Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

DIGITAL-BASED LEARNING IN EARLY CHILDHOOD EDUCATION: IMPLICATIONS FOR PRESCHOOL READING SKILL DEVELOPMENT

Siti Aisah Jamel[1]
Azizah Zain [2*]

[1]Faculty of Human Development, Universiti Pendidikan Sultan Idris, Malaysia
(E-mail: aisahjamels@gmail.com)
[2]Faculty of Human Development, Universiti Pendidikan Sultan Idris, Malaysia
(E-mail: azizah.zain@fpm.upsi.edu.my)
*Corresponding author: azizah.zain@fpm.upsi.edu.my

Article history
Received date : 24-2-2026
Revised date : 25-2-2026
Accepted date : 6-4-2026
Published date : 7-4-2026

To cite this document:
Jamel, S. A., & Zain, A. (2026). Digital-based learning in early childhood education: Implications for preschool reading skill development. *Journal of Islamic, Social, Economics and Development (JISED),* 11 (81), 499 – 505.

Abstract: *This study is a systematic review that synthesized previously published literature to determine the implications of digital-based learning on preschool children for reading development. Digital technologies have been rapidly integrated into early learning environments, changing preschool education practices. Digital media learning tools are commonly used to promote emergent literacy, but the evidence regarding their efficacy is mixed. But ongoing debates continue over screen time, developmentally appropriate use, the wide variation in quality of digital tools, and the role of adults as mediators. In highlighting these challenges, a synthesis that provides balance and clarity on the current state of understanding is necessary to inform evidence-informed practice. Methods user a narrative review approach Utilizing Scopus, Web of Science, ERIC and Google Scholar, major electronic databases, to identify relevant literature. Research papers types are peer-reviewed empirical studies, reviews and theoretical papers in English and publication between 2010–2024 to ensure comprehensive coverage, we also reviewed reference lists from key articles. A thorough literature review was conducted, followed by thematic synthesis methods to uncover patterns, trends, and gaps. According to the review result, digital-based learning can provide developmentally appropriate support for some foundational reading skills especially phonological awareness, letter recognition, and vocabulary when tools are developmentally appropriate and supplemental to traditional instruction. Teacher guidance and parental involvement are strong determinants of outcomes. Nonetheless, evidence is heterogeneous and methodological shortcomings remain frequent. This review represents a sophisticated contribution to the understanding of the potential benefits of digital–assisted preschool reading development and highlights the necessity for careful research and structured deployment.*

Keywords: *Digital-based learning; early childhood education; preschool; emergent literacy; reading skills*

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

Introduction

Development of early reading skills are a cornerstone of children cognitive, linguistic, and academic skills, laying down the ground work for educational achievement well into their adult lives and lifelong learning (Brown, 2014). Digital-based learning has become one of the most significant characteristics of early childhood education over the last few years, which is strongly influenced by the rapid growth of technology and the greater number of very young children access digital devices (Muharmi, 2022). Digital-based learning can be described as learning undertaken with the assistance of or a part of completely digital tools (like tablets, learning applications, e-books and interactive multimedia). Emergent literacy skills such as phonological awareness, letter knowledge, vocabulary, and early comprehension are common skills that preschool reading skill models encompass, which indicates the need for further discussion about what preschool reading skill models consist of (Aisyah & Wibowo, 2025; Hare et al., 2024).

Emerging research indicates that, when intentionally designed, digital learning experiences may offer multimodal input, responsive feedback, and child-initiated, interactive activities conducive to early literacy development (Klass et al., 2024; Martens et al., 2023). But important findings also point in conflicting directions, leaving ongoing discussions of screen time, developmental appropriateness, digital content quality, and the role of adult mediation. Although some studies suggest positive results on motivation in general and specific reading skills, others note mixed results and methodological limitations, revealing clear gaps in the literature (Yang et al. 2020).

This narrative review synthesizes current research regarding digital-based learning in early childhood education and developmental outcomes of preschool reading skills. It focuses on types of digital tools, types of reading skills addressed, contextual parameters for example teacher and parent involvement as well as reported opportunities and challenges. As educators and policymakers become increasingly interested in how digital technologies can be incorporated in early learning environments, this timely, important balanced synthesis fills the gap in the literature and provides a call to action for new research and practice development as well.

Method

A narrative review was conducted to bring together existing evidence surrounding digital-based learning in preschool and the development of preschool reading skills. This process was structured but flexible to allow transparency while preserving the interpretative aspect of a narrative overview.

Sources of Information

A literature search was conducted using several electronic databases to encompass a wide and cross-disciplinary scope of studies. The main databases searched were Scopus, Web of Science, ERIC, and Google Scholar because they index peer-reviewed studies in the areas of education, psychology, and child development. To achieve a thorough search, the reference lists of important papers and relevant reviews were manually scanned to identify further studies that may not have been obtained through database searches.

Search Terms and Delimiting

Search terms generated from main concepts in digital learning, early childhood education, and reading development. Among the used keywords and Boolean combinations were: "digital-

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

based learning", "digital learning", "educational technology", "early childhood education", "preschool", "emergent literacy", "early reading skills", "phonological awareness", and "vocabulary development". To target the most recent applications of digital technology, searches were confined to studies in English from 2010 to 2024. We filtered the search to retrieve peer-review journal articles & empirical studies; however, the most relevant theoretical & review papers were also be included.

Selection Criteria Employed

Inclusion criteria were studies on children aged 3 to 6 years, who used digital or technology-supported learning interventions, and reported outcomes in reading, or emergent literacy skills. Quantitatively and qualitatively, study designs were approached. Studies were further excluded if conducted with older age groups, implicated digital learning rather than examining literacy learning, and did not have enough relevance for preschoolers. This helped us to achieve not overly broad inclusion at the same time as representing enough of the relevant evidence.

Result and Discussion

Synthesis Analysis

Definition and Conceptualization of Digital-Based Learning in Early Childhood

Early childhood education with digital-based learning is generically defined as intentional use of digital technologies that is, such as tablet, touchscreen devices, educational apps, e-books, and interactive multimedia to support teaching-learning processes in the early years with young children (Behnamnia et al., 2020). These tools, in the preschool setting, are usually intended to promote emergent literacy, defined as the skills necessary for reading that are connected to decoding skills, including phonological awareness, print knowledge, vocabulary, and early comprehension (Lonigan et al., 2000; Lonigan et al., 2011). Previous literature indicates digital-based learning cannot be equated with passively staring at a screen, but rather, the educational merit is dependent on design purpose, interactivity, and developmental recommendations. Nonetheless, definitions vary between studies, some being more narrowly defined as app-based interventions while others take a wider conceptualization encompassing blended digital–traditional learning environments. The absence of this conceptual inconsistency makes it difficult to compare studies and highlights the necessity for clearer operational definitions in future variants of this analysis.

Types of Digital-Based Learning Tools for Preschool Literacy

Data allows us to identify different types of digital tools that support reading development for preschoolers, which include phonics-based apps, interactive storybooks, literacy games and multimedia programs that are audio, visual and tactile. For instance, interactive e-books facilitate vocabulary learning and story comprehension via animations, narration and story-understanding prompts. Phonics and letter-sound apps focus on literal skills (such as alphabet knowledge and phonological awareness) but support little in terms of variation or immediate feedback. Although much research provides evidence for successful application of these tools, results vary. Other researchers contend that too much interactivity can distract children from essential literacy content, especially if animations and games are poorly aligned with the learning goals. This seemingly indicates that effectiveness is less about the technology per se and more about the quality of the tools and pedagogical design (Tatminingsih, 2022).

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

Effect on Particular Preschool Literacy Domains

A range of differential effects of digital-based learning on different components of early reading development can be noted across the literature. There is stronger evidence of impacts for phonological awareness, letter recognition, and vocabulary, especially when digital technologies are used as an adjunct to traditional methods of instruction. Research on vocabulary acquisition commonly documents benefits of multimodal input, where children can hear, see, and experience new words at the same time. A lesser body of evidence, which is often mixed, points toward higher-order skills, including narrative comprehension and analytic or inferential thinking. On the one hand, some argue that digital platforms risk simplifying reading experiences, while, on the other hand, it has been suggested that guided digital storytelling with adult scaffolding may support comprehension. Such inconsistencies suggest that not every facet of reading can benefit from a digital-based approach (Dong et al., 2020; Lehrl, 2020).

Role of Teacher and Parental Mediation

Cynics, in particular, point to the role of adult mediation or lack of it in the digital-based learning being ultimately beneficial. Several studies in the preschool context have related more important learning with the use of digital tools when the use is guided by the teacher than with unguided use or mere independent use. In a similar fashion, engagement by parents in home-based digital reading practices by asking questions or providing vocabulary support, or facilitating connections between digital content and experiences in the real world has been linked to greater literacy gains. Contrarily, those that yield neutral or negative results often have less adult involvement. These findings highlight that discovery-based learning in digital form must be treated as an instructional supplement rather than a replacement for human interaction in the context of socio-constructivist theories of early literacy development (Steinfeld, 2021; Ren & Zhu, 2022).

Advantages and Potential Benefits

Although there are multiple benefits to reading development in preschool children, digital-based learning has numerous advantages as outlined by the literature. Digital tools can help create more opportunities for learner engagement, personalized pacing and real-time feedback, which are all critical for scaling diverse learners. Children with developing language abilities or learning disabilities may also be included through features like audio and visual prompts. Digital platforms, then, offer opportunities for teachers to monitor progress and personalizing tasks for particular skill needs in an instructional sense similarly. With these benefits, digital-based learning stands as a potentially powerful addition to early literacy instruction, but only when done with purpose and in the right context.

Challenges, Limitations, and Ongoing Controversies

While the research seems promising, many significant problems exist. Constant screen time, unequal access to quality digital resources, and inconsistency in professional development for educators are commonly referenced barriers. Furthermore, methodical limitations (small sample size, short periods of intervention, and heterogeneous outcomes) limits the generalization of the findings. Moreover, there are ongoing disagreements about whether some digital practices are appropriate for preschool-age children. These open issues indicate the need for more stringent, longitudinal, and theory-driven research.

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

Practice, Policy and Future Research Implications

Taken together, these studies provide some evidence that digital-based learning can contribute to preschool reading skills when they are thoughtfully incorporated into early childhood education. Evidence-based digital tools; professional development of teachers; and guidelines for balanced, mediated use should inform educators and policymakers. Future research needs to establish a common set of definitions, measure results long after an intervention, and seek the interaction effects between digital learning and both social and instructional contexts. These initiatives are key to making sure that technology-enhanced learning is supporting early literacy development as a core part of literacy education rather than an extension of trendiness in technology.

Limitations

Key limitations of this narrative review must be noted as limitations in the interpretation of the findings. First, the study is a narrative (non-systematic) review, therefore although the literature selection process was pathway based and transparent, it was not rigorously reproducible. Nonetheless, while several databases were searched and reference lists appraised, we cannot fully exclude the possibility that relevant studies were inadvertently missed. A narrative synthesis approach will bring with it a certain level of selection bias.

Second, the variation in the current evidence base is a notable drawback. The studies investigating digital-based learning in preschool differ considerably in terms of study design, sample size, intervention period, outcome measures, and the definitions of the terms digital-based learning and reading skills. However, because rates can vary widely from study to study making direct comparisons difficult and may not reflect real-world clinical practice it is difficult to reach strong conclusions about effectiveness. Most studies utilize short waves of exposure and short-term results, which may limit understanding of long-term reading development.

Third, the strength of synthesized conclusions is diminished by methodological blunders in reviewed studies. Frequent problems involve small samples, absence of control groups, self-designed assessments, and limited information on fidelity of implementation. Another limitation may be a publication bias, since studies with positive effects of digital tools are more likely to be published compared to null/negative findings.

Fourth, due to the nature of narrative synthesis, this review may be biased in interpretation; the authors used their judgment to identify themes, interpret and weigh evidence, and trends. Balanced approaches and conflicting findings about some related topics were, however, attempted, so area-based objectivity cannot be fully guaranteed.

Additional studies that incorporate stronger experimental designs, consistent outcome measures, and longitudinal designs that assess maintenance of literacy outcomes would strengthen the literature. There was also a lack of clear definitions of digital-based learning constructs and contextual factors like teacher training and parental involvement that can help to contextualize findings, but which will also serve to strengthen and enhance the evidence base and the robustness of narrative and systematic reviews in the future.

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

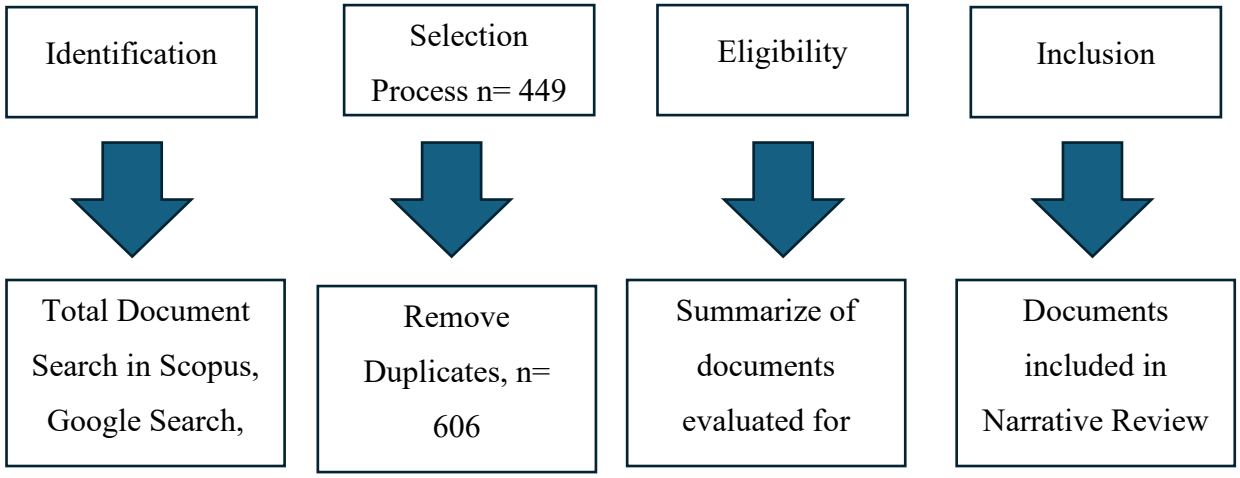

Figure 1. PRISMA-based Flow Diagram of Document Selection Process for Narrative Review

Eight unique search strategies were used to capture a broad range of perspectives on digital interventions in early childhood literacy.

Conclusion

The aim of this narrative review was to examine the role of digital-based learning in early childhood education, especially its impact on preschool reading skills while considering the educational context. Based on a large body of literature, the review shows that digital-based learning can benefit some early reading skills especially phonological awareness, letter knowledge, and vocabulary when digital enhancements are developmentally appropriate, pedagogically effective, and used as supplements to traditional classroom instruction. The synthesis reveals that learning outcomes are best predicted by contextual factors, mostly teacher guidance and parental mediation, reiterating that technology does not bring about literacy development by itself. Findings directly respond to the research goals of the study simplifying how and with what conditions digital education works to support early reading development as well as gaps in the literature on mixed results and conceptual vagueness that were present prior to this work. Simultaneously, the review highlights persistent gaps such as differences in tool quality, methodological problems in studies, and lack of evidence for long-term effects on reading. Available evidence is limited in scope and methodological rigor, and further research with longitudinal, methodologically sound designs, standardized definitions/outcomes, and attention to the simultaneous effects of digital tools, instruction, and social learning environment, is needed to begin to build a robust evidence base that can be used to advance the field. Lastly, we need evidence-informed guidelines and professional development opportunities to accommodate educators and policymakers to pursue digital-based learning successfully when meaningful support for preschool literacy development occurs.

Acknowledgements

Contributors who do not meet the criteria for authorship should be listed here to acknowledge their efforts and support, and consent must be taken from these people for their name to appear (technical assistants, writing assistants or head of department who provided only general support). Financial support should be disclosed and acknowledged.

Volume: 11 Issues: 81 [March, 2026] pp. 499 – 505
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118139

References

Aisyah, R. A., & Wibowo, S. E. (2025). Efforts to improve early reading skills and learning motivation through digital flipbook media. *Jurnal Prima Edukasia, 13*(2), 350–360.

Behnamnia, N., Kamsin, A., Ismail, M. A. B., & Hayati, A. (2020). The effective components of creativity in digital game-based learning among young children: A case study. *Children and Youth Services Review, 116*, 105227.

Brown, C. S. (2014). Language and literacy development in the early years: Foundational skills that support emergent readers. *Language and Literacy Spectrum, 24*, 35–49.

Budiarti, E., & Darmayanti, R. (2018). Is implementing digital learning media beneficial in stimulating early childhood literacy skills? *Jurnal Caksana: Pendidikan Anak Usia Dini, 1*(2), 188–201.

Committee on Early Childhood, Adoption, and Dependent Care, Klass, P., Mendelsohn, A. L., & Hutton, J. S. (2024). Literacy promotion: An essential component of primary care pediatric practice: Technical report. *Pediatrics, 154*(6), e2024069091.

Dong, Y., Wu, S. X. Y., Dong, W. Y., & Tang, Y. (2020). The effects of home literacy environment on children's reading comprehension development: A meta-analysis. *Educational Sciences: Theory and Practice, 20*(2), 63–82.

Hare, C., Johnson, B., Vlahiotis, M., Panda, E. J., Tekok-Kilic, A., & Curtin, S. (2024). Children's reading outcomes in digital and print mediums: A systematic review. *Journal of Research in Reading, 47*(3), 309–329.

Kavak, Ş. (2022). Digital game-based learning model as an educational approach. *Prizren Social Science Journal, 6*(2), 62–70.

Lehrl, S., Ebert, S., Blaurock, S., Rossbach, H. G., & Weinert, S. (2020). Long-term and domain-specific relations between the early years home learning environment and students' academic outcomes in secondary school. *School Effectiveness and School Improvement, 31*(1), 102–124.

Li, X., Zhang, X., Zhao, Y., Zhang, L., & Shang, J. (2023). Exploring the role of learning through play in promoting multimodal learning among children: A pilot study in Chinese first-tier cities. *Frontiers in Psychology, 14*, 1103311.

Lonigan, C. J., Burgess, S. R., & Anthony, J. L. (2000). Development of emergent literacy and early reading skills in preschool children: Evidence from a latent-variable longitudinal study. *Developmental Psychology, 36*(5), 596–613.

Lonigan, C. J., Farver, J. M., Phillips, B. M., & Clancy-Menchetti, J. (2011). Promoting the development of preschool children's emergent literacy skills: A randomized evaluation of a literacy-focused curriculum and two professional development models. *Reading and Writing, 24*(3), 305–337.

Martens, M., Rinnert, G. C., & Andersen, C. (2018). Child-centered design: Developing an inclusive letter writing app. *Frontiers in Psychology, 9*, 2277.

Muharmi, T. (2022). Constraints of virtually using digital-based learning media for early childhood education teachers. *International Journal Reglement & Society (IJRS), 3*(2), 154–158.

Ren, W., & Zhu, X. (2022). Parental mediation and adolescents' internet use: The moderating role of parenting style. *Journal of Youth and Adolescence, 51*(8), 1483–1496.

Steinfeld, N. (2021). Parental mediation of adolescent internet use: Combining strategies to promote awareness, autonomy and self-regulation in preparing youth for life on the web. *Education and Information Technologies, 26*(2), 1897–1920.

Tatminingsih, S. (2022). Implementation of digital literacy in Indonesia early childhood education. *International Journal of Emerging Issues in Early Childhood Education, 4*(1), 12–22.