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The Effects of Increasing Technology in K-8 Classrooms

In the last decade, we have seen the development of technology take over our everyday lives. Nowadays, almost everyone carries a smartphone in their pocket and works with technology in their jobs, whether that's through sending emails on a laptop, sending orders on a touch screen register, or controlling the high-tech instruments of a plane. Given these recent developments, then it should be no surprise that technology is also becoming more prevalent in our schools. It makes sense that this would be the case, too, as students need to learn how to properly work with technology in order to have the necessary skills to eventually enter the workforce one day. However, there are more factors that come into play than just job preparation when we are considering adding more tech into our classrooms.

There are positives and negatives when it comes to more technology, specifically in the area of privacy and security of students and their information. There are economic factors as well, especially when you consider the disparities that exist in school funding and all of the costs that go into providing more tech for students. On top of that, we must also look more into how more technology could be implemented, specifically in the realm of blended classrooms and how technology would affect different learning styles. Our paper is going to critically discuss all of these factors and provide a reference for teachers, administrators, parents, and students. Our

ultimate goal is to simply inform and educate, not to persuade or push an argument. We hope that our work will spur discussion and help others form their own perspectives, opinions, and arguments regarding educational technology.

Positives and Negatives of Increasing Technology

In implementing a one-to-one digital device policy, privacy for students can be a serious issue. If students are being provided devices from schools for free problems can easily arise. In one case a school used webcams to take “over 50,000 screenshots of students using their computers”, some of them at home (ACLU 1). In this case the school claimed to retain ownership of the device and use of the device at any time, similar to school lockers. One difference is that the locker is always on school property, but the laptop is not (ACLU 2). Another is that the device can be used after school hours, when the responsibility of surveillance has been passed back off to parents. These situations require carefully crafted privacy policies that respect the students and their parents.

But the appropriate use of technologies like built in webcams could be useful. In one application the eyes and faces of students were tracked to keep them on task and encourage them when they got frustrated or distracted doing schoolwork. Another tracked the mouse patterns of students and learns whether or not they are on task when doing algebra (Herold). This sort of access to image and usage data while they are at school could be extremely useful at developing good habits and attitudes towards their schoolwork.

Another interesting issue is when students are using software on their personal laptops that gather extensive data about their attitudes and emotions similar to the programs tracking

focus mentioned earlier. Some say there is “The possibility that technology might help students develop grit and focus—and improve their grades, job prospects, and long-term health” (Herold). Developing strategies to track and adapt to a student’s emotional needs could fill a gap in current educational methods. But this also could open the door to behaviour modification of students to fit a certain ideal that limits their own freedom — whether intentional or not. The judgement of what this ideal student looks like is a massive responsibility. It would be concerning if an individual with questionable personal or political views is making this choice for a whole school district. It raises the question — is there anyone who can be trusted to make such a choice and shape the future of so many?

As more devices are added to a school or school district’s infrastructure, the number of places where things can go wrong increases. The risk of security breaches goes up with increased internet traffic (Goran 5). When there is an increase in the number of devices, there is an increase of devices there is an increase in network traffic. Security risk also comes from improper usage and training with the devices. According to a Verizon report on data breaches “Errors were at the heart of almost one in five (17%) breaches. That included employees ... sending an email to the wrong person (3).” Teachers without adequate training, and especially young students in K-8 schools would likely pose an even greater risk to network security than your average negligent employee. Either way, one-to-one programs could increase network vulnerability, especially considering the magnitude of the increase in devices in such a program. Despite these factors, the same Verizon report says only 0.73% of all world wide cybersecurity incidents and data breaches recorded in 2018 were against educational organizations (Verizon 4).

Maybe security in schools is not such a big deal, maybe they're not commonly targeted, or maybe security will not be concern until one-to-one policies are widely implemented. The number of devices may be what separates schools from other companies at the present time.

If there are many more devices, there is also much more data that needs protection. This could be a student's files, school records, grades, etc. Since there would be drastically more sensitive data being generated, the task to protect it all would scale at the same rate. Not only would the amount of data increase, the number of places it is being stored could potentially increase as well. It is critical that when digital device programs are implemented that these factors are taken into account.

With all the other considerations involved in making digital technology available to all students, surely there must be some justification for undertaking such a task. There have been many studies exploring one-to-one device programs. In a paper that looks at a number of such studies and aggregates the results, it is shown that within the programs it analysed students' test scores in science, writing, math and English language arts improved significantly. Students also increased the amount that they wrote and edited their work. This is likely because of the natural ability for laptops to facilitate "drafting, revising, and sharing writing (Zheng et al)". It is possible with other types of devices like smartphones and tablets these benefits may not be as pronounced due to the smaller screens and lack of keyboard and mouse. The decisive factor digital devices have over pen and paper is the nature of how work is stored, which is the same for laptops as it is for tablets and phones. The file in memory can be easily changed, duplicated for distribution, and archived for reference. Another interesting advantage of writing on digital

platforms is that it can eliminate some grading bias based on the quality of handwriting of students. In a study focused on elementary school teachers that was based on many previous investigations, it was found that “papers written in neater handwriting were consistently awarded higher scores than those papers written in poorer handwriting, regardless of the quality of the presented content” (Morris 10). If digital devices were made accessible to every student then this specific grading bias could be effectively eliminated.

Students and teachers mostly expressed their satisfaction with the laptop programs in the studies that were examined. Students also improved their “21st Century skills” - their ability to access online information and other digital skills (Zheng et al 1075). This is becoming a necessary toolset for young students to be developing now that these skills are taken for granted at post-secondary institutions.

A highly valued area for educational development that technology lends itself well to is creativity. With greater access to digital technology it is easier for students to be content creators instead of content consumers, since it is easier to access new interactive technologies. One example was a sixth grader who was doing a project on the 1970’s and needed to interview 10 people of different ages. The child interviewed her family, but also created an online questionnaire and received data from an email group (Brown et al). Instead of merely reading and repeating information she created her own and unique ideas.

The previous example also highlights the global and communicative aspects of digital technology made possible by computer networking. With their own laptop students have access to a wider community and quantity of information. An example of software for young students that can be run on their device is ePALS, which has tools for “student-safe-email” and allows

them to interact with people around the world of the same age (Brown et al). With it they can work collaboratively and learn about other cultures.

Some one-to-one device programs have failed, but it is possible that technology for the sake of technology is sometimes the reason for this. It has been shown that increasing digital technology usage by itself is not an improvement, but if it is used intelligently and leveraged properly it may be beneficial (Zheng et al).

An issue that some one-to-one programs supporters claim they will solve is narrowing the education gap between lower and higher income families. It is shown that access to laptops for lower income schools improved technological literacy in those places, but has not necessarily reduced the general performance gap between lower and higher income schools (Zheng et al 1075). Giving and training students who have not had previous access to devices significantly improves their technological abilities since they are starting from zero. Even though one-to-one programs bring low income students up from where they were, they don't actually solve the inequality problem. Additionally in cases where privacy is an issue the higher income students can bring their own devices where the lower income students cannot. For example the webcam screenshot issue mentioned earlier(ACLU 1) or where files are subject to search because they are on school issued computers. In these cases the lower income students are at another disadvantage.

Monetary Feasibility of Adding Technology to the Classroom

A school's job is to prepare its students for the future. In our current society, we are seeing the advancement of technology making jobs obsolete while also creating new jobs to take

their place. In order for a school to properly prepare its students, then it must adapt to this shift and begin to implement more technology in the classroom. If students are educated around tech and computers, then they will learn important skills that will be transferable for the rest of their lives, even when tech progresses further. However, there are often large disparities in funding between schools. In just the St. Louis area alone, some school districts spend as much as \$19,681 per student per year, while others spend as little as \$7,683 (Turner). Obviously, this means that some schools would be able to dedicate a larger part of their budget to their technology than others. While it may be easy for us to tell schools, “implement more technology,” it is not necessarily easy for schools to actually do it. So, to gain an understanding of how feasible increasing technology really is, we will critically discuss the different costs associated with technology, the difficulties faced when trying to increase technology, and the potential solutions for schools that have trouble affording technology.

To start, it is important to understand the total cost of ownership of technology, which goes further than just a one-time purchase of hardware. According to Maduakolam, a school’s hardware should be upgraded every 3-5 years. This is a figure that could increase in years to come as well, considering that technology progresses faster and faster as time goes on, making old technology obsolete even quicker. We must also consider the cost of IT support and professional development (Maduakolam). IT employees are needed to keep schools’ systems up and running, while professional development is needed to properly train school officials to use the technology effectively. On top of that, schools also need to finance software, internet connectivity, and upgrades to school infrastructure that may be needed to make a school

technologically compatible (Maduakolam). All in all, there are many variables that go into funding school technology that may not be noticed at first glance.

Today, pretty much every school has to cover these costs. As I mentioned before, in the 21st century it is important for schools to adapt to changes in technology, and for the most part every schools has. In a recent survey of 451 U.S. school administrators, 98% of respondents stated that students use technology at least once a week (“Kajeet(R) Survey Results...”). Therefore, this discussion will not be about schools’ ability to pay for any type of technology; rather, it will be centered on the extent to which schools can dedicate funds to technology, and the quality of technology that can be obtained with these funds. For example, we know that every school can at least afford a computer in every classroom, but can they provide a set of computers for every classroom, or a computer for every student?

When you look at hardware, you can clearly see that there are plenty of options for schools to choose from. Most commonly, schools purchase Chromebooks, iPads, and Windows laptops for their students’ daily use (“Kajeet(R) Survey Results...”). Chromebooks are extremely affordable, with prices starting at \$250 (“Google Chromebooks”). If a school was to undertake a 1-to-1 initiative or simply wanted to provide more classroom computers, Chromebooks would be a very viable option. Even schools that spend less than \$8,000 per student could make something like this happen, as it would only require \$250 per student. The same could be said for Windows laptops as their prices can run as low as \$200 (“Shop Windows 10 Laptop Computers...”). Even new generation iPads are only marked at \$329 according to Apple’s online store. Overall, many of the most common pieces of technology that we see in schools should be able to fit within a

school's budget, even in the case of 1-to-1 initiatives. The hardware costs of these technologies would only affect a school every 3-5 years too, which would make this even more feasible.

However, the question of feasibility can get a bit more complicated when we look deeper into the total cost of ownership of technology. If a school were to increase the number of computers that they have for students, then their IT support would have to increase too. This could cause problems in certain cases because some schools are already understaffed as a result of them not having enough funding to support more employees. For example, "[In one poor school], one nurse commutes between three schools, and the two elementary schools share an art teacher and a music teacher" (Turner). In a situation like that, could a school support the personnel needed for more technology if they can't even afford to have enough teachers? I doubt it. Alternatively, schools with less funding also have trouble finding employees due to their inability to provide competitive pay. This is supported by Barker, stating, "...institutions in lower income areas miss out on more experienced teachers, who are most likely to get better pay elsewhere". If a school has trouble finding teachers that would want to work for them, then they surely would have trouble finding professionals in the high-demand field of IT. Overall, a school's ability to increase IT support alongside its increase in hardware is a big determining factor of its ability to increase and improve technology. Without the proper IT support, then more technology simply becomes inefficient and ineffective. Some schools can't provide this sort of support, so in certain cases more technology would not be feasible.

Another aspect of the cost of ownership of technology is retrofitting costs, or the costs associated with the necessary upgrades to a school's building to prepare it for technology. A school, "...must budget adequately to upgrade electrical capacity; improve heating, cooling, and

ventilation systems; beef up security systems; and remove asbestos and lead found in older buildings” (Maduakolam). This cost burden can certainly be challenging for some schools, specifically those located in low-income areas where they receive less funding. For example, Semuels states, “In [a low-income area], high school teachers must duct tape windows shut to keep out the wind and snow and station trash cans in the hallways to collect rain.” If a school has trouble just keeping out rain and wind, then it is very reasonable to infer that they couldn’t make the necessary changes needed for them to implement new technology. Also, many older school buildings have fallen so far into disrepair that the repairs required would be too expensive to carry out. These same schools wouldn’t have the money to build a new school either, so they are stuck with the inability to make the necessary upgrades for more technology, which would again question the feasibility of more technology in our public schools.

So, we can draw the conclusion that there are some schools that can afford to provide their students with an exceptional amount of technology, while other schools cannot. However, there are some federal programs out there that can help schools with less funding even the playing field. One example is the Title I-A program, which is, “...designed to provide supplementary educational and related services to low-achieving and other students attending pre-kindergarten through grade 12 schools with relatively high concentrations of students from low-income families,” (Skinner). These funds can be used in several ways, but many schools use them for technology due the cost associated with it. Another source of federal funding is the E-rate program, which “...seeks to improve access to digital technology by providing approved schools and libraries with discounts ranging from 20 to 90 percent on qualifying telecommunications services” (United States, Department of Education, Office of the Under

Secretary, Policy and Program Studies Service). The E-Rate program also helps to provide infrastructure and installation, which can assist with some of the most challenging costs that are associated with technology. For the most part, federal assistance has had a positive impact on the amount of technology that we see in classrooms, too. In the first few years of E-Rate funding, there was a considerable difference in the gap between ‘high-poverty’ and ‘low-poverty’ school districts, with ‘high-poverty’ districts seeing a large increase in internet accessibility (Department of Education, ED), Office of the Under Secretary). When under-resourced schools are provided with more resources for technology, then of course it would make sense for schools to have better access to technology.

Overall, increasing technology can be a challenge that comes with many implications that many would not think of. With the many different costs that are associated with technology, many under-resourced schools simply lack the funding to provide enough tech for their students. However, with the current availability of federal funding to help these ‘high-poverty’ schools, increasing technology is a bit more feasible. Of course, these programs can’t close an \$11,000 per student gap, but they can help prepare more of our students for the future job market through more technology. So, in the future, it is completely reasonable for us to expect an increase of technology in our children’s schools.

Changes in Learning Styles

In the last couple of decades, the use of information technology in classrooms has become more prevalent than ever. There are new and exciting methods of teaching that have

never been possible before such as flipped classroom, where the lecture is taught at home and homework is done during class, or online learning, where students do not have to come to a traditional classroom setting. With these changes however, there are concerns with how teachers adapt to the integration of technology and how students react to the changes in learning that they must overcome. My part of the Dissoi Logoi will explore the different new methods of teaching and how teachers and students are going through the integration experience.

New methods of teaching have only come out in the last few decades thanks to the integration of technology for learning. For instance, more and more teachers are moving toward the “flipped classroom” which is broadly defined as “Recording in-class activities to convey a course: Students watch the video before the class and use the class time to solve complex concepts, answer questions” (Hwang). Flipped classroom is a departure from the traditional classroom; more time and emphasis are given on students learning to understand instead of learning for a test. Students can ask teachers questions in class and rewind videos of lectures at home on their own time. Flipped classroom has really started to gain traction in public schools in America as well as colleges and universities. It shows a significant push to use technology in the classroom. These methods of teaching were never possible until now; almost all students today have access to technology resources, it’s only a matter of time until it used broadly. Another example of the departure of the traditional classroom is online classes and online universities; in 2002, “enrollment in the baccalaureate and graduate-degree programs at the University of Phoenix Online neared the 50,000 mark, a 70% increase from the previous year” (Zhang). Online learning had exponential growth in 2002; today, the number continues to rise as more devices are being used for instruction. Students see a value in the convenience and affordability in online

learning; they don't have to go to a school but can access learning everywhere in the world. Almost all universities today have options for online classes in the summer or over the winter; there is real value in online education if universities are providing them. Finally, in an education article in 1992, Strommen found that information technology "facilitates children's learning by nurturing their own active cognitive abilities" and that "technology makes possible instant exchange of information between classrooms and students; it allows instant access to databases and online information" (Strommen). Integrating the use of technology in classrooms has strengthened collaboration between students and classes; students can share information nearly instantaneously today with the use of technology. There is no longer a need to have separate books, magazines, journals and other traditional print sources, but rather use computers with databases to access a plethora of information sources. A lot has changed with technology in classrooms, this paper for instance relied heavily on Google Scholar to find reputable sources that are topical. This has not been possible until now and it is easier than ever to gather immense amounts of information in one short sitting. Technology has changed the way we think of a classroom, no longer are students sitting in a traditional classroom, but rather are learning in different environments each with their own benefits and drawbacks.

While technology has changed the way we think of the classroom, teachers are still needed for the younger generations; there are some consequences with the integration of technology in classrooms however. For instance, one study found that "teachers generally resisted the idea the technology integration should be used automatically in all situations" and that teachers "rejected relying on technology 'being the lesson'". One teacher put that "it would be like me teaching a yearlong class on how to use the calculator - it's a tool, not the actual

lesson” (Ruggiero). With some districts and administrators pushing technology into the classroom, teachers are starting to see the downsides of the push. Teachers end up not teaching content, but instead teach the technology for the content. Just because technology is implemented into a classroom does not mean it is the best for teachers; technology integration should be focused on the material and content, not the technology itself. Almost all the classroom instruction at SLU uses Crestron systems to deliver PowerPoints, presentations, etc. to students in classrooms or lecture halls. This system, from my experience in IT at SLU, is daunting and complicated for some professors and instructors; there are many more features on these systems than on the surface. When approaching the classroom computer, users are presented with a typical computer screen, but there is also a tablet like screen on the side. This tablet screen controls the projector and it sometimes breaks leaving many instructors confused with no means of troubleshooting. Many instructors do not want to spend the time to learn about these systems, especially in front of students. With the k-8 classroom, the same types of systems are found but not as complex. Teachers may still have to contact their school IT for problem solving leaving to downtime in the classroom. Another example is a middle school teacher who describes the best use of technology is when it “can be used to invisibly enhance the educational experience” and that it “should seamlessly provide additional illustrations and examples to the learning concepts” (Ruggiero). Technology should be seamless in lessons and instruction and not the stand-out activity like going to the computer lab once a week; most instructors want technology noninvasive and seamless in the classroom. How a lesson is taught and executed should not be different on whether technology is used, but rather as a supplement and aide to help present topics differently. Connecting real world applications for concepts utilizes technology in a significant

because it adds value to lessons. Finally, forty-eight classroom teachers came to the common conclusion that “technology use was becoming pervasive for whatever area it was being utilized” and that “technology integration should not be used automatically in all situations” (Ruggiero). School administrations across the country are pushing technology into classrooms at an alarming rate. When my high school and middle issued Chromebooks to us, there was not a giant leap and push to use them in classroom settings; at most it was to write a short paper on Google docs or to browse the internet while the teacher was talking. Technology is not always the correct answer in every classroom; teachers are beginning to see the proper use cases for technology integration. Technology has made learning easier in a lot of settings if used correctly; teachers have valuable criticism because they are the ones teaching the content to students. Students also have some say on the recipient end of teaching. Teachers are some of the most important jobs in our society; having reservations about technology integration is of importance. They are on the front line of students’ education and future and can see the benefits and drawbacks first hand. Their experiences can help shape a better method for the future of classrooms.

Teachers’ experiences are extremely important with the integration of technology. Students today have an immensely powerful platform to use for education, and they are now beginning to use it. For example, students are also beginning to see a change in learning styles, as one study puts that “students resist our departure from traditional ways” and that “they argued that assignments took too much time for those unfamiliar with the computer programs and that more time structure was required” (Grasha). There is a transition period going on right now where schools and districts are beginning to change over to newer teaching and instruction methods; students end up as “guinea pigs” to test the viability of these new methods. Students

are thrown right into new classroom methods such as flipped classroom without the option of having a regular classroom; not all students succeed the same way and it poses a challenge for them to adapt to the new classroom style. Flipped classroom shows that time management is important, students are required to listen and take notes on the lecture on their own time. Also, students who are not as technology apt can be lost or behind in class work from classmates who are. Finally, a study on the time, structure, social interaction, and convenience found that students “do not appear to be concerned over the loss of face-to-face interaction”, but the “ability to work at home” is the only benefit. Students were worried about the “loss of face to face classroom interaction” and they “need to exercise self discipline” (Valenta). Classrooms utilizing technology for class structure offers clear benefits such as flexibility and freedom from the traditional classroom setting, but students realize that the traditional classroom has value with group work and face-to-face interactions. More diligence and time management for class work and assignments is put onto the student instead of having teachers form a class structure which students adhere to. The students in the study brought up valid concerns with online classes and see a value in having a teacher present for structure. Online classes are more prevalent today and there still, for the most part, not a certain way to address this problem. Programs such as Saint Louis University’s winter courses require much more “self-discipline” and time management for students; there is a strong push toward online education where some schools focus solely on it, while some schools like community colleges offer almost of their classes with an online version. Finally, there is a value for students when it comes to technology integration, “it provides the ability to address all types of learners” such as hands-on or visual (Ruggiero). In the traditional classroom, lectures and lessons are usually taught one way; while it may work well for one

student, it may now for another student. Technology allows students to learn material and concepts differently with carrying levels of interaction or visual aids. In the study, a grade school science teacher was allowing students use the smart board for interaction or provided videos for other students; this gives students more options and incentives to learn material making education more valuable in the presence of technology. Students are the bread and butter of the classroom, at the end of the day students are there to learn. Technology has allowed incredible flexibility and value to flourish for students who don't learn well in the traditional classroom.

Researching this paper has been difficult to narrow down to just k-8. Throughout the paper, there are multiple sources from collegiate or high school settings. With children in k-8, the qualitative and imperial data is lacking; it is difficult to gather data and experiences from students at these ages. It is important to note that technology in classrooms isn't just reaching k-8, but the entirety of education itself. The internet, technology assisted classrooms, etc. have all contributed so much in these last couple of decades that new learning methods such as flipped classroom and online learning have exploded as more instructors and students see the benefits. The sheer pace of the advancement in the classroom has redefined what the classroom is. The classroom in the future won't be a traditional classroom, but one that relies heavily on the integration of technology to help students learn concepts more effectively. However, now we are at a transition time, where teachers are still wavering about the proper uses for technology. They don't want to have technology for the sake of having technology. Technology must have seamless and invisible integration. From here, it's up to the students to choose how they want to learn. For instance, hands on learners can use interactive websites to learn the way they want to,

offering unprecedented value and choice. As technology becomes more prevalent and integrated in classrooms, the traditional classroom will be a thing of the past.

Blended Learning Programs and Need Based Programs

As one learns more about the positives and drawbacks of an increase of technology in the classroom setting for Kindergarten through eighth grade there are many other things to consider when adding this technology. We have already discussed if it is realistic to obtain the technology and distribute it to all the children, who it affects and who should have a voice if there should be an increase, and the effect with learning styles. However, the topic we have yet to present is if it is best to introduce this addition of technology in only a few programs instead of for all kids for all subjects. There are two main types of programs that may be effected from the addition, blended learning programs and need based learning programs. First, I will be explaining what blended learning programs are, what possible effects may be for increasing the technology, and why schools must be careful about utilizing them. Secondly, I will focus on need based learning programs, explain the different types of these programs, and the possible effects of the technology with the kids who will be interacting with it.

Blended learning programs are a new type of schooling program that incorporates technology into the classroom setting to assist with the learning of a specific subject. This is typically done by having a mix of online or technology-based learning and in person or teacher-to-student learning (Bonk 2007). One of the main reasons blended learning programs have become the new big thing is that it provides the ability for more individualized learning for each child so that they can learn at their own speed (Powell 2015). When researching blended

programs in K-8 specifically most schools relied on this style for only a few courses instead of having all subjects blended. There are a few different reasons for not incorporating technology into all of the school, however the main reason is most likely due to the fact that there are some subjects that do not have a helpful or well working online counterpart. If school districts do increase the amount of technology, or even just blended learning programs there are many different effects on children's learning, both positives, negatives, and even unknown effects.

There have been a handful of studies in the past few years that have specifically focused on the effects of blended learning in K-8. One of the most promising of the positive effects of these programs was a pilot report from the state of Tennessee in 2018. The program was launched in 2016 for Algebra I courses in 37 middle and high schools across the state. Their main focus was to see if increasing the use of technology in combination with classroom learning would lead to better learning and thus increased test scores. The study resulted in a statistical difference between the control students and those in the blended learning programs. This was the conclusion the state was looking for and is hoping to increase the assistance of technology found in blended programs statewide. The schools that participated in the study found that there was a relationship between blended learning for Algebra I and increased test scores. There still needs to be more research done to see if there is a direct relationship between the two or if there is more to the relationship than just a technology based course for kids who are already behind in the typical classroom setting. While this study found that there was a positive impact of the programs other have concluded with contradictory results.

It may seem that blended learning programs are the solution to many of the problems today's school districts have in regards to learning and test scores. However, other studies have

found that incorporating technology doesn't always produce the same positive effects. Some studies have found that there is little change with an increase of technology. Still, one of their main concerns about increasing technology, especially in the case of blended learning where technology isn't the only form of teaching, is that it can become a distraction. When technology and teachers must work together kids can focus only on the "fun" and "new" method, technology and computer learning. This is why it is important to make sure the blended learning and the teacher's lesson plan work hand in hand and is used in specific situations. While there are benefits and drawbacks of blended learning there is also the issue of the unknown challenges that come with our advancement of technology (Lynch 2018). Everytime there is a new iPhone update something seems to go wrong, so by adding technology into classroom settings there may be challenges that we never could have anticipated, yet another component school districts need to be mindful of.

One of the greatest challenges for predicting the positive and negative effects of increasing technology in the classroom setting for children K-8 is that there isn't enough research. To fully understand the effects there must be more studies that specifically focus on kids in elementary schools and middle schools. The few studies that have been conducted have differing results which makes it difficult to tell what the true effects are since there are so many other factors that could be skewing these results. While there has been plenty of technology added to high school classrooms and it is basically required in higher education, there are still steps that should be taken for elementary and middle schools. Many times, there is an issue where once kids get to high school they are expected to know how to use technology yet without the addition and education of using technology when they are younger leads to a gap in

technological knowledge. This lack of technology for younger children also leads to the expectation that if we do add more technology into classrooms earlier in their educational path there will be different effects that we can't predict that could be either positive or negative. There could be psychological issues that today would not possibly predict. With all this being said there are other concerns that school districts should keep in mind and be cautious when adding more technology.

The use of blended learning should be implemented in order to assist the learning and comprehension for the students. In her article Mohammed suggests, however, that in order for a blended learning program to be successful there needs to be a solid basis of teaching methods (Mohammed 2018). For these programs to be as beneficial as possible teachers must be capable of teaching without the addition of technology. This means technology can't save students if the teachers and lessons aren't adequate to begin with. If the teachers and faculty are not strong with their jobs and teaching adding technology can be more harmful than beneficial. Faculty will also need to be trained in how to use and then functionally teach with the new technology. School districts must keep this point in mind and truly evaluate the schools to make sure an addition of technology will actually be helpful.

While blended learning programs assist all students, need based programs focus on helping children who are either behind in their coursework or have disabilities that inhibit their learning. These programs are now utilizing technology and other forms of new advancements in society to bring all kids up to speed with their education and in some cases challenge kids who are ahead of the average students. In general these programs are referred to as assistive technology especially in regards to children with learning disabilities. Assistive technology

mainly focuses on which subjects children need more help with by using technology (Stanberry and Raskind 2018).

As I stated before assistive technology and need based learning programs are used to help different types of children, even students, in different ways. The one that comes to mind first are programs that help children with disabilities. Assistive technology is used for these kids because the AT toolkits have technology that can be used to allow them to communicate easier and integrate the teachings in ways that are easier for them to learn (Robitaille 2010). Need based learning programs are also used for kids who don't necessarily have learning disabilities, but are behind in school work. Some of these programs do have issues in the sense they are only increasing the use of technology for the kids who are behind which seems unfair to the rest of the children.

Assistive technology and need based technology can be positive in many ways for the students and teachers who use them. One of the main reasons for the positive effects of using them have to do with the personalization it allows each student to have in their learning. By utilizing individualized learning implemented through technology each child is able to move at their own pace and learn in the best way for them. "... the instructor can settle on the best way to present content to special ed students through the flipped [assistive technology] model," (Schaffhauser 2013). This quote best describes how helpful assistive technology can be for special ed students. With the aid of technology teachers are able to better teach children with disabilities or those who may be behind in their school work.

While there are so many positives of the use of assistive technology there are still many negatives that are associated with an increase of this type of technology. One of these concerns is

that kids with disabilities might become too reliant on these forms of technology. Those that can work in the future could have a difficult time transitioning to not having this resource for them to fall back on if there is an issue. However, this is true for all children when talking about increasing technology in the classroom setting, they may become too reliant. Another issue is that when implemented in the classroom setting, some teachers are not competent to teach with the AT and this can harm the learning for these students rather than help them (Puckett 2002).

As one can see the possible addition of technology in the K-8 classroom has a multitude of positives and negatives as well as effects that must be considered. The first consideration school administrators, staff, parents, and students must be concerned about are the advantages and drawbacks of an increase of technology. The main advantages we were able to find included that by incorporating more specific online programs in classrooms there was an increase in standardized test scores. However, privacy, security, and student focus were some issues that could be negatively impacted by adding more technology.

Next, the issue then becomes actually having technology in the classrooms. There can be challenges both monetary-wise as well as with faculty and students. Sadly, there is no perfect way to fund technology and there could be gaps between school districts depending on the financial ability of the schools and students. Faculty will need to be trained in how to use and then functionally teach with the new technology. Students also have to be open to new digital technology and be willing to learn with the addition.

With technology becoming a big part of the learning experience, there are some arguments against and for implementing a technology driven classroom. With new technology

comes new learning and teaching styles; it may not be compatible with some people. There are few studies on how technology in the classroom benefits or degrades the education of minors. Given that using digital technology is an essential part of American society, one has to question whether districts will make a huge investment toward a broader or more applicable education than what is in place today.

Need based learning programs are beneficial for all students not only children in specialized programs. However, these programs can be split into two categories with different focuses on the kids they help: a program for kids behind in their school work and a program for kids with disabilities, including physical, mental, and learning. These programs can help all students to have individualized learning that can help them to gain the knowledge school provides in the best way possible for them.

However, one of the biggest issues with the increase of digital technology in the classroom is that there has not been much research about the effects of adding it in the K-8 classroom setting specifically. We believe there needs to be an increase in the amount of research and pilot studies that explores the impact of technology in classrooms for this age range. The few studies that have been conducted have differing results which makes it difficult to tell what the true effects are since there are so many other factors that could be skewing these results. One study that we were able to find with promising results did point out that technology can't save students if the teachers and lessons aren't adequate to begin with.

Our biggest hope is that by increasing our knowledge about adding more technology into classrooms, especially for younger children we can lead to a brighter future generation. A generation where there is equity of learning for children who learn best under different

conditions. A generation where all kids can improve their learning and do what is best for them.

Digital technology is an inseparable part of our reality now and it seems clear that we must address its integration into K-8 education.

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