opportunities (ITSE, 2008). Gentry et al. (2014) noted once specific areas needing improvement were identified, school districts were then able to consider specific professional development opportunities to address their needs. The researcher found it noteworthy the standard for this study with the lowest mean self-efficacy rating was Standard 5, which directly related to professional development, in general (ISTE, 2008).

Since teachers expressed lower self-efficacy levels in this area, their students would likely be negatively impacted in terms of learning and exhibiting these skills as well (Bandura, 1993). Furthermore, Walker Beesona et al. (2014) noted the importance of professional development related to technology for teachers at school districts with 1:1

technology. Walker Beesona et al. (2014) wrote developing skills related to teachers' technological pedagogical content knowledge (TPCK) was necessary for 21st-century teachers to be most successful in the classroom, and this was something school districts with 1:1 technology needed to consider. Since teachers in this study possessed the lowest self-efficacy for the ISTE's fifth standard, which directly related to professional development, this indicated teachers likely did not have the type of professional development experiences suggested by Walker Beesona et al. (2014).

However, the researcher noted teachers wrote multiple suggestions related to professional development in response to the two open-ended questions at the end of the survey. These suggestions pertained to Research Question Three and were addressed in that portion of the discussion.

Also, with all three school districts' responses combined, teachers expressed the highest mean scores for Standard 4. This standard focused on teachers promoting and exhibiting proper behavior with technology for digital citizens (ISTE, 2008). This meant teachers felt they had the most skills in terms of teaching students how to act ethically and appropriately with technology. Standard 4 covered a variety of issues including ethics, plagiarism, cultural sensitivity, and computer etiquette (ISTE, 2008). Teachers in this study indicated they felt most confident in this area, which based on Bandura's (1993) work, meant this was an area they were likely most effective in conveying to their students. In a study by Neumann (2016), teachers identified plagiarism and acting unethically with technology as challenges they have needed to discuss with their digital native students. Therefore, it was important to note Standard 4, which related to these issues, was the standard in which the study's participants felt the most effective.

Research Question Two. The second research question focused on what relationship existed between the participants' generational identities and their technological self-efficacy scores. The results of this study indicated the existing relationship between these two variables was one in which younger generations had higher mean technological self-efficacy scores. Generation Z, or individuals born from 1995 to 2010, was the youngest generation, and this generation had a total mean score of 203.33 out of 250 on the ETS-ES instrument. From there, in descending order, the Millennial generation, born from 1980 to 1995, had the next-highest score at 171, followed by members of Generation X, who were born from 1960 to 1980, and scored 175.81. Finally, the Baby Boomer generation, born from 1946 to 1960, came in last with a score of 171.23. Based on this data, it was noted the two generations of digital natives, which included Generation Z and Millennials, had the highest scores, with the younger generation's scores being even higher. Studies have indicated the different generations have possessed different habits in terms of technology use (Andrea et al., 2016; Kamber, 2017; Otey, 2013), and participants in this study reported different technological self-efficacy levels as well.

Another finding from the study was the sample of respondents for Generation Z was much smaller than the other generations. A total of 1.65% (n=3) of the participants identified as members of Generation Z or being born from 1995 to 2010. Furthermore, two of the three respondents for this generation may have selected the classification of Generation Z by mistake. The researcher came to this conclusion because one of these respondents noted having 11 to 15 years of experience, while another had 16 to 20 years. Since the survey specified the birth years for this generation as 1995 through 2010, those

two respondents would not be able to have that many years of teaching experience. After that, the total number of respondents for the Baby Boomer generation was 13, or 7.14% of the participant pool, which was still low, but this was significantly higher than Generation Z, which had three respondents, or 1.65% of the group. Also, Generation X made up 46.15% (*n*=84) of the participant pool, and the Millennial generation totaled 45.05% of the population (*n*=82). For these three generations, the researcher did not find any other discrepancies like the issue with Generation Z.

Research Question Three. For the third research question, the researcher aimed to determine what teachers described as the most beneficial professional development opportunities related to incorporating technology in the classroom. To answer that question, the researcher included two open-ended questions at the end the survey. One question asked the participants what they found most beneficial from professional development opportunities in the past, while the other open-ended question asked participants what they would like to experience in future professional development sessions. Multiple themes emerged regarding teachers' opinions on professional development.

Since the participants had their lowest mean score for the ISTE's fifth standard, which focused on professional development, lifelong learning, and professional growth (ISTE, 2008), the researcher found it especially insightful to analyze their comments about what professional development opportunities they considered beneficial. To elaborate, the participants, as a whole, indicated they felt less confident in this specific standard, but they also identified the types of opportunities they would like to have offered in the future. By taking their specific recommendations into consideration,

administrators for the participating school districts could potentially see their teachers' self-efficacy ratings increase in this area.

Participants' combined responses to the first open-ended question. The specific themes the researcher found for the first open-ended question included: (a) district-specific professional development, (b) coursework and conferences, (c) observing and collaborating, and (d) frustration. This first open-ended question asked: *What past professional development opportunities have helped you most in terms of incorporating technology in the classroom?* Many of the themes identified could be connected to what Bandura (1994) classified as the four sources of self-efficacy. Therefore, aspects of these themes will be discussed through this lens. Bandura (1994) wrote the sources included: (a) enactive mastery experiences, (b) vicarious experiences, (c) verbal persuasion, and (d) psychological and affective states.

District-specific professional development. Based on Bandura's (1994) explanation of mastery experiences, it was likely teachers experienced this type of self-efficacy boost as they took part in district-specific professional development that allowed them to grow more and more comfortable with the technology their school districts used. Studies have shown when people were successful once, this led to them believing they were more likely to be successful again in the future (Bandura, 1994; Flores, 2015). As teachers successfully completed their device-specific training sessions and certifications, the teachers could have viewed these as successful experiences, which increased their self-efficacy levels. Some teachers may have also seen their technological self-efficacy increase due to vicarious experiences when their colleagues demonstrated how to best use technology. They could have seen their colleagues be successful, and this made them

believe they could be successful, which would have been consistent with previous explanations of the concept of vicarious experiences (Bandura, 1994; Vries, 2017).

Coursework and conferences. The same sources of self-efficacy applied to the district-specific professional development theme may have fit with the coursework and conferences theme as well. Yüksel (2014) noted mastery experiences were the most impactful method for preservice teachers to build their self-efficacy, and it was possible the participants in this study may have similarly had some positive hands-on experiences and successfully applied their skills throughout their coursework and conferences. Moreover, in terms of vicarious experiences, Vries (2017) wrote teachers have seen their self-efficacy levels increase when observing other teachers being successful, and this may have occurred throughout the classes and conferences theme as well. In their coursework and conferences, the study's participants may have experienced modeling or observed others walking them through the process, which would have fit with previous literature related to vicarious experiences (Bandura, 1994; Vries, 2017).

Based on Bandura's (1994) writing, participants may have also experienced verbal persuasion by having their leaders or peers in the courses or conferences encourage them throughout the process. Verbal persuasion has increased self-efficacy in people when others responded positively to their efforts (Bandura, 1994; Flores, 2017). Also, Bandura (1994) noted verbal persuasion has been most effective for building self-efficacy when people were put in situations where they were more likely to succeed. It was possible these types of professional development opportunities were structured in a manner that allowed teachers to see progress and improvement in their technological skills.

Observing and collaborating. When teachers in this study wrote they observed their colleagues, this was considered a clear fit with vicarious experiences based on the explanation of this concept written by Vries (2017). This was the case because the participants observed each other successfully perform teaching strategies they could then implement in their classrooms (Bandura, 1994; Vries, 2017). It has been written in previous literature that, when people saw others in similar positions experience success, it made them more likely to believe they could be successful as well (Bandura, 1994; Vries, 2017). As for collaborating, this could have been related to mastery experiences if teachers experienced success while working together during this process (Bandura, 1994; Tilton & Harnett, 2016). Furthermore, this type of collaboration may have led to teachers' collective efficacy increasing, which could have also impacted their overall levels of self-efficacy (Tilton & Harnett, 2016).

Frustration. Finally, the theme of frustration could have been potentially related to mastery experiences, as well as psychological and affective states, based on previous explanations of these concepts (Bandura, 1994; Vries, 2017). Some of the respondents were unhappy or frustrated with the professional development, in general. This emotional state could have made it even more difficult for them to have expressed increased levels of self-efficacy (Bandura, 1994; Vries, 2017). Beyond that, some of the respondents were frustrated with a lack of resources or time to practice with the new technology. Not having the necessary resources could have also negatively impacted teachers' ability to have mastery experiences with technology, which has been the most meaningful way for people to see their self-efficacy ratings increase (Bandura, 1994; Tilton & Harnett, 2016).

Participants' combined responses to the second open-ended question. For the second open-ended question, the researcher identified themes including: (a) strategic professional development, (b) broad goals, (c) time, and (d) maintaining the status quo. The second open-ended question asked: *What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future?* School Districts A and C shared the common themes of strategic professional development, broad goals, and time. However, School District B expressed the theme of maintaining the status quo in place of broad goals. Once again, these themes potentially could have been connected to the four sources of self-efficacy outlined by Bandura (1994).

Strategic professional development. For the theme of strategic professional development, many of the participants expressed a desire to have professional development specific to their grade levels taught and content areas. Others wrote they hoped to learn about specific skills they could later implement in their classrooms. This would likely fit primarily under Bandura's (1994) writings on mastery experiences. For this theme, the teachers hoped to fully grasp how to use the technology and how it would best function in their classrooms, which, based on Bandura's (1994) work, would be necessary to have mastery experiences. If teachers learned skills and then had positive experiences in their classrooms as a result, this would lead to their self-efficacy rising as well (Bandura, 1994; Tilton & Harnett, 2016). Also, it should be noted this theme was similar to what Walker Beesona et al. (2014) discussed in regard to professional development for schools with 1:1 technology. Walker Beesona et al. (2014) noted professional development needed to be strategic and grow teachers' specific TPCK.

Broad goals and time. Next, the broad goals theme could potentially fit under any of the sources of self-efficacy as described in recent literature (Vries, 2017). This theme would be difficult to classify since many of these teachers did not provide a clear indication of what they specifically hoped to achieve. However, it was possible this theme could best fit with mastery experiences since teachers wanted to learn how to successfuly do something (Bandura, 1994; Tilton & Harnett, 2016), even if the specific something was not clear. Furthermore, the theme of time could potentially fit with enactive mastery experiences and psychological and affective states as described by Bandura (1994) and Vries (2017). Some of the teachers wrote they simply hoped to have more opportunities to practice using the technology. If teachers had more time to learn new skills, they may have experienced mastery experiences, as was the case with the teachers in Tilton and Harnett's (2016) study. Also, when teachers did not have enough time to practice, or they were lacking in the necessary resources or support, this could have potentially had a negative impact on their psychological and affective states, and it has been noted negative emotions can lower teachers' levels of self-efficacy (Bandura, 1994; Vries, 2017).

Status quo. Teachers in one of the three participating school districts wrote they hoped to continue with the school district's current professional development initiatives. Many of these respondents noted the benefit of the Tiger Tech Academy, which allowed teachers to learn from their colleagues and then ask questions and work with the new technology. In Tilton and Harnett's (2016) study, teachers noted the benefit of modeling new technology and collaborating with each other. That was similar to what primarily occurred in the Tiger Technology Academy, which would fit with Bandura's (1994)

concept of vicarious experiences. Also, when teachers had time to practice with their new technology, this could have led to mastery experiences, which was similar to findings in Tilton and Harnett's (2016) study.

Implications for Practice

School administrators in the three school districts in this study, as well as those at other school districts with 1:1 technology initiatives, should consider this study's findings in relation to their own professional development opportunities. At all three school districts, the ISTE (2008) standard with the lowest mean combined score was Standard 5, which directly related to professional development. Moving forward, school leaders should consider reassessing what they use for professional development related to technology and if teachers consider these methods to be beneficial. Based on Bandura's (1994) writing, if teachers have low self-efficacy ratings in terms of professional development, lifelong learning, and professional growth, they will also be less effective in modeling these characteristics for their students. Moreover, if the teachers have negative psychological and affective states related to the professional development opportunities, this will impact their self-efficacy levels as well (Bandura, 1994). Based on this study, teachers suggested multiple forms of potential professional development for their school districts to use in the future. If the school districts acknowledge the teachers' comments and act accordingly, it is possible the teachers' self-efficacy levels will increase, which will ultimately benefit the students and their development of 21st-century skills.

Recommendations for Future Research

Based on this study's findings, the researcher developed recommendations for future research. Considering this study only focused on the school districts' faculty members, the researcher noted it would be beneficial to also study the technological self-efficacy ratings of other school employees who work with students. For example, a study including administrators and support staff may be of merit. Additional studies focusing on the students' technological self-efficacy would be worthwhile as well. The ISTE recently launched new standards for both students and teachers (ISTE, 2016; ISTE, 2017), and these standards could serve as the framework for new surveys to be developed similar to the ETS-ES.

Furthermore, considering the multiple types of professional development available, a researcher could study which types of professional development related to technology yielded the best results in terms of teachers' technological self-efficacy. For this study, a researcher could conduct multiple interviews and focus groups related to the specific types of professional development opportunities teachers utilized. Beyond that, a researcher could also take students' standardized test scores into consideration and determine if certain professional development opportunities for teachers may correlate with higher standardized test scores for students. Also, it may be beneficial to determine if there is a relationship between students' standardized test scores and their digital devices used.

Another research topic idea would be to conduct a study similar to this research project but on a larger scale. It is possible more participants would lead to different results. This may allow a researcher to have a representative sample of participants

instead of a convenience sample, which could allow results to be generalized to greater populations. Moreover, school districts of different sizes and from different parts of the country could be invited to participate. It may also be beneficial to directly compare individual school districts of different sizes and in different areas to see if these variables may impact teachers' technological self-efficacy.

Last, throughout this study, the researcher found little literature available directly focused on the technological self-efficacy of the different generations. There was literature covering the different generations' uses of technology, but there seemed to be a gap in the amount of data available related to generations and self-efficacy. Beyond that, Generation Z was still only beginning to enter the workforce. As more and more members of Generation Z reach adulthood, it may be of merit to further examine their self-efficacy ratings and workplace habits in general.

Conclusion

Today's students have needed to develop 21st-century skills to be successful in the global economy (Gentry et al., 2014). As a result, in 2008, the ISTE developed five technology standards for teachers to use as a guide. However, it has been found teachers' levels of self-efficacy have impacted their abilities to be effective in the classroom and led to more negative classroom environments (Bandura, 1993; Kanadlı, 2017). Thus, the researcher for this study aimed to identify the technological self-efficacy ratings of teachers in three school districts with 1:1 technology initiatives. Results indicated teachers in the three participating school districts had the lowest mean technological self-efficacy for the ISTE's fifth standard, which related to professional development and lifelong learning (ISTE, 2008). Then, the highest mean score was for the fourth standard,

which focused on digital citizenship (ISTE, 2008). Furthermore, teachers in the study noted multiple types of professional development opportunities related to classroom technology they considered to be the most beneficial. For example, these teachers indicated they found professional development specific to their school districts and the technological devices used to be most beneficial. Also, the respondents expressed a desire to see more strategic professional development in the future focusing on specific grade levels, content areas, and technological skills. Gentry et al. (2014) noted school districts could begin implementing appropriate professional development initiatives related to technology once the school districts' specific needs were identified, and this study identified specific areas for improvement that school district administrators could consider in the future.

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Appendix A

The following is the print version of Gentry et al.'s (2014) Educator Technological Self-Efficacy Survey with the addition of demographics questions and two open-ended questions. The researcher used the Google Forms survey tool to administer this survey electronically.

1. How many years have you been teaching?

____ 1-5 ____ 6-10 ____ 11-15 ____16-20 ____ over 20

2. What generation do you identify with?

_____ Baby Boomer (1946-1960) _____ Millennial (1980-1995)

_____ Generation X (1960-1980) _____ Generation Z (1995-2010)

3. What gender do you identify with?

____ Male ____ Female

4. What is the highest degree you currently hold?

_____ Bachelor's Degree _____ Master's Degree

_____ Specialist Degree _____ Doctorate

5. At what grade level do you primarily teach?

_____ Elementary PK-4 _____ Middle School 5-8 _____ High School 9-12

6. What content area do you primarily teach?

_____ Core (English, math, science, history) _____ Non-core (electives and specials) _____ Other (coach, therapist, counselor)

7. What device do you primarily use in your classroom?

____ Mac laptop ____ Windows laptop ____ Chromebook ____Tablet

____ Other ____ None

8. Are you satisfied with this device?

____ Yes ____ No

9. Please indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I empower my students to demonstrate their creative thinking by using digital tools to generate new ideas and develop innovative products and processes.					
2. I am able to develop technology-enriched learning environments that enable all students to pursue individual curiosities in an active setting.					
3. I regularly involve my students in activities where they use digital tools to plan and manage projects focused on real-life events and problems.					
4. I find it challenging to promote student reflections using collaborative tools.					
5. I allow my students to only use					

digital tools that I myself feel comfortable with.					
6. I am unsure of how to set up a classroom where students can express themselves using technology.					
7. I actively involve my students in an ongoing examination of their thought processes and patterns, and believe collaborative tools enable them to clarify understanding with each other.					
8. I find it difficult to model collaborative learning for my students.					
9. I find it challenging to help my students find and use digital tools to solve real-world problems.					
10 I know how to work with students, colleagues, and others in face-to-face and virtual environments to model the collaborative knowledge					

construction process.					

10. Please indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. I am not aware of digital tools that allow students to take charge of and manage their own learning in terms of exploring curiosities, setting learning goals and learning strategies, and assessing their own progress.					
12. I am confident in my ability to collect, analyze, and report data on my student's performance in order to improve my own instruction.					
13. I am confident in customizing and personalizing learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources.					
14. I feel overwhelmed					

when asked to integrate digital tools to promote student learning and creativity.					
15. I train my students to use digital tools to independently manage their own learning objectives, plan their learning strategies, and assess their own progress and results.					
16. I struggle to provide students with multiple and varied assessments that are aligned with both the content and the technology standards.					
17. I feel challenged and overwhelmed when I try to incorporate digital tools to personalize learning activities.					
18. I am confident in my ability to design authentic learning experiences that incorporate contemporary					

tools and resources.					
19. I feel a sense of engagement and satisfaction when designing or adapting learning experiences that incorporate digital tools to promote student learning and creativity.					
20. I am unsure of how I can use digital tools and resources to design authentic learning experiences for my students.					

11. Please indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. I would describe myself as an innovative educator.					
22. My prior learning has prepared me to use digital tools to collaborate with students, colleagues, and parents.					
23. I feel as though I do not have the time I need to communicate effectively with					

students, parents, and peers using digital age media.					
24. My lack of technology skills may hinder my ability to acquire and keep pace with new technological advances in the future.					
25. I value the use of digital tools to locate, analyze, evaluate and use resources to support research, teaching, and learning.					
26. I tell students that it's important to use digital tools to locate, analyze, evaluate and use resources to support their own research and learning, but don't typically practice this in my own teaching.					
27. I am confident that the technology skills I have today will help me acquire new skills for the future.					
28. I feel as though I lack the knowledge and skills I need to					

teach in our global and digital society.					
29. I feel confident in my ability to effectively communicate relevant information to students, parents, and peers using a variety of digital age media.					
30. I feel like it's a struggle to use digital tools to communicate and collaborate with colleagues, parents, students, and members of the community to support learning in my classroom.					

12. Please indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
31. I rarely use digital communication tools for my students to interact with other students for online discussions and project teamwork.					
32. I struggle to provide equitable access to digital tools, curriculum,					

and online resources.					
33. I feel as though I model and exhibit legal and ethical behavior in our evolving digital culture.					
34. I am unsure of the rules of online etiquette (netiquette) and how to appropriately interact with others online.					
35. I do not regularly teach my students safe, legal and ethical use of online information with regard to author's rights, copyright issues, privacy, cyber-bullying and securing data.					
36. I routinely integrate digital communication and collaboration tools for my students to engage with students from other cultures.					
37. I frequently model digital etiquette (netiquette) and online social interaction responsibilities.					

38. I am continually considering and addressing different student needs, including access to software, hardware, curriculum and online resources.					
39. I do not fully understand the local and global societal issues and responsibilities in our evolving digital culture.					
40. I actively promote, model, and teach the safe, legal and ethical use of online information, including author's rights, copyright issues, privacy, cyber-bullying and securing data.					

13. Please indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
41. I have been described as a good role model for infusing technology into teaching.					
42. I consistently engage in professional development that enables me to be confident in demonstrating					

effective use of digital tools in my classroom.					
43. I sometimes feel overwhelmed when attempting to improve my professional practice by integrating digital tools and resources.					
44. I am somewhat resistant to change, and therefore am slower to integrate a new tool into my teaching until I have seen evidence of effectiveness.					
45. I don't always keep up with trends in the research for practical effectiveness of current and emerging digital tools for teaching and learning.					
46. I participate in several different 'informal learning communities/networks' in which I seek out ways to learn and grow with new tools for promoting student creativity and collaboration.					
47. I struggle to join or maintain any informal learning communities/networks for learning new digital tools for teaching and learning.					
48. I rarely discuss educational technology					

tools and resources with my colleagues.					
49. I continually evaluate research trends on the practical effectiveness of current and emerging digital tools for teaching and learning.					
50. I demonstrate and discuss with my colleagues the effective use of digital resources to improve student learning and the profession of teaching.					

14. What past professional development opportunities have helped you the most in terms of incorporating technology in the classroom?

15. What type of professional development related to incorporating technology in the classroom do you think would be most beneficial in the future?

Appendix B

From: Gentry, Dr. James
Sent: Sunday, December 24, 2017
To: Greg Edwards
Subject: Permission to use ETS-ES

Hi Greg...

Please feel free to use it as you wish... :-)

Merry Christmas and Happy New Year. I hope it is helpful.

Jim

Sent from my iPhone
James E. Gentry (Jim)
Associate Professor
Tarleton State University

From: Greg Edwards
Sent: Sunday, December 24, 2017
To: Gentry, Dr. James
Subject: Research request

Dr. Gentry,

I am a doctoral candidate at Lindenwood University, and I would like to request permission to use your ETS-ES instrument for my dissertation focusing on the technological self-efficacy of teachers at school districts with 1:1 technology initiatives.

I understand you granted permission on your website for non-profit educational researchers to use this survey, but I still wanted to personally reach out to you about this.

Once I finish my dissertation, I will make sure to send you the results.

Thank you! Merry Christmas!

-- Greg Edwards, MS, MA
Doctoral Candidate
Lindenwood University

Appendix C

From: Greg Edwards
Sent: Thursday, June 22, 2017
To: [redacted]
Subject: Research request

Dear Superintendent,

I am a doctoral student at Lindenwood University, and I am writing to request your permission to conduct research involving your school district. My research will cover teachers' perceived self-efficacy with technology and what factors contribute to this. All of the districts I will study have implemented 1:1 technology initiatives.

With your permission, I will send an email to the teachers in your school district with a survey related to their technological self-efficacy. I will not distribute this survey until later in the upcoming school year, but I need to request your permission now to get started with the IRB approval process. The teachers' anonymity will be protected throughout my research, and I will follow Lindenwood's IRB research guidelines. Once I finish my research, I would be glad to share my findings with you.

If you have any questions, feel free to call me at 573-261-1961 or email gee570@lionmail.lindenwood.edu. Thank you!

Sincerely,

Greg Edwards, MS, MA

Appendix D

School District A
From: [redacted]
Sent: Thursday, June 22, 2017
To: Greg Edwards
Subject: Research request

Hello Greg,
I have forwarded your request to our Tech Coordinator and Asst. Superintendent to ask their thoughts regarding your request. We will discuss and get back to you by next week.
Thank you,
[redacted]

From: [redacted]
Sent: Monday, June 26, 2017
To: Greg Edwards
Subject: Research request

Greg,
You have a green light from [redacted]
We would like to see the results. Good luck.

Sent from my iPhone

School District B
From: [redacted]
Sent: Thursday, June 22, 2017
To: Greg Edwards
Subject: Research request

You have my permission to conduct this research at [redacted] Schools.

School District C
From: [redacted]
Sent: Friday, June 23, 2017
To: Greg Edwards
Subject: Research request

Mr. Edwards,

Thanks for the email. We would be glad to participate. Thanks. [redacted]

Appendix E

Dear Educator:

My name is Greg Edwards, and I am a doctoral candidate at Lindenwood University. The purpose of this email is to request your participation in providing research data for my dissertation. My dissertation topic focuses on the technological self-efficacy of teachers in schools with 1:1 technology initiatives. Your superintendent granted me permission to survey your school district, and your participation will be greatly appreciated!

Here is a link to the survey: [redacted]

I can assure you that your anonymity will be protected throughout the research process. Data will be categorized based on the participating school districts, but no specific names will be included. Also, as is noted at the beginning of this survey, by submitting your responses, you are providing your informed consent.

Please complete the survey no later than [redacted]

Thank you!

-- Greg Edwards, MS, MA
Doctoral Candidate
Lindenwood University

Appendix F

Greetings! I just wanted to send everyone a quick reminder to please complete the survey I sent out last week.

Here is the link: [redacted]

I greatly appreciate you taking the time to complete this survey, and I hope its results will benefit your school district and other educators who use 1:1 technology.

Please make sure to submit your survey by [redacted]

Best,

-- Greg Edwards, MS, MA
Doctoral Candidate
Lindenwood University

Appendix G

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Gregory Edwards** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 06/12/2017.

Certification Number: 2415960.

Appendix H

Educator Technology Self-Efficacy Survey

You are being asked to participate in a survey conducted by Greg Edwards, a student at Lindenwood University, who will be supervised by Dr. Jodi Elder. This survey will be conducted to determine the technological self-efficacy ratings of teachers at school districts with 1:1 technology. The ratings will be based on based on the five teacher technology standards developed by the International Society for Technology in Education in 2008. It will take about 15 minutes to complete this survey.

Your participation is voluntary. You may choose not to participate or withdraw at any time by simply not completing the survey or closing the browser window.

There are no risks from participating in this project. We will not collect any information that may identify you. There are no direct benefits for you participating in this study.

WHO CAN I CONTACT WITH QUESTIONS?
If you have concerns or complaints about this project, please use the following contact information:

Greg Edwards: Gee570@ed.lindenwood.edu
Dr. Jodi Elder: Jelder1@lindenwood.edu

If you have questions about your rights as a participant or concerns about the project and wish to talk to someone outside the research team, you can contact Michael Leary (Director - Institutional Review Board) at 636-949-4730 or mleary@lindenwood.edu.

By clicking the link below, I confirm that I have read this form and decided that I will participate in the project described above. I understand the purpose of the study, what I will be required to do, and the risks involved. I understand that I can discontinue participation at any time by closing the survey browser. My consent also indicates that I am at least 18 years of age.

You can withdraw from this study at any time by simply closing the browser window. Please feel free to print a copy of this information sheet.

Vitae

Greg Edwards is a lifelong resident of St. James, Missouri, and a proud graduate of John F. Hodge High School. He is the son of Dwayne and Martha Edwards, and he has one sister, Amy Patterson. While a student in the St. James School District, Greg met the love of his life, Danetra Nelson Edwards, and they have been happily married since 2012. After finishing high school, Greg went on to earn both a B.S. in Socio-Political Communication and an M.S. in Administrative Studies and Applied Communication from Missouri State University. He also holds an M.A. in Teaching from Missouri Baptist University.

After finishing his bachelor's degree, Greg was hired as managing editor of the *St. James Leader-Journal.* He has never completely left the world of media since that time, but he eventually entered the field of education. He is now finishing his sixth year as an educator and has served the last four years as an instructor of communication at State Technical College of Missouri. Additionally, he serves as president of the college's Faculty Senate.

In his spare time, Greg loves trout fishing, traveling the world, and keeping up with politics. He is currently Worshipful Master of the St. James Masonic Lodge No. 230 AF&AM, and he is a former elected member of the St. James City Council.