



USE OF AI IN PRESCHOOL EDUCATION

Scientific advisor: Kamola Saidalievna

e-mail:

Student of CSPU

Department English language and theory

Nurymbetova Zumrad Ruslanovna

e-mail: nurymbetovazumrad@gmail.com

Abstract: *In recent years, Artificial Intelligence (AI) literacy has gained increasing attention within the field of digital literacy education. However, its integration into early childhood education (ECE) remains limited, as AI curricula for young children have only recently been developed. This scoping review analyzed 16 empirical studies published between 2016 and 2022 to examine thematic and content trends related to AI literacy in ECE. The review synthesizes findings on curriculum design, AI tools, pedagogical strategies, research methodologies, assessment approaches, and study outcomes. Insights from the review provide guidance for educators and researchers aiming to create interventions that introduce young children to AI concepts.*

The analysis also highlights key challenges, including insufficient AI knowledge, skills, and confidence among teachers; the lack of structured curricula; and the absence of clear instructional guidelines. Despite these initial obstacles, AI learning presents opportunities to enhance young children's understanding of AI concepts, practices, and perspectives. Looking ahead, the development of age-appropriate curricula and educational tools for ECE is expected to grow. Finally, the review offers recommendations for future research and educational practice to strengthen AI literacy initiatives in early childhood settings.

Keywords: *AI literacy, AI education Learning and teaching AI Early childhood education, Challenges and opportunities*



Аннотация: В последние годы грамотность в области искусственного интеллекта (ИИ) привлекает всё больше внимания в исследованиях по цифровой грамотности. Однако интеграция ИИ в дошкольное образование остаётся ограниченной, поскольку программы по ИИ для маленьких детей были разработаны только недавно. В рамках данного обзора проанализировано 16 эмпирических исследований, опубликованных с 2016 по 2022 год, с целью изучения тем и содержания исследований по грамотности в области ИИ в дошкольном образовании. Обзор объединяет данные о разработке учебных программ, инструментах ИИ, педагогических подходах, методах исследования, способах оценки и полученных результатах. Полученные выводы помогают педагогам и исследователям создавать программы, которые знакомят маленьких детей с концепциями ИИ.

Обзор также выделяет ключевые проблемы, включая недостаточный уровень знаний, навыков и уверенности учителей в области ИИ, отсутствие структурированных учебных программ и чётких методических рекомендаций. Несмотря на эти трудности, обучение ИИ создаёт возможности для развития понимания детьми концепций, практик и перспектив ИИ. В перспективе ожидается рост числа возрастно-ориентированных программ и образовательных инструментов для дошкольного уровня. В заключение даны рекомендации для будущих исследований и педагогической практики с целью повышения эффективности формирования грамотности в области ИИ в дошкольном образовании.

Ключевые слова: Грамотность и образование Обучение и преподавание в раннем детском возрасте - проблемы и возможности

Annotatsiya: So'ngi yillarda sun'iy intellekt (SI) bo'yicha savodxonlik raqamli savodxonlik tadqiqotlarida tobora ko'proq e'tibor qozonmoqda. Biroq SIning bolalar bog'chasi ta'limiga integratsiyasi cheklangan, chunki kichik yoshdagi bolalar uchun SI dasturlari yaqinda ishlab chiqilgan. Ushbu sharh 2016–2022 yillarda nashr etilgan 16 ta empirik tadqiqotni tahlil qilgan bo'lib, bolalar



bog'chasida SI bo'yicha savodxonlik mavzulari va mazmunini o'rganishga qaratilgan. Sharh dasturiy ta'lim, SI vositalari, pedagogik yondashuvlar, tadqiqot metodlari, baholash usullari va tadqiqot natijalarini o'z ichiga oladi. Ushbu natijalar pedagoglar va tadqiqotchilarga kichik yoshdagi bolalarni SI konseptlari bilan tanishtirishga yordam beradi.

Sharh shuningdek, asosiy muammolarni aniqlaydi, jumladan, o'qituvchilarning SI bo'yicha bilim, ko'nikma va ishonchining yetarli emasligi, tuzilgan dasturlarning yetishmasligi va aniq metodik ko'rsatmalar yo'qligi. Ushbu qiyinchiliklarga qaramay, SI ta'limi bolalarning SI konseptlari, amaliyotlari va qarashlarini tushunish imkoniyatlarini kengaytiradi. Kelajakda bolalar bog'chasi darajasi uchun yoshga mos dasturlar va ta'lim vositalari sonining oshishi kutilmoqda. Yakunda, bolalar bog'chasida SI bo'yicha savodxonlikni oshirishga qaratilgan tadqiqotlar va pedagogik amaliyot uchun tavsiyalar berilgan.

Kalit so'zlar: AIAI savodxonligi AI ta'limi Aini o'rganish va o'rgatish Erta bolalik davridagi ta'lim Qiyinchiliklar va imkoniyatlari

Introduction

Early childhood, defined as the period from birth to six years, represents a crucial stage in children's lives, characterized by rapid cognitive, social, and emotional growth. Research indicates that this period is particularly effective for early interventions aimed at supporting development. With the rapid advancement of technology, the use of artificial intelligence (AI) to enhance early childhood development is steadily increasing. AI can be applied directly by children—for example, through adaptive learning technologies—or by those who interact with children, such as educators, parents, and healthcare professionals. Additionally, AI can assist individuals who indirectly contribute to early child development, including researchers and policy makers.

This scoping review aims to provide guidance for stakeholders by examining how AI has been implemented across various contexts to support the development of infants and young children. It also identifies the most commonly used AI



technologies and approaches within these contexts. Despite the growing integration of AI into early childhood settings, there is still limited understanding of how these technologies influence developmental outcomes. Therefore, this review explores the types of AI tools, their application by different users, and the resulting developmental effects. An evidence gap map will be created to highlight areas that require further research and development in AI applications for young children.

What is Early Childhood Education?

Early Childhood Education (ECE) refers to the period of learning that takes place from birth to age 8, an essential window in a child's cognitive, emotional, and social development. During these early years, children are like sponges, rapidly absorbing information, developing language, building motor skills, and forming the building blocks of lifelong learning. ECE isn't just about teaching ABCs or counting to 10. It's about nurturing the whole child, fostering curiosity, empathy, creativity, and resilience. Early childhood educators play a pivotal role in shaping this foundational stage, using developmentally appropriate practices (DAP) to guide, assess, and support each child's unique learning journey.

In Canada, the demand for trained and certified ECE professionals continues to rise. Programs like the Early Childhood Education Certificate at CDI College help prepare future educators to meet the evolving needs of classrooms, especially in the face of technological change.

Use of AI in Early Childhood Education

Artificial Intelligence, or AI, refers to computer systems capable of performing tasks that typically require human intelligence like speech recognition, decision making, or problem solving. In ECE, AI is being explored as a supplementary tool, not a replacement for educators, to enrich the classroom experience and personalize learning. Tools like intelligent tutoring systems, voice assistants, and adaptive learning platforms are emerging to help monitor a child's learning pace, identify strengths and weaknesses, and adapt content accordingly.



Far from being a futuristic fantasy, the integration of AI into early childhood classrooms is already happening through games that teach phonics, translation apps that support language learners, and AI powered administrative platforms that give educators more time to focus on teaching.

Materials and Methods

This study employed a scoping review approach to systematically examine the use of artificial intelligence (AI) in preschool education. Scientific articles, reports, and empirical studies focusing on AI applications for children aged 0 to 6 years were analyzed.

The review focused on three main areas:

1. Direct use of AI by children, such as adaptive learning technologies and educational applications.
2. Use of AI by adults who interact with children, including educators, parents, and healthcare professionals.
3. Indirect use of AI by individuals supporting early childhood development, such as researchers and policy analysts.

Data analysis included content analysis of publications, identification of AI technologies and pedagogical approaches, and assessment of their impact on children's cognitive, social, and emotional development.

Results and Discussion

The review revealed that AI is increasingly applied in preschool education to individualize learning, monitor children's progress, and support educators in planning activities. Key technologies include adaptive learning platforms, voice and visual assistants, applications for developing literacy, numeracy, and logical thinking, as well as systems for tracking developmental milestones.

Direct use of AI by children has been shown to enhance cognitive and social skills, attention, and creativity. AI tools used by educators and parents improve lesson planning and enable better monitoring of each child's progress. Indirect



applications of AI help researchers and policymakers analyze data and develop programs to improve early childhood education.

However, challenges were identified, including a lack of teacher training in AI, limited age-appropriate programs, and the need to ensure data privacy and security. Overall, AI provides new opportunities for personalized learning and fosters the development of essential skills in young children.

Conclusion

The findings of this study suggest that AI tools, such as conversational agents and social robots, hold significant potential in fostering dynamic and interactive learning environments that enhance language acquisition, emotional development, and cognitive growth in preschool children. These insights offer valuable implications for both educational practice and policy-making in early childhood education. Despite these contributions, it is important to acknowledge certain limitations of this systematic review. The relatively small number of studies included may have resulted in gaps in the findings, potentially due to the specific search criteria and strategies employed. Future research should consider expanding the screening criteria to include a broader range of studies, thereby capturing a more comprehensive picture of AI applications in early childhood education.

REFERENCES

1. Su J, Ng DTK, Chu SKW. Artificial intelligence (AI) literacy in early childhood education: The challenges and opportunities. *Computers and Education: Artificial Intelligence*. 2023;4:100124. DOI: 10.1016/j.caeai.2023.100124
2. Kandlhofer M, Steinbauer G, Hirschmugl-Gaisch S. Artificial intelligence and computer science in education: From kindergarten to university. In: 2016 IEEE Frontiers in Education Conference (FIE). Erie, PA, USA: IEEE; 2016. pp. 1-9
3. Williams R. PopBots: Leveraging social robots to aid preschool children's artificial intelligence education [thesis]. USA: Massachusetts Institute of Technology; 2018



4. Jin L. Investigation on potential application of artificial intelligence in preschool children's education. *Journal of Physics Conference Series*. 2019;1288(1):012072. DOI: 10.1088/1742-6596/1288/1/012072
5. Fomichov VA, Fomichova OS. The artificial intelligence theory and highly effective methods of teaching young children's foreign languages. *Cybernetica*. 1995;38(4):321-344
6. Zhang P, Kamel Boulos MN. Generative AI in medicine and healthcare: promises, opportunities and challenges. *Future Internet*. 2023; 15: 286. doi: 10.3390/fi15090286. [DOI] [Google Scholar]
7. Bhutoria A. Personalized education and artificial intelligence in the United States, China, and India: a systematic review using a Human-In-The-Loop model. *Computers and Education: Artificial Intelligence*. 2022; 3: 100068. doi: 10.1016/j.caeai.2022.100068. [DOI] [Google Scholar]
8. Su J, Yang W. Unlocking the power of ChatGPT: a framework for applying generative AI in education. *ECNU Review of Education*. 2023; 6: 355–66. doi: 10.1177/20965311231168423. [DOI] [Google Scholar]
9. Akdeniz M, Özdiñç F. Maya: an artificial intelligence based smart toy for pre-school children. *Int J Child Comput Interact*. 2021; 29: 100347. doi: 10.1016/j.ijcci.2021.100347. [DOI] [Google Scholar]
6. Haenlein M, Kaplan A. A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence. *Calif Manage Rev*. 2019; 61:5–14. doi: 10.1177/0008125619864925. [DOI] [Google Scholar]
11. Vaswani A, Shazeer N, Parmar N, et al. Attention is all you need. *Adv Neural Inf Process Syst*. 2017;30 [Google Scholar]
12. Wu T, He S, Liu J, et al. A brief overview of ChatGPT: the history, status quo and potential future development. *IEEE/CAA J Autom Sinica*. 2023; 10: 1122–36. doi: 10.1109/JAS.2023.123618. [DOI] [Google Scholar]
13. Bharadiya J. Machine learning and AI in business intelligence: trends and opportunities. *IJC*. 2023: IJC:123–34. [Google Scholar]



14. Briganti G, Le Moine O. Artificial intelligence in medicine: today and tomorrow. *Front Med (Lausanne)* 2020;7 doi: 10.3389/fmed.2020.00027. [DOI] [PMC free article] [PubMed] [Google Scholar]
15. <https://www.cdicollege.ca/news/use-of-ai-in-early-childhood-education/#gsc.tab=0>
16. <https://pmc.ncbi.nlm.nih.gov/articles/PMC12587935/>
17. <https://www.sciencedirect.com/science/article/pii/S2666920X23000036>