



THE IMPACT OF ARTIFICIAL INTELLIGENCE IN IMPROVING NUMBER AND LETTER LITERACY IN EARLY CHILDHOOD

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Abstrak

Kemampuan membaca dan menulis sangat penting bagi anak usia dini. Kedua kemampuan ini membantu anak dalam keberhasilan belajar di jenjang pendidikan selanjutnya. Di sisi lain, perkembangan berbagai aplikasi kecerdasan buatan dalam pembelajaran angka dan huruf dapat dimanfaatkan oleh guru untuk meningkatkan kedua keterampilan tersebut. Penelitian ini bertujuan untuk menganalisis dampak kecerdasan buatan dalam mengembangkan literasi huruf dan angka pada anak usia dini. Penelitian ini menggunakan pendekatan studi literatur yang bersumber dari artikel-artikel yang telah dipublikasikan pada jurnal internasional bereputasi yang mengkaji hubungan penggunaan aplikasi dalam mengembangkan literasi angka dan huruf pada anak usia dini. Hasil penelitian menunjukkan bahwa berbagai aplikasi kecerdasan buatan telah digunakan untuk meningkatkan literasi angka dan huruf pada anak usia dini. Namun, penggunaan yang tepat perlu dipelajari di masa depan.

Kata Kunci: *Kecerdasan buatan, Kemampuan membaca, Kemampuan menulis, Anak usia dini*

Abstract

Number and letter literacy skills are very important for early childhood. These two skills help children in successful learning at the next level of education. On the other hand, the development of various artificial intelligence applications in learning numbers and letters can be utilized by teachers to improve both skills. This research aims to analyze the impact of artificial intelligence in developing letter and number literacy in early childhood. This research uses a literature review approach sourced from articles that have been published in reputable international journals that examine the relationship between the use of applications in developing literacy of numbers and letters in early childhood. The results show that various artificial intelligence applications have been used to improve number and letter literacy in early childhood. However, the appropriate use needs to be studied in the future.

Keywords : *Artificial intelligence, Reading skills, Writing skills, Early childhood*

A. Introduction

Montessori stated that children learn letters and numbers using their ability to absorb information around them, much like a tissue absorbs water (Montessori, 1949). If it is related to artificial intelligence which is used in providing media that is very easy for children to absorb in learning, then there are at least 3 (three) advantages of artificial intelligence in helping children master the ability to recognize letters and numbers, namely: 1) Artificial intelligence can be used to create applications or games that can help children learn letters and numbers in a fun and interesting way. For example, applications that can help children recognize letters with sounds, images or videos. 2) Artificial intelligence can also provide timely and accurate feedback to children as they learn letters and numbers. This feedback can help children to understand what they are doing correctly and what they need to improve, and 3) teachers or parents can use it to observe and track the child's progress in learning letters and numbers.

On the other hand, Piaget believed that the best way to learn for children is learning through play (Piaget, 1969). This is because children learn better when they are active and involved in interesting activities. Artificial intelligence has provided various interesting games or games for recognizing letters and numbers in early childhood and providing developmentally appropriate learning experiences. For example, games can help children practice basic math skills, such as addition, subtraction and multiplication. These games can be designed in a way that is interesting and fun for children. Meanwhile, Vygotsky believes that children learn by collaborating with other people who are more capable, be they adults, peers, or even technological devices (Vygotsky, 2017). In the context of learning to recognize letters and numbers, artificial intelligence can be a valuable learning partner for young children. Learning partners are fun, interesting, and interactive.

Artificial intelligence tools can benefit preschool or playgroup children in several ways (Kewalramani et al., 2021). Following here are some examples of AI tools that can improve number and letter literacy: 1) PlayKids, this application uses AI technology to help children learn about basic concepts, such as numbers, letters, and vocabulary, 2) Little Writer – Tracing Letters, this application uses AI technology to help children learn to write letters and numbers in a fun way and interactive, 3) ABC Kids –Tracing & Phonic, this application uses (Kewalramani et al., 2021)AI technology to helps children learn letters, numbers and basic vocabulary through interactive games (Zebua et al., 2023, hal. 64–65)

However, the various benefits that artificial intelligence has in helping children learn letters and numbers, of course not all of them provide positive benefits. For example, game addiction, exposure to content that is not suitable for children, and disrupting children's eye health (Sit et al., 2023). Educating early childhood children in the digital era, or in the era of AI technology, is a process of mentoring and dialogue in building emotional bonds (bonding) by providing training that includes teachings, demands, and knowledge about children's morals and morals, by using AI for everyday life and carried out from an early age (Vartiainen et al., 2020). Therefore, when using artificial intelligence as a medium to improve children's ability to recognize numbers and letters, teachers and parents are advised to choose suitable media, limit the time of use, and control the results. This article aims to explore articles that have provided information about the methods and success of using artificial intelligence in improving the ability to recognize numbers and letters in early childhood, considering that this information is still not presented in various existing studies..

B. Research methods

The systematic literature review method was chosen as the research method, because this method is considered suitable for providing an assessment of what has been published on the topic of using artificial intelligence in improving the ability to recognize numbers and letters in Early childhood today uses detailed standards (Petticrew & Robert, 2006). The standards used in this research start from the formulation of research questions, inclusion criteria in making exceptions to articles reviewed, and searching for articles based on a reliable database until the analysis carried out is objective and accountable. The rigorous and reliable standards of systematic literature reviews enable researchers to understand the depth, breadth and quality of research on a particular topic, even if it is not exhaustive. The results of research using a systematic literature review can provide valuable contributions, including being the basis for policy formulation.

Inclusion criteria were established and used to organize the various articles that should be found in the research. The inclusion criteria are: 1) Intervention studies using quasi-experiments; 2) Studies written in English; and 3) published in a reputable international journal. The sources used are the Google Scholar online database and international journals indexed by Scopus. The keywords used are artificial intelligence methods, the ability to recognize numbers and letters, and early childhood. Search results in online databases found more than 28 articles. All abstracts of the articles were read and 10 were selected to read full text. After

reading it in its entirety, it was found that there were 4 manuscripts that met all the inclusion criteria that had been set. The process of determining which articles to use as research sources is illustrated in the following section:

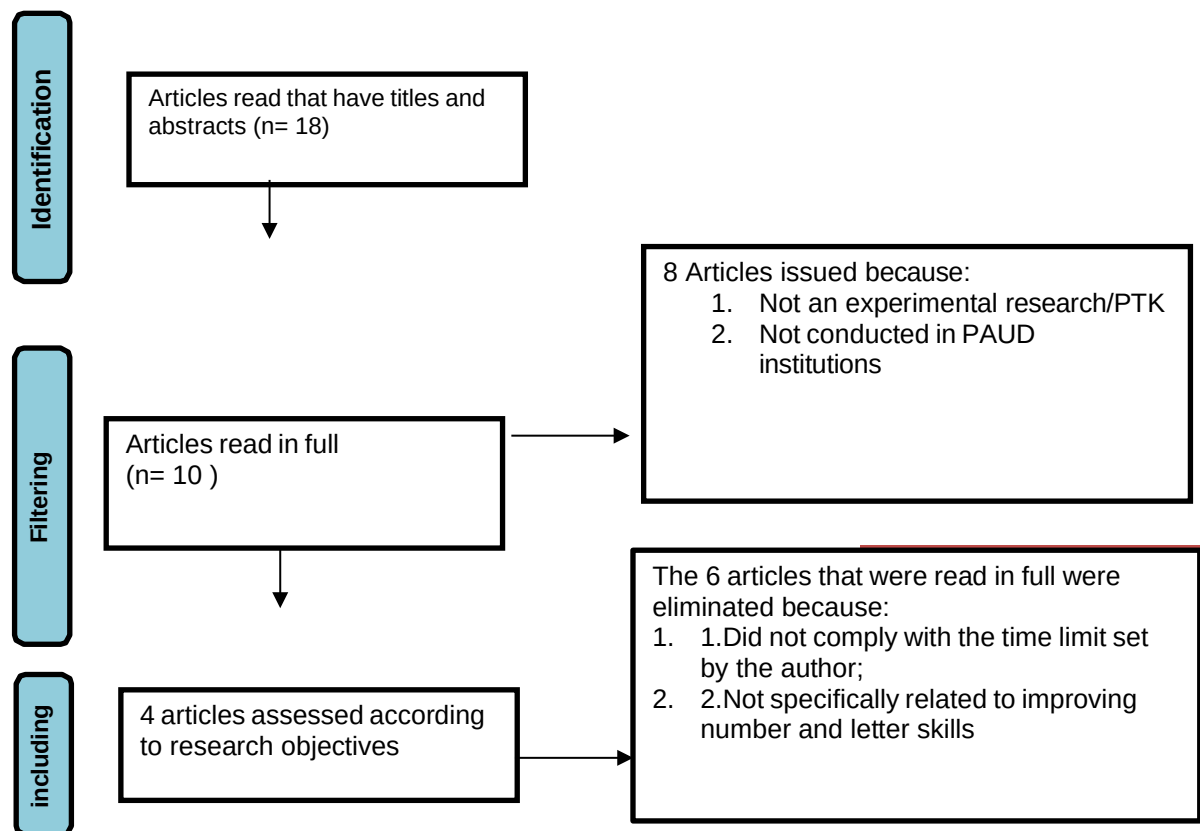


Figure 1: Research Identification Process Chart

The data analysis used was narrative synthesis analysis which was carried out in three stages, namely extraction and coding, code tabulation (findings), and code analysis within and/or all articles included in the research (Petticrew & Robert, 2006). Extraction and coding are based on five research elements, namely, research subjects, interventions/actions, comparisons, research results in the form of the ability to recognize numbers and letters in early childhood, and arrangements for obtaining important materials in analysis and synthesis (Petticrew & Robert, 2006). The results of data extraction are presented in a matrix that helps researchers to check the findings and ensure whether the available data has led the researcher to conclusions.

C. Research Results and Discussion

1. Result

Four studies after complete reading of the articles met the inclusion criteria. Of these, all were experimental research. Research was conducted in various countries around the world and published in reputable international journals. The selected research was conducted in the last seven years (2018-2024). The total research subjects were four articles. Details can be seen in the following table:

Table 1 Recapitulation of Articles Assessed

N o.	Writer's name/ Publication Year	Article title/Journal title/Data base	Research Methods and Results
1.	Neumann, M.M. (2018)	“Using tablets and apps to enhance emergent literacy skills in young children,” Early Childhood Research Quarterly, 42, p. 239–246. http://dx.doi.org/10.1016/j.ecresq.2017.10.006 www.scopus.com	Experimental method Results: Using the iPad has been able to improve children’s ability to recognize, name sounds and write letters.
2.	Papadakis, S., Kalogiannakis, M. and Zaranis, N. (2018)	“The effectiveness of computer and tablet assisted intervention in early childhood students’ understanding of numbers. An empirical study conducted in Greece,” Education and Information Technologies, 23(5), p. 1849–1871. https://doi.org/10.1007/s10639-018-9693-7 www.scopus.com	Experimental method Results: Tablet games combined with the use of developmentally appropriate software can make a major contribution to number understanding in young children
3.	Lee, H.K. and Choi, A. (2020)	“Enhancing early numeracy skills with a tablet-based math game intervention: a study in Tanzania,” Educational Technology Research and Development, 68(6), p. 3567–3585. https://doi.org/10.1007/s11423-020-09808-y www.scopus.com	Experimental method Results: Tablet-based math games can improve children's early numeracy skills in Tanzania
4.	Liu, W., Pulie, N., Tan, L., Liu, X., & Zhang, X. (2023).	The Effect of Tablet App with Different Learning Content on Preschoolers' Implicit Memory Development: Numbers and Literacy. <i>International Journal of Human-Computer Interaction</i> , 1–17. https://doi.org/10.1080/10447318.2022.2154889 www.scopus.com	Experimental method Results: Tablet application-based teaching can improve children's ability to remember numbers and letters simultaneously

The results of this research show that internationally, artificial intelligence with various applications has been used to introduce numbers and letters to young

children and has shown satisfactory results. Therefore, the ability of teachers and parents to use this new technology needs to be further improved.

2. Discussion

The 21st century is an industrial century supported by increasingly sophisticated information technology. This progress requires the support of a reading and writing culture, namely the realization of inclusive behavior abilities, habits and needs for reading and writing (Crescenzi-Lanna, 2023). Increased innovation Technology in the field of education is really needed. This is useful for support the learning process in this era is a form of improving the quality of education so that quality human resources can be formed that can later compete in a global world. For this reason, apart from advanced educational technology, it needs to be balanced also with creative teachers so they can utilize internal technology supports the learning process (F. Liu & Kromer, 2020).

The process of learning to read and write is one of the most important tasks in childhood. The ability to read and write are basic skills needed for success in education and life. However, the process of learning to read and write can sometimes be difficult for children, especially for children who have learning disorders or learning difficulties. Artificial intelligence (AI) has become a rapidly growing research field in recent years. AI has the potential to be used in various fields, including education. AI can be used to develop various devices and applications that can help children learn to read and write (Vartiainen et al., 2020).

AI can help children recognize numbers and letters in various ways. One way AI can help is by providing a variety of interactive and interesting learning resources. Interactive learning resources can help children learn in a fun and meaningful way. Apart from this, AI can also be used to provide appropriate feedback to children. Proper feedback can help children understand their mistakes and correct them. AI can also be used to track children's progress and adjust their learning according to needs (Lee & Choi, 2020; W. Liu et al., 2023; Neumann & Neumann, 2017; Papadakis et al., 2018).

For example, game apps can be used to help children learn numbers and letters in a fun way. Game apps can be designed to teach children about various mathematical and alphabet concepts. Apart from that, currently various learning applications can be used to provide lessons about numbers and letters

interactively (F. Liu & Kromer, 2020). Learning applications can be designed to adapt learning to each child's needs (Crescenzi-Lanna, 2023). Even artificial intelligence has provided assessment software that can be used to assess children's ability to recognize numbers and letters. Assessment software can provide proper feedback to children to help them correct their mistakes.

The four studies above have shown the effectiveness of AI in helping children recognize numbers and letters. A study shows that the reason why artificial intelligence is more effective is because children are more motivated to learn with this technology (Sella et al., 2021). They are also more confident in using artificial intelligence in learning numbers and letters. Early childhood educators in Indonesia have also used artificial intelligence in learning numbers and letters, but the results of this treatment have not been published internationally.

D. Conclusion

Artificial intelligence has strong potential to be an effective tool for helping children recognize numbers and letters. Artificial intelligence can be used to provide a variety of interactive learning resources, provide appropriate feedback, and track children's progress. At least the four studies above have shown that AI can improve children's ability to recognize numbers and letters. Early childhood children learn to correct their learning mistakes because they have high self-confidence and motivation to learn with this new technology.

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