LUMEN ET VIRTUS

Digital Culture in Early Childhood Education: Tools, Challenges and Perspectives for an Inclusive Pedagogical Practice

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ABSTRACT

This article addresses the growing integration of digital culture in early childhood education, exploring digital tools, impacts on child development, advantages and challenges associated with the use of technology in this context. The literature review reveals a growing trend in the use of educational applications, digital games and other relevant digital resources in early childhood education classrooms. While technology offers opportunities for personalization of learning and development of skills such as language and problem-solving, it also presents challenges, including inequalities in access, concerns about inappropriate content, and the need for proper supervision. This study contributes to the field of early childhood education by providing a comprehensive analysis of the benefits and challenges of digital culture, highlighting implications for educational practice, and suggesting future directions for research.

Keywords: Early Childhood Education, Digital Culture, Educational Technology, Child Development, Pedagogical Practice.

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1 INTRODUCTION

The rapid evolution of digital technology has significantly impacted many aspects of our lives, including the way we learn and teach. In the context of early childhood education, digital culture emerges as a topic of increasing relevance, raising debates about the benefits and challenges of the use of technology by children at an early age. According to Prensky (2001), we live in an era in which children are digital natives, growing up immersed in an environment permeated by electronic devices and digital media. This early immersion in digital technology has been the subject of growing interest and debate in recent years, raising important questions about the impacts on children's cognitive, social, and emotional development.

Understanding digital culture in early childhood education is crucial for educators, parents, and researchers. In this scenario, this article aims to analyze digital culture in early childhood education, highlighting the useful tools for this audience, as well as the pedagogical, social and ethical implications associated with their use. Through a critical literature review, it seeks to offer a comprehensive view of the potentialities and limitations of technology in the education of children of preschool age and in the first years of elementary school.

The study is justified by the need to better understand how digital culture is shaping children's educational experience, as well as to promote an informed and responsible approach to the use of technology. Digital culture offers significant opportunities for child learning and development, but it also brings with it challenges and concerns that need to be carefully addressed.

Given the ubiquity of technology in contemporary society, it is essential to investigate how educators, parents, and professionals in the field can take advantage of the benefits of the digital age, mitigating potential risks and ensuring an equitable and inclusive educational approach. By the end of this article, it is hoped to offer valuable guidance for those seeking to foster a digitally enriching and stimulating learning environment for children at an early age.

In today's scenario, the growing presence of digital technologies transforms various aspects of human life, profoundly influencing the way we communicate, work, and learn. This phenomenon impacts education, especially in the context of early childhood education, where the incorporation of digital culture raises heated discussions about its potentialities and challenges. As pointed out by Prensky (2001), children often labeled as "digital natives" grow up immersed in an environment permeated by digital technology, from mobile devices to social networks. This early immersion raises questions about the role of technology in the education of preschool children and in the early years of elementary school.

This article is justified by the need to better understand how digital culture is influencing educational practice in early childhood education and by the importance of promoting an informed and responsible approach to the use of technology in this context. As pointed out by Turkle (2011), it is essential to consider not only the benefits but also the potential negative impacts of technology on child development.

By the end of this article, it is hoped to offer valuable insights for educators, researchers, and other stakeholders seeking to foster a digitally enriching and stimulating learning environment for children at an early age.

2 THEORETICAL FOUNDATION

2.1 DIGITAL CULTURE IN EARLY CHILDHOOD EDUCATION

Digital culture in early childhood education represents the integration of children with the technological and digital environment, covering not only the use of electronic devices, but also the way they interact, learn, and develop in an increasingly digitized world. According to Prensky (2001), today's children are considered "digital natives", as they grow up immersed in an environment where technology is part of their daily lives from a very early age. Digital culture also involves the incorporation of digital tools into pedagogical practices, the development of digital skills, and reflection on ethical and social issues related to the use of technology. It is a set of practices, values, norms, and skills related to the use and interaction with digital technology in the educational context.

2.1.1 Definition and context

Digital culture in early childhood education is inserted in a context of rapid technological evolution and social changes. Marsh et al. (2017) highlight that children are increasingly familiar with devices such as *tablets*, *smartphones*, and computers, exploring a variety of digital apps and games from an early age. In this sense, digital culture in early childhood education encompasses not only access to technology, but also understanding and the ability to critically and creatively use available digital resources. This digital immersion has transformed not only the way children play, communicate, learn and develop.

In the educational context, digital culture offers both unique opportunities and challenges. On the one hand, it allows access to a vast amount of information, providing more dynamic and interactive learning experiences. On the other hand, it raises concerns about issues such as online security, privacy, and digital equity. Therefore, understanding digital culture in early childhood education requires careful analysis of the impacts of technology on

children's development, as well as best practices for integrating technology effectively and responsibly into the educational environment.

Research, such as that of Marsh et al. (2017), indicates the importance of new technologies in children's lives, underlining the role of digital media and social networks in children's social and educational development. Kucirkova (2018) highlights that the role of educators is fundamental in mediating the use of technology, promoting meaningful and enriching educational experiences that go beyond the simple handling of electronic devices. Thus, the definition of digital culture in early childhood education involves the balanced and intentional integration of technology into the educational environment, aiming at the integral development of children.

2.1.2 Impact of technology on child development

The impact of technology on child development is widely discussed in the literature, with research highlighting both benefits and concerns associated with the early use of electronic devices by children in preschool and early elementary school. Digital technology offers a wide range of opportunities for learning and exploration, but it also raises concerns about its effects on children's cognitive, social, and emotional development.

Research suggests that the appropriate and balanced use of technology can have positive impacts on child development. According to Guernsey (2012), well-designed educational apps promote the development of cognitive, linguistic, and mathematical skills, as well as stimulate creativity and problem-solving. Marsh et al. (2017) highlight that digital games offer opportunities for exploration, experimentation, and active learning, contributing to the development of skills such as critical thinking, collaboration, and decision-making. For example, a study by Aladé et al. (2020) demonstrated that children who used interactive educational apps showed significant improvements in problem-solving and critical thinking skills compared to those who did not use such technologies. Another study conducted by Neumann (2020) showed that the use of tablets in early literacy activities helped improve familiarity with letters and sounds, facilitating learning to read.

For example, a study by Hirsh-Pasek et al. (2015) found that children who used interactive educational apps showed significant improvements in language and problem-solving skills compared to those who did not use such technologies. Another study conducted by Neumann (2014) demonstrated that the use of tablets in early literacy activities helped to improve familiarity with letters and sounds, facilitating the learning of reading.

However, the impact of technology on child development is not exclusively positive. Turkle (2011) argues that excessive use of electronic devices can interfere with children's

ability to develop social and emotional skills, such as empathy, communication, and emotional regulation. In addition, concerns related to screen time and the quality of digital content are also raised by several authors (AAP, 2016). Madigan et al. (2019), for example, associated excessive screen time with delays in the development of motor and social skills, emphasizing that these issues are corroborated by recent research.

Studies such as that of Christakis (2014) highlight the potential negative effects of excess exposure to technology in young children, including delays in language development, attention difficulties, and behavioral problems. These results were corroborated by a study by Przybylski and Weinstein (2019), which found a correlation between excessive screen time and behavior problems in young children.

The American Academy of Pediatrics (AAP, 2016) recommends limiting screen time for preschoolers in order to promote healthy development. They emphasize the need for a balanced and informed approach to technology use, which takes into account both the potential benefits and the challenges and concerns associated with children's use of technology.

Therefore, understanding the impact of technology on child development requires a careful and balanced analysis of the benefits and risks, promoting practices that integrate technology effectively and responsibly into the educational environment.

2.2 DIGITAL TOOLS FOR EARLY CHILDHOOD EDUCATION

Digital tools for early childhood education encompass a wide variety of resources and technologies designed to facilitate children's learning and development. These resources range from educational applications to digital games and other interactive tools, adapted to different educational contexts.

2.2.1 Educational Apps

Educational apps are widely used in early childhood education, providing interactive and engaging learning experiences in various areas of knowledge, such as literacy, mathematics, science, arts, and socio-emotional skills. Studies indicate that well-designed apps can stimulate the development of cognitive and academic skills, as well as promote creativity and curiosity (Takeuchi & Stevens, 2011).

For example, interactive reading apps have been shown to improve reading skills while also stimulating children's creativity and imagination (Kucirkova, 2014). Likewise, Neumann (2016) highlights that applications aimed at teaching mathematics can help children develop numerical and conceptual skills in a playful and accessible way.

It is important to consider that the quality of content and the design of educational apps play a crucial role in their effectiveness. Plowman and McPake (2013) argue that well-designed apps should be tailored to children's needs and interests, offering challenges appropriate to their developmental level and encouraging active exploration and engagement.

Chaudron et al. (2018) highlight the importance of critically evaluating the appropriateness and educational value of apps, ensuring that they provide meaningful and relevant learning experiences for children.

A successful example is the "Endless Alphabet" app, developed to help children learn vocabulary and phonics concepts in a fun and interactive way. Utilizing engaging games and activities, children explore and practice essential language skills while having fun.

This educational app is specifically designed to teach the alphabet and expand children's vocabulary in a captivating way. It offers an interactive educational experience, where each word features a puzzle with missing letters and a brief animation that illustrates the definition. (Endless Alphabet - Apps on Google Play)

Designed with children in mind, Endless Alphabet does not include high scores, failures, limitations, or stress, allowing them to interact with the app at their own pace.

Khan Academy Kids is a free educational app aimed at preschool and early school children. It offers a variety of interactive activities and educational games designed to help children learn basic math, reading, social-emotional skills, and more. The app utilizes a game-based approach to make learning fun and engaging by adapting the learning pace according to each child's progress. In addition, Khan Academy Kids is developed with the guidance of early learning experts to ensure that activities are educational and developmentally appropriate for children.

Apart from these, there are several popular educational apps that are widely used by students, educators, and parents around the world. Here are some examples:

1. Duolingo: A language learning app that uses games and interactive activities to teach a wide range of languages, such as English, Spanish, French, and more.
2. Quizlet: An app for creating and studying personalized flashcards and quizzes on a variety of topics, including vocabulary, science, math, and more.
3. Photomath: An app that allows students to scan math problems using their phone's camera and receive step-by-step explanations on how to solve them.
4. Kahoot!: A game-based learning platform that allows educators to create interactive quizzes, discussions, and surveys to engage students in the classroom.

5. Google Classroom: A tool integrated with Google Workspace for Education that simplifies the creation, distribution, and grading of assignments, and facilitates communication between teachers and students.
6. Seesaw: A digital portfolio app that allows students to document their learning using photos, videos, drawings, and notes, and share them with teachers and parents.
7. Epic!: A digital library for children that offers access to thousands of e-books, audiobooks, and educational videos, suitable for different age groups.
8. Prodigy: A mathematical role-playing game that motivates students to practice math skills while exploring a virtual world and battling monsters.

Thus, educational apps represent a powerful tool to support learning and development in early childhood education, as long as they are used in a balanced way and accompanied by adequate pedagogical mediation, with attention to the quality of the content.

2.2.2 Digital games

Digital games are an essential category of tools used in early childhood education, providing interactive and playful experiences that stimulate skills such as critical thinking, problem-solving, and collaboration, which are fundamental for children's development. Studies highlight several benefits of these games. For example, Takeuchi and Stevens (2011) demonstrated that they can improve children's problem-solving and spatial reasoning skills. In addition, De Freitas and Neumann (2009) argue that they offer a motivating and personalized learning environment, adapting to the individual needs and interests of each child.

Clark et al. (2016) suggest that digital games can also promote social-emotional development, such as empathy and cooperation, through engaging storytelling and interactive challenges. They facilitate collaborative learning and socialization among children, as highlighted by Gee (2007), offering a safe space for experimentation and exploration.

It is crucial, however, to recognize that not all digital games are equally effective, beneficial, or suitable for early childhood education. Plowman and McPake (2013) emphasize the importance of selecting games based on sound pedagogical principles, which offer meaningful and relevant learning opportunities for children. The quality of the content and the pedagogical orientation are determinant, especially in view of concerns about screen time and the possible negative effects of excessive use of technology, as warned by the AAP (2016).

These games are designed not only for entertainment but also to promote the learning of specific skills, from math and language to social and emotional skills, in an interactive and engaging way for children. Some of the most used digital games in early childhood education are:

1. Minecraft: A building game that allows children to explore and create virtual worlds, encouraging creativity, problem-solving, and collaboration.
2. Prodigy Math Game: A game that combines RPG elements with mathematics, making learning numerical and arithmetic concepts more engaging and fun.
3. ABCmouse: An educational platform that offers a variety of interactive games and activities for young children, covering areas such as reading, math, science, and art.
4. Duolingo: Although it is best known for language learning, Duolingo utilizes gamification methods to make learning new vocabulary and linguistic structures more engaging and effective for older children.
5. PBS Kids Games: A collection of online character-based games and educational programs from PBS Kids, offering interactive activities that complement educational content broadcast on TV.
6. BrainPOP Jr.: Offers interactive games and educational animations that cover a variety of academic topics, helping children explore concepts in a visual and dynamic way.

Therefore, while digital games represent a valuable tool to support learning and development in early childhood education, their use must be carefully planned and supervised to ensure positive and enriching educational experiences.

2.2.3.Other relevant digital resources

In early childhood education, in addition to educational apps and digital games, a variety of digital resources can enrich the learning experience and child development. These resources include educational videos, simulation *software*, online learning platforms, virtual reality environments, and creation and programming tools.

Educational videos are widely used to complement early childhood education, as they can retain children's attention and facilitate the understanding of complex concepts in a visual and accessible way (Hirsh-Pasek et al., 2015; Kirkorian et al., 2008). However, it is important

that videos are selected carefully, taking into account the quality of the content and its suitability for the target audience.

Similarly, interactive e-books have been touted as an effective way to promote literacy and language development by allowing children to actively interact with the content (Kucirkova, 2018).

Interactive software, such as simulation programs and virtual construction activities, provide hands-on, immersive experiences in science, math, and engineering, promoting children's critical thinking, problem-solving, and creativity (Squire, 2016; Honey & Hilton, 2012).

Finally, digital creation tools, such as animation software and video editing programs, encourage creative expression and the development of critical thinking and problem-solving skills (Bers, 2018). Additionally, ebooks and online learning platforms are gaining popularity in early childhood education, offering access to a wide range of educational resources, interactive activities, and educational games. However, it is essential to ensure that these resources are developed based on sound pedagogical principles and that they offer meaningful and relevant learning experiences for children.

Therefore, digital resources such as educational videos, e-books, interactive software, and online learning platforms represent valuable tools to support learning and development in early childhood education, complementing traditional educational experiences and offering diversity and meaning to the learning process.

2.3 ADVANTAGES AND CHALLENGES OF TECHNOLOGY IN EARLY CHILDHOOD EDUCATION

The integration of technology in early childhood education brings with it a series of advantages and challenges that require attention from educators, parents, and professionals involved. These aspects range from the potential benefits of using technology to the ethical and pedagogical concerns associated with its impact on child development.

2.3.1 Potential benefits

The benefits of technology in early childhood education are diverse and significant. For example, educational apps and digital games can make learning more accessible and engaging by offering personalized learning experiences that are adaptable to each child's pace (Hirsh-Pasek et al., 2015). In addition, technology provides opportunities to practice cognitive skills such as problem-solving and critical thinking, in a playful and interactive way (Kucirkova, 2014).

Several studies have highlighted the potential benefits of using technology in early childhood education. Among these benefits, technology offers access to a wide variety of educational resources, allowing children to explore different areas of knowledge in an interactive and engaging way (Kucirkova, 2014). In addition, it enables the personalization of learning according to the individual needs of each child, promoting a more effective and adapted education (Clark et al., 2016).

Early contact with technology can help children develop digital skills that are essential for the contemporary world, preparing them for the challenges of the twenty-first century (Marsh et al., 2017). Technology also stimulates creativity and innovation, allowing children to explore new forms of expression and create digital content and creative projects (Prensky, 2001).

Another significant benefit of technology in early childhood education is its ability to promote inclusion and equity. It can meet the individual needs of children with different learning styles and abilities by offering accessible and adaptable resources for those with disabilities or learning disabilities (Clark et al., 2016).

In addition, technology facilitates collaboration and communication between educators, parents, and students, creating opportunities for greater involvement in children's education (Plowman & McPake, 2013).

Therefore, the potential benefits of using technology in early childhood education are vast and can contribute significantly to children's learning and integral development, as long as its use is carefully planned, monitored, and responsible.

2.3.2 Challenges and concerns

While the integration of technology into early childhood education offers significant benefits, it brings with it a number of challenges and concerns that demand a critical and careful approach from educators, parents, and professionals involved. These challenges range from issues related to children's excessive exposure to electronic device screens to ethical and pedagogical concerns associated with the use of these technologies in the educational environment.

One of the main challenges is the excessive time children spend in front of screens, such as *tablets* and *smartphones*, which has been linked to health problems such as obesity, sleep disorders, and attention difficulties (AAP, 2016). Studies indicate that more than two hours of screen time a day can negatively influence the behavior, attention, and sleep of preschoolers (Hinkley et al., 2014; Madigan et al., 2019). To mitigate these impacts, strategies

such as limiting the time of use to 20 minutes per session, interspersed with physical activities and outdoor games are recommended (Barr et al., 2010).

Another relevant concern is the quality of digital content accessed by children. Not all material available on the internet or in educational applications is appropriate for the preschool age group, and may expose them to inappropriate content such as violence, inappropriate language and targeted advertising (Livingstone and SEFTON-GREEN, 2017). An example of this is that a child may inadvertently access a YouTube video with inappropriate language or violent themes, which are not appropriate for their age, in addition to being exposed to intrusive ads and non-educational content.

The research by Nansen et al. (2012) highlighted the need for careful curation of apps and digital media, aligned with clear pedagogical objectives, in order to maximize the educational benefits of technologies. In the same sense, the research by Beals and Bers (2009) highlights the importance of selecting content that promotes age-appropriate cognitive and social skills in children.

Inequality in access to technology is also a relevant concern, as not all children have access to quality electronic devices or internet at home, which can widen existing educational disparities Holloway et al., 2013). A study conducted by Rideout and Katz (2016) revealed that children from low-income families have less access to digital technologies, which negatively impacts their academic performance compared to children from more affluent families, resulting in a significant digital divide. This limits your ability to participate in online educational activities. Initiatives such as borrowing tablets and internet access at school can help reduce this inequality and provide more equitable learning opportunities (Warschauer et al., 2014).

The lack of adequate mediation by parents and educators also poses a challenge. It is essential that adults are involved in children's digital learning process, offering guidance, supervision and setting appropriate boundaries (Plowman & McPake, 2013). A study by Stephen and Edwards (2018) demonstrated that mediation by teachers significantly improves children's educational and behavioral outcomes when using digital technologies. A teacher, for example, may even use an educational app in the classroom, but without explaining how it relates to the concepts taught, they end up missing the opportunity to integrate technology in a meaningful way. Another study, conducted by Zaman et al. (2016) showed that active parental mediation, such as watching and discussing digital content with children, is also associated with better performance in cognitive and social skills.

Finally, online privacy and security are growing concerns, with inappropriate collection of personal data and exposure to inappropriate content posing significant risks to children's

well-being (Livingstone & Sefton-Green, 2017). Numerous studies, such as those by Marsh et al. (2017) and McReynolds et al. (2017) have looked at popular apps for children and found that many collected personal data without proper parental consent, raising serious questions about privacy and security. In this way, such information can be misused or exposed to risks. Educating children about online safety and ensuring the use of platforms and apps that adhere to strict privacy standards are essential measures to protect them (Leathers et al., 2014).

In short, addressing these challenges and concerns carefully and proactively is key to promoting a responsible and balanced use of technology in early childhood education. Strategies such as limiting screen time, carefully selecting digital content, ensuring equitable access to technology, active mediation by adults, and strict protection of online privacy are key to mitigating the risks associated with technology use by young children.

2.3.3 Ethical and pedagogical considerations

When integrating technology into early childhood education, it is essential to consider not only the technical and practical aspects, but also the ethical and pedagogical considerations involved. This involves reflections on the use of technology, who benefits and the implications for child development.

1. Equity and inclusion: Ensuring that all children have equitable access to technology, regardless of their socio-economic background, abilities, or disabilities, is a crucial ethical requirement (Selwyn, 2011). It is vital that technology does not widen digital disparities between children from different social and economic backgrounds. Strategies must be implemented to ensure that everyone has equal access to and opportunities to learn from technology (Lankshear & Knobel, 2011).
2. Privacy, safety and data protection: Children have the right to privacy and safety online. Educators and parents should ensure that the use of technology respects children's privacy and protects their personal information. Additionally, it is important to educate children about online safety and help them develop skills to navigate the internet safely. This includes the use of platforms and applications with robust security measures and compliance with data protection laws (Livingstone and SEFTON-GREEN, 2017).
3. Development of critical skills: Technology should be utilized to promote the development of skills such as critical thinking, collaboration, and problem-solving.

Educators have a central role in helping children develop a critical understanding of the digital world and to use technology conscientiously and responsibly, as well as encouraging children to question, explore, and create responsibly (Buckingham, 2007; (Livingstone and SEFTON-GREEN, 2017).

4. Balanced integration: Technology should be integrated in a balanced way and complementary to traditional pedagogical practices. It should not completely replace traditional learning experiences, but rather enrich them and broaden their possibilities (Cuban, 2001).
5. Promoting Digital Citizenship: Early childhood education should promote digital citizenship, empowering children to actively participate in the digital society in an ethical and responsible manner. This includes teaching about online rights and responsibilities, respecting diversity, and combating cyberbullying and misinformation (Ribble, 2015).

Thus, ethical and pedagogical considerations are essential to ensure that the use of technology in early childhood education contributes to the integral and healthy development of children, preparing them for life in the contemporary digital world.

3 METHODOLOGY

This study is based on a literature review, focusing on sources that address the application of digital tools in early childhood education, as well as the advantages and challenges associated with their use.

3.1 RESEARCH APPROACH

The research adopted a qualitative approach, based on a systematic literature review. This technique allows for the identification, evaluation, and synthesis of relevant studies on a specific topic, providing a comprehensive and critical view of the existing literature (Booth, Sutton, & Papaioannou, 2016). The choice for the qualitative approach is justified by the need to understand in depth the various dimensions and implications of the use of digital technology in early childhood education (Creswell & Creswell, 2013). The literature review facilitates the synthesis and critical interpretation of the results of previous studies, offering a well-founded view on the subject.

3.2 CRITERIA FOR SELECTING LITERATURE

To ensure the inclusion of relevant and quality studies in the review, the following criteria were defined:

1. Thematic relevance: We include studies that directly address the use of technology in early childhood education, such as educational apps, digital games, and other digital resources, and that explore the impacts on children's development, as well as the associated ethical and pedagogical issues.
2. Publication period: Studies published in the last ten years (2013-2023) were considered to ensure the timeliness of the information and the relevance of the data analyzed.
3. Reliable sources: The selection included articles from recognized scientific journals, books by renowned authors in the field of education and technology, book chapters, and reports from educational and research organizations.
4. Methodology: Empirical studies, systematic reviews, and meta-analyses that provide robust evidence on the impact of technology on early childhood education were considered.
5. Language: Publications in Portuguese and English were included to broaden the scope of the review and incorporate relevant studies from different cultural and educational contexts.

3.3 ANALYSIS PROCEDURES

The analysis procedures followed a systematic approach to synthesize and interpret the data collected from the selected literature. The specific steps in the process were:

1. Literature search: Using academic databases such as Scopus. Web of Science, ERIC, Google Scholar and CAPES journals, relevant studies were identified. Keywords used included "digital culture", "early childhood education", "educational technology", "educational applications" and "digital games".
2. Screening and selection of studies: After the initial collection, the studies were screened according to the previously established selection criteria. Abstracts and, where necessary, full texts were reviewed to determine the relevance and quality of the studies.
3. Data extraction: For each study included in the review, relevant information was extracted, such as study objective, methodology, main findings, and conclusions.

4. Synthesis and interpretation of data: The extracted data were synthesized qualitatively, identifying recurring themes, patterns and gaps in the literature. The interpretation of the data considered the evidence presented in the selected studies and their relevance to the objectives of the present study.

The methodology used ensures a comprehensive and critical review of the literature on digital culture in early childhood education, allowing the identification of advantages, challenges and ethical and pedagogical considerations associated with the use of technology in this context.

4 RESULTS

In this topic, we present the synthesis of the main findings and trends identified in the reviewed literature, along with examples of relevant studies that illustrate these discussed points. The critical analysis of the literature allowed us to identify patterns and central questions about the use of digital culture in early childhood education.

4.1 SUMMARY OF KEY FINDINGS AND TRENDS

The literature review on digital culture in early childhood education revealed significant findings and trends. First, there was a growing trend in the integration of digital tools in early childhood education environments. Studies indicate that the use of devices such as tablets and computers in classrooms is becoming increasingly common, providing new opportunities for interactive and personalized learning (Kucirkova, 2014; Marsh et al., 2017).

The benefits of using technology include positive impacts on children's cognitive and socio-emotional development. Research indicates that digital technology, when used appropriately, can promote early literacy skills, such as letter and sound recognition, as well as improve language and math skills and promote collaboration and teamwork (Neumann and Neumann (2014), Hirsh-Pasek et al., 2015 and Clark et al., 2016).

Digital tools, especially educational games and interactive apps, have been shown to increase children's engagement and motivation to learn. Hirsh-Pasek et al. (2015) highlight that digital learning environments can make education more attractive and accessible, encouraging children's exploration and experimentation.

The review also pointed out that early exposure to technology helps children develop technology skills that are essential for the future. According to Marsh et al. (2017), familiarity with digital devices and educational software prepares children for an increasingly digitized world, promoting skills such as navigation, research, and problem-solving.

However, the literature has also identified significant challenges. The persistence of inequalities in access to technology is one of them. Children from lower socioeconomic backgrounds often have limited access to digital devices and the internet, which can exacerbate educational disparities (Warschauer & Matuchniak, 2010).

Another challenge is the risk of overuse of technology and the varying quality of the digital content available. The American Academy of Pediatrics (AAP, 2016) warns of the risks associated with excessive screen time, recommending moderation and supervision in the use of digital devices by children. Unsupervised use of technology can lead to problems such as sedentary lifestyle, sleep disorders, and exposure to online risks (AAP, 2016; Livingstone and SEFTON-GREEN, 2017).

To maximize the benefits and minimize the risks, the mediation of adults is essential. Research emphasizes that the guidance and involvement of parents and educators is essential to ensure that children use technology in a safe and productive manner (Plowman & McPake, 2013).

4.2 EXAMPLES OF RELEVANT STUDIES

Neumann and Neumann (2014) conducted a study on the impact of educational apps on early literacy development. The results showed significant improvements in letter and sound recognition among children who used high-quality educational apps.

Research conducted by Hirsh-Pasek et al. (2015) explored how digital learning environments can increase children's engagement and influence the development of language and literacy skills. Their studies show that well-designed digital games can encourage curiosity and experimentation, resulting in deeper and more meaningful active learning.

Studies carried out by Kucirkova (2014) analyzed the impact of the use of iPads in early childhood education contexts. The results indicated that the devices can enrich children's learning when used in a targeted manner and with proper supervision. iPads helped personalize learning, adapting to the individual needs of children.

Marsh et al. (2017) also investigated the development of technological skills in preschoolers. The researchers concluded that familiarity with technology from an early age prepares children for future challenges by fostering essential digital skills.

The American Academy of Pediatrics (AAP, 2016) has provided guidelines on children's use of media and technology, emphasizing the importance of limiting screen time and ensuring that the content consumed is appropriate and educational.

The analysis promoted by Warschauer and Matuchniak (2010) highlighted inequalities in access to and use of technology in different socioeconomic contexts. The authors argue that educational policies and practices should be implemented to reduce these disparities and ensure that all children have equal opportunities to benefit from educational technologies.

Thus, this article highlighted both the benefits and challenges of using digital technology in early childhood education, highlighting the need for careful balance and adequate supervision to maximize positive outcomes.

5 DISCUSSION

The discussion on the use of digital technology in early childhood education, based on the results of this literature review, offers critical reflections on the benefits and challenges identified, presents the implications for educational practice, identifies gaps in existing research, suggesting future directions.

5.1 CRITICAL REFLECTIONS ON THE RESULTS

The results indicate that the integration of technology in early childhood education can provide a number of benefits, such as access to diversified educational resources, the personalization of learning, and the development of digital and socio-emotional skills (Kucirkova, 2014; Marsh et al., 2017; Hirsh-Pasek et al., 2015). However, these benefits are not evenly distributed among all children, due to inequalities in access to technology (Warschauer & Matuchniak, 2010). In addition, significant concerns have been raised regarding the overuse of technology, the quality of digital content, and online privacy and security (AAP, 2016; Livingstone and SEFTON-GREEN, 2017). These challenges highlight the need for a balanced approach that maximizes the benefits and minimizes the risks associated with the use of technology.

Studies indicate that without proper mediation, technology may not fulfill its educational potential and instead contribute to health problems and social inequality (AAP, 2016; Livingstone and SEFTON-GREEN, 2017). Therefore, supervision by educators and parents is crucial to ensure that children make beneficial and safe use of technology (Plowman & McPake, 2013).

5.2 IMPLICATIONS FOR EDUCATIONAL PRACTICE

Effective implementation of technology in early childhood education requires careful planning and a robust pedagogical approach. Educators must be empowered to integrate technology meaningfully into their practices, using digital tools to complement and enrich traditional teaching (Hirsh-Pasek et al., 2015). In addition, parents and educators should play an active role in mediating children's use of technology. Proper guidance can help ensure that children use technology productively and safely (Plowman & McPake, 2013).

There is a clear need for the development and delivery of high-quality digital content that is pedagogically sound and appropriate for child development (Hirsh-Pasek et al., 2015). Thus, investing in evidence-based educational apps and games can amplify the benefits of technology in early childhood education.

In addition, education policies should be developed to ensure equitable access to digital technologies, addressing the socioeconomic inequality that may limit the learning opportunities of some children (Warschauer & Matuchniak, 2010). The promotion of digital citizenship is equally important and should be incorporated into early childhood education curricula in order to empower children to navigate the digital world ethically, critically, and safely (Ribble, 2015).

5.3 GAPS IN RESEARCH AND FUTURE DIRECTIONS

Despite significant advances in understanding the impact of technology on early childhood education, several gaps persist in research.

First, there is a need for more longitudinal studies that follow the long-term impacts of technology use on child development. This would help to better understand how prolonged and continuous exposure to technology affects various aspects of child development (Kucirkova, 2014).

Most of the studies reviewed focus on Western and urban contexts of developed countries. Future research should explore the use of technology in early childhood education in different socioeconomic and cultural contexts, which may reveal significant variations in the perceptions and impacts of technology, contributing to a more global and inclusive understanding of the topic (Livingstone and SEFTON-GREEN, 2017).

In addition, additional research is needed to explore best practices in technology mediation by parents and educators. Studies investigating effective mediation strategies can provide valuable insights to maximize the benefits and minimize the risks associated with the use of technology (Plowman & McPake, 2013). Investigate specific pedagogical interventions that can optimize the use of technology in early childhood education classrooms. Experimental studies can help identify effective practices and strategies to integrate technology in a more beneficial and balanced way.

In conclusion, while technology offers significant promise for early childhood education, it is crucial to approach the challenges and ethical considerations with caution. Future research and educational practices should focus on maximizing the benefits of technology by promoting responsible, safe, and equitable use.

6 CONCLUSION

This article reviewed the literature on digital culture in early childhood education, highlighting the useful digital tools, as well as the benefits and challenges associated with the use of technology in this context. Initially, we set the context and explored the increasing

integration of technology in early childhood education classrooms. We examine the impact of technology on child development, highlighting benefits such as the personalization of learning and the development of social-emotional skills, as well as concerns related to overuse and inappropriate content. The discussion included educational apps, digital games, and other digital resources, underlining the importance of mediation and supervision by parents and educators.

The review revealed that technology can enrich the educational environment by providing personalized learning and developing children's cognitive and socio-emotional skills. However, significant challenges have also been identified, such as inequalities in access to technology, concerns about excessive screen time, and the need for proper supervision to ensure safe and productive use.

The contributions of this article to the field of early childhood education are multiple. First, it offers a comprehensive and critical overview of the current state of technology in early childhood education, highlighting both the benefits and challenges. Secondly, the article underlines the importance of mediation and supervision by educators and parents, emphasizing that proper guidance is essential to maximize the benefits of technology and minimize risks. In addition, by addressing inequalities in access to technology, the article contributes to the discussion on the need for policies and practices that promote digital equity, ensuring that all children have equal opportunities to benefit from digital tools.

Although this article has addressed several facets of the use of technology in early childhood education, several areas need further investigation. Studies are needed that track the long-term impact of technology on child development. Studies of this nature can provide deeper insights into how continuous exposure to technology impacts various areas of development, such as cognitive, social-emotional, and motor skills.

Another suggestion would be to broaden the research to include a wider variety of socioeconomic and cultural contexts. This will help to understand how different environments influence the use and impact of technology in early childhood education, providing a more inclusive and global vision.

In addition, it is necessary to develop and evaluate specific pedagogical interventions that can optimize the use of technology in classrooms. Experimental studies that test different methods of technological integration can identify effective strategies that reduce the risks associated with the use of digital tools in early childhood education, offering richer and more diverse learning opportunities.

With the constant advancement of technology, it is essential to continuously evaluate new devices and applications to determine their effectiveness and safety in the children's

educational context. Research focused on evaluating new technologies can ensure that only beneficial tools are incorporated into educational practices.

In conclusion, this article reinforces the importance of a balanced and supervised use of technology in early childhood education, highlighting both the opportunities and challenges that digital culture presents. By promoting a deeper and more critical understanding of the subject, it is hoped that this work will contribute to more informed and equitable educational practices, benefiting the integral development of children.

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