

Effects of Technology on Student Learning

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ABSTRACT

The purpose of this study was to analyze the effects of technology on student learning. With the ever-changing world of technology, classrooms are gaining more technology and having to incorporate it into student learning. Although technology can benefit student learning, it can also be detrimental to the educational process. Technology enhances many learning opportunities and allows for student comfort but can also be a tool that is too heavily relied on and can potentially effect student fine motor development and problem-solving skills. In this research study, the researchers surveyed to K-12 educators to get feedback on how technology effects their classroom. This research helped determine how technology effects student learning. The findings showed that more training for teachers and students are necessary to better implement technology in the classroom. Furthermore, this research pointed out that students are more engaged and comfortable with technology, yet they can become a management concern.

KEYWORDS: Technology effects, Student learning, Motivation, Problem solving, Fine motor skills

INTRODUCTION

Today's youth are growing up in a time where technology is constantly at their fingertips. The growing world of social media applications and internet sites spike interest in children. Additionally, cell phones, computers, tablets, free Wi-Fi, gaming systems, and electronic-based toys are all the rage in today's society. Students are growing up in a time when technology is a competitive fad. According to Klopfer, et al. (2009), "Every day, many students are spending countless hours immersed in popular technologies—such as Facebook, MySpace, World of Warcraft, or Sim City" (p. 1). In today's classroom, technology is becoming a more prominent form of learning. With the ever-changing world of technology, teachers work hard to incorporate technology into their everyday instruction in order to connect student passion with learning. According to Harris (2016):

Today's educators are under great pressure to provide 21st century students with a quality education based on 21st century standards. Those standards include providing students with the technological and informational skills needed to compete in an ever-changing, technology-driven world (p. 27).

Educators are constantly looking for the technological tools that are going to enhance the learning of their students. However, technology has been viewed as a great resource in classrooms that has heightened learning but has its negative effects on student learning.

With new information technology, education is fast becoming free of time and space. But every learner still needs to be connected to a scaffold of support for lifelong learning achievement. Students need parents, friends, and supervisors who are also teachers and coaches. The primary function of the school-to-work movement is to mobilize understanding and support so that students will acquire the skills, habits, values, and understandings essential to productivity in all the roles of life (Hakim et al. 2000, p. 263).

Technology is an important part of students' lives. Incorporating technology into the classroom has proved to be beneficial yet also has some drawbacks. Technology has helped student willingness and engagement and allows for the enhancements of learning. According to Fisher, et al. (2014), "The need for construction and engagement means that the best types of learning will be those that involve choices that the student can make, and learning where there are meaningful contexts where the student is engaged" (p. 5). But is this enough to outweigh some of the negatives? In a study conducted by Sülzenbrück, et al. (2011) that examined the effect computer use has on

motor skills, they discovered that using modern technology could effect changes in basic psychomotor and cognitive skills. This includes using tools such as computers, electronic organizers, navigation systems, etc. This can cause concerns in student growth in the classroom. Furthermore, research also shows some pros and cons and goes in depth into why technology may or may not be beneficial.

The purpose of this study was to examine K-12 educators' perceptions regarding the use of technology devices in the classroom, the benefits and drawbacks of the use of technology in education, and particularly the impact on students' learning. For the purpose of this study, technology included only educational technology, i.e. internet and computer-mediated tools. It is important to understand the impact of technology on student learning because it can significantly impair or empower the learner. This study was intended to help educate teachers on best practices in the classroom. Students can benefit from instruction that is aimed to help them achieve success. Parents of students can discover how technology impacts their child's learning. The findings from this study will contribute to existing knowledge on technology incorporation in classroom settings.

LITERATURE REVIEW

While technology has become increasingly more popular in classrooms, there is a concern that students are relying too heavily on technology. While technology can be a great tool, are students prepared to problem solve technology related issues?

With the use of technology, some teachers are adopting the flipped classroom approach. This allows students to study the material at home and come to school to engage in more discussions, exercises, and activities. According to Song and Kapur (2017), "few studies have reported how to develop students' problem solving skills and enhance their conceptual understanding in flipped classroom in mathematics inquiry" (p. 293). While in this setting, students are learning more on their own, they are missing out on some of that lecture time that can spark deep conversation on problems. This article looks at the different benefits and concerns of a flipped classroom.

Fisher, et al. (2014) discuss how classrooms are turning to technology for teaching and learning, and how teacher's roles have changed. The teacher becomes the facilitator, who takes the students on their learning journey, learning with them instead of 'teaching' them. Students needs to make judgements about and be able to calculate the value of the content they gather. Learners are also self-assessing using technology. This helps to "move learners from being the consumers of information to being producers of it" (p. 11).

FINE MOTOR SKILLS

With more integration of technology, the effect it has on fine motor skills is questionable. Some research has dug into this topic, but it is still fairly undiscovered. Purcell, et al. (2013) provide a comprehensive report about social media's impact on writing. Students and teachers talk about what they consider writing to be. Teachers also discuss how social media has been helpful and harmful to classroom writing. Teachers "encourage their students to do at least some writing by hand...because they feel students do more active thinking, synthesizing, and editing when writing by hand, and writing by hand discourages any temptation to copy and paste others' work" (p. 6). Due to social media, students are able to write collaboratively, share their work with more people, and be more creative in their writing.

Sulzenbruck, et al. (2011) indicate "there are indeed specific differences in basic fine motor skills depending on the amount of time spent typing and handwriting texts" (p. 250). Their study does not only focus on handwriting but fine motor skills in general. Computer use also has in impact on major behavioral requirements.

MOTIVATION

As teachers, it is our number one priority to motivate students in their learning. The more motivated students are to learn something new, the more likely the student is to retain the material. Research shows that while growing up in the ever-growing technology world, the incorporation of technology helps motivate students to learn. For example, Schaen, et al. (2016), discuss a project they conducted that allowed third grade leaders and first graders to work together and create an app that will allow kindergarteners to practice math strategies. This weeklong project allowed students to use technology, collaborate, and teach. Schaen, et al. study discussed the process that the students went through and the outcomes of the project. This technology enhanced project motivated students who wanted to continue building and working at home. "The project gave young students a real-world purpose for planning and creating collaboratively" (p. 509).

In another study, Millar (2013) focuses on motivating students in the classroom and how this can be a difficult task. Using technology is, "like giving each student their own smartboard" (para. 3). They can show what they

know, and teachers can be comfortable knowing learning is occurring. The use of technology allows all students the opportunity to participate, “It’s hard to be honest when you have to put your hand up in front of the room” (p. 2).

Similarly, Heafner (2004) discusses how technology allows students to search and find information easily and has “helped them understand what they were talking about in class” (para. 22). This supports the learning happening in class. They feel proud to share their work and knowledge mastered via technology. Students also feel confident in using technology and completing tasks. The confidence helps them establish motivation in their learning.

EXPANDING LEARNING

According to many educational sources, there are many ways to expand and enhance student learning through the incorporation of technology. Bitner and Bitner (2002), have spent years working with teachers and technology and synthesized eight different areas that seem to help with teacher integration. Their article focuses on the following eight areas:

1. Fear of Change
2. Training in basics
3. Personal use
4. Teaching models
5. Learning based
6. Climate
7. Motivation
8. Support

The article then goes into more detail on each of the areas and discusses why these areas are important to integrating technology into the classroom. Once these areas are met, integration of technology can best help students in expanding their learning.

In another study, Klopfer, et al. (2009) discussed how students are growing up and are completely normalized by digital technologies (p. 1). The study explained that “many students in this group are using new media and technologies to create new things in new ways, learn new things in new ways, and communicate in new ways with new people-behaviors that have become hardwired in their ways of thinking and operating in the world” (p. 1-2). While there is much resistance to incorporating technology, “there are countless examples of these technologies demonstrating their educational value to other industries, confirming the powerful learning opportunities and advantages they afford” (p. 2). While determining the effects technology has in our classrooms, Klopfer, et al. strongly believe that the incorporation of technology makes the classroom stronger. They argue that “undoubtedly, without these recent technologies (i.e. digital games, Web 2.0, etc.) in the classroom, strong lessons can still be achieved, but there’s a sharp disconnect between the way students are taught in school and the way the outside world approaches socialization, meaning-making, and accomplishment” (p. 3).

Shivakumar and Manichander (2013) discuss education within the 21st century and how that technology is a powerful tool for students. They emphasized collaborating with one another and incorporation of blended learning, as well as information and communication technologies (ICT). “ICT refers to technologies that provide access to information through telecommunications” (p. 21). In using ICT in education, teachers are able to familiarize themselves with technology and some of the issues that arise (p. 21). This paper goes on to discuss different forms of ICT and how they benefit the classroom.

METHODOLOGY

The researchers utilized a mixed method approach to understanding how the integration of technology affected students’ learning. A survey was developed and administered through Qualtrics to collect data. The survey contained 14 questions that utilized a variety of questions formats such as open-ended, multiple choice, and Likert scale. Plano, et al. (2010) describe the survey research design process as being fairly flexible. The researchers utilized this approach and synthesized trends revealed by the data. The survey was sent to K-12 educators at a local school district in central Illinois. Participation was voluntary. The data was analyzed using descriptive statistics such as means, standard deviation, and percentages. Qualitative data was analyzed and organized into emerging themes. The quantitative and qualitative data was triangulated to help answer the research questions.

The study was intended to answer the following research questions:

1. What are the teachers’ general views regarding the use of technology in teaching and learning?
2. What are teachers’ perspectives regarding the impact of technology use on student learning?

3. What are teachers’ thoughts regarding other positive and negative outcomes of incorporating technology in the classroom?

RESULTS

The purpose of the study was to better understand how the effect of technology in the classroom is helping or harming our students. In general, data shows that the participants seem to view technology as a tool that enhances learning and engages students. They pointed out that technology is used for a variety of purposes. Figure 1 shows the breakdown of how teachers utilize technology in their classroom.

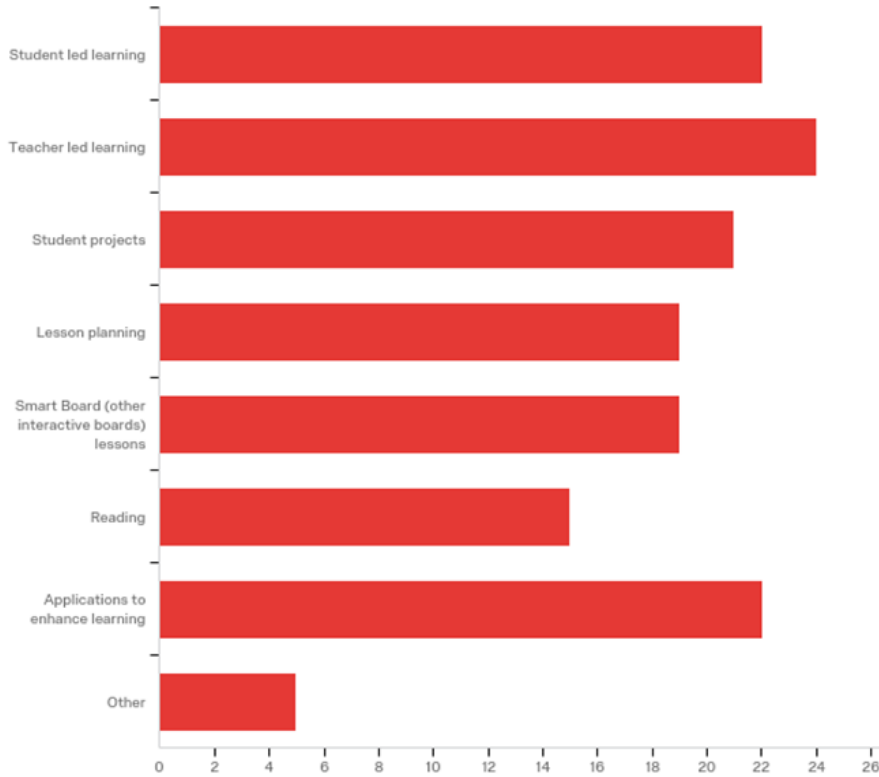


Figure 1- How teachers utilize technology in the classroom

Teachers using technology state that the majority of their time spent on technology is geared at teacher led learning. This includes using the smart board for teaching lessons and other applications to help enhance student learning. A small portion of teacher technology time was spent on lesson planning and communication. Teacher participants reported that students also took more interest in learning when it involves technology. The teachers stated that technology is used by students for projects and creations, collaboration with peers or adults, reading, and other applications to enhance learning such as math centers.

In determining the teachers’ general views regarding the use of technology in teaching and learning, the researcher wanted a better idea of the time spent using technology district wide. Figure 2 shows the amount of time students engaged in technology daily. Teachers report that students in the districts spend mainly thirty minutes or less a day engaged in technology. The choices count and percentages for the minutes per day that students were engaged in technology were as follows: 0-30 minutes a day was 12 (41.38%); 30-60 minutes a day was 7 (24.14%); 60-90 minutes a day was 7 (24.14%); 90-120 minutes was 2 (6.90%); more than 120 minutes a day was 1 (3.45%). The total count was 29.

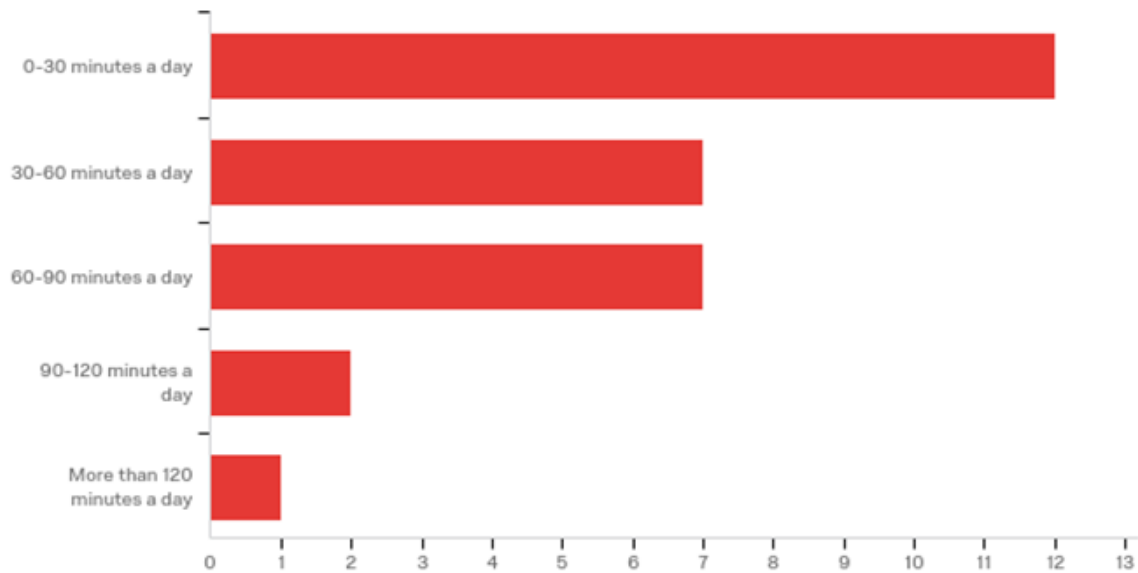


Figure 2. Minutes per day that students engage in technology.

When asked if the classroom has a designated handwriting block, 72.41% of the teachers responded with no. Of the teachers that have a handwriting block, they spend around 15 minutes on average daily. Teachers stated that they need more access to devices (1:1 (one to one technology), chromebooks, iPads, computers) in order to be successful in implementing technology in their classrooms. They also feel time is a necessary resource as well. Time is needed to do research on available platforms, websites, applications, and learning tools that would be beneficial for students. Time and money are required for training teachers on how to use and implement the available technology. Time is also a factor for educators to teach their students how to use technology accurately and efficiently. Lastly, the teachers said they need “problem solving methods for technology problems.” When asked, “If technology fails or is unavailable, are your students familiar with other research/learning methods...?” almost sixty-nine percent of teachers said that their students were capable of using alternate methods to find answers to their questions or gather research.

The availability of technology varies across the district. Some classrooms are at, or close to 1:1, while others have many students and few devices. It was also mentioned that some classes share technology or technology space. The district has implemented a Bring Your Own Device (BYOD) program in grades five through twelve. Within the school district, there is a wide range of technology being utilized on a daily basis. In reviewing survey data, there were many teachers that shared their positive outcomes when it comes to technology, as well as the negatives.

The usage of technology in the classroom comes with its many perks according to teachers in the district. With the inclusion of technology in the district, we are opening our students up to so much more information than we could do with the resources within our classrooms. Technology is how kids learn in the world today and it is what they feel most comfortable using. Technology provides a high student interest, allowing them to engage in their learning at multiple levels. With the growing amount of technology, teachers feel that students have a good deal of choices when studying and allows them to be self-sufficient learners in and out of the classroom.

With enough current and reliable technology, it can greatly affect the way in which students interact and learn within the classroom setting. The survey asked teachers to share their top three technology sources that they utilize in the classroom. Survey results showed a large range in the top three technology resources that are used district wide to enhance student learning, as well as teacher growth and planning. These resources and interactive games allow for high interest learning, while allowing teachers to differentiate material when needed. With the students’ excitement and willingness to engage with technology, they are able to access these resources to help them be more successful, enthusiastic learners. Within school settings, there are a variety of different learners. Some students need the extra challenge, some need the extra academic support, and others may need technology to help them with everyday skills. The use of technology allows students with disabilities the opportunity to utilize speech to text software. This allows students who are more successful at verbalizing their thoughts the opportunity to work on developing their writing and speech skills. The inclusion of technology at station time allows students the opportunity for intervention or enrichment.

As there are many positive outcomes to technology in the classroom, there are some negative outcomes as well. While technology gives students more information at a quick pace, there’s also so much information that is incorrect or not appropriate for school. This could make it difficult for teachers to monitor. One of the top complaints of technology in the classroom is that it just doesn’t seem to work at the time you need it to work and we are “at the mercy of the server.” The technology in the classroom is not always responsive and the Wi-Fi doesn’t always work. In reviewing the survey results, the teachers are most frustrated in technology when it does not function correctly. One response shared how having technology issues during the day results in a delay in teaching time.

Some teachers feel that the use of technology becomes more of a management concern. “The time it takes to get students logged in and logged out during a station that is 15 minutes long” ends up taking up half of the station. With the amount of time it takes, it can cause distractions. “Students will find ways to be distracted by the device they are using, such as doing random google searches during work time.” One response shared that, “technology has a tendency to increase distraction and dishonesty in some students.”

One of the final negative effects of technology is the availability of technology and the need for more staff and student training on these devices. Teachers want to make sure students know where to go and what to do so that instructional time is not being interrupted. With students that need more guidance with technology, there is not much teacher time throughout the day to support them. One participant shared that their confidence in technology is not high and knows that there is more that they could be doing in the classroom with technology to enhance student learning.

While it is not stated whether or not teachers believe it is a positive or negative impact, 79.31% of teachers believe that students probably or definitely rely heavily on technology. Figure 3 shows how heavily teachers feel students rely on technology. Many students are relying on technology, but teachers believe that with this heavy reliance, 68.97% of students are familiar with other forms of research/learning models, such as dictionaries, nonfiction texts, alternative games, or exercises.

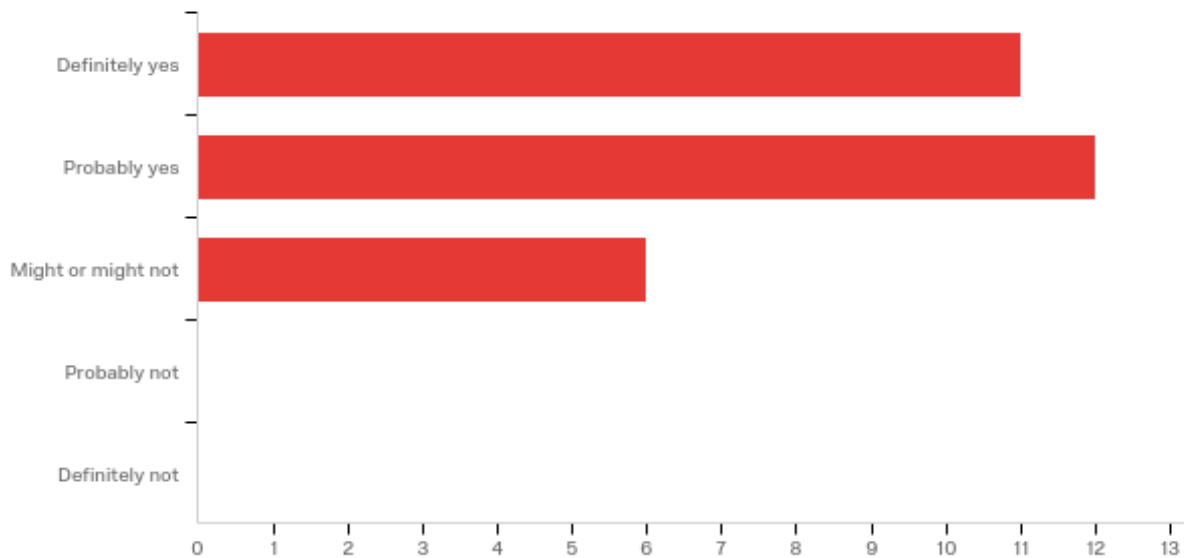


Figure 3- Student reliance on technology

DISCUSSION

The purpose to the research study was to determine the effects that technology has in the classroom. The questions asked through the given survey were meant to provide information to answer the following questions:

1. What are the teachers’ general views regarding the use of technology in teaching and learning?
2. What are teachers’ perspectives regarding the impact of technology use on student learning?
3. What are teachers’ thought regarding other positive and negative outcomes of incorporating technology in the classroom?

The data shows that 62.07% of the participants were Elementary teachers. Figure 4 shows the different ways teachers utilize technology.

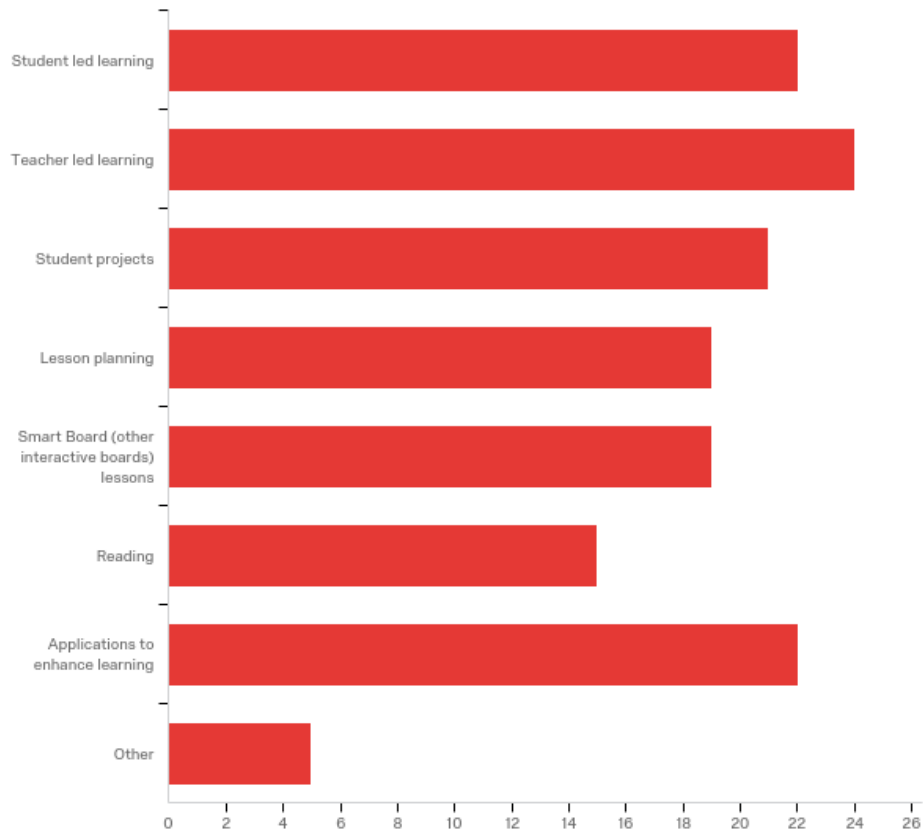


Figure 4- How teachers utilize technology in the classroom

The participants also reported using technology for communication and collaboration among peers, students, and parents. They also administer testing, create art, and use it for math centers. Bitner and Bitner (2002), explained that once the eight keys to success are followed, technology is the best way to help students’ growth. Three of the eight keys to success are personal use, teaching models, and learning based. Looking at the results in figure 4, teachers are sharing their personal use in technology, such as lesson planning. Teachers are providing different teaching models and ways of learning by using teacher led learning, student led learning, student projects, etc.

Figure 4 shows that teachers are utilizing technology in the classroom for student led learning and student projects. This is further supported by Klopfer et al. (2009). They stated, “many students in this group are using new media and technologies to create new things in new ways, learn new things in new ways, and communicate in new ways with new people-behaviors that have become hardwired in their ways of thinking and operating in the world” (p. 1-2). This supports the importance of and need for more student access to technology.

When participants were asked if they feel that their students rely heavily on technology, figure 3 shows that there is more of a reliance on technology than not. A study by Purcell et al (2013) shared that teachers, “encourage their students to do at least some writing by hand...because they feel students do more active thinking, synthesizing, and editing when writing by hand, and writing by hand discourages any temptation to copy and paste others’ work” (p. 6). This article discusses the importance of handwriting. With newer technology, students spend more time typing than before, that can affect student’s fine motor skills. Sulzenbruck et al. (2011) indicate “there are indeed specific differences in basic fine motor skills depending on the amount of time spent typing and handwriting texts” (p. 250). Survey results showed that 72.41% of educators do not have a designated handwriting block, which can affect student fine motor skills.

The participants were asked to share their feelings regarding the positive and negative impacts that technology has on students or their learning. Many participants shared that students are more engaged and motivated in their work when technology is involved. This supports one of Bitner and Bitner’s (2002) eight keys to success. The motivation for teachers and students to want to use the technology helps enhance their learning. The participants also shared that the students are comfortable with the use of technology in their learning. Today’s students have grown up in a digital community. Student have had a large range of technology experiences. Using technology allows them more comfort in their learning. Erin Millar (2013) explained that , “It’s hard to be honest when you have to put your hand up in front of the room” (p. 2). This allows for all students to feel safe while participating.

When asked what some of the biggest problems were with technology implementation, some teachers shared that they feel more technology training would be beneficial for their students and themselves. Some teachers also shared that they do not have much confidence when it comes to technology. In referring back to the eight keys to success, Bitner and Bitner (2012) stated that how fear of change and training are important for student success in technology.

CONCLUSION

The findings of this study show that there are many positive and negative aspects of technology use in the classroom. Although looking through survey results, teachers did share more positive impacts of technology than negative. There were areas that teachers felt like they could use more support, but that they felt that student motivation and engagement were higher with the use of technology in the classroom. Moving forward, teachers would benefit from more personal training on implementing the technology in the classroom so that they feel more comfortable with the inclusion of technology. Educators also felt that students need more training with the provided technology to help promote more independence. The researchers believe that there needs to be more research completed to determine the effects technology has in the classroom.

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