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Technology in Education: The Ongoing Debate of Access, Adequacy and Equity

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Technology in Education: The Ongoing Debate of Access, Adequacy and Equity

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Abstract

Technology is intertwined in all aspects of our lives. Technology has evolved in ways that were once considered unimaginable. Yet, access to these advancements in technology are not adequate, especially throughout our education system. The purpose of this paper is to bring to light the significance technology can have on our education system today. This paper will reflect research which supports the integration of technology beginning in early childhood classrooms. This paper will also reflect on the injustices that exist in how educational technology is unequally distributed between socio-economic status. More is available to wealthy, white students. While people from low-income backgrounds and people of color continue to struggle to access the same tools for academic, and later professional success. Our education system needs to advocate so that all learners regardless of their socio-economic status have access to adequate and equal technology.

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Introduction

I am writing this paper during a time of great uncertainty in education throughout the United States. No one could have seen a crisis like this coming or likewise the lack of preparation leading up to it. I am speaking about the COVID-19 pandemic, which has forced schools across the United States to shut their doors and turn the switch to distant learning. As educators we affirm daily the importance of creating meaningful, trusting relationships with our students, but on Friday March 13th we left school unsure if we would return on Monday.

We were caught off guard and unable to prepare our students for what was to come because we ourselves had no idea. I can only imagine the thoughts and feelings that arose after learning they would not be in school on Monday. In the blink of an eye educators were challenged with the task of implementing a new online program that both teachers and students were required to learn and navigate.

Although a vast majority of students have access to remote learning, there are still many students who do not. The health threat of this pandemic is a tremendous worry on everyone's mind but for teachers we also worry that the crisis will worsen the achievement gap for low-income households. Schools were forced to scramble to try to provide all students access to a computer or tablet. In this day and age we assume that everyone has access to the internet, but that too is not the case. Wifi companies across the country have offered free or reduced-cost internet access for 60 days to low income families. Others have pledged not to shut off service for unpaid bills (Adely, Balcerzak,

2020). Technology is everywhere- entwined in every part of our daily lives, but still not accessible to all.

Amidst this unsettling time we are beginning to see how important technology integration is amongst learners of all ages. COVID-19 has shed light on the inadequate and unrealized potential of technology in classrooms as well as the dire consequences to those whose economic status limits their access to technology. The purpose of this paper is to delve into the significance of technology in our education system today, starting in our early childhood classrooms. Through this paper I will reflect research that supports the integration of technology beginning in early childhood education, and the ways in which technology can support classroom learning. In light of my research I believe even more strongly that our education system must advocate so that all learners regardless of their socio-economic status have access to adequate and equal technology.

Approach

A study of available research and literature was completed to help provide information on the significance of technology in our classrooms by providing evidence of how and why technology can benefit learners, teachers, and schools. It also aims to identify the conditions that lead to successful implementation as well as some of the barriers that impede the effective use of technology in education. A literature search was completed, collecting items from academic and professional sources. These sources were reviewed and summarized to support the push for access to adequate and equal technology in our education system. Although this paper strives to make a push for te

Summary of Key Findings

Through this literature review I have grouped my key findings and presented them below.

1. Integration of technology should begin in early childhood classrooms.
2. A successful learning environment is characterized by the right blend of teachers and technology.
3. The use of technology can reduce inequalities and promote inclusion.
4. Technology outside of learning environments is still unevenly distributed across ethnic and socioeconomic lines.
5. High-speed Internet access is needed to implement successful learning.
6. Successful utilization of technology depends not just upon sufficient access to tools and resources but on the availability of sufficient training and support for teachers.

Literature Review

Through an extensive literature review the key findings above were developed. The following sections will delve into the key findings with support of previously acquired research.

Integration of technology should begin in early childhood classrooms.

The first finding of this review concludes that the integration of technology should begin in early childhood classrooms. For the purpose of this research study, early childhood refers to birth through second grade. As many educators and parents have observed, today's children are exposed to technology at an early age, with tablets, e-readers, and smart phones being some prevalent choices. (McManis & Gunnewig, pg. 14, 2012) During the preschool years, children begin to develop a sense of initiative and creativity. They begin to explore their ability to create and communicate using a variety

of materials. Digital technologies provide many more outlets for children to demonstrate their creativity and learning. The question should no longer be *if* we should use technology in early childhood, but *how* and *why* we use technology to improve program quality, increase responsiveness to parents, and expand opportunities for professional development. (Donohue, pg. 17, 2003) Research shows that when used properly computer use increases young children's skills in social, cognitive, language, literacy, writing, and mathematics.

While the literature establishes the use of educational technology and positive outcomes for children, it also indicates that technology needs to (1) be developmentally appropriate for children, (2) include tools to help teachers implement technology successfully, and (3) be integrated into the classroom and curriculum. (McManis & Gunnewig, 2012, Clements & Samara 2003; Glaubke 2007) Technology plays an important role in children's learning when it is based on research, child development theory, and developmentally appropriate practices. Development in these early childhood classrooms is focused on social, physical, emotional, and language development. All of these skills are provided with adult guidance. Teachers can integrate these technologies to help children focus on tasks, problem solve, and collaborate with others.

Previously, there were fears that using computers with young children would result in poor social skills, less active learning opportunities, and fewer age-appropriate play activities. Recent research shows that computers can facilitate social, cognitive, and play development among very young learners when incorporated effectively. (Wood, Specht, Willoughby, Mueller, pg. 211, 2008) Kaitlin Bradley in her article *The Benefits of*

Technology in Early Childhood Education states "Technology in early childhood

classrooms should support collaborative learning environments and, therefore, enrich

student's interactions with their peers."(Bradley, 2019) Children in these classrooms

should interact with peers when using the computer or tablet. This gives them the ability

to share and help one another, collaborate to solve problems, ask for and provide

explanations. Adult guidance for children using computers is associated with increases in

abstract reasoning, planning behavior, visual-motor coordination, and visual memory.

(Primavera, Wiederlight, & DiGiacomo, 2001) Teachers can help children focus on tasks

or guiding them through certain situations while using a particular software program.

This also helps teachers to determine where children need extra supports and how to

provide them.

When teachers support children and media rich content is integrated with the

curriculum, technology experiences are associated with better language and literacy

outcomes, such as letter recognition, sequencing, and sounds; listening and

comprehension; vocabulary, and understanding concepts about stories and print.

(Primavera, Wiederlight, & DiGiacomo, 2001) Studies have also found that with the

newest technologies such as tablets preschool children learn to use the devices quickly,

independently, confidently, and explore more freely. (Couse & Chen 2010) It is the role

of the early childhood educators to ensure that they are using these technologies in

developmentally appropriate ways, if they do there are many benefits students will gain.

Early access to these tools ensures that students have the skill set needed to learn and

utilize rapidly changing technology in later grades. When used effectively technology can strengthen and facilitate meaningful learning for young children.

A successful learning environment is characterized by the right blend of teachers and technology.

The second finding of this review concludes that a successful learning environment will come from a mix of teachers and educational technology. This paper does not suggest that we turn the switch to remote learning, but rather we switch to a method of *blended-learning*. Blended learning, which strategically integrates in-person learning with technology to enable real-time data use, personalized instruction, and mastery-based progression. (Mohammed, 2019).

Experiences with technology can pave the way for unprecedented learning opportunities. However, without an education component, technology cannot reach its full potential for supporting children's learning and development. (McManis, Gunnewig, pg. 14, 2012) Computers and tablets should not just be placed in the classroom without purpose. Teaching practices are key to effective instruction, and I will argue that teachers matter more than the presence of specific tools. When technology is integrated into lessons in ways that are aligned with good in person teaching pedagogy, learning can be better than without technology. (Mohammed, 2019)

A 2018 meta-analysis of various rigorous educational technology studies, indicated that when technology is used to individualize a student's pace of learning, the results show "enormous promise". (Escueta, Quan et al., 2018). This analysis also found that increased access to technology in school was associated with improved proficiency

with, and increased use of technology overall. This means that students as they go through the school system will be able to use their proficiency in technology to better their education, and later in life their careers can be positively impacted as well.

Research indicates that young children use computers most effectively when supported by teachers. (Wang, Kinzie, et.al, pg. 11, 2019) Depending on the age of students the scaffolding provided by teachers should be modified as well. In early childhood programs, the education component often means adults being nearby, interacting and providing opportunities for peer-to-peer learning to encourage children to gain the skills they need for succeeding in school. (McManis, Gunnewig, pg 14, 2012) As students grow older teachers still need to be there for support, but less intervention is needed, students will learn how to use technology to supplement their learning. Simply adding technology into a classroom doesn't guarantee better learning. It is only effective when the teacher is there to coach the students and intervene when they experience problems, to scaffold their learning with prompts, cues and modifications. I argue that technology cannot stand alone, it should exist as part of the education system as a tool to enhance the role of the teacher.

The use of technology can reduce inequalities and promote inclusion.

The third finding of the literature review states that using technology in classrooms can reduce inequalities and promote inclusion. There is indicative evidence that the use of technology can reduce gaps in subject attainment, and promote inclusion when they are effectively implemented. Research has found that technology has increased

learners' interest in learning, their confidence, practicing skills, and the time they spent on non-formal learning. (Becta, 2007)

If teachers have access to a computer, laptop, smart board, or iPad, these tools can meet the specific needs of each type of learner. The Universal Design for Learning (UDL) is an educational framework that many educators are integrating into their classrooms. For the purpose of this paper, Universal Design for Learning is a way of teaching that helps give all students an equal opportunity to success. The guidelines of UDL provide a framework for identifying specific evidence-based options and alternatives to consider in designing successful learning activities for all students. (Rose, Gravel, 2010) This involves flexibility in the ways students access material, engage with it and show what they know. Through this framework technology allows adequate access to the curriculum for students in ways in which they otherwise are unable to engage. When given multiple means of representation, CAST (2009) argues that learners are given various ways of acquiring information and knowledge" (pg 1.) Through the use of available computer software and other technologies, information can be transformed and presented in various ways to learners. These UDL frameworks combined with modern technology can reduce inequalities and promote inclusion because all learners needs can be met through modified lesson plans.

Technology can be used to increase students' motivation and engagement levels. (Wang, Kinzie, et.al, pg. 5, 2019) Research shows that digital learning increased learners's interest in learning, their confidence in practicing a skill, and the time they spent on non-formal learning. (Becta, 2009) Studies have shown that the integration of

digital resources can help learners who are behind in reading, spelling, writing, and mathematics. Reed et al. (2013) found that digital resources could help learners over the age of 8 who were 6-12 months behind their age group in their reading age catch up.

Technology can also support inclusion throughout classrooms. The use of *Assistive Technology* has been more widely accepted in schools for students with learning disabilities. For the purpose of this study the definition of *Assistive Technology* is any device, software, or equipment that helps students with an IEP participate in an inclusive classroom setting. In classrooms which have not yet adopted the use of technology there are still students with a learning disability, who are required to use a device to participate in their learning. Whether this device be a computer or speech tablet research has shown students refuse to use their devices in fear of stigmatization. (Parette, Scherer, pg 4, 2004). So why is technology not accessible to all? We can prevent feelings of stigmatization, as well as support learners without IEPs who might be struggling to access the curriculum.

Technology can provide aids for all types of learners in the classroom including; visual, auditory, and kinesthetic learners. Teachers can use technology to produce visual aids to help visual learners understand the lesson. (Emma, 2018) For example, teachers can use powerpoint programs to outline key points while including diagrams and pictures. For auditory learners teachers can use reading apps or video presentations. Lastly for kinesthetic learners, or learners who use their whole bodies to work, there are various apps where students can physically get up and learn. There are games where students are able to use their hands to practice addition and subtraction. Not only do these

various technologies make learning more accessible but they also have the ability to make learning more fun and engaging. When paired with expert teaching pedagogy technology has the ability to reduce academic gaps and promote inclusion.

Technology outside of learning environments is still unevenly distributed across ethnic and socioeconomic lines.

For the purpose of this paper we use *ethnic* to refer to race, and use the term socioeconomic in regards to household income. Although much of the research for this study was based inside the school, a significant number of resources touched on the inequitable access to technology outside of school. Since learning is acquired not only in the classroom this finding was prevalent throughout the research. Two surveys conducted in 2013 reveal disparities in devise ownership and Internet access across socioeconomic levels and ethnic/racial minorities. (Madden et al., 2013, Purcell et al., 2013) Low socioeconomic and ethnic minorities are less likely to use the Internet than their more affluent and white peers. These studies also found that racial and ethnic minorities, especially Hispanics, are less likely to own a computer. This is very problematic as studies have shown that students with computers in their home have higher GPAs, and are more likely to graduate, less likely to be suspended, and less likely to engage in criminal activity than those without computers in their homes. (Beltran, Das, & Fairlie, 2006)

The digital divide has been a topic of debate for decades with researchers, advocates and policymakers. For the purpose of this paper the digital divide refers to inequalities between individuals and groups of different ethic and socioeconomic levels in access to information and communication technologies. The most obvious divide is

family income. Anderson and Kumar in their article *Digital divide persists even as lower-income Americans make gains in tech adoption* state "Roughly three-in-ten adults with household incomes below $30,000 a year (29%) don't own a smartphone. More than four-in ten don't have home broadband services (44%) or a traditional computer (46%). And a majority of lower-income Americans are not tablet owners. By comparison, each of these technologies is nearly ubiquitous among adults in households earning $100,000 or more a year". (Pew Research Center, 2019). At all income levels, White families are twice as likely to own a computer than Black and Hispanic families. (Primavera, Wiederlight, & DiGiacomo, pg. 4, 2001) The main reason that they do not have technology is because they are too expensive. (Rideout, & Katz, 2016, pg. 5) Socioeconomic status and race play a large role in access to technology both inside and outside of the classroom.

Although students from lower-income households might have the opportunity to engage with technology throughout the school day studies also show that there is an inequality that exists in terms of how computers are used and the skills that the children are being encouraged to develop. Computer use in low income schools adhere to more traditional practices and beliefs about student learning, whereas computer use in high socioeconomic schools often reflects more constructivist and innovative teaching strategies. (Primavera, Wiederlight, & DiGiacomo, pg. 4, 2001) For example in high socioeconomic schools students might use technology to enhance their writing skills, or to analyze information. Students in low socioeconomic schools use computers for

remediation of skills, and to work independently. The use of technology in school should be the same no matter the economic status.

As children get older and the demand for outside school work becomes larger. Not having access to the internet can put them behind academically. The achievement gap begins in the home and widens as students lack access to technology and families lack the digital literacy skills to use technology effectively. The disparity in online access is also apparent in what has been called the *homework gap*- the gap between school-age children who have access to high speed internet at home and those who don't. (Anderson & Kumar, 2019) Nearly 3 million students in the United States struggle to keep up with their studies at home because they do not have internet access. (Associated Press, 2019). Students study in parking lots of schools, libraries or restaurants wherever they can find Wifi.

COVID-19 is exposing just how bad America's homework gap really is. With school closure learning has resumed online. But getting online, as evident from research stated above, will be hard for students of low socioeconomic status. They also do not have the ability to access the internet in places like libraries or a restaurant because they are now closed. The disruption of schooling during this pandemic will have disparate effects across the socio-economic ladder. The achievement gap between children from poorer and richer families is bound to rise as long as school closures continue. (Doepke, & Zilibotti, 2020) A recent article *COVID-19 and Children's Education* estimates just how big of an effect the COVID-19 pandemic will have on achievement gaps. The authors state "We can make an educated guess by considering as a benchmark what

happens during an interruption to learning that takes place every year: the summer break… In short the less fortunate children might be left behind by the equivalent of more than an entire year of schooling." (Doepke, & Zilibotti, 2020) A whole year of learning could be lost due to a single missing factor, a lack of a working computer, no Internet access, or the inability to work the computer on their own. The worst case scenario is learning will simply stop for the students due to their lack of access among socio-economic groups. I believe even more strongly that our education system must advocate so that all learners regardless of their socio-economic status have access to adequate and equal technology. If not we are allowing a whole group of students to lose an entire year of schooling, which might be nearly impossible to get back.

High-speed Internet access is needed to implement successful learning:

Unreliable and slow Internet connection in our day and age can be infuriating. Many of us are able to open up our phones, tablet, or laptop and automatically connect to high-speed Internet. This is not the case in many schools and households. The importance of reliable high-speed Internet access is increasing as technology continues to evolve. One of the biggest mistakes schools make when deploying or allowing a new device into their classrooms is not making sure their network infrastructure is up-to-date and or sufficient enough to properly support their end-users. (Mareco, 2017)

Grime and Warschaeur (2008) found that when students were given one-to-one laptop access as well as access to the Internet at school, they made use of this at least several times per week to support their learning. Fast and reliable Internet access allows teachers and students to support learning in real time. The Internet is something all

schools should have equal access to. Of course, learning does not stop when students leave the classroom. In the article *Why We Must Act Now on Universal Internet Access and the Digital Divide* the author talks about the importance of making high-speed internet universal for all, and speaks to the ways in which internet access can benefit or contribute to systemic oppression. High-speed Internet is essential for economic growth, job creation, and global competitiveness. High-tech innovation, job growth, telemedicine, distance learning, rural development, public safety, e-government and solutions to our environmental problems require truly high-speed universal networks. Those who go without are left out of the advantages of high speed Internet in areas as diverse as economic development, higher education, health, civic participation and information access. The authors state that Universal Internet access would ensure that everyone has the chance to reap these benefits, and that no one is forced to remain on the wrong side of the digital divide. (Speed Matters, 2020).

I believe now more than ever we as a country have noticed the importance of access. In this pandemic of COVID-19 Wifi companies across the country have offered free or reduced-cost internet access for 60 days to low income families. Others have pledged not to shut off service for unpaid bills (Adely, Balcerzak, 2020). I hope that we are able to continue this pledge even after pandemic and keep providing access for *all* families. It is imperative that in the 21st century we have universal high-speed Internet access policy.

Successful utilization of technology depends not just upon sufficient access to tools and resources but on the availability of sufficient training and support for teachers.

One of the most consistent findings throughout this literature review was from the point of view of the teachers. Many shared that they wanted to use more technology throughout their classroom, but felt they did not have the proper training and support to implement it effectively. The use of technology can be daunting to many teachers. Incorporating technologies into lessons is a challenge for instructors due to apprehension while using unacquainted technology, absence of training and the lack of onsite support. (Alper & Raharinirina, 2006)

As was discussed earlier in order for technology to be integrated effectively it must be used in tandem with good in person teaching. Teachers can have access to the best technology but this means nothing unless they also understand how these tools can be used to respond to learners. The continued under-use of technology in the classroom across all grade levels and the failure to use technology for instructional purposes is due to teachers' personal barriers with technology. (Blackwell, et.al, pg. 311, 2013) Teachers' attitudes, as well as lack of confidence and computer skills, hamper effective integration of computers into the classroom. (Chen & Chang, 2006). Research has found that individual attitudes, such as confidence with or anxiety about using technology, have been correlated with actual use of technology, such that those more in favor of technology or more open and willing to try it are more likely to adopt technology in their classroom. (Blackwell, et.al, pg. 311, 2013) Younger teachers who have more experience using technology are more willing to try technology in their classrooms, compared to teachers with more experience in the classroom but less experience with technology.

It is important that teachers feel they have the resources to incorporate technology effectively in their classrooms. Training programs, workshops or online training, can help teachers learn ways of integrating technology-enhanced learning into everyday classroom teaching and learning, in addition to prerequisite technical skills. (Wang, Kinzie, et.al, pg. 12, 2019) In their meta-analysis Blackwell et.al (2013) found that providing early childhood teachers with more targeted professional development on using technology in developmentally appropriate ways would help educators more effectively integrate technology into their classrooms. Secondly they found, by providing a technology policy for teachers that lays out how to appropriately incorporate technology into their curriculum to meet the developmental needs of students would help educators more effectively use technology with their students. Lastly they found that shifting the teaching attitudes of educators to embrace the positive potential of technology to impact children's learning could go a far way to increase these teachers' actual use of technology in the classroom. (pg. 318) Teachers are the agent of change in the classroom, if they have positive attitudes towards the use of technology in their classroom their students can benefit greatly. By providing teachers with support and training we can increase the use of effective technology in all classrooms.

Access to Technology a Social Justice Issue

Education was created to be an equalizer. Going to school was supposed to provide all with the education and professional opportunities necessary to overcome and eliminate oppression. Unfortunately, in America our education system has been a place of injustice and unequal opportunity. The truth is educational resources remain unequally

distributed, more is available to wealthy, white students. While people from low-income backgrounds and people of color continue to struggle to access the same tools for academic, and later professional success. The tool of technology is no exception to this. Technology has become a fundamental component of the learning process, however access and adequacy is not provided for all students. In the 21st century mastery of technology is expected in order to progress academically and professionally. The students who achieve mastery are those who have come from high socio-economic status, while those who come from low socio-economic status are in a continuous cycle of oppression.

Many schools across the United States have already gone 1:1, one tech device for each student, while others barely have reliable Internet access or two devices for a class of students to share. This issue is known as *digital equity*. Just like books, science equipment, extracurricular options, healthy food for lunch, technology is now another resource that's abundant in well-funded schools and lacking in underfunded schools, creating one more way low-income students will fall behind their more affluent peers. (Gonzalez, 2017) Rather than providing a solution to wealth inequality, education reinforces it. Technology also plays a role in creating this inequality, but can also help provide solutions to overcome it. Technology in the classroom promises to be a great equalizer, but effective implementation must consider the socio-economic context of the school district and include programs and practices that facilitate universal student access. (NetRef, 2016) School districts do not enjoy equal access, education is paid for with the amount of money available in a district. Wealthier school districts have more to offer their in turn wealthier students, which only exacerbates the achievement gap and digital

divide. (NetRef, 2016) Closing the digital divide by simply providing technology in schools will not be the great equalizer of learning. We have to ensure that all students understand how to use technology as a tool to engage in creative, productive, learning.

With the increased importance of technology in society digital literacy is an imperative tool. For the purpose of this paper digital literacy is defined as the ability to use technologies to find, evaluate, create and communicate information. In today's digital world, nearly every career requires digital communication at some point, so equipping students with the skills to effectively and responsibly find, evaluate, communicate, and share online content is key to their futures. (Renaissance, 2019) Digital literacy is a crucial skill required for almost any job. Early, quality access to technology gives students a head start at home and school. "Wealthier students have more access to digital tools, they are learning to think, behave and make meaning in ways that likely correlate with elite status and success in the future. Underprivileged children do not have access, so they do not learn the same things putting them at a disadvantage." (NetRef, 2016) Unequal exposure to digital literacy has consequences that will last a lifetime. Without proper access to digital literacy, underprivileged students will have an increasingly hard time raising above the poverty line.

In his article *Technology skills only scratch the surface of the digital divide*, Jordan Shapiro talks to the ever apparent realities of the digital divide. When access to technology is not distributed equally, then neither is access to digital literacy. Shaprio states "Put simply, because rich kids have better access to digital tools, they are learning to think, behave, and make meaning in ways that will likely correlate with elite status and

success in the future. Poor kids are not learning the same things." (Shaprio, 2016) He

argues that we often forget about the context of the classroom, or what students learn

from interacting with one another, and with the tools in their learning environments. The

way in which technology is integrated into affluent classrooms is far different from the

ways in which it is integrated in low socioeconomic schools. Again leading to the many

gaps that exist between affluent and low socioeconomic students.

      For the past several years the focus has been on putting technology in our schools.

Most schools now have some type of technology available, of course this is not yet

equally distributed. Since we have begun to realize the importance of having technology

in all schools, the dialogue now needs to be dedicated to dismantling the way technology

is used to support learning in underserved schools. Even when the playing field is leveled

for technology access inequities persist. Schools serving privileged students tend to use

the same technologies in more progressive ways than schools serving less privileged

students. (Reich & Ito, 2017, pg 6.) The way technology is being used is opening a

second divide amongst these two types of schools. Known as the *second digital divide,*

this separates those with the competencies and skills to benefit from computer use from

those without. "Affluent students use the same technologies to support richer forms of

learning with greater adult mentorship. While low-income, nonwhite children are often

using technology in math class for drill and practice." (Boser, Ulrich, 2013) The teaching

that is taking place within schools with technology becomes a matter of equity and

education opportunity. Providing dynamic learning opportunities with technology that has

become a new challenge in underserved schools. Technology needs to be used in low-income schools to encourage discovery and exploration rather than remediation skills.

Digital Equity, Digital Divide, Achievement Gap, Homework Gap, Digital Literacy, Second Digital Divide. Six ways in which technology is failing students due to their socioeconomic status. Education plays a vital role in providing people with social mobility. In order to ensure social mobility students need to be properly equipped with the tools and resources needed for the technology driven economy. Although our education system has begun to notice the importance of technology in schools, it is not being integrated equally across socioeconomic lines. Technology does stand a chance at becoming the equalizer in the realm of education when implemented equally in all schools. This is not an easy task. It involves both equitable access in the classroom and at home as well, across all age bands. Finding ways to make technology accessible across the board must be a goal of our education system. If we do not, minority groups will continue to be stuck in a continuous cycle of oppression. Although this paper advocates for technology in school it also recognizes the social injustices that are already in place. If technology is going to be used to benefit all learners we must dismantle the ways in which it keeps the wealthy, wealthy and the poor, poor. Until this is done technology will continue to contribute to the gaps and divides in our education system.

Discussion

As I came to the end of my research and findings I continued to think back to the state our education system is in right now. What I concluded from this research study is that technology can be very beneficial in classrooms when it is combined with expert

teaching pedagogy. The main barrier that impedes us from allowing technology into classrooms is that access to technology is still unevenly disturbed across ethnic and socioeconomic lines. Those from lower income families are less likely to have Internet in their homes, or access to a computer. When children from low socioeconomic homes do have access to these devices in school their experiences are still not the same as students of higher socioeconomic status. This divide has been a huge factor in the achievement and homework gap in the United States.

Now during the COVID-19 pandemic schools across the United States have been forced to shut their doors and turn the switch to distant learning. In the blink of an eye educators were challenged with the task of implementing a new online program that both teachers and students were required to learn and navigate. Teachers in underserved communities were unsure how their students would get access to this remote learning. They tried to provide students with the necessary technology but it wasn't feasible, technology can only do so much if it is not connected to the Internet. Preschool and elementary teachers who had never used technology in their classrooms scrambled to find a new way to reach their students. So, here we are in the year 2020 faced with a major health pandemic, and an education system that will yet again leave a majority of students to fall through the cracks.

I was interested to see if this pandemic has or will change teachers views on technology in school. My curiosity prompted me to ask three teachers, to reflect on their feelings throughout this pandemic. One teacher works in a private preschool in Manhattan, the second teacher works in a special education elementary school in

Brooklyn, and the third works with fourth graders in an underserved community in Philadelphia. I asked these teachers to provide me with a quick response about their overall experience with COVID-19 and the switch to remote learning. The three specific questions that were asked were: (1) Was technology used in your classroom previously?, (2) How is your school getting students who do not have technology access to learning?, (3) Will you try to incorporate technology into your classroom when we return? These responses were asked through email and are provided in the appendix.

The experiences of their students and classroom environments were all very different. In the preschool classroom technology was seldom used, only a laptop was provided for teacher use. The teacher mentioned sometimes she would read ebooks using this laptop. In the special needs elementary school they had access to a smart board, but computers were not something her students used daily. Lastly in the fourth grade classroom, each of the students were provided with a Chromebook, the students were allowed one hour a day on the Chromebook. Each of the teachers wished that they were able to incorporate more technology into their classroom previously. They felt that this would have made the transition to online learning a lot smoother, especially for students with special needs. They all felt that the transition to remote learning has been a lot easier than anticipated. I feel this is due to the young ages of the teachers, and their comfort level with using technology. I wonder if I had interviewed older teachers if their transition experiences might not have been so smooth and natural. All three teachers agreed that they plan to incorporate more technology throughout their classrooms when they return. They feel that this can really benefit not only their students, but the parents as

well. One teacher in response to this question stated "Absolutely, especially as a tool to communicate with parents. Being able to talk to parents every day through this platform has been a silver lining." I felt inspired by these teachers' responses to include them into this paper as hope for the future of our education system.

Amidst this unsettling time we are beginning to see how important technology integration is amongst learners of all ages. I feel that all teachers should be integrating technology into their curriculum in any way possible. There are many benefits that can come from introducing this media when it is paired with thoughtful in person teaching. In light of my research I believe even more strongly that our education system must advocate so that all learners regardless of their socio- economic status have access to adequate and equal technology.

Conclusion

We live in a digital age, technology is intertwined in all aspects of our lives. We can hold the power of the internet in the palm of our hand. Technology has evolved in ways that were once considered unimaginable. Yet, access to these advancements in technology are not adequate, especially throughout our education system. The purpose of this study was to bring to light the significance of technology in our education system today, starting in our early childhood classrooms. Through the use of a literature search six key findings were found through the research. These key findings are: (1) Integration of technology should begin in early childhood, (2) Successful learning environments are characterized by the right blend of teachers and technology, (3) The use of technology can reduce inequalities and promote inclusion, (4) Technology outside or learning

environments is still unevenly distributed across ethnic and socioeconomic lines, (5)

High-speed Internet accuses is needed to implement successful learning, (6) Successful

utilization of technology depends not just upon sufficient access to tools and resources

but on the availability of sufficient training and supports for teachers. Using technology

as the studies suggested, can increase student engagement, increase motivation, allow for

student-teacher interaction, support collaboration, and support learners in a variety of

school subjects. I believe even more strongly that our education system must advocate so

that all learners regardless of their socio- economic status have access to adequate and

equal technology.

Appendix 1:

Teacher One: Preschool teacher 4/5s classroom. Private School, Upper West Side, Manhattan

"Throughout the classroom technology is not incorporated enough. The three teachers have access to one laptop. On this we are expected to do all of our work and communicate with parents. We sometimes use the computer for a story online, but trying to show a book to 16 kids on a tiny laptop just isn't enough.

I think we should implement more technology in our classroom. It would be easier to teach certain things. For example during our architecture unit it would cool to show the students buildings from all over the world but on our tiny laptop, it doesn't make it seem that cool. I've heard smart boards come in handy. The kids can directly write them which would be great for their letter and number formations. We could graph more, teach with more visuals! There are so many age appropriate things that we could do with technology it's a shame we don't use it more often.

Our students are surrounded by technology, look at Mateo, my son, at 4 months old he already knows to look at the phone when we're FaceTiming. Why not implement it in early childhood classrooms? Our students were lucky enough to all have access to technology at home, so this switch to remote learning hasn't been as difficult for them as I can imagine it is for other students who do not already have technology at home. I hope we can find a way to integrate technology into our classrooms.

Teacher Two: Elementary teacher, Special Education, Public School, Brooklyn

"My experience so far switching to remote learning has been better than I thought. I work with 8 students with autism. They are all very high functioning so they have been doing a pretty good job with the online learning platform. We are utilizing Class Dojo for our parent communication and posting links to different websites on Class Dojo that the students need to complete each day. The websites all have personal logins so we can track the students' work. My job is to FaceTime each kid every day and offer support. I have been able to FaceTime or talk on the phone with 6 of them each day. They have technology that they are able to use. The other 2 do not have technology to use which has been hard for them. One student only has his mom's cell phone to complete the assignments. When his mom gets home from work each day she tries to work with him on the cell phone but it is not easy since she gets home late every night. The last student is having trouble with this new transition and has broken all of his mom's technology so I have not been able to work with him on any of the assignments. I have put in a request with the DOE (Department of Education) to get iPads sent to their homes but they have not received it. I definitely wish we used more technology on a daily basis in the classroom before this all happened so the adjustment could have been a bit easier. We do use a smart board every day but we do not use online platforms like we are using now." When asked if she would be incorporating technology into the classroom when she returned "Absolutely! Especially as a tool to communicate with parents. Being able to talk to parents every day through this platform has been a silver lining."

Teacher Three: Elementary Teacher, Fourth Grade, Public School, Philadelphia

"Every student in my classroom receives their own chrome-book to keep at school. My district mandates that the chrome-books should be used for only an hour a day to complete students daily I-ready minutes which is a program for reading and math that includes diagnostic and instruction.

Yes I wish I could incorporate more technology into my classroom. Using chrome books for my students with severe special needs can be challenging at times, but I am working on incorporating more technology through interactive smart board games. The transition to online learning has been okay, I am comfortable using a computer so after the first few lessons I got the hang of it.

There are a few students during this pandemic who do not have access to technology. Currently, my school is working on a plan to support students who do not have access to technology at home. Our district plans to allow students to receive their school chrome book to use at home now. I hope this continues when we return to school.

Yes, I plan to incorporate more technology through the classroom through virtual manipulatives and more videos relating to lessons. I feel like there are so many applications that would help me throughout the day. The students have access to the technology so I feel that we should be using it more than just an hour during the day."

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