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Implementing and Addressing Challenges of LIMASTERS Integration in Early Childhood Education: A Case Study

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Abstract

Purpose – This study aims to explore the implementation and challenges of integrating LIMASTERS (Literacy, Mathematics, Science, Technology, Engineering, and Arts) in early childhood education within the School Mover Program in Jambi City. The research responds to the growing demand for 21st-century learning integration at the preschool level and examines how practices align with the principles of the Independent Curriculum.
Design/methods/approach – A qualitative case study design was applied. Data were collected through classroom observations, in-depth interviews with teachers and the principal, and document analysis of lesson plans and children's work. Data were analyzed thematically using the Miles and Huberman model of data reduction, display, and conclusion drawing.
Findings – The study shows that literacy, mathematics, and arts are consistently integrated into daily learning, while science, technology, and engineering remain less developed. Teachers conduct initial assessments to align activities with children's needs and interests. Key challenges include limited facilities, insufficient time, and teacher competencies. These are partly mitigated through peer collaboration, self-initiated training, and phased implementation.
Research implications/limitations – The findings are context-specific and do not address long-term child development outcomes. Nonetheless, they provide valuable insights for designing integrative curricula and teacher training policies in Indonesian ECE (Early Childhood Education).
Practical implications – The study offers a practical model for LIMASTERS integration through child-centered exploratory activities that emphasize interactive experiments, scaffolding, and contextualized learning.
Originality/value – This research contributes a holistic framework for balancing literacy and STEAM within early childhood classrooms in a local Indonesian context, highlighting the potential of exploratory and contextual learning to advance curriculum reform.

Keywords Early childhood education, LIMASTERS, Integrative learning, School mover program, Contextual curriculum, Teacher capacity

Paper type Case study

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1. Introduction

Early Childhood Education (ECE) serves as the primary foundation for shaping the quality of future human resources. The early years are often referred to as the *golden age* because rapid brain and character development during this stage strongly determines children's later academic success and social adjustment (Mustari, 2015; Papalia et al., 2011). Neuroscience studies highlight that educational interventions in early childhood have long-term effects on achievement, health, and social behavior (Shonkoff, 2017). Economists have also shown that investments in early education yield significant social and economic returns (Heckman, 2011). Therefore, ensuring the quality of learning at this crucial stage is a key priority in global and national educational agendas (UNESCO, 2020).

In the context of globalization and the Fourth Industrial Revolution, education is challenged to cultivate 21st-century competencies, including critical thinking, creativity, collaboration, communication, and digital literacy (Trilling & Fadel, 2009; Voogt & Roblin, 2012). These skills are not only essential at advanced educational levels but should also be nurtured from early childhood to build adaptive learners. A report by UNESCO emphasizes the need for holistic learning that equips learners with life skills beyond academic knowledge (UNESCO, 2020). Similarly, a World Economic Forum report points to a global shift in skill requirements, highlighting problem-solving, creativity, and technological literacy. In Indonesia, these competencies are increasingly urgent as young learners must be prepared to thrive in a digital society (Wahyuni, 2020).

To respond to these challenges, cross-disciplinary learning approaches have gained strategic importance. STEM/STEAM education, which integrates science, technology, engineering, the arts, and mathematics, provides holistic and engaging experiences for children (Bybee, 2010; Yakman, 2008). In Indonesia, this framework has been adapted into LIMASTERS—literacy, mathematics, science, technology, engineering, and art—tailored to early childhood education (Yulianti & Handayani, 2021). Research shows that such integrative approaches foster creativity, motivation, and problem-solving abilities in young learners (Kim et al., 2019). The inclusion of coding and computational thinking in early childhood through play-based learning environments has also been emphasized (Bers, 2021). These findings suggest that integration across domains is not only a pedagogical trend but an educational necessity.

The Indonesian government has addressed these challenges through the Independent Curriculum (*Kurikulum Merdeka*), first implemented in 2021. This curriculum provides flexibility for schools to design contextual, project-based, and integrative learning (Kemendikbudristek, 2022). At the early childhood level, the School Mover (*Sekolah Penggerak*) program functions as a pilot for curriculum innovation and integrative practices. Studies report that the implementation of this curriculum fosters enjoyable, participatory, and exploratory learning environments (Lisnawati et al., 2024; Sriandila et al., 2023). Further evidence shows that teacher innovation and collaboration with parents are crucial for successful curriculum implementation (Agustina et al., 2024; Jalil, 2025). These policy initiatives thus open up opportunities for advancing LIMASTERS integration in Indonesian ECE.

Despite its promising potential, the implementation of the Independent Curriculum in ECE still faces substantial challenges. Many teachers struggle to understand cross-disciplinary integration and require additional training to design effective learning modules (Mastikawati et al., 2024; Nur & Hanum, 2023; Rakhman & Surur, 2024). Infrastructure limitations, particularly in rural areas, hinder the use of materials and media required for project-based learning (Hasibuan et al., 2022; Wondal et al., 2023). Moreover, gaps in technological literacy and digital competence remain an obstacle for teachers in delivering integrated learning (Huliyah et al., 2024). Institutional leadership, including the commitment of school principals, also plays a decisive role in supporting curriculum implementation (Rakhman & Surur, 2024). Addressing these barriers requires systemic strategies that combine teacher professional development and stronger institutional support.

Recent studies provide valuable insights into how literacy, numeracy, science, and technology integration is developing in Indonesian ECE. Research shows that STEM integration

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enhances children's critical thinking and problem-solving skills but requires curriculum adaptation and teacher training (Intisari et al., 2024). Studies on digital literacy emphasize the need for teacher and parent involvement to ensure safe and inclusive use of technology in ECE (Asmayawati, 2023; Tatminingsih, 2022). Research on numeracy highlights the development of context-specific assessment tools and the close link between numeracy, vocabulary, and learning environments (Novita et al., 2023; Yudha & Hetharia, 2025). Technology has also been shown to boost children's motivation and literacy when applied appropriately (Maulinda et al., 2024). Furthermore, pedagogical innovation based on local wisdom has proven effective in strengthening digital literacy in sustainable ways (Asmayawati et al., 2024). These findings demonstrate progress yet underline the ongoing need for professional capacity-building and equitable access.

The integrative approach in ECE aligns with constructivist theories, which emphasize the importance of direct experiences and social interaction in learning (Piaget, 1970; Vygotsky, 1978). The theory of multiple intelligences further underscores the need to accommodate children's diverse potentials across learning domains (Gardner, 1993). Contemporary perspectives expand this foundation through project-based learning and cultural-historical approaches, both of which reinforce the importance of multidimensional early learning (Fleer, 2015; Thomas, 2020). However, international reviews show that empirical studies on STEM/STEAM at the ECE level remain relatively limited compared to primary and secondary education (English, 2017; Li et al., 2020). In Indonesia, this gap is even more significant, with few in-depth studies exploring the actual implementation and challenges of LIMASTERS integration in early childhood settings.

In light of these considerations, this study seeks to address two research questions: (1) How are the elements of LIMASTERS implemented in learning activities at School Mover kindergartens in Jambi City? and (2) What challenges do teachers encounter in the integration process? The contribution of this research is threefold: first, to provide a contextual understanding of integrative practices in Indonesian ECE; second, to fill a literature gap on curriculum implementation at the early childhood level; and third, to propose practical recommendations for strengthening teacher competence. The findings are expected to inform both policymakers and practitioners, while also contributing to global discourse on ECE transformation. By bridging local experiences with international perspectives (Bers, 2021; Jalil, 2025; UNESCO, 2020), this study highlights the significance of integrative, future-oriented early childhood education.

2. Methods

2.1. Research Design

This study employed a qualitative approach with a case study design, as it aimed to explore in depth the processes and challenges of implementing the Independent Curriculum (*Kurikulum Merdeka*) in early childhood education (ECE) units. A case study design was considered appropriate because it allows the researcher to investigate real-life contexts and capture the complexity of the learning environment (Creswell & Poth, 2018; Yin, 2018). The qualitative orientation also made it possible to describe the experiences and perspectives of participants in a natural setting. The researcher acted as the primary instrument, directly engaging in the field to collect data while maintaining objectivity through systematic procedures.

2.2. Research Site and Participants

The research was conducted at Kirana Kindergarten, located in Jambi City, Indonesia, over a four-month period from January to April 2024. This site was selected because it is a designated *Sekolah Penggerak* (School Mover), functioning as a pilot institution for implementing the Independent Curriculum at the early childhood level. Participants were selected using purposive sampling, focusing on individuals directly involved in the curriculum implementation. The participants consisted of three categories: (1) ECE teachers responsible for classroom instruction, (2) the school principal as the institutional policy maker, and (3) parents supporting children's learning at home. This combination ensured that data reflected multiple perspectives on curriculum integration.

2.3. Data Collection Techniques and Instruments

Three primary techniques were used for data collection: (1) limited participatory observation of classroom learning activities, (2) in-depth interviews with teachers, the principal, and parents using semi-structured interview guides, and (3) document analysis of lesson plans, learning modules, and child development reports. The instruments included observation sheets, interview protocols, and documentation checklists, all of which were developed based on the research focus. The researcher served as the main instrument, supported by field notes, audio recordings, and digital tools such as mobile phones. Ethical considerations were addressed by obtaining informed consent from participants, ensuring voluntary involvement, and guaranteeing the confidentiality of all data collected.

2.4. Data Analysis and Trustworthiness

Data were analyzed using the interactive model, which consists of three stages: (1) data reduction, (2) data display, and (3) conclusion drawing and verification (Matthew B. Miles, 2014). Data reduction involved coding and categorizing the information collected, while data display was carried out through matrices and thematic summaries. Conclusions were drawn iteratively and continuously verified against the data to ensure accuracy. To enhance trustworthiness, the study employed source and technique triangulation, member checking with participants, and peer debriefing with colleagues. The use of multiple strategies strengthened the credibility, dependability, and confirmability of the findings.

3. Result

3.1. Implementation of LIMASTERS in Kirana Kindergarten

The implementation of LIMASTERS at Kirana Kindergarten in Jambi City demonstrates an effort to integrate literacy, mathematics, science, technology, engineering, and the arts into daily learning activities. This integrated approach is intended to create a stimulating environment that nurtures children's creativity and critical thinking from an early age. Teachers play a central role in designing meaningful experiences, while parental involvement provides reinforcement at home. Observations conducted during classroom activities reveal that LIMASTERS is not only applied in structured lessons but also embedded in routine interactions, such as morning greetings, playtime, and group discussions, allowing children to learn holistically through multiple domains.

The literacy element is evident in various daily practices that foster children's communication and comprehension skills. Observations show that teachers often begin the day with greetings and verbal interactions, which encourage children to express themselves confidently. Activities such as connecting pictures with letters, recognizing vowels through colorful flashcards, and reading storybooks collectively enhance early literacy competence. As Participant 6 explained, *"The implementation of literacy integration at Kirana includes providing a reading corner accessible to children, decorating the walls with interesting writing, and reading storybooks on a regular schedule"* (Interview, February 14, 2024). A similar emphasis was highlighted by Participant 7, who stated, *"During class, we integrate literacy in various ways. First, we introduce vowels using colorful, illustrated letter cards. In addition, we also read books to the children, followed by discussions and Q&A sessions to deepen their understanding"* (Interview, February 14, 2024). These practices show that literacy integration is not limited to reading and writing, but also encourages dialogue and interaction as a foundation for early communication skills.

Mathematics integration at Kirana Kindergarten is designed to develop children's numeracy and logical thinking through engaging, hands-on activities. Teachers utilize concrete objects such as blocks, picture cards, and everyday items to introduce basic concepts of counting, measurement, and geometry. For example, children were given square wooden blocks of varying sizes—small, medium, large, and jumbo—and were asked to group themselves according to the size of their block, allowing them to compare dimensions in an interactive manner. Participant 6 emphasized this practice, noting, *"The application of mathematics integration here is carried out*

through the use of concrete objects to count and learn about measurements and shapes of objects" (Interview, February 14, 2024). Similarly, Participant 7 highlighted the use of geometric picture cards and number recognition activities, stating, *"We usually implement mathematics by introducing numbers with illustrated cards, or by creating activities such as drawing lines and calculating raindrops during daily lessons"* (Interview, February 14, 2024). These activities demonstrate how abstract mathematical concepts are made accessible through playful and experiential learning.

Science elements are integrated through experimental and exploratory activities that encourage children's curiosity about the natural world. Teachers guide students in simple experiments, such as making a rainbow using food coloring, milk, and sunlight, which allows children to observe cause-and-effect relationships in a concrete way. Observations show that children actively respond to these experiments by sharing their thoughts and discussing the outcomes with peers and teachers. Participant 6 described this approach by saying, *"For science activities, we explore natural objects, for example, making a rainbow from food coloring, or using materials like sand, twigs, stones, and flowers to build curiosity and encourage children to investigate further"* (Interview, February 14, 2024). Participant 7 added that natural materials are often used for science projects, explaining, *"We usually make children's work using natural materials, such as twigs, soap, oil, and water, to conduct simple experiments that motivate children to explore"* (Interview, February 14, 2024). Through these activities, science integration not only introduces basic concepts but also fosters inquiry-based learning and problem-solving skills.

Technology integration at Kirana Kindergarten is primarily realized through the use of simple digital tools that enrich classroom activities. Teachers often employ projectors, laptops, and other audiovisual media to display videos, pictures, or interactive learning materials that help children connect with abstract concepts. Observations revealed that these tools are not only used for instructional purposes but also to create an engaging, play-based learning atmosphere. Participant 6 described, *"Technology integration here is achieved through the use of simple media such as projectors to display videos, learning media, or other images that support the learning process"* (Interview, February 14, 2024). Reinforcing this perspective, Participant 7 stated, *"We usually use laptops and Infocus to display materials at the front of the class, allowing children to learn while playing and becoming familiar with the use of media"* (Interview, February 14, 2024). These practices show that even with limited resources, teachers can incorporate technology to foster children's digital awareness from an early age.

Engineering elements are implemented through activities that encourage children to build, design, and manipulate objects, thereby strengthening their problem-solving and fine motor skills. Teachers frequently guide students in creating models or shapes using available classroom materials, linking the activities to daily learning themes. One example observed was the activity of forming a sun by arranging sticks into a circular shape, allowing children to explore spatial awareness and design thinking. Participant 6 explained, *"Today's activities involved forming a circle to represent the sun, then attaching sticks as rays, using simple materials to simulate sunlight"* (Interview, February 16, 2024). A similar activity was described by Participant 7, who noted, *"The engineering activity was pasting a circular origami sun and attaching sticks as its rays"* (Interview, February 16, 2024). Through these tasks, children learn to apply creativity and logic simultaneously, demonstrating how engineering integration can be adapted to the context of early childhood education.

The integration of arts at Kirana Kindergarten is visible in activities that allow children to express creativity while reinforcing their understanding of colors, shapes, and patterns. Teachers encourage children to engage in drawing, coloring, cutting, and pasting, often in connection with broader learning themes. For example, children were observed making an image of the sun by pasting yellow paper circles and attaching sticks as rays, while naming the colors involved. Participant 6 described, *"For the art of sticking the sun, children place the sticks as rays according to their own ideas, and they also name the colors and raindrops"* (Interview, February 16, 2024). In line with this, Participant 7 explained, *"We encourage children to draw, color, and cut or paste according to their creativity, so they can freely express themselves in class"* (Interview, February 16,

2024). These practices illustrate how art activities are not only aesthetic but also support children's cognitive, motor, and emotional development.

The observation results of two participants (P6 and P7) further confirm the comprehensive implementation of LIMASTERS at Kirana Kindergarten. Both participants demonstrated engagement in literacy, mathematics, science, technology, engineering, and arts activities, as summarized in the following table:

Table 1. Observation of Participants

Name	Literacy	Mathematics	Science	Technology	Engineering	Art
P6	✓	✓	✓	✓	✓	✓
P7	✓	✓	✓	✓	✓	✓

The table shows that both participants consistently experienced integrated activities across all six domains. Daily routines, such as morning greetings and hands-on projects, ensured that LIMASTERS was embedded from the beginning of the school day until dismissal. These findings highlight the intentional design of learning that addresses multiple developmental aspects simultaneously.

Overall, the implementation of LIMASTERS at Kirana Kindergarten demonstrates how literacy, numeracy, science, technology, engineering, and the arts can be woven into a holistic learning framework. Through observation, interviews, and documentation, it is evident that teachers effectively use a combination of direct instruction, playful exploration, and creative expression to nurture children's competencies. Although variations exist between classes and individual teachers, the overall pattern shows a strong commitment to integrating multiple domains of knowledge in early childhood education. This holistic approach not only strengthens foundational skills but also prepares children to adapt to complex challenges in the future.

3.2. Challenges in Implementing LIMASTERS

Despite the positive outcomes of LIMASTERS implementation at Kirana Kindergarten, teachers reported several challenges that hindered the consistency and sustainability of the program. The most prominent obstacle was the limited number of human resources available to support daily classroom activities. When some teachers were required to attend training outside the school, the remaining staff often struggled to design and manage integrated learning activities across all six domains. This shortage created gaps in the continuity of certain learning elements, especially those requiring more preparation, such as science experiments and the use of technology.

The shortage of teaching staff affected not only the frequency but also the quality of activities delivered in the classroom. Teachers indicated that with fewer personnel, it was difficult to balance the demands of instructional time, classroom management, and preparation of learning materials. As one teacher noted, the lack of colleagues during training sessions often left classes with limited support for hands-on experiments. This situation reduced opportunities for children to engage in scientific exploration or technology-based tasks, making literacy and mathematics relatively more dominant because they were easier to implement with minimal resources.

Another challenge was the limited availability of technological tools and supporting devices for science-based activities. While projectors and laptops were available, their effective use required collaboration between teachers to prepare media and operate equipment during lessons. Teachers admitted that coordinating time and responsibilities for these tasks was not always possible, particularly when staff numbers were reduced. Consequently, technology and science elements were not consistently integrated into daily activities, despite teachers' awareness of their importance in developing children's curiosity and digital literacy.

These challenges suggest that while LIMASTERS can be successfully implemented, its sustainability depends on adequate staffing, resource allocation, and effective coordination among teachers. Without sufficient human resources and structured planning, certain elements such as science and technology risk being marginalized in favor of activities that are simpler to manage. Addressing these obstacles requires institutional support, teacher collaboration, and the

provision of resources that ensure all six elements of LIMASTERS are consistently integrated into the curriculum.

4. Discussion

This study explored the implementation and challenges of integrating LIMASTERS (Literacy, Mathematics, Science, Technology, Engineering, and Art) in early childhood education within a School Mover Kindergarten in Jambi City. The findings indicate that literacy, mathematics, and art were more consistently embedded in daily classroom practices, while science, technology, and engineering were less emphasized. These results resonate with previous Indonesian studies suggesting that teachers tend to implement literacy, numeracy, and artistic activities more readily than science and technology-based learning (Hasanah et al., 2025; Yuliana et al., 2022). Such patterns highlight the uneven integration of LIMASTERS elements at the early childhood level in Indonesia.

The evidence demonstrates that teacher readiness, resource availability, and institutional support strongly influence the extent of integration. Teachers showed initiative by assessing children's needs and interests as a basis for designing activities, which aligns with constructivist principles emphasizing active participation and experiential learning (Piaget, 1970; Vygotsky, 1978). The use of play-based and thematic learning also reflects the multiple intelligences framework, where varied domains of children's potential can be nurtured (Gardner, 1993). This confirms that effective LIMASTERS integration requires pedagogical practices that recognize both developmental appropriateness and children's diverse learning pathways.

However, the limited application of science, technology, and engineering reveals a significant gap between policy expectations under the Independent Curriculum and field practices. Teachers expressed difficulty in designing experiment-based activities, partly due to limited training and insufficient access to learning materials. This mirrors broader challenges reported in ECE, where STEM integration is often constrained by teacher capacity and infrastructure (English, 2017; Moomaw, 2013). Thus, while the Independent Curriculum envisions integrative learning, its realization at the early childhood level remains partial and inconsistent.

These findings are not unique to Indonesia. International reviews of STEM/STEAM in early childhood have also shown that teachers are generally more comfortable with literacy and arts, while facing barriers in science and engineering activities (Li et al., 2020). Research further shows that while computational thinking and coding can be introduced in playful ways, many teachers lack confidence in facilitating such activities (Bers, 2021). Without adequate training, integration across domains tends to be superficial rather than transformative (Kim et al., 2019). The Indonesian case thus reflects a global pattern, but with context-specific challenges such as disparities in infrastructure and access between urban and rural schools.

Practically, the findings suggest that collaboration among teachers, peer mentoring, and incremental skill-building are critical to overcoming these limitations. Activity-based exploration supported by teacher scaffolding has proven effective in making abstract STEM concepts accessible to young children (Thomas, 2020). Integrating local contexts—such as using everyday objects for experiments—can also enrich the relevance of science and technology learning (Asmayawati et al., 2024). Therefore, solutions must not only address technical skills but also encourage creative use of local resources and community involvement.

At the policy level, the results point to the need for more holistic teacher training initiatives that go beyond literacy and numeracy to equip educators with skills in science, engineering, and technology. Professional development programs should be continuous and practice-oriented, allowing teachers to co-develop modules and share best practices. Institutional leadership also plays a vital role in providing supportive environments, including adequate resources and encouragement for innovation. This requires alignment between national curriculum policies, local school management, and teacher capacity-building efforts to ensure sustainable implementation.

The study also opens avenues for further research. Longitudinal studies could evaluate the long-term impact of LIMASTERS integration on children's cognitive, socio-emotional, and creative development. Design-based research (DBR) could be employed to co-create and test training models tailored for early childhood teachers. Comparative studies across diverse geographical and socio-economic contexts—urban versus rural, Java versus outer islands—would provide insights into the adaptability and effectiveness of LIMASTERS practices in different environments. By advancing these research directions, scholars and practitioners can contribute to bridging the gap between curriculum aspirations and classroom realities in Indonesian early childhood education.

4.1. Research Contribution

This study contributes to the growing body of literature on integrated learning in early childhood education, particularly in the Indonesian context where LIMASTERS (Literacy, Mathematics, Science, Technology, Engineering, and Arts) has not been extensively explored. Theoretically, the findings reinforce the constructivist and multiple intelligences perspectives by demonstrating how children learn holistically when diverse domains are interconnected through play-based and thematic learning. Practically, this study illustrates how LIMASTERS can be implemented effectively in resource-limited settings through creative teaching strategies and contextual adaptation. It offers concrete examples of literacy, numeracy, and art integration that can serve as models for early educators seeking to apply integrative learning approaches. From a policy standpoint, the research highlights the gaps between the goals of the Independent Curriculum and real classroom practices, thereby providing valuable insights for policymakers to design more comprehensive teacher training and support systems.

4.2. Limitations

Despite its valuable insights, this study has several limitations. First, the research was conducted in a single kindergarten, which limits the generalizability of the findings to other contexts, particularly those with different socio-economic or infrastructural conditions. Second, the data relied primarily on qualitative methods—interviews, observations, and documentation—without incorporating quantitative measures that could provide more robust evidence of learning outcomes. Third, the study involved only two teacher participants, which may not capture the full diversity of pedagogical practices or challenges faced by educators in other institutions. Additionally, the implementation of LIMASTERS observed was influenced by situational factors such as teacher availability and resource constraints, making it difficult to isolate the effects of each learning domain. Lastly, the study did not include longitudinal data to assess the long-term impact of LIMASTERS on children's development, which limits conclusions about its sustained effectiveness.

4.3. Suggestions

For future research, it is recommended to employ mixed-method or longitudinal research designs to explore the long-term impact of LIMASTERS on children' s cognitive, social, and creative development. Comparative studies across urban and rural settings, as well as between public and private institutions, are also suggested to provide broader insights into the adaptability and scalability of LIMASTERS implementation in diverse educational contexts.

5. Conclusion

This study demonstrates that the integration of LIMASTERS (Literacy, Mathematics, Science, Technology, Engineering, and Arts) in kindergartens participating in the School Mover Program in Jambi City remains uneven, with literacy, mathematics, and arts being more consistently implemented than science, technology, and engineering. The findings highlight gaps between curriculum expectations and classroom realities, largely due to limitations in teacher competence, resources, and institutional support. These results emphasize the need for strengthened teacher training, the development of contextual learning modules, and improved infrastructure, while also

calling for future research that examines the long-term impacts of LIMASTERS integration and explores adaptable models across diverse early childhood education contexts in Indonesia.

Declarations

Author contribution statement

Mastikawati conceived the idea. Nazurty and Hendra Sofyan conducted the data collection process. Yantoro developed the theoretical framework related to digital literacy, cognitive development, and early childhood education. All authors participated in discussions of the findings, performed data analysis collaboratively, and contributed to the writing and final revision of the manuscript.

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Data availability statement

The dataset generated and analyzed during the research is available from the corresponding author upon reasonable request.

Declaration of interests statement

All authors declare that they have no financial or personal interests that could influence the work presented in this manuscript.

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