

Children in the Digital Space: Issues Researched and Suggestions for Future Research

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Abstract

The integration of digital technology into daily life has significantly altered the landscape of childhood experiences, presenting both opportunities and challenges. With regard to children in the digital space, this paper aims to explore the issues that have been researched and the suggestions for future research. This exploration is done with the aid of ChatGPT, while the output generated is reviewed and evaluated by the author. Areas of research concerning children in the digital space include digital literacy, skills and cognitive development, socialization and communication, online safety and privacy, screen time, health and well-being, parental mediation, digital divide and inequalities. Issues for future research include screen time and health, online safety and privacy, digital literacy, effect of (emerging) educational technologies, parental mediation-guidance, digital inclusion-equity, and ethical considerations. Addressing these issues can contribute to a better understanding of the interplay between children and digital space, informing policies, practices, and educational interventions to support healthy, positive experiences for children in the digital space-age.

Keywords

Digital Technology, Digital Space, Children, Online Safety, ChatGPT

1. Introduction

In today's increasingly digital world, children are navigating an ever-expanding digital space at a remarkable pace. The integration of digital technology into children's daily life has significantly altered the landscape of childhood experiences, presenting both opportunities and challenges (Pescott, 2024; Nikolopoulou, 2022, 2023). From interactive (mobile) educational applications to online digital platforms, children are exposed to various digital tools and content from a young age (Gözüm et al., 2023; Nikolopoulou, 2021). As digital natives, children are

adept at navigating online environments, often surpassing the technological proficiency of previous generations. However, this proficiency does not necessarily translate into digital literacy or critical thinking skills, leaving children vulnerable to misinformation, online predators, and cyberbullying. Moreover, excessive screen time can impact physical health and hinder social interactions, raising concerns about the long-term effects of digital immersion on children's well-being. To understand the complexities of children's experiences in the digital space, it is essential to consider empirical evidence on what has been researched. For the purpose of this paper, "digital space" refers to the virtual environment created by electronic devices and includes, for example, digital applications/programs, websites, social media platforms, online forums, and virtual reality environments; within the context of digital space, children can engage in various activities facilitated by digital technologies and interact with others.

The purpose of this paper is to explore the issues that have been researched and the suggestions for future research on the topic "children in the digital space". The topic addressed is significant and timely, exploring children's interaction with digital spaces, an increasingly pertinent issue given the pervasive role of digital technology in contemporary society. Although, research has indicated that digital technology can be used as a tool to support young children's learning and development, there is a need to also consider issues for future research because new emerging technologies such as Artificial Intelligence (AI) tools are gradually introduced/spread across formal and informal educational settings.

The exploration in this study was carried out with the aid of ChatGPT, and the output generated was reviewed and evaluated by the author. The approach used was of qualitative type, with queries submitted to ChatGPT. ChatGPT is an advanced Artificial Intelligence chatbot (launched in November 2022), and some studies indicated that it has been used as an aid to support creation-generation of content (Iskender, 2023; Zhu et al., 2023; Hsu, 2023; Nikolopoulou, 2024). For example, Iskender (2023) asked questions in the field of tourism industry and education, and reported that his study originality lies in using ChatGPT as an interviewee. ChatGPT is one of the most advanced large language models, it can generate new content and human-like responses, while its function as a research aid is linked to benefits and challenges/concerns (Nikolopoulou, 2024). Experimenting with ChatGPT as a research assistant is a novelty, possibly opening new possibilities for research investigation. In this study, examples of prompts/queries submitted to ChatGPT were: Children in the digital space—What issues have been researched? What are the main recommendations, suggestions? What are the issues for future research? The term "information technology" was also used as alternative to the term "digital space".

2. Children in the Digital Space: Issues-Topics That Have Been Researched

Research on children in the digital space covers a wide range of issues-topics in-

cluding the impact of digital technology on skills and cognitive development, socialization, education, health, and safety. Below, are presented some key areas that have been researched:

1) Digital literacy and skills development: Studies examine how children develop digital literacy skills, including their ability to navigate digital interfaces, critically evaluate online information, and use digital tools effectively for learning and communication. For example, [Ohler \(2012\)](#) explores the educational potential of digital storytelling in classrooms, and discusses how digital tools can enhance literacy skills, foster creativity, and promote meaningful learning experiences for children. In preschool, children use technology for various reasons such as searching for information, as a supplementary-supportive tool and for displaying educational video/pictures ([Nikolopoulou, 2020](#)). Lack of digital literacy skills can hinder children's ability to navigate the digital world safely and effectively. [Blum-Ross and Livingstone \(2017\)](#) examine the role of digital literacy in children's online safety and empowerment.

2) Cognitive development: Studies have examined how exposure to technology, such as digital games and educational apps, influences children's cognitive abilities, including attention, memory, problem-solving skills, and spatial reasoning. While technology offers educational benefits, excessive use may impede cognitive development, particularly in areas such as attention span, critical thinking, and creativity ([Christakis, 2014](#)). [Anderson and Subrahmanyam \(2017\)](#) explore the effects of digital screen media on cognitive development in children; it reviews existing research and discusses both positive and negative impacts of screen time on cognitive abilities.

3) Socialization and communication: Research explores how children use technology to interact with peers and family members, as well as how digital communication platforms affect their social skills/development, empathy, and understanding of interpersonal relationships. Indicatively, studies ([Coyne et al., 2013](#); [McDaniel & Radesky, 2018](#)) have investigated how technology use impacts children's social interactions and relationships with peers and family members.

4) Online safety and privacy: Researchers examine children's ability to navigate digital environments safely, and the risks children face online such as exposure to inappropriate content, cyberbullying, online predators, and privacy concerns (e.g., related to the collection and use of personal data). [Livingstone and Smith \(2014\)](#) examine the risks children face while using online and mobile technologies (e.g., exposure to inappropriate/aggressive content) and strategies for managing them; they found that 28% of European children had experienced some form of cyberbullying. A comparative study ([Livingstone et al., 2014](#)) investigates children's online risks and opportunities across Europe, providing insights into how children navigate the digital landscape.

5) Screen time, health and well-being: Studies explore the effects of screen time on children's learning outcomes ([Papadakis & Kalogiannakis, 2023](#)), cognitive development ([Madigan et al., 2019](#)), physical and mental health, including

issues like sedentary behavior, sleep disturbances, and the impact of digital media on cognitive development and emotional well-being (Odgers & Jensen, 2020). Researchers who examined the impact of technology use on children's physical and mental health outcomes, suggest that prolonged screen time is associated with adverse health outcomes in children (Primack et al., 2009; Odgers & Jensen, 2020; Chassiakos et al., 2016). Preschool teachers' and parents' views regarding the influence of screen-time exposure on children's development (Monteiro et al., 2022) is also a research topic.

6) Parenting and digital media use: Studies investigate parental attitudes, practices, and strategies regarding children's screen time, digital device usage rules, co-viewing/co-playing behaviors, and the role of parental mediation/monitoring in shaping children's technology experiences. For example, parental strategies for managing children's digital use, include monitoring their online activities, setting rules and boundaries, and promoting responsible and safe internet use. Studies have emphasized the importance of parental mediation/guidance and involvement in mitigating the negative effects of technology on children (Livingstone & Helsper, 2008). It is noted that content/applications that target young children may be presented as "play" (Nikolopoulou & Gialamas, 2015).

7) Digital divide and inequalities: Studies investigate disparities in access to digital technologies and internet connectivity among children from different socioeconomic backgrounds, as well as the implications of these disparities for educational opportunities and social inclusion. Research explores how factors such as gender, socioeconomic status, cultural background, and developmental disabilities influence children's access to and experiences with technology. Research highlighted the importance of addressing the digital divide to ensure equitable access to educational resources (e.g., Warschauer & Matuchniak, 2010).

8) Educational technology and learning outcomes: Research evaluates the effectiveness of educational technology (apps, games, online platforms) in supporting children's learning, academic achievement-performance, engagement, and motivation across various subjects and age groups. Also, with the rapid advancement of technology, researchers investigate the implications of emerging technologies such as virtual reality, augmented reality, artificial intelligence, and robotics on children's development, learning, and social interactions. For example, Hwang et al. (2019) explored the effectiveness of educational technology in enhancing learning outcomes and academic achievement in children.

9) Ethical and legal considerations: Scholars examine ethical dilemmas and legal frameworks related to children's online behavior, including issues like children's rights, data privacy, online advertising targeting minors, and regulation of age-appropriate content.

10) Policy and Regulation: Research explores the role of government policies, industry regulations, and educational initiatives in promoting children's digital rights, online safety, and equitable access to digital technologies.

3. Children in the Digital Space: Recommendations and Suggestions

When it comes to children navigating the digital space, there are several recommendations and suggestions to ensure their safety, well-being, and responsible usage. It is essential to strike a balance between embracing the benefits of technology while also ensuring that children develop healthy habits and critical thinking skills. Some recommendations and suggestions are listed below:

1) Digital literacy and online safety: Educate children about online safety, privacy, and responsible digital citizenship. Digital literacy skills are important for navigating in the digital space and protecting children online (Livingstone et al., 2014). Teach them to recognize and avoid online threats such as cyberbullying, inappropriate content, and phishing scams. Encourage critical thinking and skepticism towards information found online.

2) Limit screen time: Excessive screen time has been linked to various negative outcomes on children's physical health, mental well-being, and academic performance (e.g., obesity, poor sleep quality, and decreased academic performance). Research by Carter et al. (2016) highlights the importance of limiting screen time before bedtime to improve sleep quality. The American Academy of Pediatrics recommends limiting screen time for children to no more than one to two hours per day for school-aged children (American Academy of Pediatrics, 2016).

3) Parental guidance and supervision: Parents should actively engage with their children regarding their online activities. Supervision is crucial, especially for younger children, to monitor their interactions and guide them appropriately. Parents (and teachers) can establish clear guidelines and rules about the time spent online, types of content allowed, and appropriate behavior online. Supervise younger children's online activities to ensure they stay safe and engage in appropriate content. Research suggests that parental mediation strategies (active mediation, dialogue) are associated with more positive outcomes for children's digital media use (Livingstone & Bulger, 2013), while consistent and age-appropriate rules help children develop self-regulation skills and promote responsible digital citizenship (Radesky et al., 2015).

4) Monitor online activities: Stay informed about children's online activities and interactions. Utilize parental controls and monitoring software/tools to restrict access to inappropriate content and track their online activities. However, balance monitoring with respecting children's privacy and autonomy (Ofcom, 2020).

5) Encourage digital literacy and critical thinking: Teach children how to critically evaluate online content, distinguish between reliable and unreliable sources, and question information they encounter online.

6) Encourage creativity and learning: Encourage children to use technology for creative purposes, such as creating digital art, coding, or composing music. Choose educational apps, games, and websites that promote learning in areas

like mathematics, science, and language skills.

7) Promote healthy habits and outdoor activities: Encourage balance between online and offline activities, including physical exercise, hobbies, and spending time with family and friends. Encourage outdoor activities (participation in sports, nature walks, outdoor play, and creative hobbies) and a balance between screen time with physical activity and outdoor play. Limit sedentary behavior by scheduling regular breaks for exercise and outdoor exploration.

8) Model responsible behavior: Children often mimic the behavior of their parents and caregivers. Set a positive example by demonstrating appropriate and responsible technology/digital habits yourself. Show them how to use technology responsibly and mindfully, such as by taking breaks, avoiding excessive screen time before bedtime, and maintaining a balance between online and offline activities.

9) Promote family time and communication: Use technology as a tool to facilitate family bonding and communication. Play video games together, watch educational videos, or engage in online activities as a family. Encourage open discussions about technology use and its impact on their lives. Foster an environment where children feel comfortable discussing their online experiences, concerns, and seek guidance when encountering unfamiliar or distressing content online. Parents and caregivers should actively engage with children during their digital media use. Research indicates the importance of parental involvement and communication in promoting children's online safety (Livingstone & Bulger, 2013). Co-viewing and co-engagement facilitate discussions about content, promote critical thinking, and help children understand the implications of what they are viewing (Common Sense Media, 2017).

10) Stay informed and updated: Keep yourself informed about the latest trends and developments in technology, apps, and online platforms popular among children, so you can better understand and address any potential risks children may encounter. Be prepared to discuss potential risks and concerns with them.

4. Children in the Digital Space: Issues for Future Research

Research into children and the digital space is crucial for understanding the impact, challenges and opportunities in this evolving digital landscape. Here are some potential areas for future research:

1) Screen time and health: Investigating the relationship between screen time and various aspects of physical and mental health, including obesity, sleep patterns, social skills, and psychological well-being. Indicatively, exploring the effects of prolonged screen time on children's health, well-being, and social development constitute ongoing research topics. This includes examining the impact of different types of digital content and devices on children of different ages.

2) Online safety and privacy: Examining children's understanding of online

privacy, their ability to protect personal information, the potential risks associated with sharing data on online spaces, and the effectiveness of parental controls. Research could explore effective prevention strategies and support mechanisms for children of different ages. It is important to understand possible digital harassment among children, including risk factors, coping mechanisms, and intervention strategies.

3) Digital literacy and media literacy: Assessing children's digital literacy skills, including their ability to critically evaluate online content, identify misinformation, and navigate digital platforms responsibly. Digital literacy development also regards effective strategies for teaching digital literacy skills to children (e.g., critical thinking, online safety, and ethical considerations in the use of technology).

4) Educational technology: Exploring the effectiveness of educational technology tools and digital learning platforms for improving academic outcomes, engagement, and skills development among children; in supporting children's learning outcomes across various subjects and age groups. This includes examining factors such as usability, engagement, and the role of educators in integrating technology into the classroom.

5) Emerging technologies: Anticipating the impact of emerging technologies such as artificial intelligence, virtual reality, and augmented reality on children's cognitive development, creativity, and social interactions. This includes addressing potential ethical concerns and designing age-appropriate guidelines for their use.

6) Parental mediation, and guidance: Understanding parental strategies for managing children's digital use, including monitoring, guidance, and setting boundaries, and their impact on children's well-being and development. Understanding parental attitudes, behaviors, and challenges related to managing their children's use of technology. Research could explore effective strategies for parental mediation, guidance and communication about online risks, and fostering a healthy balance between online and offline activities.

7) Digital inclusion and equity: Examining disparities in access to digital technologies and the internet among children from different socio-economic backgrounds, geographic locations, and cultural contexts. Exploring strategies to promote digital inclusion and reduce the digital divide. Such research could inform policies aimed at bridging the digital divide and promoting digital inclusion.

8) Ethical considerations and digital citizenship: Exploring ethical issues surrounding children's participation in online spaces, including data privacy, online advertising targeting children, and the commercialization of children's digital experiences. Investigating children's understanding of their rights and responsibilities as digital citizens, including ethical behavior, online etiquette, and participation in digital communities. Research could explore ways to promote positive digital citizenship skills from an early age.

9) Longitudinal studies: Conducting longitudinal research to track changes in children's digital experiences and behaviors over time, including their usage patterns, preferences, and attitudes towards technology. Long-term studies can

provide valuable insights into the evolving relationship between children and information technology.

5. Discussion

In order to explore the issues that have been researched and the suggestions for future research, ChatGPT was harnessed as a research aid. The output-responses generated by ChatGPT (based on the questions posed to ChatGPT) provided a starting point-basis for the exploration, thus facilitating the research procedure. The content created by ChatGPT was trustworthy, while there was some overlap among the output generated after the prompts. The output was evaluated and finalized by the author.

Some of the broad areas of research concerning children in the digital space regard: Digital literacy and skills development, cognitive development, socialization and communication, online safety and privacy, screen time, health and well-being, parenting and digital media use, digital divide and inequalities, educational technology and learning outcomes, ethical and legal considerations, and policy and regulation. This wide range of topics also includes the effects of digital technology on cognitive development, social interaction, educational outcomes, and well-being. Although such issues have been researched throughout the years, they are still relevant today. For example, post-pandemic it is imperative to understand children's digital literacy and multimodal practices (Fu et al., 2024). Not all children have equal access to digital technology due to factors like socioeconomic status, geographic location, or disabilities, and this can maintain the digital divide. Further research is needed on children's exclusion due to limited language skills, digital literacy skills, accessibility to computer/smartphone (Islam et al., 2024), as well as on digital competence and responsible use of digital technologies by children (Su & Yang, 2024). Ensuring that all children have access to high-quality educational resources and tools is essential. Also, balancing screen time with other activities, and ensuring children's safety and privacy while navigating the digital world constitute concerns throughout the time. A recent review (Caballero-Julia et al., 2024) indicates a growing concern about the cognitive and emotional impact of screen use, highlighting the importance of teacher training and digital literacy for children and parents for appropriate and healthy use of technology.

Recommendations and suggestions include: Digital literacy and online safety; limit screen time; parental guidance and supervision; monitor online activities; encourage digital literacy, critical thinking, creativity and learning; promote healthy habits and outdoor activities; model responsible behavior; promote family time and communication; stay informed and updated. By implementing these recommendations and discussing with children about their digital experiences, children can develop a healthy relationship with digital technology and be facilitated to navigate the online world safely and responsibly. Children's engagement with the digital space is a multifaceted issue that requires careful consideration

to ensure their well-being and development. In particular, after the recent pandemic, a period where digitalization was widely applied and in early childhood settings, affecting digital literacy skills and communication with parents (Nikolopoulou, 2022).

Areas/issues for future research include: Screen time and health, online safety and privacy, digital literacy and media literacy, effect of educational technology and emerging technologies, parental mediation-guidance, digital inclusion and equity, ethical considerations and digital citizenship, and longitudinal studies. For example, with regard to screen use and educational outcomes in childhood, empirical research will provide a foundation for the development of informed and responsible educational practices in the digital age (Caballero-Julia et al., 2024). With regard to emerging technologies, topics for future research may include STEM learning opportunities for young children (O'Neill et al., 2023), mobile augmented reality, as well as the effects and ethics of utilizing Artificial Intelligence tools. Indicatively, a recent review reported that Artificial Intelligence tools can contribute to the improvement of young children's skills such as literacy and robotics skills, collaborative inquiry, computational thinking and creativity (Su & Yang, 2022). AI literacy is a crucial part of digital literacy and little research has been done on how to teach AI literacy to children (Yang et al., 2024). Also, augmented reality technology, together with mobile devices, can be beneficial to support the teaching of science, mathematics, reading, or language (Criollo-C et al., 2024). By addressing these and other relevant research topics, scholars will contribute to a better understanding of the complex interplay between children and digital space, ultimately informing policies, practices, and interventions to support healthy digital development.

The issues for future research could be methodologically approached by both quantitative and qualitative approaches; it is suggested that the methods are driven by children's cognitive and developmental needs. Quantitative approaches that use experimental-control groups, paper and pencil tests, or questionnaires (commonly used with older pupils) are practical for children aged six or above, while qualitative approaches are practical for younger children. Research studies with small samples, though not easily generalizable, are valuable in early childhood education settings. Also, researchers need to be aware of ethical issues when conducting research with young children. Indicatively, Water (2024) highlights ethical considerations when undertaking participatory research with children and young people, including questions of participation, representation, diversity, cultural contexts, dissemination, digital spaces, discussions on informed consent, and the role of gate keepers. Additionally, mixed methods are suggested in order to collect data from parents and/or teachers (e.g., interviews are particularly useful since these reveal the "how" and "why" of the teaching and learning processes).

Limitations of this study include that key research areas may have been left out. This study does not adequately address cultural and socioeconomic dispari-

ties in digital access and usage among children globally, since there is not a uniformity in the impact of digital spaces on children (different communities might experience disparate effects). The output generated by ChatGPT was reviewed-evaluated by the author of this paper, and it was characterized as trustworthy. However, ChatGPT can only provide information up to a specific date, because it does not access real-time and latest data/information. In the context of implementing Artificial Intelligence tools like ChatGPT in investigations, it is essential to address ethical considerations/issues (e.g., data privacy, transparency, accessibility, cultural sensitivity), potential concerns, and risks. The content created by ChatGPT on the topic of children in the digital space had an alignment with American culture (e.g., emphasis on the journal *Pediatrics*). This is in line with [Cao et al. \(2023\)](#), who reported that ChatGPT exhibits a strong alignment with American culture (while it adapts less effectively to other cultural environments).

6. Conclusion

Given the pervasive role of digital technology in contemporary society, the topic addressed in this study (children in the digital space) is significant and timely. Its novelty lies in its comprehensive exploration of various issues, including cognitive development, socialization, online safety and digital literacy, and its forward-looking perspective on future research needs in the digital experiences of children. In general, the research in this field aims to provide insights into the complex relationship between children and digital space, informing parents, educators, policymakers, and technology developers about the opportunities and challenges associated with children's digital experiences. Researchers continue to explore the complexities of children's experiences in the digital space, and their implications for children's development, education, and well-being. By implementing various recommendations and suggestions, parents, caregivers, educators, and policymakers can help children navigate the digital space safely and responsibly while maximizing its potential benefits for learning and development. Finally, by addressing issues/areas for future research, scholars can contribute to the development of evidence-based policies, interventions, and educational initiatives aimed at promoting healthy and positive experiences for children in the digital space/age. Future research is suggested to examine emerging issues and trends in this rapidly evolving field, by using both quantitative and qualitative approaches/methods.

With regard to ChatGPT usage in this study, it assisted the generation of content-ideas for further investigation. ChatGPT is a useful research assistant tool that aids researchers, educators and students in the research process. However, human supervision, critical evaluation, expertise and engagement are essential. ChatGPT can be a valuable resource, but it should be used as a complementary-supportive tool, and potential risks, misuses and concerns need to also be addressed (e.g., widening of the digital divide, ethical considerations, potential bi-

as, incredible/inaccurate output).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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