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Teachers' Perception Of Student Technology Use

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Students in today's public school system are inundated with technology devices and software applications at an early age. These students are expected to learn from technology; however, they are often not taught to use the device or program. It is a common belief that these students are fully immersed in a world of laptops, tablets, and cell phones before entering the school system and are already prepared to use the devices at school. Evidence to provide devices for each student are beneficial is severely lacking, yet many schools across the United States have adopted the one-to-one program, providing either a tablet, laptop, or other device for every student. This study reports the perception of business and technology teachers regarding the technology aptitude of students in grades 6-12. The primary aim was to answer this question: Does the assumption of technical knowledge in digital natives lead to a demonstrated skill gap for today's students? In context, the term digital natives coined by Marc Prensky (2001) refers to individuals who have only lived in a world of digital media. The participants were six business and technology teachers from the Midwest. Three teachers were junior high teachers and three were high school teachers. This qualitative research data was collected via one-on-one virtual interviews. The results indicate that by junior high, students use hardware devices and software applications in the classroom regularly, yet students are displaying skill gaps such as inefficiencies in use of the keyboard and time management, overconfidence in multitasking, and

even deficiencies in morals such as cheating. Further research is needed to confirm the results and to identify other factors that could strengthen the effectiveness of these campaigns.

KEYWORDS: Education, Technology, One-to-One Computing, 1:1 Computing, Electronic Devices in Education, Technology Education, Computer Education, Technology Literacy

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CHAPTER I: INTRODUCTION

The Problem and its Background

For quite some time, there has been a push to include more technology in education. With computer hardware, software applications, and digital productivity tools continuously changing and adapting, teachers are expected to provide students with lessons that include both higher-level thinking and learning, with implementation of the latest technology to reach those goals. Many educational institutions, such as elementary schools, high schools, and colleges, have transitioned to one-to-one computing. With this movement, schools are providing each student with full access to an electronic device for educational purposes. The devices can range from tablets to laptops (e.g. iPads, Chromebooks, etc.). However, this is only the most recent installation of technology in the classroom saga. Technology is always evolving and expanding; as such, the push for teachers to use it in the classroom has been on the rise since United States President Bill Clinton and Vice President Al Gore's push to do so in the 1990s (Kennedy, 2008). Hardware device usage is so engrained in education that digital tools are implemented in ages as young as pre-school for increasing periods of time in their daily lives (Otterborn, Schönborn, & Hultén, 2018).

The use of technology in the classroom may have many positive effects including adding interest and engagement to a lesson. Through the current implementation of technology, both the extra exposure to software applications in day-to-day lessons and implementation of devices for all, students are exposed to technology devices at much younger ages, including an expectation for computer literacy as young as kindergarten (Harris, Al-Bataineh, & Al-Bataineh,, 2016; Illinois Early Learning Standards Kindergarten, 2013). Some possible implications of this eagerness to implement technology devices include students not being taught basic technology

productivity skills to the same degree as in previous years due to the assumption that students will develop the skills on their own from frequent and early use. While the implementation of technology devices and digital applications can provide many benefits to a student's education, there is still a possibility this extensive use of technology could be detrimental to a student's success in their learning journey. There are varying degrees of what is considered a "successful" use of computer hardware and software in the classroom. As students have more and more access to technology in relation to their work in the classroom, it is important that educators question the effectiveness of technology implementation.

Digital native is a term coined by Marc Prensky (2001) which describes anyone in a generation who grew up in a time of ever-present technology. K-12 students today would fall into this category. Whether or not the students themselves have had the opportunity to have various forms of hardware devices at home, it is likely most of them have experienced easy access to technology; however, it is also important to point out the type of device that is typically used at home by these students. In the past nine years, there has been a decrease in personal computer sales and an increase in tablet sales (Alsop, 2020). This could be linked to the release of the Apple iPad. While it was not the first tablet created, it a known popular device and has sold many millions worldwide (Griffey, 2012). At times, an inherent knowledge of all technology devices in students is assumed because of their digital native status and their presumed easy access to technology. But is this assumption, in combination with the rush to implement technology into the classroom, hindering students' future?

Globally, many teachers feel they have been asked to utilize computer devices, software applications, or other digital programs without proper training and do not feel comfortable with technology use in their classroom (Hyndman, 2018). With the implementation of devices for

every student, it is possible that some schools this is happening without proper training for the teachers or students. Research shows that frequent integration of technology devices or programs does not necessarily predict a teacher's continual use in the classroom and is more closely related to the teacher's motivation to use computer hardware and explore different computer software (Kim & Jang, 2020). While there are ways to help teachers ensure their students are actively participating in higher-level thinking with technology such as the Substitution Augmentation Modification Redefinition (SAMR) Model, it is an additional task for teachers when implementing technology devices or programs in the classroom. The SAMR model is a four-tiered approach designed by Ruben Puentedura (2013) to assist teachers in deciding which level of technology to use to add to a lesson, ranging from the lowest level of substituting an electronic document for pencil and paper to the highest level of redefinition, allowing for creations of new tasks with the hardware or software (Hamilton, Rosenberg, & Akcaoglu, 2016). Again, while this is an extremely helpful model to educators, it can be a daunting undertaking for those who are not already tech savvy.

The previously mentioned flaws in assuming that because students are digital natives, they are all tech savvy; however, the problem is they may be tech savvy on a device that is different from the one being used in the classroom. This is a problem because the students may have an understanding of some devices, such as a cell phone or tablet, but that skill may not be transferring to the classroom or later on their careers when using a desktop and various software programs. Another key factor which comes into play is a lack of access to devices at home for some students. Based on the studies conducted, there has not been a consensus on whether home access to hardware devices has a positive impact on a student's reading comprehension and

grades, but a positive impact has been demonstrated on the students' computer skills in school (Fairlie & Robinson, 2013; Gubbels, Swart, & Groen, 2020).

Purpose of Study

The purpose of this study is to examine how junior high and high school business and technology teachers perceive students' familiarity with technology and technology skill levels prior to entering a business course. This study recognizes that there will be varying individual interpretations on how students are affected by their device use in and out of the classroom. Factors that were taken into consideration were encouragement of device and software use by the school district, grade level at which students are expected to begin using technology in school, grade level at which students are expected to use technology in the classroom on a regular basis, and teachers' perception of students' technology skills with both hardware and software.

Research Questions

The following research questions were developed to collect information about teachers' perception of student technology use and understanding.

1. What does technology education look like for students today?
2. How are students expected to utilize technology in the classroom?
3. Is technology education taught prior to or during the time students are expected to actively engage with technology in the classroom on a daily basis?
4. Does the assumption that digital natives have developed technology skills prior to coming to the 6-12 classroom lead to a demonstrated skill gap for today's students?

Significance of Study

With more schools transitioning to become one-to-one schools utilizing laptops, tablets, or Chromebooks for each student, as well as the shift to e-learning by many schools due to

COVID-19, an understanding of students' technology knowledge and skills is becoming even more vital. Analysis of the teacher perception in this area could lead to better teaching practices concerning the development of basic technology productivity skills in students. Ideally, skill development would occur prior to requiring students to use computer devices for assignments on a daily basis.

CHAPTER II: LITERATURE REVIEW

Technology in the classroom is a deeply researched subject area. The literature outlined in this review address the studies directly related to teachers' perception of student basic technology skills in the classroom.

Attitudes toward Technology in Education

According to a recent study, 100% of the participants reported using a computer in their education at least weekly and 93% indicated they were used daily (Carver, 2016). Many teachers feel a push from administrators and even state legislature bodies to integrate computer software and hardware into their lessons. Purchasing the devices is only one aspect of implementing technology into the classroom, yet at times there seems to be no vision applied towards what device is best for the school district and students. Some teachers who implemented the devices rolled out by their administration have later banned the device or left it on a cart unused because they felt it was more of a distraction rather than educational (Tucker, 2019). Negative teacher attitudes lead to the assumption that some educators may be using computer hardware or software in the classroom simply for the sake of using technology, regardless of whether or not it adds value to the lesson. If this push is made by administrators as opposed to teachers, this could have negative ramifications. According to a study by Blackwell, Lauricells, and Wartella (2014) of early childhood educators serving children 0-8 years of age, the positive effects of technology are lessened when a teacher's confidence is low with use of the device or application or their attitude toward the tools is not positive.

Student Comfort Levels with Technology

A study published by Akçayır, Dündar, and Akçayır (2016) on digital native status investigated whether basic student demographics played a part in their comfort levels of hardware and software use. The participants of the study consisted of 560 students from two different universities. A questionnaire was used to find the demographics of the students, amount of time spent on technology use, years of experience with technology, types of devices used by the students, and the level of expertise with technology. The survey results indicated that there was not a large difference between male and female participants. While the differing genders may have different interests with specific software, hardware, or other digital applications, it did not affect the amount of time or experience they had using the technology tools. However, their school year level demonstrated a difference in results, indicating the amount of education significantly increased the comfort level of students and increased their digital native status. A student's area of study did not seem to have as much of a correlation; however, there seemed to be a difference between the two different universities where students attended. Finally, the study found that students who spend more of their leisure time on electronic devices (cell phones, tablets, etc.) were more likely to be competent with devices.

While many students spend leisure time on the computer or other technological devices, many times they are not being taught to utilize the device applications in a way that will benefit their future education or careers. When students enter the workforce, they are finding that they are expected to do tasks with various productivity software to carry out workplace responsibilities. However, these are not skills they inherently learn through their leisure uses of hardware or software. Employers are voicing a concern related to the proficiency level of technology use in students following their education. While students may feel comfortable using

devices such as a cell phone or tablet, they are not developing technical skills that are beneficial to their future employment, such as an inability to locate, organize, and evaluate information from multiple sources, limited ability to locate information to solve workplace problems, and an observed ineffectiveness with the use of computer software. (Sparks, Katz, & Beile, 2016). A concern for student comfort levels with technology is not a new concept as an older study by Keengwe (2007) previously addressed the relationship between integration of computer devices in classroom instruction and students' perception of improved learning related to technology integration. Keengwe's study found that the top uses students felt comfortable with at that time were Internet usage, email, and followed by word processing software (such as Microsoft Word) for personal and educational use. However, teachers rarely implemented publishing, content specific software, imaging devices, or discipline devices.

A student's overconfidence in their perceived comfort levels with technology can lead to other types of issues in the classroom such as attempting to multitask during classroom instruction time. One study by Wood et al. (2012) found that while many schools are implementing the use of technologies in the classroom, it may actually be hindering students. The students tend to use the technology as a multitasking device, causing more distraction than learning. The study found that the increase in time for multitasking demonstrated lost time from switching back and forth between the various tasks. The study also found that students who learned without these distractions were able to fully learn the material being taught and apply it flexibly to new situations. However, subjects in the study who participated in multitasking activities were not able to apply the new information to new contexts, though it did not seem to affect their ability to obtain the factual information of the lesson.

Negative Impacts of Technology in Education

The United States is not the only place taking an interest in the effects of computer hardware and software use in the classroom for students. A Dutch study of 15-year-old students provided findings that may influence educators worldwide to rethink their approaches to technology. This study found that granting students access to their own devices such as e-books, tablets, and laptops in the classroom was associated with lower reading performance. This is not to say that all device use in the educational world is negative. The study also found that the way in which a teacher implements the device into a lesson determines a positive or negative outcome for the laerners (Gubbels, Swart, & Groen, 2020). Utilizing technology devices in education can greatly improve learning when individualized learning is used. However, as published by the Organization for Economic Co-operation and Development, unnecessarily increasing screen time is where the negative effects occur. In adolescence and young adulthood, loneliness, poor attendance, and lower grades can be associated with the excessive presence of hardware devices in learning environments (OECD, 2015).

In addition to these negative effects for students, there are also negative implications for the teachers as well. While cheating in education is not new, it can be easier for students to do with the use of hardware devices. A recent study by Burnett, Enyeart, Smith, and Wessel (2016), showed that while cheating decreases in college compared to high school, those same college students admitted to cheating more frequently in online courses and with hardware devices such as computers and cell phones. While students reported an understanding that these methods would constitute cheating, they would often not report this type of cheating if they had witnessed it.

Need for Computer Education

As of September 2020, the Bureau of Labor Statistics indicates rapid employment growth in professional, business, and scientific occupations due to continued technological advancements (Bureau of Labor Statistics, 2020). Despite this growth in the world of employment utilizing both computer hardware and software, awareness—let alone rigorous training on how to use computer hardware, software, and productivity tools—is lacking in K-12 education programs across the United States (Lee, 2020). With an obvious need for these skills at the career level, the next question would be related to when these skills should be implemented in education. This may seem counterintuitive to the comments made earlier in this review, especially in relation to the statements of negative effects of overuse of hardware devices for children. But the reason for this response is due to the fact that children in some parts of the world are growing up in a technology-driven environment. A recent study showed that approximately twenty-six percent of adolescents were at risk of becoming addicted to their smartphones (Lee et al., 2016). While the study by Lee consisted entirely of high school aged boys in South Korea, it can still shed light on the early cell phone usage for children in other parts of the world.

Summary

Technology in the classroom is obviously a vast subject. This review only covers a small subsection of the information and research available on a broader topic. There are several key points that resonate after a thorough analysis of the literature. The first being, that while there is information available related to technology devices in the classroom, there is a gap in the research concerning the usefulness of it in the classroom. Teachers have taken notice and feel that there needs to be more research to show the evidence of a device's effectiveness; however,

some administrators are on the opposite end of the spectrum and widely approve of computer device usage in schools, finding its only downfall to be the price to implement.

In addition to understanding teachers' and administrators' views on technology, it is vital to consider students' perceptions. While students of today fall into the digital native category, they have varying levels of comfortability in relation to hardware and software use. A student's demographics do not seem to play a part in their level of comfort with the use of hardware. While there may be shared interests, it ultimately did not cause a specific group of students to demonstrate more or less comfort with hardware or software use. In adult students, those that spent more of their leisure time on technology devices ranging from cell phones to computers, were more confident in their device usage at school. The school that the student attended played a bigger role in their success with technology. How devices are used in their schools, also determines a student's comfort with technology. On the other hand, research shows that digital natives can also experience an overconfidence in their abilities. This demonstrates itself in the students' attempts at multitasking. While students feel that they can multitask easily with technology, by switching between software programs on a computer and even switching devices by checking messages on their phone, they are in actuality performing much slower and understanding much less than those students who do not participate in those types of multitasking activities.

Now that hardware devices have been accessible by most students in the classroom for some time, more research is appearing on the negativity technology can have on students' health, grades, understanding, and even ethical positions. When all students have access to hardware devices in the classroom, they are performing worse than those who do not. Prolonged exposure

to excessive technology use is also leading to attention deficit and hyperactivity in adolescent and young adult students. In addition to these side effects, cheating has been increasing with the use of hardware devices in the classroom, and the moral stance on cheating has lessened. Some students demonstrate fewer reservations toward cheating and cheat more freely with hardware devices.

Even with these negative connotations, technology is not an inherent evil that must be avoided. If computer hardware and software are employed correctly, they can benefit the students greatly. In fact, technology is not going anywhere, and students should be prepared to use it. In the realm of technology, there are many opportunities for students with computer science skills. Students in the United States live in a world of overwhelming technology. At this point, K-12 students have only lived in a world crowded with various devices and applications. In order to be successful in their future careers, they need to be properly prepared with computer knowledge and skills during their education.

Going forward, the research outlined focuses on the perceptions of junior high and high school business and technology teachers on students' technology use and competence prior to entering the business classroom. The reason business and technology teachers were chosen is due to their knowledge of the computer industry and their understanding of career requirements in business and technology. This will include their perception of how hardware and software are being implemented in their schools, when students are expected to use technology for assignments regularly, any demonstrated gaps in technological skills by the students, and causes and effects of these skill gaps in students.

CHAPTER III: METHODS

Research Design

This study used a qualitative method approach to determine teachers' perceptions of student technology use in the classroom. A semi-structured interview was conducted with junior high and high school teachers who teach business and technology. These study participants were not selected based on their location or region, but simply the subject in which they teach and the age group of their students. The responses were organized into categories based on common themes.

Research Setting and Participants

Approval was obtained from the Illinois State University (ISU) International Review Board (IRB) in May 2020 and the interviews of this study were conducted in July 2020. The participants were selected from a social media page where business and technology teachers across the United States can connect virtually; participation was voluntary. Three junior high and three high school teachers participated in the study. The subject sample size was kept small to keep an evenly matched number of junior high and high school teachers, as well as to allow for analysis of in-depth answers to the interview questions. Of the participants, 66% had education beyond a Bachelor's degree, including one who had obtained a Master's degree and Administration Certification. Females made up 66% of the participants and all teachers worked at a school in the Midwest with a student body of less than 2,500.

The participant pool was chosen using cluster sampling based on the age group that the teachers teach. Business and technology teachers were chosen because of their knowledge of hardware, software, and digital productivity tools and expectations of students in their age group. They were also chosen based on their professional experience or connection with the business

and technology industries. While computer hardware and software is used by more than just the business and technology teachers, these teachers could be considered the experts in this area in their individual schools.

Ethical Considerations

Most participants volunteered to participate in the study following a post made on the previously mentioned social media page; however, a few were sought out and asked individually based on the grade level they taught. Those that were asked individually could have felt pressured to participate in an attempt to support a colleague. The participants could have also felt hesitant to be fully honest with regards to the feelings of their administration or district toward technology. To circumvent these issues, the consent form stated that teachers may withdraw from the study at any time, as well as decline to answer any specific question they felt uncomfortable answering. Participants were also assigned a number, purposely omitting any personal identifying information, for the data collection process. Because of COVID-19 and the location of participants, all interviews were conducted through video conferencing. Participants had the option to not record their image, if desired. For those that did choose to display their video, only audio was recorded at the end of the conference. Names or any identifiable information were not shared via audio.

Instruments/Measurements

The instrument for this study consisted of a semi-structured interview questionnaire. One-on-one digital interviews were conducted with teachers by asking questions about their demographics and experience, and then the interviewer moved into questions about the teachers' perceptions of student technology device and digital application use in their classrooms and

schools. Some of the demographic questions were close-ended questions, for ease of data collection. The remaining demographic questions, as well as all of the questions related to their perceptions of technology use, were open-ended questions. This was to accommodate the investigative nature of this type of study. See Appendix A for the full interview instrument.

Procedures

Per the requirements of the Illinois State University International Review Board, consent was obtained from the administrators of the Business Educators Facebook page prior to asking for volunteers to participate in the interviews. Afterward, a request for volunteers was posted on the social media page in June 2020. Email addresses were obtained from those who volunteered and consent forms were sent. Of the volunteers, only three junior high and three high school teachers were interviewed. Upon receipt of the consent forms, a link was sent to the participants to schedule a time for their interviews. A video conference link was then sent to each participant. Before the interview began, participants were reminded that the video conference was being recorded and the process was explained related to how the interview would work. If the interviewee did not have any questions and still wished to proceed, the interview began at that time.

Data Analysis Procedures

The qualitative research method was used for data collection and content analysis. As is the case with many educational studies, this method was the best way to proceed as it lends itself to the interpretive and personalistic nature of this study (Stake, 2010). During this study, teachers were questioned on their perceptions of students' hardware and software use and skills, and data were analyzed based on their responses. Meaning was gathered based on the teachers' point of

view during the interviews; therefore, this qualitative method was the best way to analyze the data. Homogenous and purposeful sampling were used in order to curate the participants for this study (Creswell, 2019). In order to ensure the researcher was interviewing the subject matter experts, the participants were required to teach Business and Technology in either the Junior High or High School level. The participants were homogenous in their subject area, but they were purposefully chosen based on their students' age group. For the data collection process, six teachers were interviewed, with no specific connection to location or region, as they were contacted virtually through a social media platform. From the teachers interviewed, two teachers have two years of teaching experience, one has six years of experience, one has 14 years of experience, and two of the teachers have approximately 25 years of experience. While these teachers currently teach Junior High or High School, their past experience also includes Elementary and Community College levels as well. Two of the teachers are in their 20s, one teacher is in her 40s, and three teachers are in their 50s. The areas of degrees held by these teachers include Business Education (held by four of the interviewees); Business, Marketing, and Computer Education; Marketing Education; and Hospitality Management. Two of the teachers indicated that they had careers in business prior to switching to education. One of the educators held a Master's degree in addition to holding an Administration certificate (see Figure 1 through 6).

The one-on-one virtual interviews took place over the course of two weeks, based on the interviewee's availability. The interview questions took between 25 and 30 minutes to complete. While the interviewer asked teachers questions related to students' technology use, questions specifically targeted the age at which students are plunged into the technology world and teacher's perception of the skills students are demonstrating, or lack thereof, with that computer

hardware, software applications, and other digital productivity tools. Each interview was audio recorded and transcribed for data analysis. For ease of data analysis, the data collected from the interviews were categorized based on the teacher's answers.

During this analysis process, the subjects' responses were grouped together based on similar topics that were discussed across the six interviews. In order to do this, the transcribed interviews were reviewed and categorized based on the words and feelings of the interviewees. While exploring the data, it was discovered that there were several key points repeated throughout the multiple interviews. Meaning was gathered from this data by combining the subjects' responses into cohesive themes to better tell the story of what the junior high and high school business and technology teachers were observing in the students of their classrooms. These themes displayed throughout the interviews are outlined in the Findings section.

CHAPTER IV: FINDINGS

The purpose of this study is to examine how junior high and high school business and technology teachers perceive students' familiarity with technology and technology skill levels prior to entering a business course. The research questions were designed to

1. Determine what technology education is for students today;
2. Identify expectations of technology use for students in the classroom;
3. Determine whether there is an expectation for students to actively engage in technology regularly or on a daily basis; and
4. Determine whether the assumption of technical knowledge in digital natives leads to a demonstrated skill gap for today's students.

This study sought to determine if technology is being implemented at an early age, at times without adequate training for basic computer skills and online safety, and if this is affecting the students through a demonstrated skill gap. Based on the data analysis, results indicated that while many students are enrolled in a school that has implemented a 1:1 computing program (one technology device per every one student), there is often not any formal training on basic technology knowledge, skills, or online safety until later—or not at all. The students also demonstrate an inability to type efficiently. The results indicated that there is a presumed knowledge of technology hardware and software because the students are perceived as digital natives; however, in many instances that is not what is demonstrated in the classroom. Some teachers even felt that this was related to the fact that the school or district was a 1:1 school utilizing either tablets or Chromebooks.

Technology Education for Students

The implementation of technology for students differs by each individual school district. The participant answers were equally varying. Two of the participants stated students were introduced to desktop computers in elementary school, as early as kindergarten, two stated that technology devices were introduced in seventh grade, and the final two stated that technology devices were not implemented in the students' education until ninth grade (see Figure 7). Just as the ages of introducing the students to technology varied, so did the ways in which they were introduced. Students who were introduced to technology at the elementary level took courses such as Introduction to Technology or in a Library/Media combination class that only met once a week. One teacher stated, "the students have introduction to technology in the elementary school. There is a technology person who introduces the kids to different programs, but I can't tell you exactly which programs. She is a STEAM teacher, so she teaches in various areas." Another teacher stated, "In our district, they have IMC class, which is essentially integrated media learning in the library. They mesh library time with computer instruction. They start exposing them to desktop computers in kindergarten, but they do not have access to a login until second grade." While these required courses met once a week, they were integrated classes, meaning technology skill development was not the main or only focus. While these particular students may have been taught technical skills with computer hardware and software, the teaching of these skills do not appear to be a first priority. In both schools, the technology course is integrated with other subject areas. In one of the schools, the topics covered in the course are not shared with the upper level business and technology teacher, making it difficult to build on previous skills the students may have learned. With regard to the students that started technology courses in the seventh grade, these were not required classes, but the courses helped students

develop a deeper computer skillset. Examples of these courses include Computer Applications, Technology & Coding, and Keyboarding. One high school instructor stated that her students can "take a semester course with her as a Freshman, but they took typing classes in seventh grade including some basic tech and coding". The ninth grade courses were similar to the seventh grade. These courses were either electively chosen by the student or randomly chosen for the student by administration. The courses covered such topics as Digital Citizenship, Microsoft Office Suite, and Coding. At one point during the interview, one instructor stated, "What's shocking to me is that it's only been a few years since they have had a technology class in the junior high. So when they see me as 14 and 15 year olds, that was essentially the first exposure to technology devices they were really getting. I don't think they had enough time to use it or grasp it." Yet another teacher stated, "We introduce them to technology in ninth grade with a particular class that we call Digital Tools. It covers digital citizenship, Microsoft Office, and coding. It is a nine-week seminar. Most students take the course, but it is not required." These teachers indicated that they were teaching some exciting topics in the realm of business and technology, but not all of the students had access to these courses at the junior high and high school level as they were elective courses for the most part. Based on the tone of the subjects, it was clear that they felt their students needed more training in the subject of business and technology in order to be successful with the use of computer hardware and software.

While these are the ages that students are introduced to computer hardware and software, the expectation for students to begin utilizing technology for regular use also varied. Regular use is determined as multiple times per week to daily. One instructor indicated that this is the norm for sixth graders, two stated this begins at seventh grade, and finally three stated it starts in ninth grade for their students. When asked to describe what this regular use of hardware or software

entails, the teachers gave varying responses including both hardware and software. These responses focused on what is expected of the students across all of their classes, not only the Business and Technology courses. One subject stated that her students are expected to use software and online applications regularly by the ninth grade, "it depends on the teacher as to what that looks like. There is a lot of work submission via Google Classroom, but it could be Ed Puzzle, a Gimkit, Google Slides, or Microsoft PowerPoint. It depends on the class what type of medium that would be used, but there would be some element of computer work involved." Another teacher stated, "the students are expected to complete homework with a computer/device by seventh grade in all core and elective classes. They do a lot of things through Google Classroom and we will be transferring over to Canvas. In English and Social Studies, approximately 60% of their assignments is technology based. Obviously in my business classes they are all technology based as I am in a computer lab." The most commonly mentioned device that students were expected to use was a Chromebook (five out of the six), while only one school was a Bring Your Own Device school—which means the students are able to bring their own devices in to complete assignments rather than the school providing a device such as with the 1:1 program. Three teachers mentioned the learning management systems their schools utilize: two use Google Classroom, the other uses Canvas. Half of the teachers mentioned Google Suite being heavily used by their students, two teachers mentioned slideshow presentations, and only one mentioned spreadsheet software being used regularly. Two teachers listed additional online-based sites and/or mobile applications also being used regularly by the teachers and classes at their school or district (See Figure 8). Based on these comments, students are utilizing computer devices to complete homework assignments regularly across multiple subjects by at least the junior high level. It is obvious that schools are embracing technology. There are several software

programs and brands of devices that are repeated across these interviews, even though they are used across multiple subjects. It appears that teachers may be using the same products to meet their needs, rather than potentially finding the best product (either hardware or software) to meet their needs.

One specific participant who worked at a district who was a 1:1 school with Chromebooks, indicated that they were in the process of implementing Office 365 so that their students can still include Microsoft products in their studies, in light of the COVID-19 pandemic and potentially implementing remote learning in the fall of 2020. He stated, "We're at an intersection where we are looking at a hybrid model, which I feel is crucial given that actual digital literacy comes from being able to adapt to a multitude of products." This teacher's definition of digital literacy was ultimately desired by the other study participants. It was heard in their voices and it can be seen in their curriculum. The types of skills being taught by the research participants can be broken down into four different categories: Introduction, Company Specific, Productivity, and Other. Under the introduction category, these students learn topics such as Digital Citizenship including cyberbullying, email etiquette, digital footprint and computer basics, such as computer hardware identification, virus/malware/virus protection, and file management. The two company specific items that students are learning in this study are Google Suite and Microsoft Office Suite. Some of the items in the production category could fall under one, neither, or both of the company specific items listed previously. These productivity skills include word processing, spreadsheet, desktop publishing, and slideshow presentation programs. Finally, the students also experience other tools and skills such as Gamestar Mechanic, Scratch, other coding programs, and online programs (See Figure 9).

Expectations and Frequency for Technology Use

There has been a strong "push" for technology use in education; in fact, two participants used that word specifically when asked the question related to how their district, school, or administration encouraged them to use specific hardware or sfotware in the classroom. Only two of the participants actually felt pressured to utilize technology (including both specific hardware and software) in the classroom. All teachers who specifically mentioned Chromebooks, also mentioned utilizing Google Classroom and Google Suite. Specifically, 66% of the participants felt at the very least obligated to use Chromebooks and Google Suite, 33% indicated they felt the need to utilize BYOD devices or computer labs, and 16% mentioned doing their best to use other hardware provided by the district such as Smartboards and document cameras (See Figure 10). Based on the feedback from the teachers, the ones that utilized Chromebooks in their school, they also frequently used Google Suite and Google Classroom because they work well together. This was also mentioned to be the case across the entire curriculum, not just their own classrooms.

In addition to the technology skills being taught to the students, the subjects were interviewed regarding the extent of Internet safety policies and procedures taught and utilized in their schools as well. Since students begin using technology devices at a young age, it is interesting to note exactly what procedures and precautions are being taken to protect students with this device for Internet usage, which is often provided by the school or district. Several teachers indicated that at the beginning of a semester or term, policies and procedures for Internet safety are covered with the students through various ways. One instructor indicated that it fell under his duties as the business and technology teacher; however, the courses taught by the business and technology teachers interviewed were not required (and the courses that were

required were not the ones in which they discussed this topic). Half of the interviewed teachers indicated that it was addressed across the different teams of teachers, both required and non-required courses. Since this is covered in multiple subjects, way teachers bring awareness to safety procedures can vary. One teacher stated, “It can depend on the teacher. For me, I try to spend some time at the beginning of the semester saying ‘these are my expectations’. Since I come from a business environment for 20 years before teaching, I tell them these are the things your boss would want. If you go to work at an Amazon warehouse or go to work in an office, these are the things that will be expected of you and these are my expectations for the classroom.” Finally, one teacher stated that she never addressed it in any of her courses, but rather it was addressed in a required ninth grade course (See Figure 11). At least at the junior high and high school level, it appears as if the students are coached on Internet safety precautions. Only one teacher felt that there were some students in her school that may not receive that information, since it was only covered in an elective course. However, even if the schools where it was covered throughout the school year in multiple subjects, it seemed that it was up to the individual teachers when and how it was addressed. This could potentially lead to some inconsistencies in the information that is presented to the students.

The policies and procedures the teachers referred to in the questioning above are primarily for student monitoring. However, several of the teachers also indicated that they have additional forms of invoking online safety for the students. The ways in which they accomplish this is through software monitoring (either by themselves or by other staff), use of a Firewall, and basic observation/walk-arounds during class time (See Figure 12). None of the teachers mentioned any monitoring that happens outside of the school walls. While the teachers and schools take advantage of popular software applications as well as traditional teacher observation

methods, this does not address what students are doing at home or when they think they are not being monitored. This also does not fully prevent students from attempting to use the Internet in unsafe ways or prevent them from utilizing it in negative ways, such as with multitasking during lessons as will be discussed in depth.

Assumption of Technical Knowledge

Finally, the participants were asked specifically about their students' skill level with technology. First, they were asked if they had observed any skill gaps with their students, either before they had taken the technology class or in some cases even after. One instructor felt that there was no gap; however, this instructor was the only one that felt this way. It is important to note that while his school was a 1:1 school with Chromebooks, they also heavily implemented Microsoft Office and he taught in a computer lab with desktop computers. His students were introduced to multiple brands of devices and software applications. Several skill gap issues were observed by the other participants during their classes. The first two are related to time management skills, such as students trying to multitask with the device (which in the end slows them down) and poor typing skills, causing them to spend much more time on their assignments than necessary. One teacher stated, "The students don't know the keyboards, but they are expected to type documents in a specific amount of time. The administration won't let us have a keyboarding class anymore. We've incorporated it, but we have found that kids have no idea how to type when they come into seventh grade despite the fact that each classroom has access to a technology cart station at the elementary schools in our district." With regard to issues with multitasking, another teacher stated, "the students think they are better at multitasking than they really are, and I struggle in class with their time management and perception of how much time they need to finish a project. They tend to spend more time on the device doing other things than

on the project itself, thinking they have the time for both. Then the due date comes around and they aren't done with their work. It's a struggle for them." Half of the teachers noticed an inability or low ability in transferring their skills either across hardware or software. One teacher felt this was due to the type of hardware the students were more comfortable with, stating "I think it depends on the student, but overall what I have been noticing as the years go by is just that they aren't super familiar with the computer itself. They are used to different devices such as a phone or tablet. They don't understand basic stuff about the computer such as programs or how to use the Internet." An inability to research or find reliable sources has been an issue for teachers; some specifically mentioned a simple Google Search was causing struggles in the classroom. One participant said, "Yes, there are absolutely skills gaps! I think primarily research skills. You would think these students would know how to research because are on their computers and phones all of the time, but they really don't know how to just use Google—how to find information and knowing which information is reliable." File management or even knowing how to save a file in the first place was an issue for 50% of the teachers in the study. From a business world perspective, it was noted that Excel skills were lacking. Specifically, Excel, as opposed to other spreadsheet programs, was mentioned as it is widely accepted in the business world. In fact, employees are expected to know how to do various tasks within Excel in order to be successful in the workplace (Formby, Medlin, & Ellington, 2017; Gossie, 2020). Finally, email and digital communication skills was specifically mentioned by one instructor—not knowing how to send an email as well as not knowing proper email etiquette when composing an email (See Figure 13). One educator stated, "they don't know how to put together a professional email. I get emails starting with 'hey'. Using communication skills within technology is lacking." When discussing these skill gaps, some participants volunteered their

opinions as to the leading causes of the gaps. The leading suggestion came from five of the six teachers and they indicated it was from an assumed knowledge in technology devices and software applications. The assumption is that simply because these students are born in the age of technology, they all know how to use it or adapt to use different forms of it. However, the teachers indicated that was not what they were observing in their classrooms. One teacher stated, "Usually this stems from the myth of them being digital natives, that they don't need to be taught the digital skills—which is not true at all." Another stated, "our gap is when they come into the seventh grade, there is too much assumption made that they know a lot already with relation to saving and file location. They also don't know the keyboard." Another teacher stated, "You hear people say this generation is the most tech savvy, but it isn't the kind of technology we have in our classrooms. They can use the phone and tablet better than I could, but it's because they have easy access to it and many teachers have the misconception that they don't need to teach technology skills. While some may argue that we should modify our teaching, that is not what the industry is doing. It is still highly pushed to use Microsoft Word and Microsoft Excel." The other repeated suggestion from two teachers was that the use of 1:1 computing with Chromebooks or heavily used Google Drive were leading to some of the issues related to the inability to transfer skills to other software platforms, saving files, and file management (See Figure 14). The participants of this study obviously feel that the skill gaps the students are demonstrating are significant and they had strong opinions related to the misconception that technology skill gaps do not exist in students today. While not all participants mentioned having an issue with overuse of a specific brand of device or software application, it was repeated during this process.

Participants also speculated what the impact of these skill gaps will be for the students, either academically or in their future careers. The skills that came up as the most concerning for students future careers were related to time management, specifically not being able to accomplish tasks in a timely manner because of multitasking and poor typing skills. One teacher said, “They are extremely slow typists and they aren’t used to typing.” Another said, “Since they are looking at their hands when they type, it is taking them longer to get work done.” Another concern was a fear for the students to continue to lose their work due to a lack of ability to save their files—even after several one-on-one attempts working with the students to solve this issue. There was concern about the students’ inability to search for reliable information: “They don’t know how to do searches to understand how to figure something out [in a program],” and “I feel like the research skills are important, at least going into the college level.” Primarily, the teachers were more concerned for the students’ success on the job as opposed to how these skill gaps will affect them in school. “I think it is going to be more so a long-term impact where they are thrown for a loop by a future employer where they are required to use a software they are not used to.” Other teachers echoed the same concern, “beyond academics, every job uses technology now. The mechanic who is fixing your car is typing into a computer what they are doing.” “For a business major, not having those spreadsheet skills will affect you.” Overall, these teachers are concerned what these skill gaps mean for their students academically, but more importantly in their future careers. These business and technology teachers strive to teach their students skills that will help them in the workforce after school, but their fear lies in an inability to adapt to different computer devices, software applications, or other basic technology skills such as typing speed and file management.

The teachers also had positive comments about their students' use of software as well. When asked about a time when they were impressed by a student's ability to use technology, the answers fell into two categories. The first category was related to the student body as a whole. The business educators have been impressed with their students' social media understanding and abilities, as well as their creativity in areas such as graphic design and video production. The other category of scenarios the teachers shared were geared toward specific students and their individual skill sets. In this case, teachers were impressed when they saw students demonstrate a high level of skill in Microsoft Word, Microsoft Excel, and the internal workings of the computer hardware such as understanding the function of the motherboard and where it is located. The comment that was echoed behind all of these scenarios, regardless of whether the teacher was referring to his or her students as a whole or individual ones, was that the impressive skill was honed from familiarity with the program or device. While the students felt that the students' familiarity with phones and tablets at home led to a misconception of aptitude across hardware and software, they felt that there were some positive effects from the easy access to these types of devices as well. One teacher said she realized she was "woefully behind on what is cool or 'happening' when her students were working on social media projects in Marketing." She said there were several occasions where her students inspired her with their ability to navigate their way around YouTube and social media platforms.

On the flip side, there were interactions with students where the teacher was disappointed in a student's technology skills or knowledge. There was one participant who indicated observing an increase in cheating with the use of a device. The participant would have been impressed with a student's "hacking" ability used to cheat if it was used for a different purpose. This teacher found it disappointing that the students did not have the accountability or integrity

to be ashamed or desire to use their abilities in a different way. Two of the teachers reiterated the issues they have had with students saving incorrectly or not at all, even after in depth one-on-one tutorials, reminders to the entire class, and extra efforts from both teachers. Finally, half of the teachers felt that a lack of knowledge or skill, in addition to the lack of motivation was extremely disappointing. They felt that the students coming to them simply had not had an in-depth exposure to productive software skills and when they tried to learn more difficult concepts, those students really struggled. One teacher said, "We have some poorer students who don't have a computer at home, some don't even have electricity or running water. Those are the ones that are extremely behind, especially in typing where they are only typing nine words per minute. It is hard to teach those students in the same class as the one who is really interested and picking it up quickly, whereas these students are starting from base one." In addition, those students who did not demonstrate a motivation to learn with the software, whether they had prior experience or not, also fell behind. One subject stated, "I notice a lack of motivation, there are students who can give their best efforts, but don't. Coming more from laziness to be blunt." These teachers exhibited frustration with their students' unwillingness to try to improve their skills due to the students feeling they did not need these skills. The teachers were referencing students who feel that their skills on a tablet or cell phone are sufficient for their future careers.

Summary of Results

In summary, this sample group of business and technology teachers had experience with their students learning about hardware and software at varying ages and to varying degrees. There is no consistency with the technology education for children across these districts. While some schools introduce technology in early elementary grades, there is not formal training until at least sixth grade, but usually later in seventh or ninth grades. The schools were fairly

consistent in that they either were currently, or in the process of becoming a one-to-one school using Chromebooks. Through this program, the students are expected to complete assignments with the device, even though the students have had little to any technology education in some cases. These teachers all teach technology; however, none of them teach a required technology course. They teach elective courses such as Digital Citizenship, Computer Basics, Microsoft Office Suite, Google Suite, word processing, spreadsheet, slideshow presentation, desktop publishing, keyboarding, Gamestar Mechanic, Scratch, coding, and some online programs. In required courses that are taken by students, they utilize Chromebooks or Bring Your Own Device, Google Classroom, Canvas, Google Suite, Microsoft Office, slideshow presentations, spreadsheets, online based programs, and mobile applications.

With the technology devices provided by the district, teachers felt a push to utilize the device or a software associated with that device, although most teachers did not feel pressured by the administration to use the technology. Teachers indicated the bulk of the device made available to them involved Chromebooks, Google Suite, and Google Classroom. With this use of school devices, there should be a concern as to whether students know how to employ the technology tools safely. The bulk of the teachers indicated safety procedures and policies are covered across the students' required curriculum, including in their own elective courses. However, there was an instance where it was only covered in their non-required class and another instance wherein it was not covered in the business or technology courses, but it was covered in a required introductory course that all students take. The teachers also indicated there were varying ways in which this safety was enforced for the students. Half of the teachers at least had access to monitoring software programs to assist in this, but other forms of safety

precautions included utilizing the Firewall, and utilizing walk-arounds and personal observation to monitor safety.

Despite the implementation of technology devices at an early age, 83% of the teachers felt that there was indeed a skill gap demonstrated in the students' technology knowledge and abilities. The teachers noticed a lack of ability in the following skill sets: multitasking with their device, poor typing skills, research skills, transferrable skills from hardware and software programs, saving files and file management, Excel (specifically Excel as opposed to other spreadsheet programs because it is what is widely used in the business industry), and email and other digital communication. Some teachers suggested a possibility for the cause of these gaps. Some mentioned the push to use Chromebooks and Google Drive as a major cause because it does not require students to save their work. Another possibility mentioned is that students become familiar with using the same device or software program every day and do not tend to explore other software types. While some felt this was a cause, it was overwhelmingly suggested that a larger issue is the assumed abilities of digital natives. The teachers felt that there is a general belief among the public that as digital natives, students do not need to be taught how to use technology efficiently, effectively, and safely. Therefore, they are not.

Teachers went into detail regarding their disappointment related to these skill gaps displayed by the students, in addition to others such as cheating with a device. Not only was there an issue with cheating, but there was also a lack of remorse related to the act of cheating or using the technology devices to cheat. The student behavior mentioned circumventing testing environments to search for answers. These students did not feel ashamed when caught in the act and continued to do it ever after being caught. An additional disappointment was related to a lack

of motivation in the students to learn more about computer hardware, software applications, and digital productivity tools. There is a lack of desire to transfer any skills the students have developed from other tools and applications they are accustomed to such as their cell phones and tablets.

In the classroom, there can be just as many exciting and impressing moments portrayed by students as there are disappointing ones. The teachers showcased their classes as a whole on their abilities to work with social media and display creativity in areas such as graphic design and video production. When recognizing students individually, teachers mentioned skills in areas such as Excel, Word, computer hardware, and internal workings of a computer. Regardless of whether the participants were referring to their entire student body or an individual student, they mentioned that some students were overtly familiar with that software or hardware, which led to the students' enhanced abilities in that specific area.

CHAPTER V: DISCUSSION

Summary of Findings

After analyzing the data, this topic of teachers' perception of student technology use needs to be addressed and needs further research. While at first glance it seems that adding devices to the classroom would only enhance the learning experience, this study indicates that this may not always be true in all instances.

Some of the results of participant's comments in this study confirm results of other studies concerning the use of technology in the classroom. Studies report that school administrators are often the ones who are most excited about devices in the classroom and that is where the push tends to come from for educators (Tucker, 2019). Specifically, there has been an increase in the use of school funds to purchase devices for student use at home. This is despite the fact that there is little evidence demonstrating a positive relationship between home computer access to improved academics (Vigdor, Ladd, & Martinez, 2014). At other times, teachers lack confidence in their abilities to utilize the devices the district would like them to use (Blackwell, Lauricells, & Wartella 2014). While the business and technology teachers in this study indicated a confidence in the use of computer hardware and software, their peers in core classes may not feel the same.

The teachers in this study also indicated that students try to multitask regularly, when in reality they are slowing their productivity rather than helping. This aligns with the study that demonstrated the lost time when switching back and forth between various applications on the computer and even different devices (Wood, et al., 2012). Often this idea to multitask while completing assignments on a device stems from an overconfidence with technology (Keengwe,

2007). With this study, it was found that students were introduced to computer software at early ages, but not trained to use the software until later. When the students are then placed in a technology course, they do not realize that their skills with tablets or cell phones are not automatically transferrable and they do not realize that they are lacking any skills—demonstrating this overconfidence in their own skills. This overconfidence could potentially be the cause of the lack of motivation and desire to learn more about technology described by the participants in this study.

This study also discovered heavy usage of one-to-one computing programs, specifically with Chromebooks, even with this small sample size of teachers. The ones that were not currently 1:1 schools with Chromebooks, were already in the process of becoming one in the coming year. This is in spite of the research found that granting students access to their own devices has shown lower reading performance (Gubbels, Swart, & Groen, 2020).

One teacher in this study indicated an issue with cheating in her school with the use of technology devices. She also stated that the students involved did not seem to experience any ethical dilemma about their decision to cheat. This coincides with the study wherein college students indicated a tendency to cheat more with a device as well as a lack of urgency to report others who do the same (Burnett, Enyeart Smith, & Wessel, 2016).

Reiterated by the teachers across the study sample was the desire and need for additional technology education for their students. They felt that although their students were considered "digital natives" they still needed to be educated on computer hardware and software as it is not an inherent skill within us as humans. While students are gaining access to cell phones and other devices at earlier ages at home, it does not necessarily mean the students know how to take any

of those skills and transfer them to hardware or software that would eventually be required of them in their future careers and even in their education, present and future. One instructor specifically mentioned a fear that the students leaving their particular school would not be prepared for an Accounting program in college because they would be expected to be familiar with Excel. The students at that school would not be prepared to succeed in an Accounting program upon graduation, despite being enrolled in first and second levels of high school Accounting courses.

Using technology just for the sake of using technology is not the best route to take, educators should strive to be intentional with hardware and software use just as they are with other aspects of their lesson planning. If students are given the best opportunities to use computer hardware and software, taught how to use different types of hardware and software, and taught how to transfer that knowledge elsewhere, technology can greatly improve the future careers and lives of students.

Addressing the Research Questions

The attitudes and perceptions of the teachers interviewed in this study can address the research questions posed. The teachers interviewed in this study had mostly consistent thoughts and opinions. Analysis of the answers provided during the teacher interviews resulted in the following areas for improvement.

1. What does technology education look like for students today?
2. How are students expected to utilize technology in the classroom?
3. Is technology education taught prior to or during the time students are expected to actively engage with technology in the classroom on a daily basis?

4. Does the assumption that digital natives have developed technology skills prior to coming to the 6-12 classroom lead to a demonstrated skill gap for today's students?

Outlined below are summaries of the collective answers to the research questions supplied by the teachers in this study.

What Does Technology Education Look Like for Students Today? Technology Education varies from school to school. While the bulk of students referenced in this research have exposure to software applications from an early age, not all of them have the opportunity to learn how to use software productivity skills at that same time. Some of the students have the opportunity to take a class with a business or technology teacher in elementary school approximately once a week. While others do not take a course where they learn how to utilize technology effectively until junior high or high school. As technology courses are typically elective courses, not all students will be enrolled in those courses at the junior high and high school levels.

How Are Students Expected to Utilize Technology in the Classroom? Students utilize technology devices and programs at an early age and are expected to use them on a regular basis across many subjects. The students use a variety of software programs, but the majority of students are familiar with Google Classroom and applications in the G Suite. In the Business and Technology classrooms of the research participants, students are expected to utilize more than just these programs and websites. The students get the chance to explore other options in those classrooms, but as indicated they may not get that opportunity until later in their education.

Is Technology Education Pushed when Students Are Expected to Actively Engage with Technology in the Classroom on a Daily Basis? Based on the information shared by the

subjects of this study, educating today's students on using devices efficiently and safely is not a priority at an early enough age. Many of the courses where students learn this material is either an elective course, or it is not re-enforced strongly enough because the course only meets at most once a week. However, the students are still required to use technology devices for assignments on a regular basis, despite the little to no technology education the students receive.

Does the Assumption of Technical Knowledge in Digital Natives Lead to a Demonstrated Skill Gap for Today's Students? The Business and Technology teachers of this study mostly indicated there were various skills that were lacking in their students upon arrival to their classroom. The teachers felt that the students should be able to complete basic technology tasks such as saving and locating files and utilizing search engines to locate useful and reliable data. While the students have the opportunity to better develop these skills in the classroom with the Business and Technology teachers, not all students are enrolled in those classes and as a result, they do not have an opportunity to develop technology skills prior to graduating high school.

Limitations

Limitations of this study include the sample size. With the qualitative method application and the research team made up of one member, there was a small limit on how many teachers could be interviewed. While there were initially more than six potential participants who volunteered to participate, not all returned the consent form and one person was forced to cancel due to a family emergency and could not reschedule.

All interviews were conducted using video conferencing software, so some potential participants who initially demonstrated an interest, may have felt hesitant to participate upon

discovering that aspect of the study. However, participants had the option to not include a video image with their interview if it made them feel more comfortable. As stated in the consent form, the participants were also able to choose to not answer any question they felt uncomfortable with or they could choose to drop from the study at any point, even though their video and audio footage was not being shared as part of the research.

Being the only member of the research team, there is always a possibility for biases to come through with regard to technology in the classroom. To counteract this, leading questions were avoided when creating the questionnaire and the questions were reviewed by objective outsiders prior to preparing to interview the participants.

Finally, this study was conducted during the COVID-19 pandemic, which could have skewed some of the responses had they been asked a few months prior or even some months into the future. Some of the teachers indicated that their schools had made a big switch with the use of technology devices out of necessity in recent months so that students could participate in remote learning. It is unclear whether the changes being made because of the remote learning through this time period are going to be beneficial or detrimental in regard to the type of device and application program use mentioned in this study.

Implications for Future Research

While preparations for this study were being implemented in the spring of 2020, the study truly took place over the course of a month in the summer of 2020, when decisions had yet to be made about fall classes for many schools because of the pandemic. Another study of this nature on a much larger scale, in addition to adding the teacher's location to the demographics would be useful to gain further insight into this topic. It would also be beneficial attempting this

research again in the future after some changes have been finalized in relation to COVID-19. While most schools have made plans for the fall at this point, many are stating they are "flexible" and willing to adapt, which means there could be several more changes this coming semester. Completing further research into this area of study right now would likely be inconclusive and it would be better to wait until some issues have settled for teachers, administrators, and school districts.

Furthermore, a longitudinal study of a school that has yet to implement one-to-one devices but who are planning to in coming years, could give results that lead to deeper understanding of how this affects the students over time and whether the perceptions displayed by teachers in this study are in any way related to the specific device used by the school. It would also assist the school in deciding whether a specific brand of device such as iPads or Chromebooks is being utilized in the way they had hoped. It could also discover areas in which teachers could use some professional development and/or training to better implement the usage of the device(s).

Another topic that could be considered for additional research would be to choose two different school districts. One would be a school/district that implemented technology at a young age, along with thorough technology instruction and compare it to another school/district that did not teach the students technology productivity skills, such as those mentioned throughout this study. This could also be a longitudinal study or simply an interview of graduates who have been in that same district/school throughout their entire educational experience to see how their skills have transferred to the world outside of education.

Recommendations for Future Practice

Based on the analysis of the data from this research study, there are some recommendations for future practice. These recommendations are intended to utilize hardware and software in the best way possible and for students to get the most benefit from that specific form technology.

Recommendation 1: Finding the Correct Device While one-to-one programs are good in theory, it seems that there may not be much thought put into what is the best way to implement it into each individual school district. This thought stems from each teacher interviewed in this study from schools utilizing a 1:1 program: they were all using Chromebooks. In this study, Chromebooks were widely used and accepted as the device of choice. This could likely have to do with the affordability of Chromebooks when buying on a large scale for a school or district. However, there are many ways in which a budget friendly laptop of another brand could potentially be more beneficial to the students and the school district. The decision on what type of technology device to purchase for a school should be based on thorough research. Some questions a school should consider for the type of device they wish to purchase include:

- In what way will the device(s) be used?
- Does every student need access to the device(s)?
- Do the students need access to the device from home?
- Would a device cart in each teacher's room meet the technology needs of the students in the school?
- Does each teacher or subject need the exact same device (e.g. tablet for a hands-on course that utilizes data collection mobile applications versus laptop for a class that spends more time writing essays)?

- Would having fewer, but higher quality devices be more beneficial to students (e.g. two or three high quality computer labs that all have access to, as opposed to cheaper products for each individual student)?
- What can the school or school district afford to spend on the technology device(s)?

Considering these questions can assist schools in determining the best option for the teachers and students.

Recommendation 2: Teach Students Technology Skills The biggest take away from this study is to avoid believing that because these students are digital natives, they do not require the expertise of a technology educator. That would be the same as assuming children born in the United States, do not need to be taught the English language or any history lessons about their country because they would inherently know that information. While children would gather some of this information on their own without formal training, they would only be scratching the surface of understanding. The teachers in this study were most impressed by students who had found a hobby in technology device or software program and had the opportunity to become familiar with a program or even hardware by exploring with their own interest. Skills that should be taught to the students early and often include touch typing, digital citizenship/safety, and productivity programs such as word processing, spreadsheet, slideshow presentation, and perhaps even desktop publishing. These productivity programs are listed simply because students are currently being expected to complete assignments using these productivity software tools. It is unfair to expect students to teach themselves how to use technology devices or software programs when they are expected to use these items to complete assignments so often. This is likely why so many of the students fall back on the exact same programs, because they have already familiarized themselves with specific tools and can mindlessly complete the work—

which in a sense defeats the purpose of using the device or program to implement higher learning in the lesson.

Recommendation 3: Professional Development Finally, professional development or other training for educators on ways to implement technology devices and software applications in a way that enhances the education is vital. With this training, it would be crucial for educators to learn tools that are age appropriate for their students and can be used for lesson enhancement, not busy work. A first grade student should not be expected to complete math homework on her own with a tablet. Students at this age level are still in the learning to read stage of their education, and not quite to the point of reading to learn. Expecting them to fully grasp the concepts laid out before them, as well as complete the task in a digital format is a lot to ask of these students. While this seems like common sense, if a teacher is not pointed in the right direction for what is age appropriate and what is geared toward their students' needs, they are forced to look into the vast expanse of devices and/or programs available and use what they can find—typically whatever is free or cheap.

Conclusion

In conclusion, the issue is not related to a lack of devices or software or even a willingness to use technology by teachers or students. The issue lies in the fact that perhaps technology is overwhelmingly used and modern day society is so relaxed in its ubiquitous nature that schools do not take the time to teach how to utilize technology hardware and software effectively in the classroom. The ones who ultimately suffer from this downfall, as usual, are the students. The students have been assumed to be digital natives, and therefore, they are not taught technology skills. While the students currently do not realize their lack of inability because of an

overconfidence in their skills with devices such as cell phones and tablets, these students could benefit from some education with other devices which will assist them in their present and future academia as well as their future careers. By giving in to the idea that they do not need to learn this information, it is a disservice to the students. The goal for educators is, and always has been, to give the students the best education they can receive so that when the time comes, they can be successful members of society. As technology will remain a constant in students' lives, it is important to teach the students to use those technology devices and software applications to their fullest potential. The responsibility to teach those skills falls on schools. Schools can meet that responsibility with proper training for the teachers, proper training and technology education for students, and the use of quality computer hardware and software.

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APPENDIX A: FIGURES

Figure 1

Participant 002 Demographics

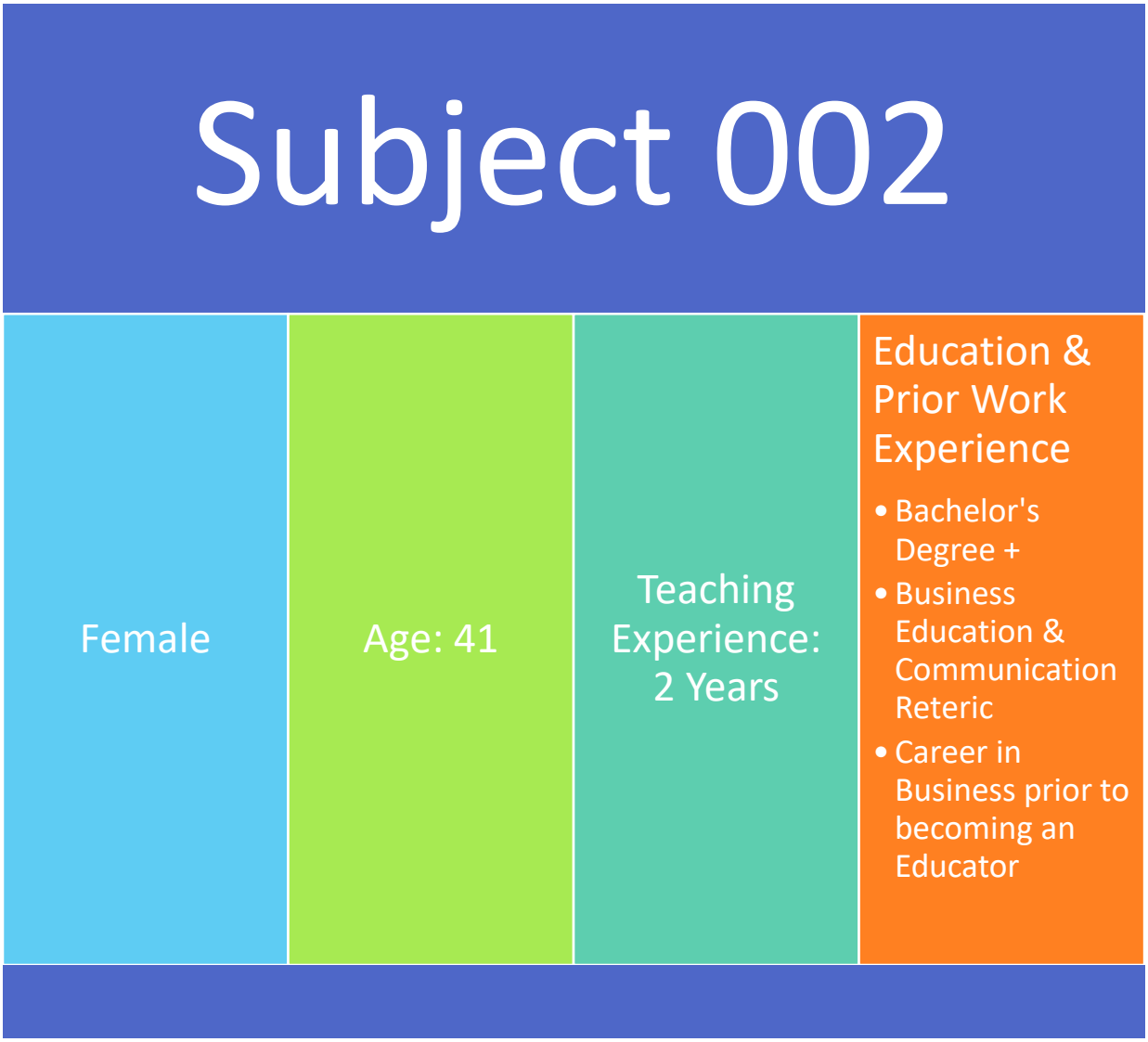


Figure 2

Participant 009 Demographics

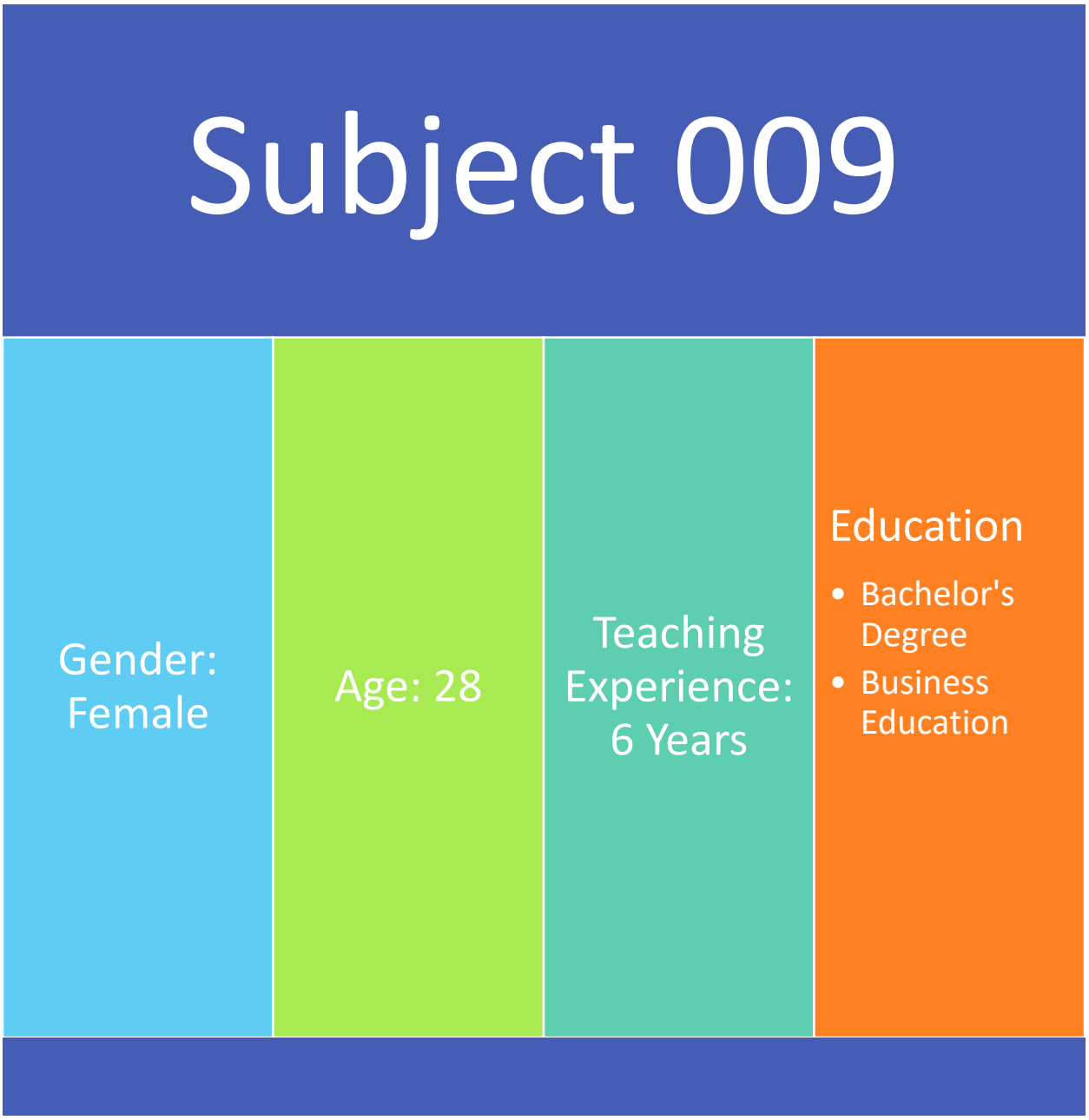


Figure 3

Participant 013 Demographics

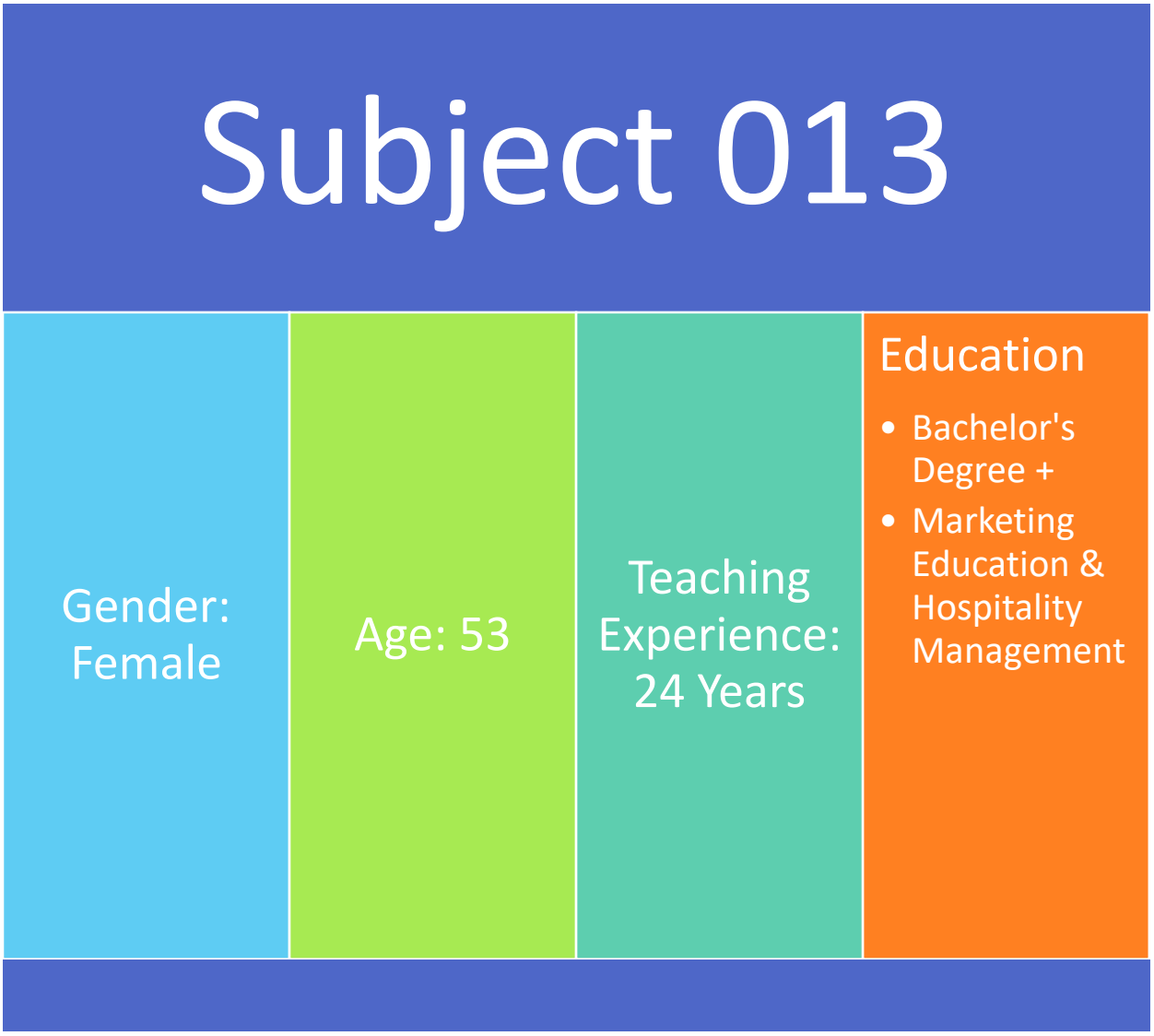


Figure 4

Participant 014 Demographics

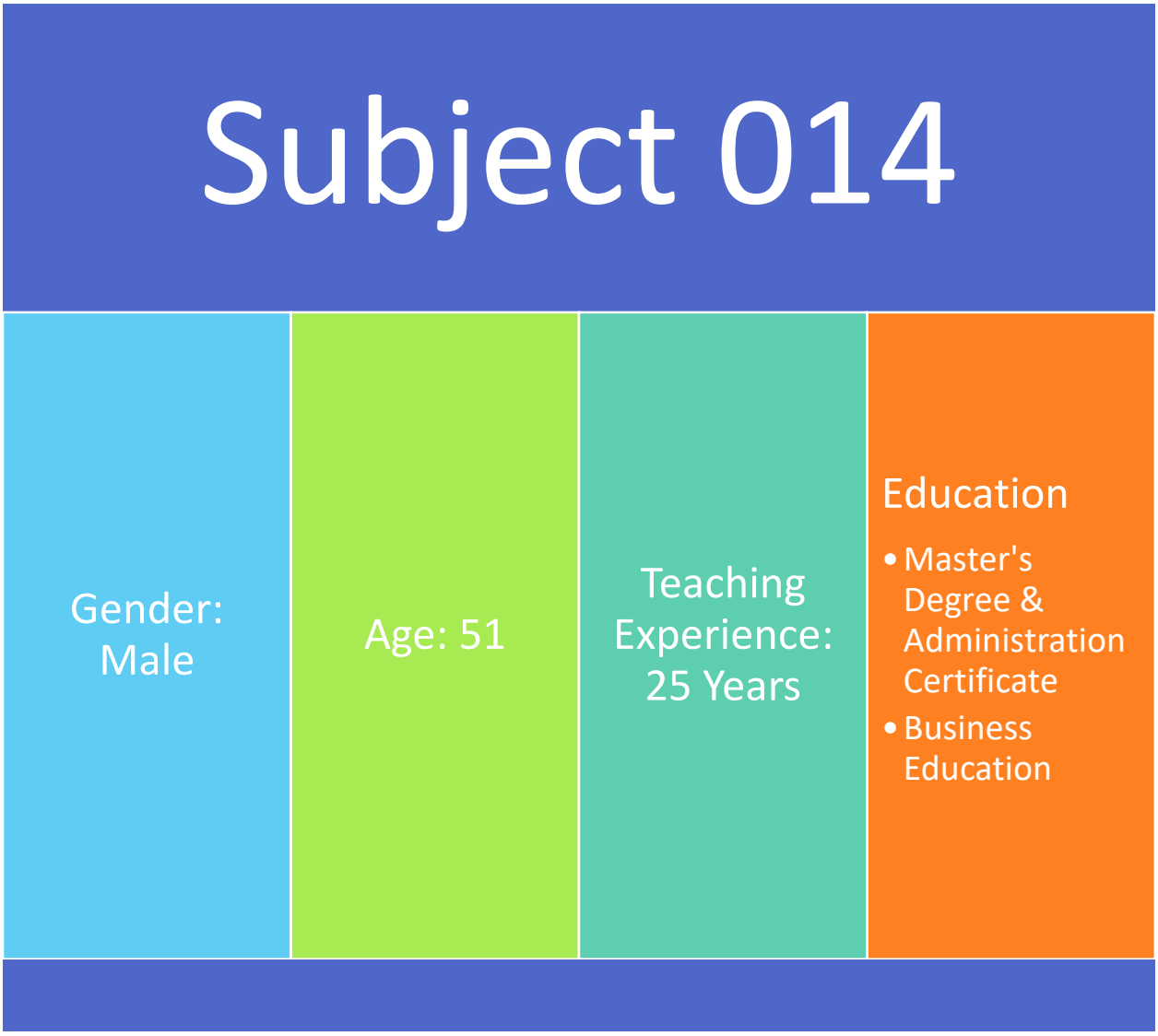


Figure 5

Participant 016 Demographics

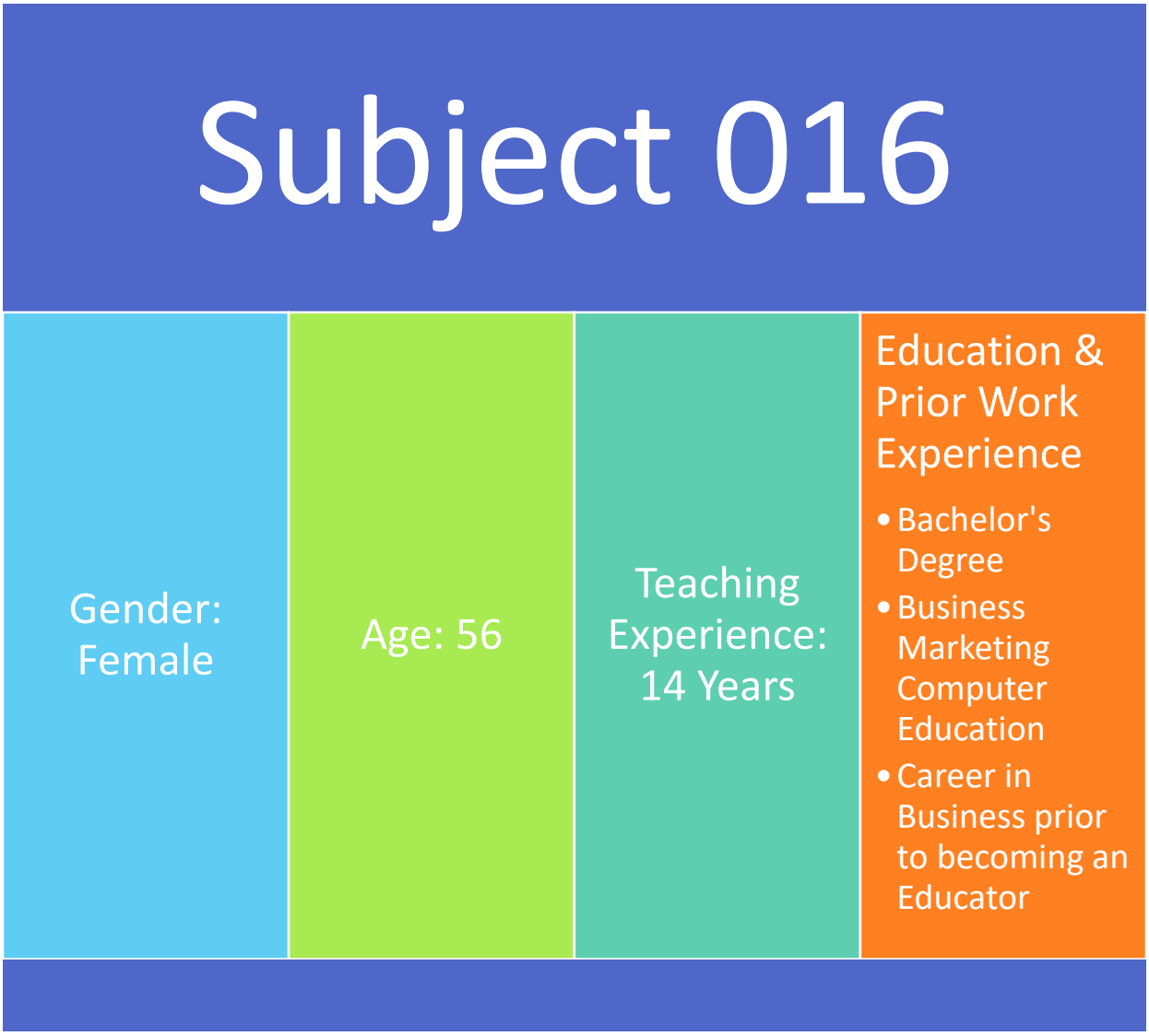


Figure 6

Participant 017 Demographics

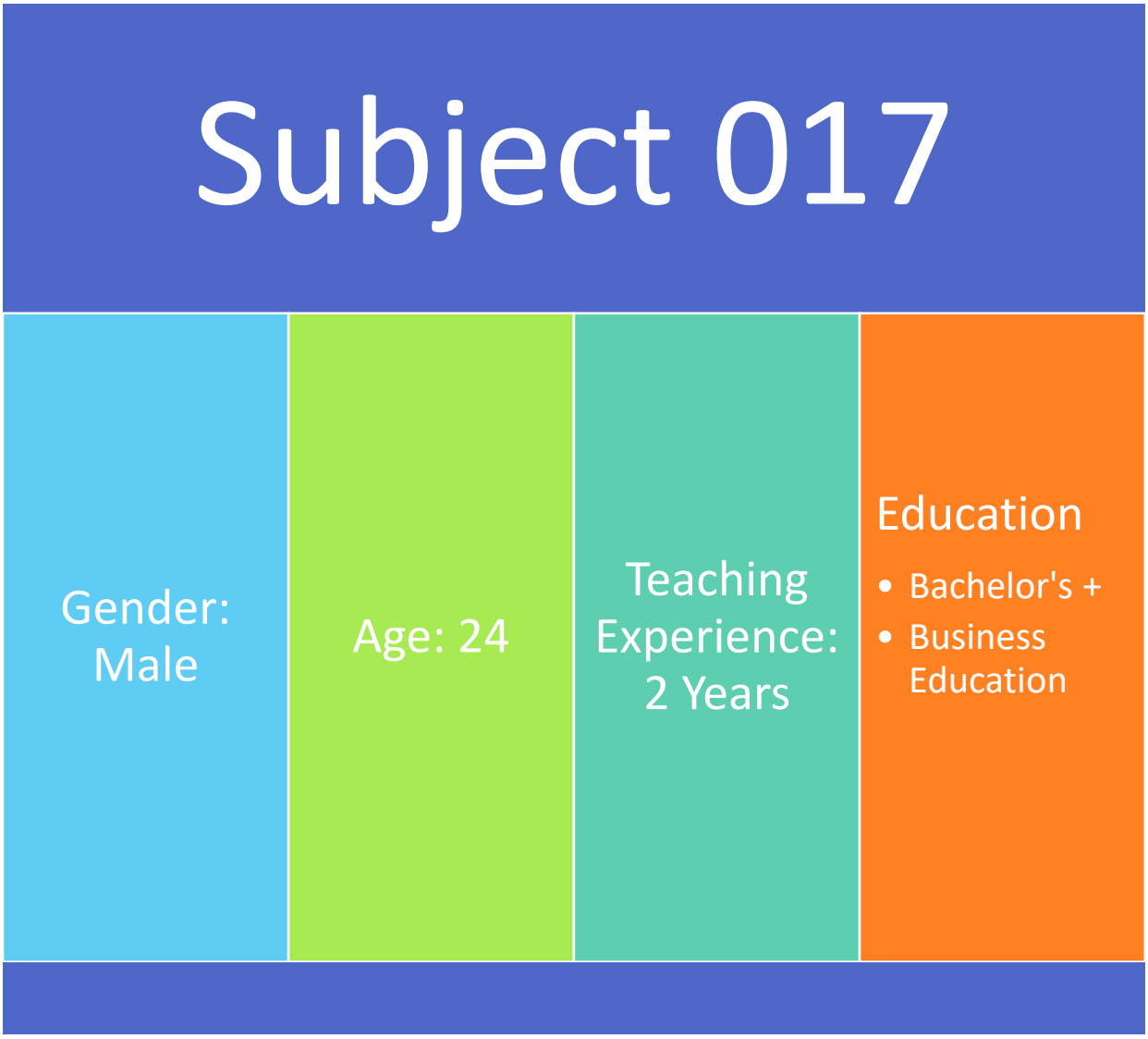


Figure 7

Grade Level Technology is First Introduced to Students

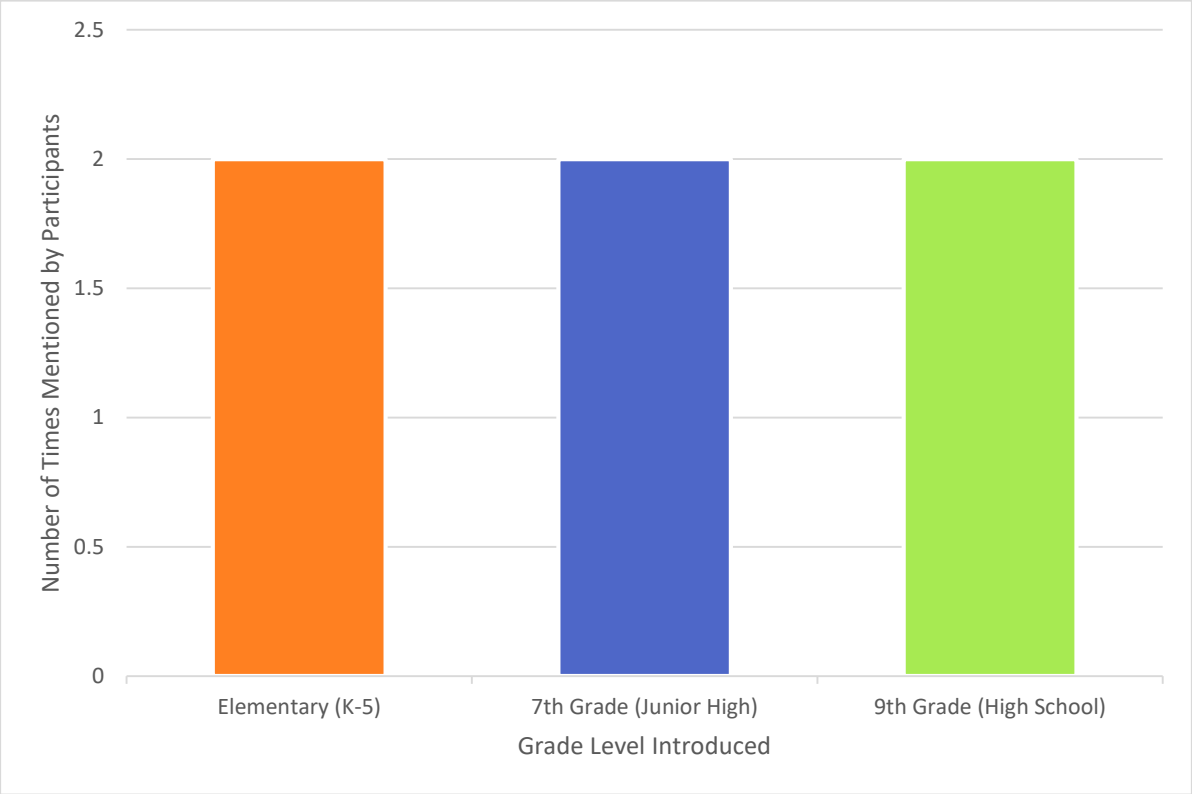


Figure 8

Ways in which Technology (Hardware and Software) is Frequently Used in the Classroom

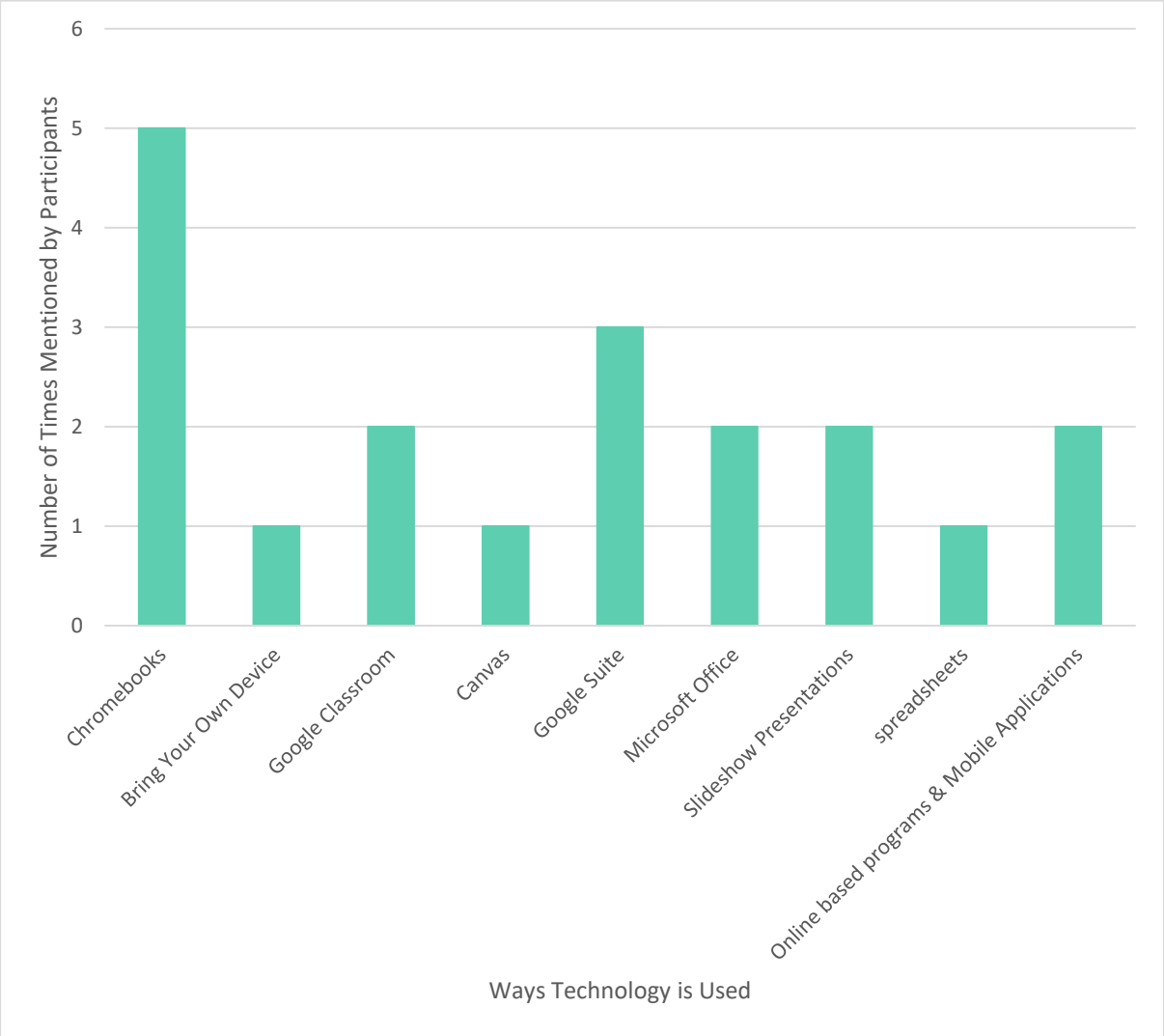


Figure 9

Technology Skills Taught by Study Participants

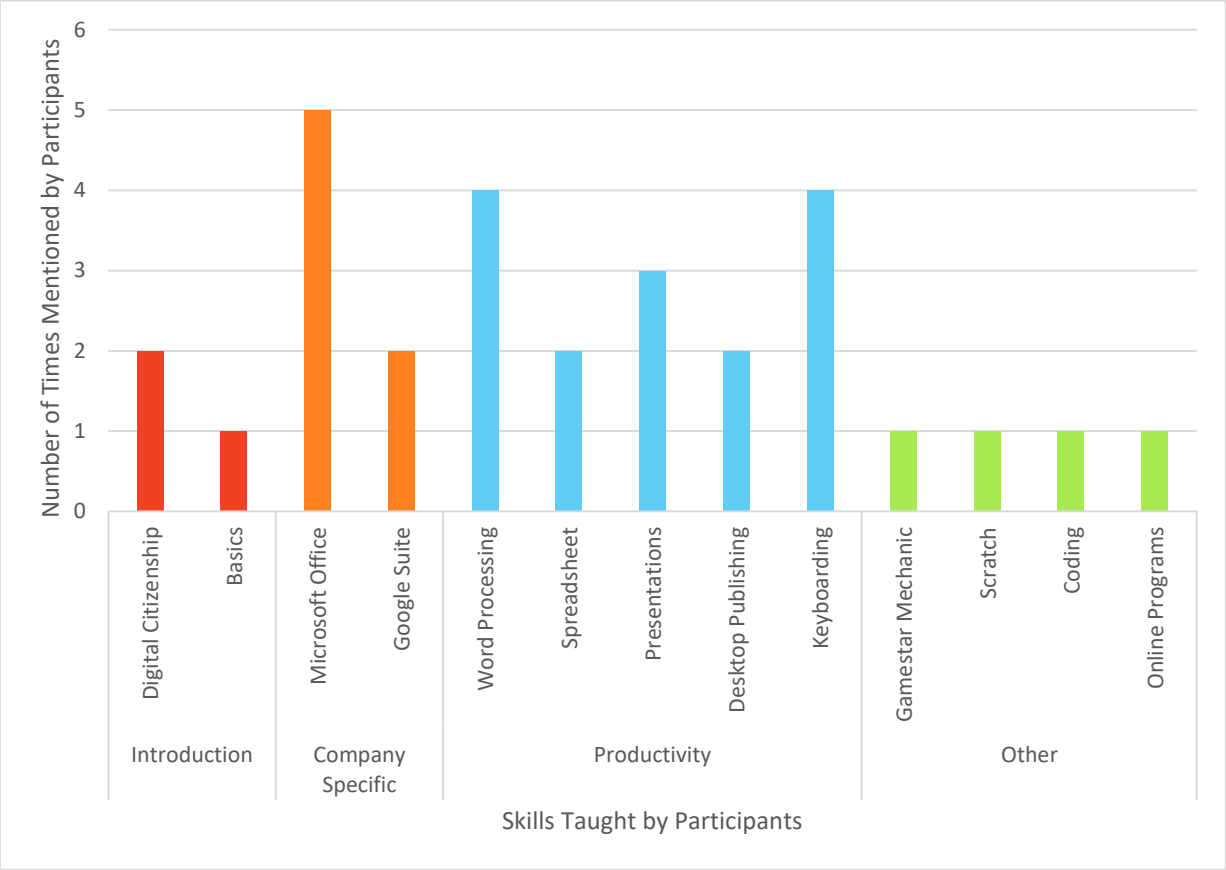


Figure 10

Types of Technology that Teachers are Encouraged to Use by Administration

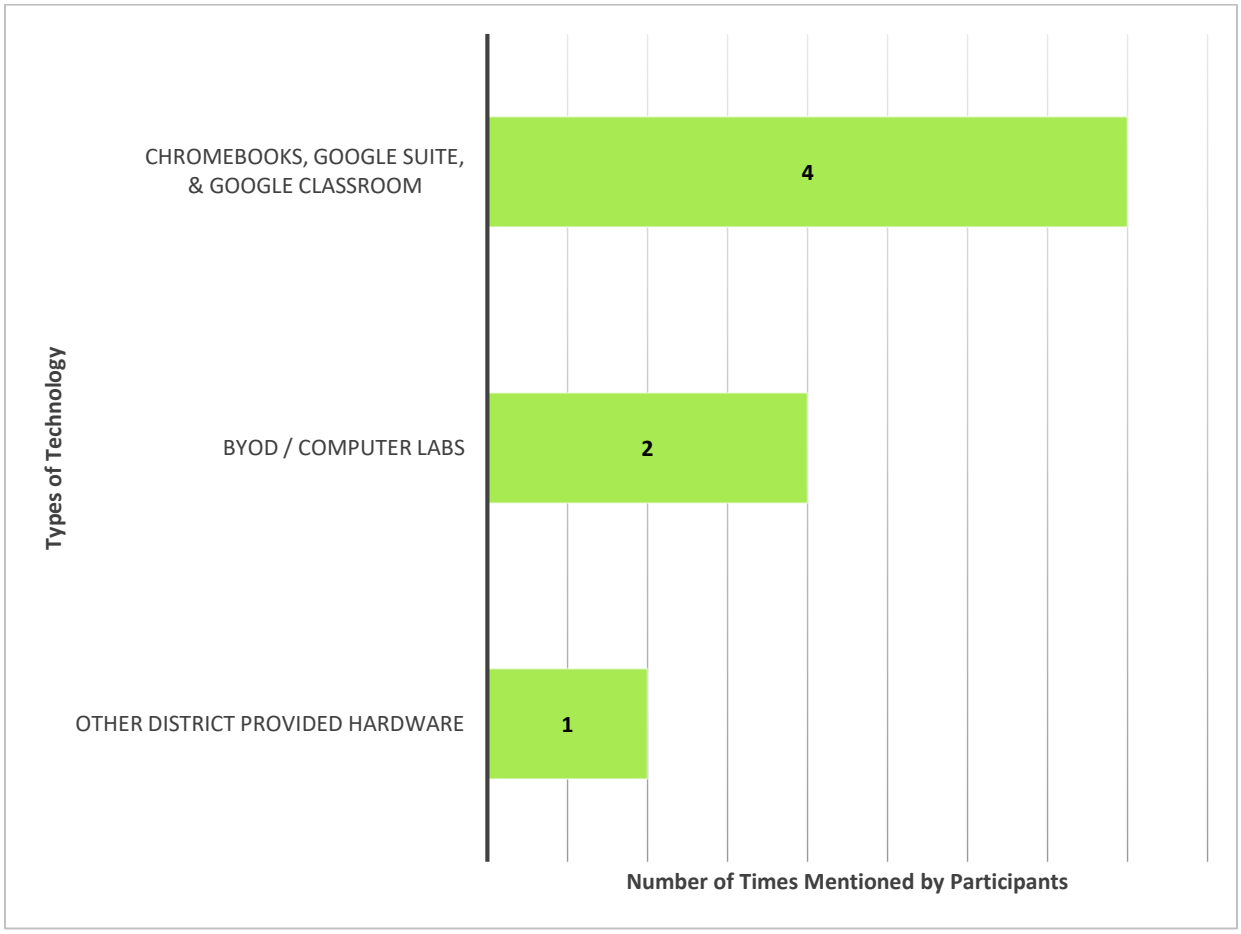


Figure 11

Courses in which Safety Policies and Procedures are Explained to Students

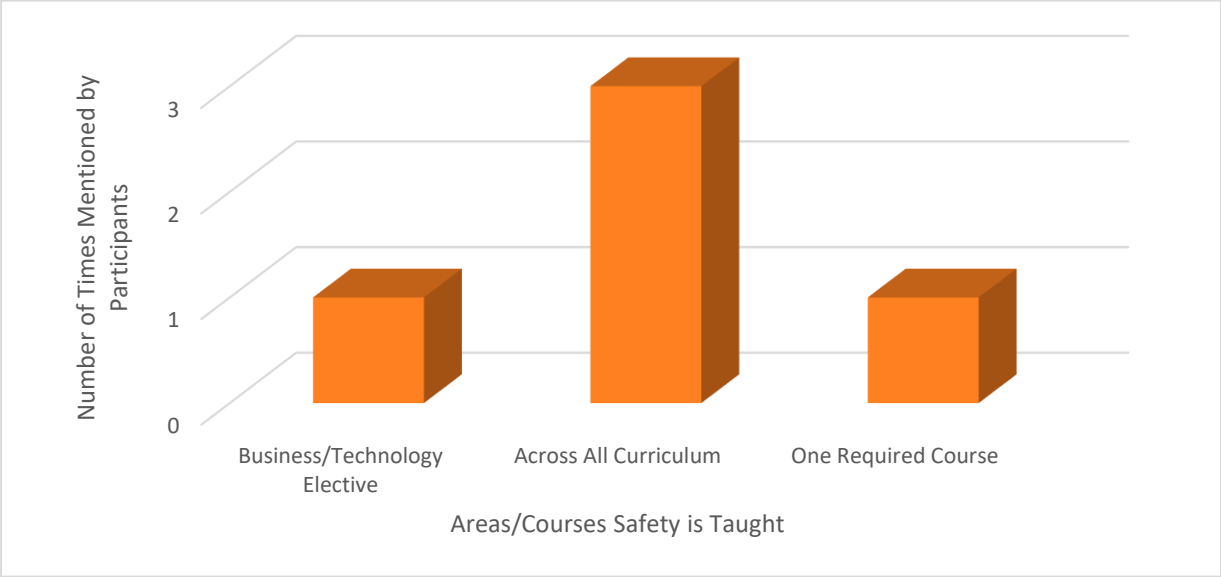


Figure 12

Ways in which Safety Policies are Enforced

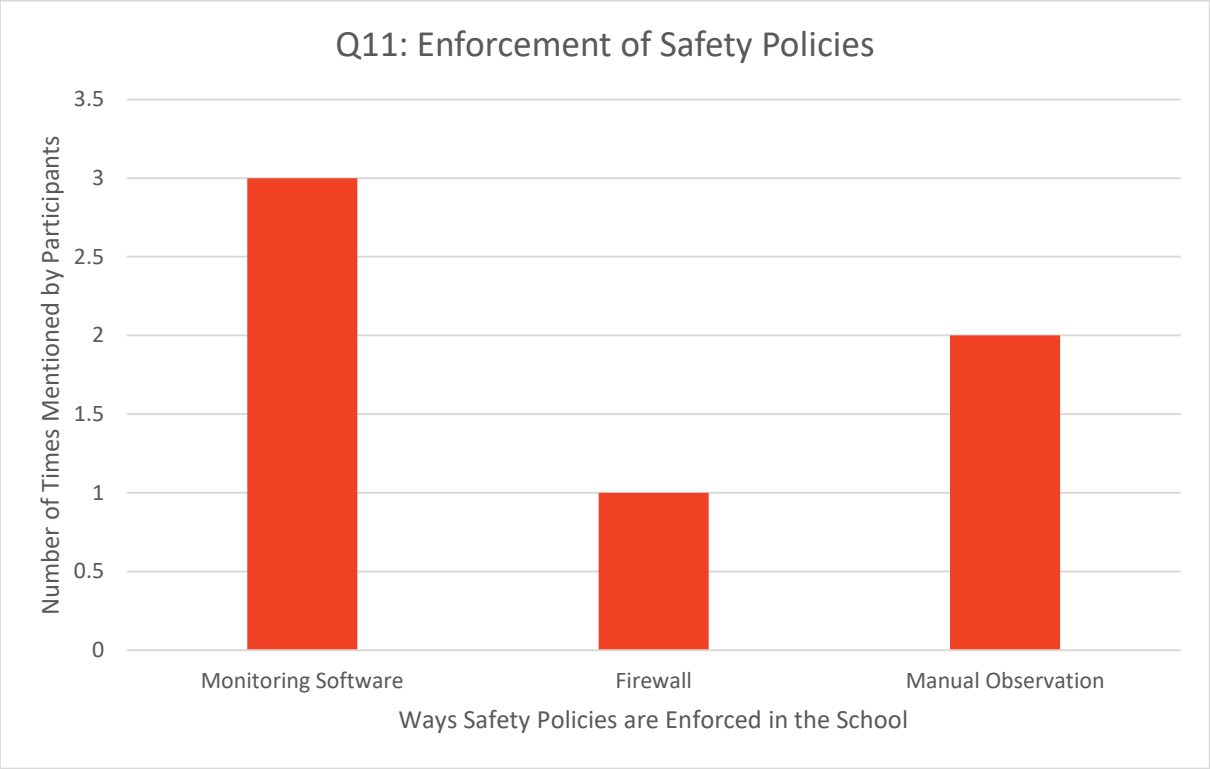


Figure 13

Technology Skill Gaps Observed by Participants

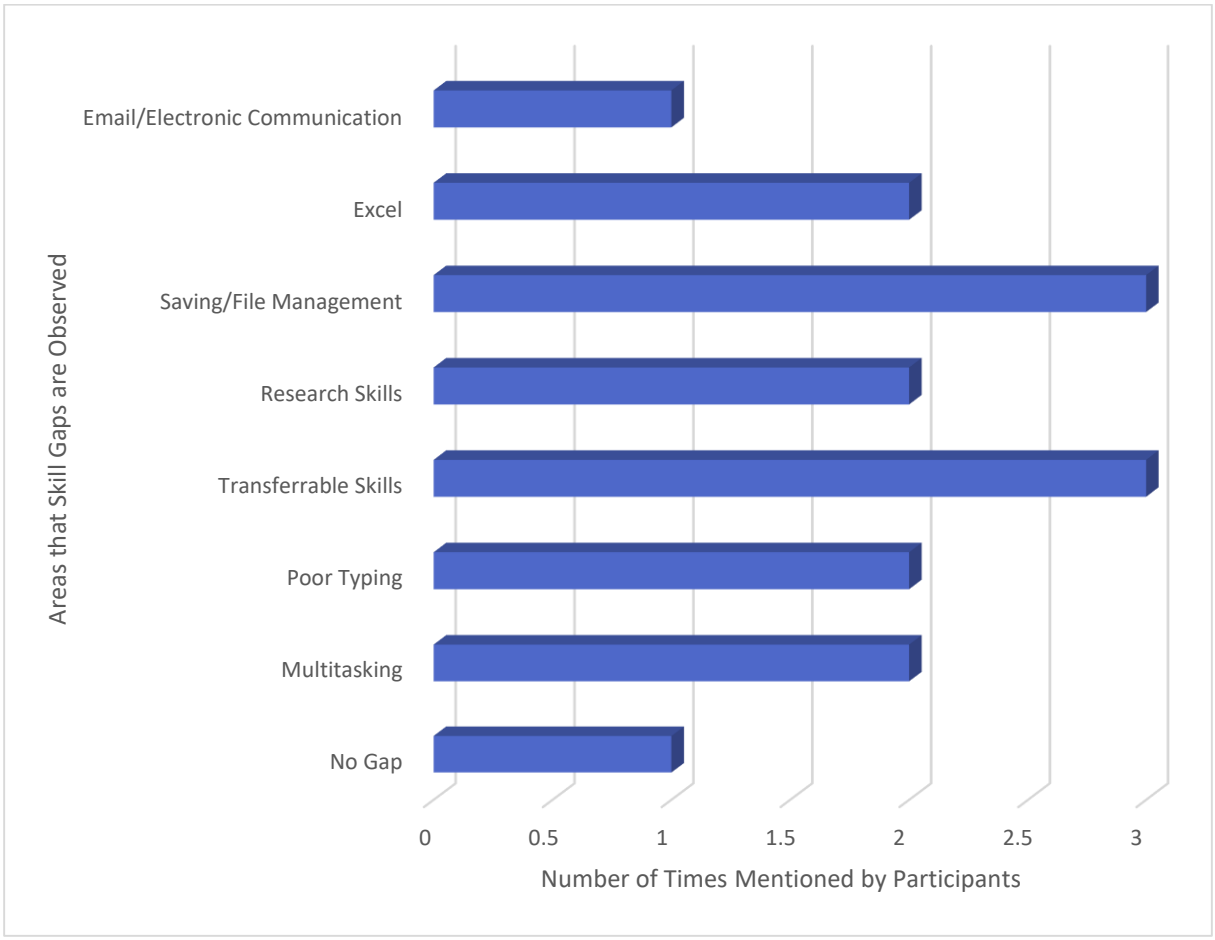
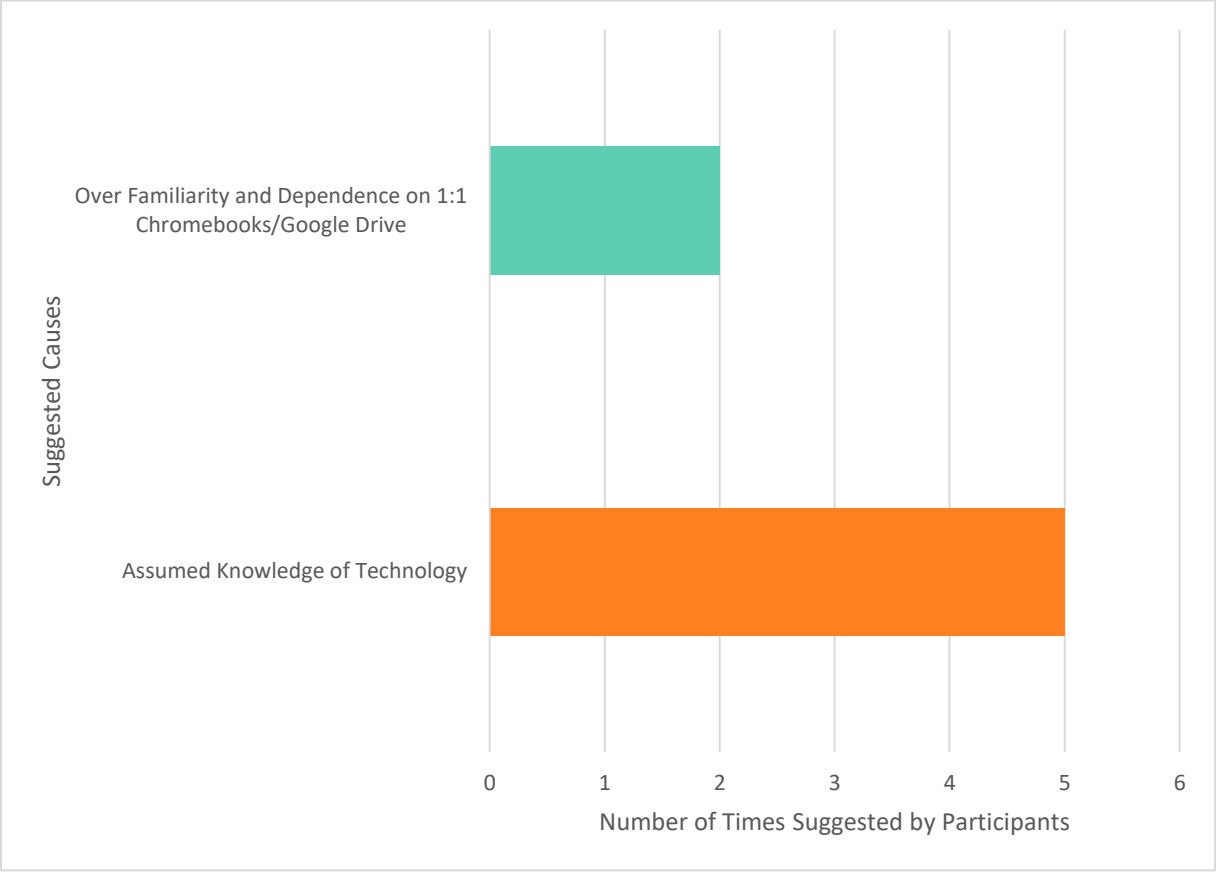


Figure 14

Suggested Causes for Technology Skill Gaps



APPENDIX B: INTERVIEW QUESTIONS

Independent Research for Master's Thesis

Classroom Technology Usage Research Questionnaire
(for teachers)

The following survey is to evaluate the effect of the early usage and implementation of technology in the classroom. Please answer the following questions based on your personal experience with technology (devices, programs, etc.) as an instructor. Thank you in advance for your participation.

1. What is your gender?
    a. Male
    b. Female
2. What is your age?

3. How many years have you taught?

4. What is your highest level of education?

    a. Bachelor's
    b. Master's
    c. Ph.D/Ed.D

5. Content Area of degree
    a. Business Education
    b. Technology Education
    c. Other: _____

6. What grade level do you currently teach? (check all that apply)

    a. 6th Grade
    b. 7th Grade
    c. 8th Grade
    d. 9th Grade/Freshmen
    e. 10th Grade/Sophomores
    f. 11th Grade/Juniors
    g. 12th Grade/Seniors

7. What is the size of your student body?
    a. Rural (less than 2,500 students)
    b. Small Urban (2,500-50,000 students)
    c. Large Urban (50,000-2 million students)
    d. Metropolitan (greater than 2 million students)

Teacher Perception of Technology Literacy in Students

8. At what grade level are your students introduced to technology?

9. At what grade level are the students expected to complete assignments using technology on a regular basis?

10. How does your school encourage the students' use of technology in the classroom?

11. How are students taught to use technology safely?

12. What technology skills are taught to the students?

13. Do you perceive a skill gap in your students with the use of technology? If so, what skills are lacking?

14. What do you perceive to be the impact this skill gap has for students academically? Beyond academics?

15. Can you share an interaction with a student where you were impressed with a student's technology knowledge?

16. Can you share an interaction with a student where you disappointed with a student's technology knowledge?