Teacher's Perception of Student Technology Use

Heather Borowiak and Dr. Tamra S. Davis

Illinois State University

heather.borowiak@gmail.com; tdavis2@ilstu.edu

Abstract
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 concerning the benefits of providing one-to-one devices for each student is limited, 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.

Introduction/Theoretical Framework
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 K-12 educational institutions, both public and private, have transitioned to one-to-one computing in the United States, as well as on the other side of the globe in Asia, Australia, and Europe (Turner, 2019). 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.).

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 (both hardware and software) use in their classroom (Hyndman, 2018). With the implementation of devices for every student, it is possible that this is happening in some educational institutions 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.

Purpose and Significance 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.

With more schools transitioning to a one-to-one model utilizing laptops, tablets, or Chromebooks, as well as the shift to e-learning due to COVID-19, an understanding of students' technology knowledge and skills is 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 daily.

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. Topics include technology use by the teacher, digital literacy of students, self-efficacy of the students related to technology use, and the secondary effects of technology use in the classroom.

Teachers' technology use in the classroom is not a new concept. According to a 2016 study, 100% of the participants reported using a computer in their education at least weekly and 93% indicated they were used daily (Carver, 2016). A more recent study (Serin & Bozdağ, 2020) indicated that teachers use technological tools frequently in the education process but use more hardware than software applications. Teachers primarily use computers (62.3%), Smart Boards (57.3%), and telephones (23.2%). This same study showed that specific groups of teachers were more likely to demonstrate frequent use of these hardware devices in their classrooms: 22.7% of primary school teachers, 12.5% of English teachers, and 10.9% of Mathematics teachers utilized this technology on a regular basis. Many teachers feel a push from administrators and even state legislative 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 a lack of strategic vision related to an institutional technology plan. Some teachers who have been required to implement various devices have either banned the device or left it on a cart unused because they felt it was more of a distraction than useful for educational tasks (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 it adds value to the lesson. If this push is mandated by administrators as opposed to requested by teachers, negative ramifications are probable. According to a study of early childhood educators by Blackwell, Lauricells, and Wartella (2014), the positive effects of technology are lessened when a teacher's self-efficacy related to the use of hardware is low or their attitude toward the tools is negative.

A study published by Akçayır, Dündar, and Akçayır (2016) on digital literacy status investigated whether basic student demographics played a part in comfort levels of hardware and software use. The participants of the study consisted of 560 students from two 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, gender did not affect the amount of time or experience they had using the technology tools. However, a difference in results was seen by academic level of the participants, indicating the education attainment significantly increased the comfort level of students and increased their digital native status. The study concluded that use of technology, not age is important to building self-efficacy.

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 skills are not inherently learned through leisure uses of hardware or software. Employers are voicing a concern related to the proficiency level of technology use in students following their education related to workplace skills. While students may feel comfortable using devices such as a cell phone or tablet, they are not developing the technical and problem-solving skills that are important in the workforce, such as an ability to locate, organize, and evaluate information from multiple sources, locate information to solve workplace problems, and the effective use of computer software (Sparks, Katz, & Beile, 2016).

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. Multiple studies have found that while many schools are implementing the use of technologies in the classroom, it may hinder student progress (Mercimek et al., 2020; Pedro et al., 2018; & Wood et al., 2012). These studies show that the students tend to use the technology as a multitasking device, creating distraction rather than learning. One important finding is that an increase in time for multitasking demonstrated lost time when switching back and forth between the various tasks. Additionally, students who learn without the distractions created through multi-tasking were able to comprehend the material and apply the learning to new situations. The students who multitasked were not able to apply the new information to new contexts; however, the students were able to find the information and record it on a worksheet or other assessment.

The United States is not the only place interested 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 use in the classroom. 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 learners (Gubbels, Swart, & Groen, 2020). Utilizing technology devices in education can greatly improve learning when individualized to the student. However, as

published by the Organization for Economic Co-operation and Development (2015), unnecessarily increasing screen time creates negative effects for students. In adolescence and young adulthood, loneliness, poor attendance, and lower grades can be associated with the excessive presence of hardware devices in learning environments.

In addition to these negative effects for students, there are also negative implications for the teachers. While cheating in education is not new, it can be easier for students to cheat when technology devices are present. 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 when technology devices, such as computers and cell phones, are available. Although students reported an understanding that these methods would constitute cheating, they would often not report this type of cheating if they had witnessed it.

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 workplace, deliberative instruction in the use of computer hardware, software, and productivity tools related to workplace skills 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 should be to determine the best place to provide student learning of technology-related workplace skills. This may seem counterintuitive to the findings discussed; however, it is an important question to answer due to the technology-driven nature of the world today. 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.

Methodology
This study used a qualitative method approach to determine teachers' perceptions of student technology use in the classroom. The researcher determined that the interview methodology would be most appropriate for this study to allow the researcher to better understand and explore teacher opinions, behaviors, and experiences, allowing the collection of in-depth data. The sample size was limited to 5 – 8 participants, *a priori,* as small sample sizes are appropriate for focused, qualitative studies. Qualitative studies of this nature are often used to determine how to structure a quantitative study with a larger sample size.

Interviews were conducted with middle and high school teachers who teach business and technology courses. The sample demographics were selected based on the subject in which they teach and the age group of their students. The responses were organized into categories based on common themes following standard manual qualitative thematic coding protocols. 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 world can connect and collaborate; participation was voluntary.

Research Question: What are the teacher perceptions of student technology use in middle and secondary school classrooms?

Three middle school and three high school teachers participated in the study. The subject sample size was kept small to allow for analysis of in-depth answers to the interview questions. Of the participants, four participants had education beyond a bachelor's degree, including one who had obtained a master's degree and administration certification. Four female and two male teachers participated. All teachers taught in the Midwest at small schools of 2,500 students or less.

The participant pool was chosen based on the age group within the teachers' classroom. 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 are used by more than just the business and technology teachers, these teachers are the experts in technology within their individual schools and are expected to teach career readiness skills.

The instrument for this study consisted of a semi-structured interview questionnaire. One-on-one interviews were conducted with teachers by asking questions about their demographics and experience before moving to the 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 related to the participant's perception of technology use were open-ended questions. See Appendix A for the full interview instrument.

Limitations of Study
Limitations of this study include the sample size. With the qualitative research methodology and one interviewer for consistency of the interview process, the sample size was limited to 5 – 8 participants, *a priori,* as small sample sizes are appropriate for focused, qualitative studies. All interviews were conducted using video conferencing software, so potential participants who initially demonstrated an interest, were hesitant to participate upon learning that the interviews would be recorded. Participants had the option of an audio recording only and one participant requested audio only.

As with any interview setting, the possibility of researcher bias exists. To counteract this possibility, the interview questions were created to avoid leading the participant to a particular answer. Additionally, the questionnaire was reviewed by three objective evaluators prior to the beginning of the interview sessions.

Finally, this study was conducted during the COVID-19 pandemic, which may have influenced some of the teacher's perceptions. If the study had been conducted prior to the pandemic, and before schools switched very quickly to a remote environment that was dependent upon technology for success, the results may have been different. Repeating this study one-year post-pandemic would be beneficial.

Findings
This study sought to determine teacher perceptions of student technology use in middle and high school classrooms. Based on the data analysis, results indicated that while many students are enrolled in a school that has implemented a one-to-one computing program there is often not any formal training on basic technology knowledge, skills, or online safety (see Figure 1).
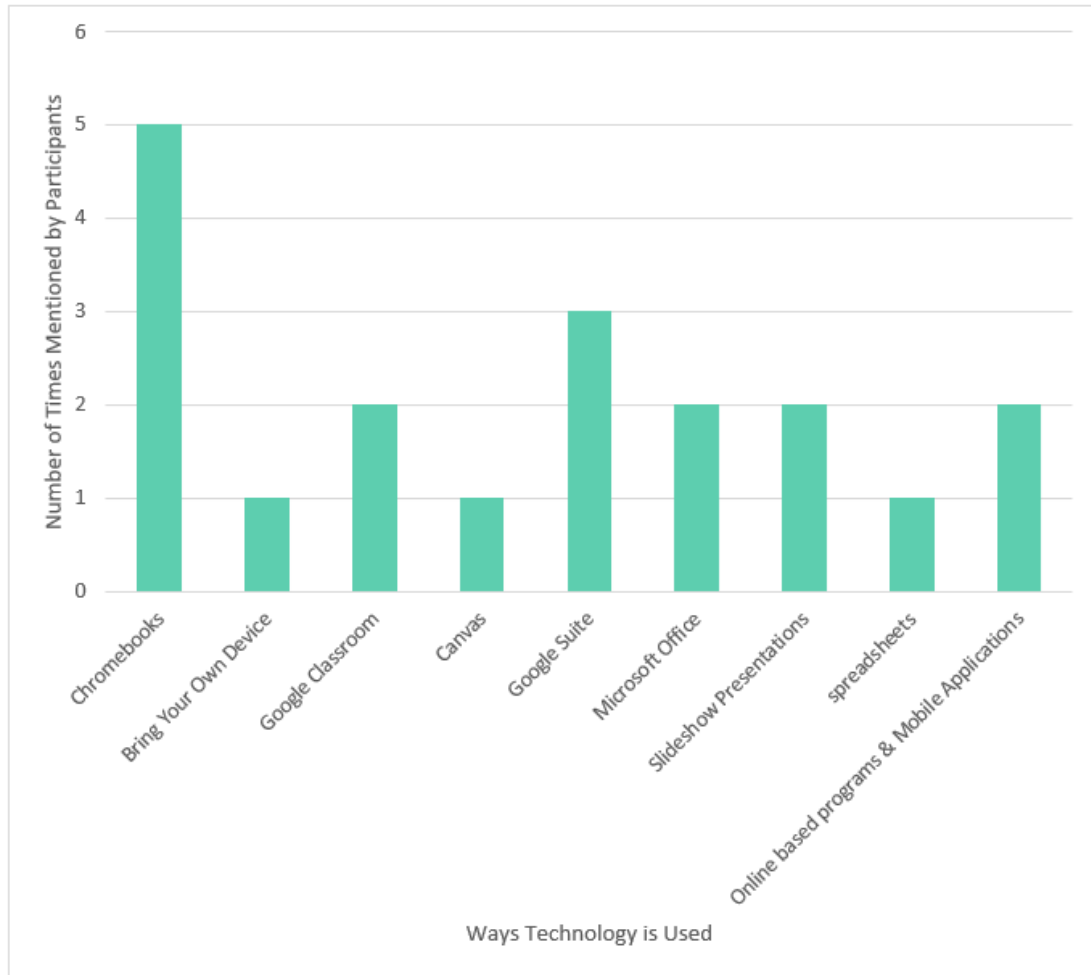
Figure 1

Grade Level Technology is First Introduced to Students
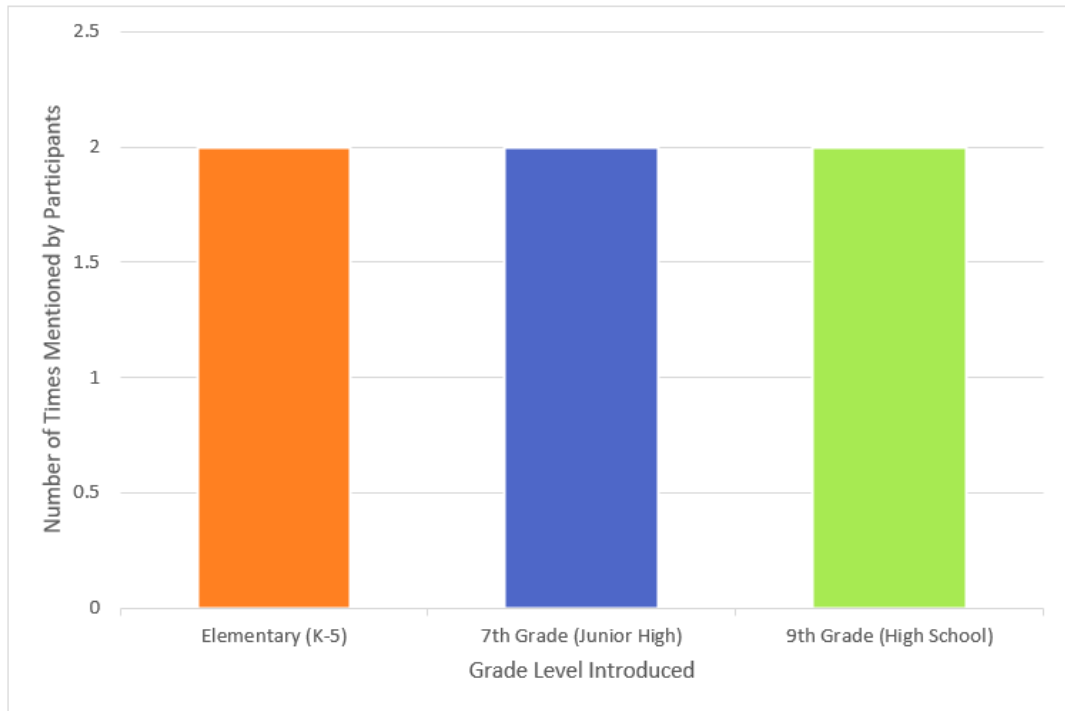
Despite the lack of technology skills/knowledge education, students are expected to utilize various forms of hardware or software throughout their general courses as early as kindergarten (see Figure 2).

Figure 2

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

Although the participants in this study taught a variety of technology skills and content (see Figure 3), these courses are primarily elective courses and/or not taught to all students. Students who do not participate in business or technology courses may never be taught basic computer literacy or digital literacy.

Figure 3

Technology Skills Taught by Study Participants
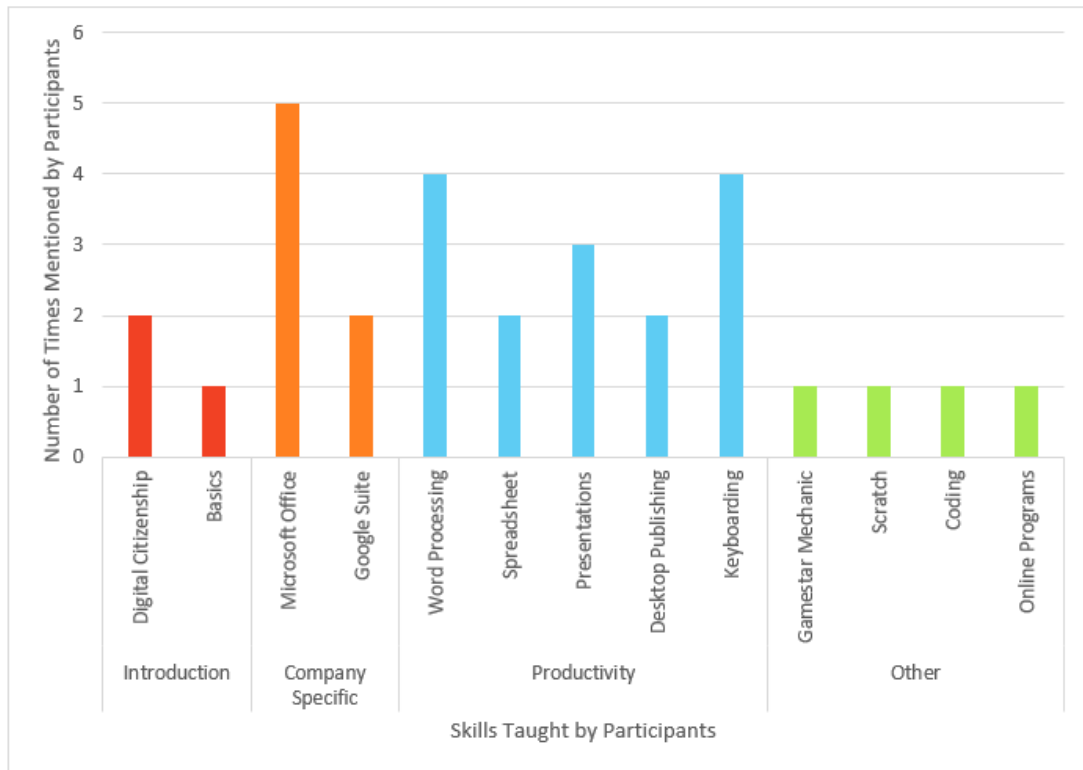
The results indicated that there is a presumed knowledge of technology hardware and software because the students are considered to be digital natives. A digital native, as defined by Prensky (2001) is someone who has grown up in close proximity with computers, video game consoles, the internet, mobile phones, and tablets; however, in many instances the use of technology does not show increased ability to utilize technology for educational or workplace skills (see Figure 4). 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.

Figure 4

Technology Skill Gaps Observed by Participants
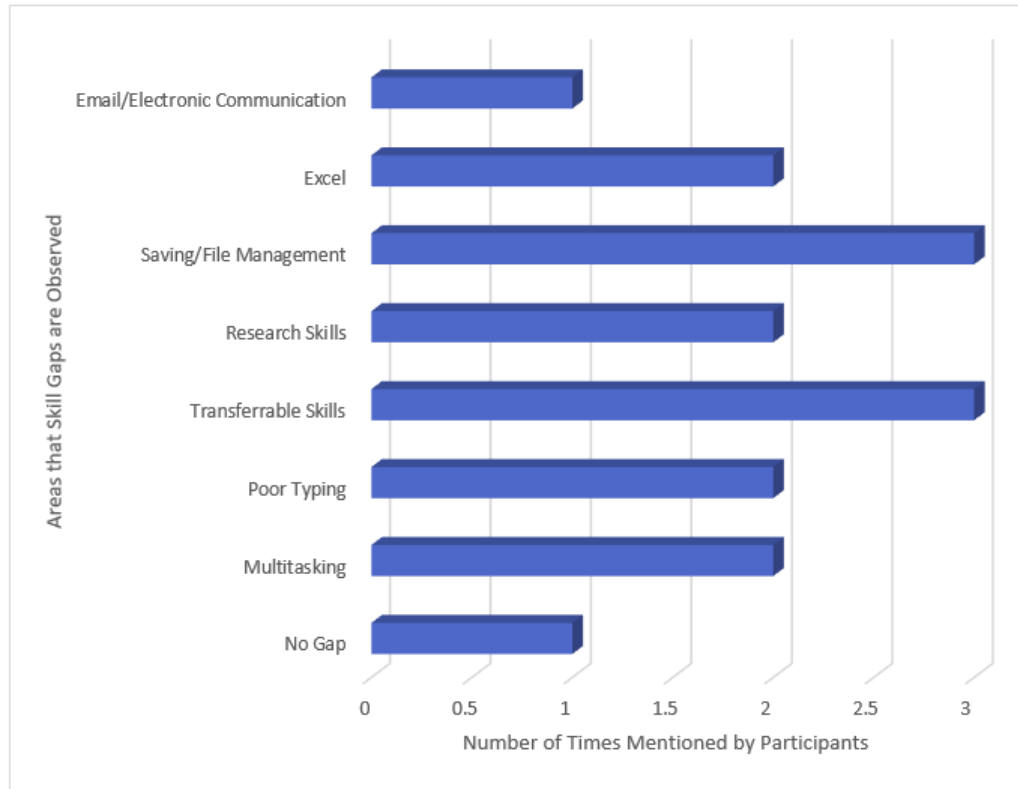
Discussion

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 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 push technology use requirements into the classroom without sound pedagogical reasons for its use (Tucker, 2019). The participants in this study also felt pressure to use specific technology from their administrators (see Figure 5).

Figure 5

Types of Technology that Teachers are Encouraged to Use by Administration
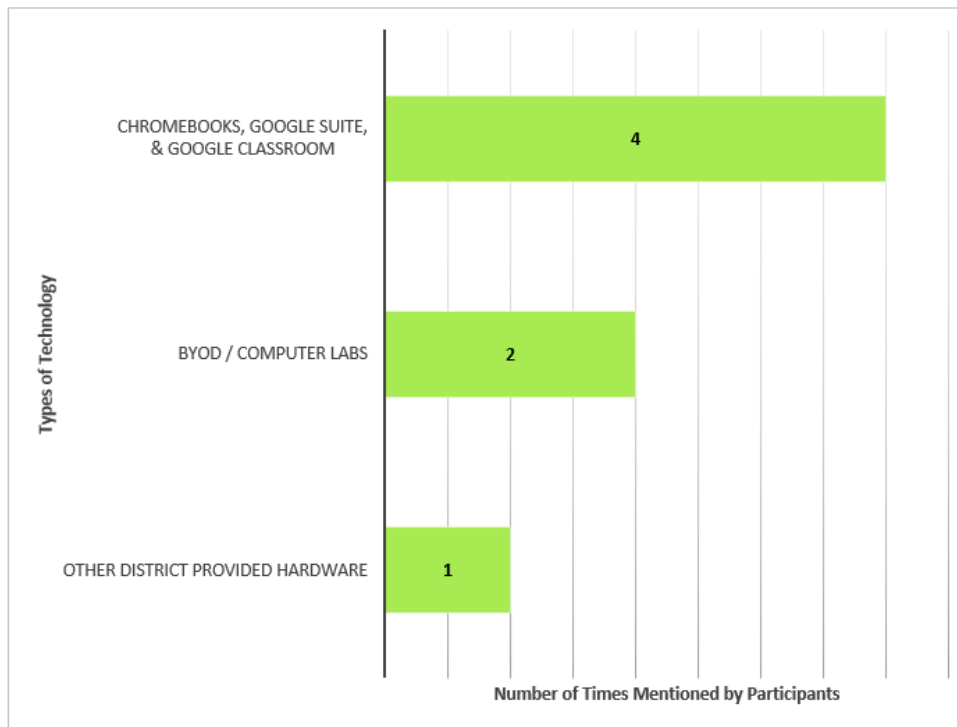
Specifically, there has been an increase in the use of school funds to purchase devices for student use at home, even though there is little evidence demonstrating a positive relationship between home computer access to improved academics (Vigdor, Ladd, & Martinez, 2014). At other times, teachers lack confidence in their abilities to utilize the devices the school district has provided (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 were not as confident, as evidenced by the business and technology teachers being asked how to use specific devices by their colleagues.

The teachers in this study also indicated that students attempt to multitask often leading to distractions, longer completion times, and lower levels of retention and/or learning. This finding aligns with the study that demonstrated lost time when switching back and forth between various applications on the computer and/or multiple devices such as between a computer and mobile phone (Wood, et al., 2012). This study found that students were introduced to computer software at early ages, but not trained to use the software until later. The impact is that when students are in a technology course, they may struggle with basic skills that the teacher assumes they have. For example, students who enter a classroom that is teaching Microsoft Office, may not be aware that they need to save a document (and remember where it is saved) as they have been taught using Google tools previously.

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

one-to-one schools with Chromebooks were in the process of becoming a one-to-one school within the year despite the research found that access to individual devices has shown lower reading performance (Gubbels, Swart, & Groen, 2020).

One teacher in this study indicated an issue with cheating in her school using technology devices. She also stated that the students involved did not seem to experience any ethical dilemma about their decision to cheat, nor did they consider it cheating. 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 there was an assumed knowledge of technology projected onto their students, the students needed to be taught technology skills despite being digital natives (see Figure 6).

Figure 6

Suggested Causes for Technology Skill Gaps
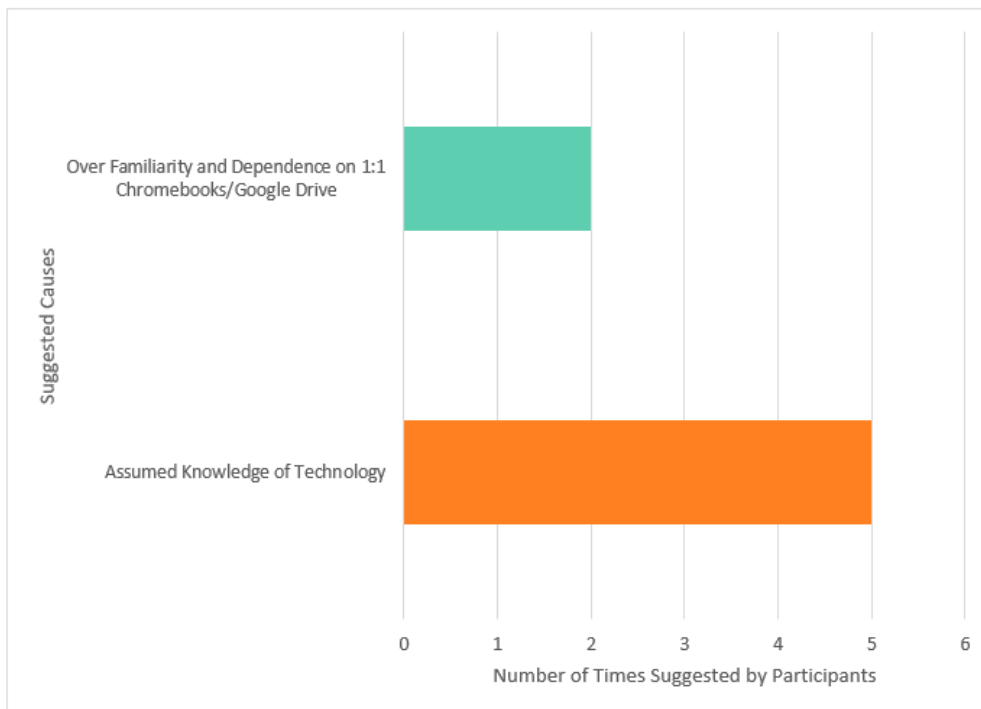
While students are gaining access to cell phones and other devices at earlier ages in the home, it does not necessarily mean the students know how to transfer the skills to hardware or software that be required in their future careers or academic education. One instructor specifically mentioned a fear that the students leaving high school would not be prepared for an accounting program in college because the students are not learning Excel at the high school any longer, yet Excel is considered a basic skill at the college level.

Using technology just for the sake of using technology is not prudent, educators should strive to be strategic in the lessons taught using 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.

It is important to note that the findings of this study can only be applied to the participants and not generalized to a broader audience. The purpose of this study was to gather data to inform one or more larger projects in the future as described below.

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. A qualitative study seeking to answer the same research question would provide a wider view and potentially generalizable data related to teacher perceptions of technology use in K-12 schools. Repeating the same qualitative study after the pandemic could potentially shed light on the impact of the pandemic upon technology self-efficacy of both students and teachers.

An important longitudinal study of a school that begins prior to implementation of a one-to-one program through the entire academic career of the students would yield data that potentially leads to deeper understanding of how one-to-one programs impact the students over time. Additionally, a study of this nature would provide data about how teachers perceive technology use and its efficacy within the classroom, potentially leading to enhanced professional development for classroom teachers. Another topic that could be considered for additional research would be to compare two or more school districts with different approaches to technology instruction within the districts.

Conclusion
The central 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 how technology is used, its pervasiveness in modern-day society, and the assumptions of transferrable skills into the classroom. Although documented through multiple studies, the ability to use a mobile phone, tablet, or computer for social interaction does not lead to an increased ability to utilize the technology for learning or workplace skills. It is assumed that students are digital natives; therefore, they do not need to be taught technology skills. Many students do not recognize their lack of skill to use technology as a learning tool or workplace tool because of an overconfidence in their skills with devices such as cell phones and tablets. The goal for educators is, and always has been, to give the students the best education they can receive so that when the students graduate to the next level of school or into the workforce, they can be successful members of society. As technology remains ubiquitous in students' lives, it is important to teach the students how to use technology devices and software applications to their fullest potential. The responsibility to teach important 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.

References

Akçayır, M., Dündar, H., & Akçayır, G. (2016). What makes you a digital native? Is it enough to be born after 1980? *Computers in Human Behavior*, *60*, 435–440. https://doi.org/10.1016/j.chb.2016.02.089

Blackwell, C. K., Lauricella, A. R., & Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers & Education, 77*, 82–90. https://doi.org/10.1016/j.compedu.2014.04.013

Bureau of Labor Statistics. (2020, September). Employment Projections 2019-2029. U.S. Department of Labor. https://www.bls.gov/news.release/pdf/ecopro.pdf

Burnett, A. J., Enyeart Smith, T. M., & Wessel, M. T. (2016). Use of the social cognitive theory to frame university students' perceptions of cheating. *Journal of Academic Ethics, 14*(1), 49–69. https://doi.org/10.1007/s10805-015-9252-4

Carver, L. B. (2016). Teacher perception of barriers and benefits in K-12 technology usage. *Turkish Online Journal of Educational Technology, 15*(1), 110–116. https://files.eric.ed.gov/fulltext/EJ1086185.pdf

Gubbels, J., Swart, N. M., & Groen, M. A. (2020). Everything in moderation: ICT and reading performance of Dutch 15-year-olds. *Large-Scale Assessments in Education, 8*(1), 1–17. https://doi.org/10.1186/s40536-020-0079-0

Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The Substitution Augmentation Modification Redefinition (SAMR) Model: A critical review and suggestions for its use. *TechTrends, 60*(5), 433–441. https://doi.org/10.1007/s11528-016-0091-y

Kim, H. J., & Jang, H. Y. (2020). Sustainable technology integration in underserved area schools: The impact of perceived student change on teacher continuance intention. *Sustainability, 12*(12), 4802. https://doi.org/10.3390/su12124802

Lee, A. (2020). The association between female students' computer science education and STEM major selection: multilevel structural equation modeling. *Computers in the Schools, 37*(1), 17–39. https://doi.org/10.1080/07380569.2020.1720553

Lee, J., Sung, M.-J., Song, S.-H., Lee, Y.-M., Lee, J.-J., Cho, S.-M., Park, M.-K., & Shin, Y.-M. (2016). Psychological factors associated with smartphone addiction in South Korean adolescents. *The Journal of Early Adolescence, 38*(3), 288–302. https://doi.org/10.1177/0272431616670751

Mercimek, B., Akbulut, Y., Dönmez, O., & Sak, U. (2019). Multitasking impairs learning from multimedia across gifted and non-gifted students. *Educational Technology Research and Development, 68*(3), 995–1016. https://doi.org/10.1007/s11423-019-09717-9

Pedro, L. F., Barbosa, C. M., & Santos, C. M. (2018). A critical review of mobile learning integration in formal educational contexts. *International Journal of Educational Technology in Higher Education, 15*(10), 1–15. https://doi.org/10.1186/s41239-018-0091-4

Prensky, M. (2001). Digital natives, digital immigrants: Part 1. *On the Horizon, 9*(5), 1-6.

Puentedura, R. R. (2013). Ruben R. Puentedura's Weblog: SAMR: Moving from enhancement to transformation. *Hippasus*. http://www.hippasus.com/rrpweblog/archives/000095.html

Serin, H., & Bozdağ, F. (2020). Relationship between teachers' attitudes towards technology use in education and autonomy behaviors. *The Turkish Online Journal of Educational Technology, 19*(3), 60–69. https://doi.org/https://files.eric.ed.gov/fulltext/EJ1261402.pdf

Sparks, J. R., Katz, I. R., & Beile, P. M. (2016). Assessing digital information literacy in higher education: A review of existing frameworks and assessments with recommendations for

next-generation assessment. *ETS Research Report Series*, 2016(2), 1–33.
    https://doi.org/10.1002/ets2.12118

Stake, R. E. (2010). Qualitative research: Studying how things work (Illustrated ed.). The
    Guilford Press.

Turner, K. (2019). One-to-one learning and self-determination theory. *International Journal of
    Instruction, 12*(2), 1–16. https://doi.org/10.29333/iji.2019.1221a

Appendix A: Interview Questions

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 upon your personal experience with technology (devices, programs, etc.) as an instructor. Thank you in advance for your participation.

1. What is your gender?
2. What is your age?
3. How many years have you taught?
4. What is your highest level of education?
5. What was the content area of your degree?
    a. Business education
    b. Technology education
    c. Other
6. What grade level do you currently teach?
7. What is the size of your student body?
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 academically?
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 were disappointed with a student's technology knowledge?