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Impact of Technology Use on Early Childhood

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Impact of Technology Use on Young Children

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Abstract

Technology is something that has evolved immensely over the last 20 years and only continues to grow and change. Technology has affected early childhood education, in the home and classroom. This literature review explores the impact of technology use on young children, as well as how educators can support students learning using technology. The literature review will analyze how technology can positively affect student learning through increased collaboration, enhanced engagement, strengthened motivation and creativity. In addition, the literature review will explain how technology can improve academic skills, such as reading and math. Educators are the key facilitators for improving student understanding and the appropriate use of technology. With the support of school leaders and district administration, educators can improve outcomes using technology.

Keywords: technology, early childhood education, academic achievement, growth, educational technology, collaboration, engagement, creativity

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Introduction

The use of technology with children has been a healthy debate with educators, parents, and professionals for many years. An abundant number of individuals have been debating the positive aspects of technology use in education. Cicconi is a researcher who compared Vygotsky's research and the power of collaboration through his social learning theory. Cicconi researched the idea that technology can enable children to collaborate and learn rigorous educational concepts by using different technology tools. Many different children could be empowered to use technology to collaborate, stay engaged, and build knowledge. NAEYC has released specific statements on technology and young children that promote using interactive educational technology tools to develop learning, creativity and relationships with children, "When used intentionally and appropriately, technology and interactive media are effective tools to support learning and development" (NAEYC, 2012). A joint statement from NAEYC and Fred Rogers Center claims, "Intentional use requires early childhood teachers and administrators to have information and resources regarding the nature of these tools and the implications of their use with children" (NAEYC, Fred Rogers Center, et al., 2012).

The problem with the current research is that teachers in classrooms are not reading it, according to advocate Fox-Turnbull (2019). He argued that educators taught how to use technology in their classroom were quickly enjoying the tools and seeing how useful technology can be. Researchers Mantilla and Edwards (2019) found that teachers, especially veteran teachers, failed to gain insight about the benefits of using technology in the classroom to boost student learning. NAEYC provided a clear declaration that technology is beneficial when used properly, under the impression that teachers and administrators are knowledgeable in this area (as cited in NAEYC, Fred Rogers Center, et al., 2012).

This literature review will examine the impact of technology use in early childhood education. The purpose of this review is to use the knowledge gained from ample research to improve educator, parent, and professional outlook on technology. Experts frame technology as harmful for children and this review will consider the effective use of technology, specifically in the classroom. The research will address and potentially eliminate the negative perspective that comes with technology use.

The literature review will cover the main topic of technology with a substantial amount of research focused on the benefits of technology use in the classroom. A majority of the studies identify technology in the classroom setting, as well as how teachers choose to use it. Advantages include the development of, engagement, motivation, problem solving, creativity, collaboration, interactive learning, and enhanced literacy and mathematical skills. For this review, the key terms “technology benefits in ECE,” “effects of technology in ECE,” and “technology in early childhood” were used as a guide to find research. Research studies were retrieved from the following databases: ERIC, DeWitt Library, and Google Scholar, all resources used range from the last 10 years, 2011-2021.

Review of Literature

The evidence presented from thorough research finds that educators have a lack of training to understand what a healthy relationship with technology looks like for students. This review supports the theory that technology is a necessary tool for children to enhance an abundant number of abilities in school. Mantilla and Edwards (2019) agree that adults should be educated on the appropriate use of technology at home and school. In the study by Mantilla and

Edwards (2019) with 4,000 parents, evidence was found to support the necessity of training for teachers to obtain a better idea of implementation of technology in the classroom. Alternatively, these same scholars suggest that technology comes with an equal number of positive and negative aspects for classroom use. Additionally, the researchers state that teachers simply need support with the growing use of technology and appropriate ways to incorporate a healthy, useful amount. It was found that additional training on how to implement appropriate technology use in the classroom would boost morale, keeping teachers interested and comfortable with using technology to teacher benefit (Al-Bataineh, Bataineh, et al., 2021). The debate on the effects of using technology in the classroom starts with educating teachers and ends with enhanced learners.

Enhanced Collaboration

Children who participate in the use of technology within the classroom can build collaboration skills with and without technology in their future. Although face-to-face interactions are the norm, the effects of collaborating through technology can justify the use in and outside of the classroom (Fox-Turnbull, 2019). Student-created video projects are one example of enhancing collaboration along with many other academic benefits (Morgan, 2013). The results of the study found that allowing young students to enjoy technological activities such as creating a video to present what a student knows promotes the students ability to stay connected in class. The research findings from first grade students proved that students stayed attentive and motivated while working on their videos. According to the educators, students built critical-thinking skills, literacy skills, and collaboration skills (Morgan, 2013).

In addition, collaboration between students from different states, or countries can take place thanks to great advancements in digital media and technology. In a study by Zhao and Li

(2015), kindergarten students from Finland and Japan were assigned to share a blog to communicate ideas and work. Moreover, the results of this research have proven that blogging builds basic media skills while collaborating with students from other countries. Using public blogging allows students of all ages to share their ideas in a pedagogically functional way while learning about social media and interactions (Zhao & Li, 2015). The use of blogging, explored by Zhao and Li indicates that 21st century skill targets can be met while encouraging collaboration.

Enhancing collaboration may be taken to another level with social media all while educating children on 21st century skills. Tran (2019) had similar findings when studying collaboration while using technology and believes that computer technology skills are growing in today's workforce. Tran (2019) claims K-12 education has an imperative need to provide opportunities to students in order for them to be well prepared for 21st century jobs. The research of 200 elementary students found that children who used computational thinking during the 10-week investigation built essential skills such as collaboration, persistence, and creativity for success in today's digital world. These examples provide evidence that enhanced collaboration can take place when technology is used with young children.

Increased Engagement

According to Maureen, et al., (2018), the use of technology in classrooms helps students stay engaged longer and leads to an increase in different academic skills compared to students without technology as an intervention. The researchers found from 45 students aged 5-6 years old, both paper and digital storytelling activities held students' attention and boosted literacy

skills but the group with digital activities had significantly more increases in engagement (Maureen, et al., 2018). The researchers concluded that the approach of integrating storytelling and storytelling activities allow early childhood aged children to boost their attention span. In addition to increased engagement, the teachers saw overall growth in literacy skills from this approach.

Another study in early childhood by Papadakis, et al. (2018) researched 365 kindergarten students and expressed that using technology to assist an intervention proved to keep students attention for longer than those without assistive technology express. The results of the research revealed that the groups of students using technology significantly outperformed the groups learning without technology. Additionally, the results determined that developmentally appropriate software being built into children's routines could substantially improve a child's attention in subjects that may otherwise disengage them leading to lower academic scores. The researchers did however conclude in contrast to the results that a delayed post-test to measure the persistence of the interventions might present differing results. Although allowing students to use technology as a different learning style does not guarantee engagement. It does provide the opportunity for a majority of students to stay attentive during learning activities, which may lead to growth in many academic areas such as math and literacy.

Strengthened Motivation and Creativity

The role that technology plays in motivating children to learn is increasing significantly, as the digital era takes place before us. The first motivation is the general use of technology to create work. Researchers Campbell and Jane (2012) found the influence of technology on a

student's work with 80 general education students in Australia. The motivation behind a student's work is one of the strongest elements in relation to a technological activity. Overall, the research found the children feel a sense of achievement and fulfillment when interacting on a digital tool. Furthermore, the study with rural and regional students found that children using technology were focused on fun, completion, and difficulty when asked to do a technological task; however, the motivation lies in the work created. This study seems to indicate the idea that technology has an impact on the motivation behind the quality of a student's work.

According to Madanipour and Cohrssen (2020), augmented reality (AR) is a beneficial tool in early childhood education. According to the findings from multiple research articles on AR use in an educational setting; AR is a tool that can motivate young students to learn topics that are not typical. The researchers argue that this technology allows students to interact with real and virtual objects, which offers the potential for young children to understand abstract concepts that they may not encounter otherwise. In addition, the researchers found from teacher feedback within the articles that AR supports enhanced engagement, motivation, excitement and enjoyment with children. Therefore, a technological tool such as augmented reality is optimal for motivation and creativity in early childhood education.

In contrast, a study of 353 preschool students in suburban and sub-province areas claimed young students who spent time in a digital environment provided them with preconvention constructs for reading (Altun, 2019). The findings from Altun's (2019) surveys claimed the motivation to learn reading relates strongly to the experience with print-based versus digital literacy in the classroom or home setting. The researcher found preschool aged students have the same motivations for reading digitally as elementary aged students. Notably, the gender of preschool

students has little impact on motivation. The study indicates that motivation for reading or learning literacy skills was boosted with the use of technology and digital tools.

Technology can improve motivation through digital activities, new types of learning, and academic goals. Nevertheless, it can also enhance positive behavior in a classroom setting. Scholars Lynne, et al. (2017) found the use of an application called “ClassDojo” promotes positive student behavior and is an effective tool for managing classroom behavior. The researchers observed classroom behavior before, during and after the use of the technology. The study of three classrooms in a southeastern state found that there was reduced student disruptive behavior, increased academically engaged behavior, and increased behavior-specific praise statements allowing the students to become more motivated in class. In other words, the motivation behind behavior is reliant on technology use and incentives.

Researcher Bowden (2019) found that collaborative games build creativity and artful skills with students when given the opportunity to work on digital practices in the classroom. In the research, elementary students in Sweden were observed for a total of 75 hours as students designed a digital game for others to play. In addition, students' outside experiences were incorporated into assignments to draw upon wider social and cultural competency skills deriving from the participation of students. Bowden (2019) claims developing students' interactions with technology positions them as consumers, creators, and producers of media. Motivation and creativity are lifelong skills in the 21st century that technology can help build and allow success for students.

Academic Growth: Mathematics

The effects of technology education when Kurvinen, et al. (2020) in Finland with 72 students in second grade, researched learning math. The research was acquired over one school year based on the student's mathematics performance in observation and fluency tests. Overall, the data revealed students who received math lessons electronically had stronger scores on tests than those who received a face-to-face lesson with the teacher. The findings from Kurvinen, et al., suggest that the integration of educational technology when learning mathematics can boost student performance on skills tests.

In other research, by Yoon, et al. (2014), integrated online STEM education was found to help 831 elementary students score higher on assessments related to science, technology, engineering and math (STEM). The school in the south-central United States saw significant growth on student knowledge tests and the Engineering Identity Development Scale after students received integrated STEM lessons online, regardless of diversity or gender. Teachers noted in data analysis that growth was shown over time with all students; however, students who received the integrated lessons online predominantly scored higher than those without. Overall, it is appropriate to suggest online education as a useful tool for students learning skills such as STEM.

Academic Growth: Literacy

In a study completed by Mitra (2019), two groups of 24 children from India and the UK were observed in the students' classrooms. The research was completed in 90-minute increments over six school days using qualitative research. Students using the internet as an assistive tool to learn literacy skills were able to build reading comprehension faster than those taught traditionally were. Using the internet, as a tool to teach reading and comprehension is advisable based on this data.

Along with Mitra, researchers Baron, et al. (2019) studied the use of educational technology to differentiate instruction for young readers. 594 third grade students were studied over a period of one school year using an intervention tool referred to as Lexia Core 5. The research confirms that the majority of students using the educational technology tool performed remarkably higher from spring to fall on reading and comprehension skill scores. Teachers affirmed that students with mixed deficits in reading abilities such as decoding or comprehension made great increases over the year in addition to their grade level peers. The data from Baron, et al. insists the recommendation for educational technology use with reading.

Zhou and Yadav (2017) analyzed the effects of multimedia stories with preschool students in the Midwest region of the United States. Over two weeks 72 students received reading sessions with a vocabulary and comprehension test to acquire data on the effects of online or paper stories. The evidence portrays that students who received multimedia stories built vocabulary faster than students with paper books did, which suggests children are more engaged with stories online. Students are likely able to enhance their own early literacy outcomes when reading digital books and interacting with features of a digital book.

In connection to Zhou and Yadav (2017), researchers Kaynar, et al. (2020), studied the use of electronic books (ebooks) and the idea that they improve students' literacy skills. A group of thirteen teachers from three different schools completed a survey and interview identifying their perception of electronic books. The teachers noted that ebooks increase student interest and reading competencies. According to teacher interviews, students are motivated and enjoy earning rewards and electronic badges that come along with the electronic version of books that are not available with paper copies. Ebooks allow student reading skills to be enhanced in multiple ways such as their interest in reading and many skills in reading as well.

Additional research by Neumann, et al. (2017), claims 122 kindergarten students' digital literacy skills about concepts of print increased with the use of technology. The findings indicate that digitized literacy tools can enable parents and teachers to effectively support early childhood literacy learning skills. Additional findings from an earlier study by Neumann, et al. (2014), support observations of 60 children under the age of eight using tablets. The research found the competence of young children to be extremely high when navigating the interface of a tablet. The enhancement of literacy skills such as knowledge of letters, words, print concepts, and emergent writing are of great potential when scaffolding is provided by parents or teachers.

Future Research

With the research completed by multiple scholars in the last ten years there are many ideas in relation to using technology in early childhood education that need to be settled. First, scholars Park, et al. (2017) found it ideal that early educators use STEM in their classrooms to build readiness in the elementary setting. The research with 830 early childhood educators revealed in a survey that the majority agreed that professional development and pre-service training programs are necessary to build appropriate STEM education and readiness in the classroom. Therefore, for further implications to be made, administration needs a push of willingness to address ideas within STEM and provide proper training to teachers.

Adaptive technology (AT) is another subject that has fallen into the future research category due to the lack of evidence behind it. Huda, et al. (2017) researched the effect of adaptive technology with children and found that AT provides guidance for children who have a need for adaptive technology services in the educational setting. The scholars concluded parental and educational guidance is vital for children to achieve appropriate media skills while exploring its content and AT has not received sufficient research with general education students. Overall,

adaptive technology is underused in general education and further research must be completed to claim the best uses of an AT framework.

Researchers Mantilla and Edwards (2019) completed an analysis with 4,000 parents and 100 teachers to identify the appropriate use of technology at home and school. During the analysis, the researchers found a lack of education on appropriate technology use and therefore leaves room for future research on the education behind technology. Often, parents and teachers are the adults educating children but adults lack the education needed to inform their children or students. Mantilla and Edwards claim the information is available through statements from Educational Credential Assessment (ECA) or National Association for the Education of Young Children (NAEYC) regarding young children and digital technologies. Professional advice is necessary for parents and teachers alike to understand the appropriate tools and activities to use with children.

Another partnership between researchers Hosokawa and Katsura (2018) studied the effects of technology on behavior of the early elementary students. A group of 1,642 Japanese children were surveyed and observed. Children who routinely used technology seemed at higher risk for behavioral problems, according to surveys by the children's parents. The researchers state that it is unclear if technology exposure is the only cause of behavioral problems or if children with behavior problems are more attracted to technology devices. Future research is important to identify the specific content children are viewing starting at a variety of ages in correlation to their behavior at home or school.

Another issue needing to be addressed is the hardware available to teachers to provide sufficient educational opportunities in their classrooms. Scholars Ntule and Kyei-Blankson (2012) completed a survey with 56 early childhood educators in the Midwest. The study

identified teachers who were willing to incorporate technology into classroom learning but the educational games and applications had a lack of data generation. The educators who completed the survey identified professional development and teacher support as necessities. Teachers made it clear that support with technology was lacking and technological, pedagogical knowledge and assessment are not taught and therefore cannot be used appropriately in the classroom setting.

Finally, researcher Ehmann (2020) claimed the shift to technology in the classroom exploded when distance learning became necessary during COVID-19 pandemic between 2019 and today. Ehmann identified different educational platforms for learning during COVID-19. More research is necessary to match technology to the local, district and state standards.

Solutions

Finally, in order to solve issues that come along with the abundant use of technology in the classroom a few suggestions must be presented. Researchers Ozyurt, et al. (2018) surveyed a group of 76 mothers. Throughout the survey and observations, mothers stated that positive parenting with technology was the biggest concern in their home life. The mothers were provided a positive parenting program to improve maternal well-being, family functioning and technology use. It was suggested that parents simply need guidance to help their children and young adults to find the appropriate balance.

Researcher Mikelic Preradovic and his team (2016) investigated parent attitudes towards digital technology use in early childhood education. A group of 152 parents with young children responded to surveys. At least 99% of parents admitted to owning and using devices with and without their children. Parents claimed their children were not gaining computer literacy or other skills when technology was in their possession- the focus was on gaming or social media. The

researchers discussed concerns that digital technology can be an effective learning tool when used appropriately and parents needed to be taught about digital literacy in order to help their children.

Conclusion

Technology use is common, at both home and school. Digital tools affect student success with collaboration, engagement, motivation, mathematics and literacy. The effects of educational technologies are positive if parents and teachers are provided with proper tools to implement learning while using digital tools. However, with certain digital tools, there are negative results that may take place if used inappropriately. Future research should continue to examine the effectiveness of professional development for teachers, the prevalence of specific digital tools and applications that educate students, as researchers stated the need for additional research (Ehmann, 2020; Huda, et al., 2017; Mantilla & Edwards, 2019; Ntuli & Kyei-Blankson, 2012; Park, et al., 2017). Other researchers found the need for studies that investigate the connection between technology and behavioral issues (Hosokawa & Katsura, 2018). Finally, future research may examine the need for technological applications that provide appropriate scoring, assessment and feedback in relation to the Common Core Standards (Ntuli & Kyei-Blankson, 2012).

In conclusion, the use of technology in early childhood is an effective way for students to gain confidence, creativity and collaboration while learning. By using digital tools in the classroom, teachers can educate students as 21st century learners who use technology to remain engaged, build academic skills, and stay motivated.

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