

## Multiliteracy-Based Learning in Early Childhood Education in the Era of Society 5.0

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### ABSTRAK

The transformation of early childhood education in the era of Society 5.0 requires the integration of multiliteracy to support children's holistic development. Multiliteracy encompasses not only basic literacy but also digital, multilingual, ecological, and moral-religious competencies, which are essential in responding to rapid technological advancements while maintaining humanistic values. This study aims to analyze and develop a multiliteracy-based learning framework in early childhood education that is adaptive to the demands of Society 5.0. This research employs a qualitative approach with a descriptive-analytical design, combining library research and field study. Data were collected through in-depth interviews, observations, and documentation, and analyzed using data reduction, data display, and conclusion verification with triangulation techniques to ensure validity. The findings reveal that multiliteracy-based learning has been partially implemented through digital media, project-based learning, STEAM approaches, and integration of cultural and religious values. However, challenges persist, including limited infrastructure, low teacher digital competence, uneven implementation, and weak institutional management. The discussion highlights the need for a balanced integration of technology and character education within a structured multiliteracy framework. In conclusion, multiliteracy-based learning in early childhood education must be developed through a holistic, adaptive, and human-centered approach that integrates technology, pedagogy, and cultural values to prepare children for the complexities of Society 5.0.



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### INTRODUCTION

The rapid evolution of digital civilization has fundamentally transformed the landscape of education, including early childhood education (ECE), particularly within the framework of Society 5.0. This concept, originally introduced as a human-centered society that integrates cyberspace and physical space, emphasizes the strategic use of advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), big data, and immersive technologies to enhance human well-being. In the context of early childhood education, this transformation requires a shift from conventional pedagogical approaches toward more adaptive, personalized, and technology-integrated learning



environments. Early childhood education is no longer limited to foundational literacy skills but must also accommodate digital, visual, cultural, and ethical literacies to prepare children for complex future challenges (Aini et al., 2023; Abbas et al., 2025; Salim, 2024).

In Indonesia, the transformation of early childhood education (PAUD) is increasingly visible through policy reforms and pedagogical innovations aligned with the principles of Society 5.0. The implementation of the “Merdeka Belajar” policy and the Kurikulum Merdeka has encouraged teachers to design contextual, flexible, and differentiated learning experiences that accommodate the diverse needs of learners. This transformation reflects a paradigm shift from teacher-centered instruction to child-centered, exploratory, and project-based learning approaches. Teachers are expected to act as facilitators who integrate technology meaningfully while nurturing children's creativity, collaboration, and critical thinking skills (Lestari, 2024; Zahroh et al., 2024).

Furthermore, the integration of digital technology in PAUD has expanded through the use of educational platforms, digital storytelling, gamification, and AI-supported learning tools. These innovations aim to enhance children's engagement and cognitive development while fostering interactive and multimodal learning experiences. For instance, digital ethnopedagogical media have been introduced to bridge technological advancement with local cultural values, such as Sundanese cultural identity, thereby strengthening children's social self-image and cultural awareness. This approach demonstrates that technological integration does not necessarily undermine local wisdom but can instead reinforce it when applied appropriately (Gandana et al., 2022).

Another significant transformation is observed in the implementation of multilingual learning models, such as the One Teacher One Language (OTOL) system, which supports children's linguistic development in a multicultural and globalized environment. This approach aligns with the values of Society 5.0, which emphasize adaptability, inclusivity, and intercultural competence. By exposing children to multiple languages from an early age, educators aim to enhance communication skills and cognitive flexibility, which are essential competencies in the 21st century (Andari et al., 2025).

Despite these advancements, the transformation of early childhood education also introduces complex challenges, particularly concerning the integration of multiliteracy approaches. Multiliteracy, as a pedagogical framework, extends beyond traditional literacy to include digital literacy, visual literacy, cultural literacy, and moral-religious literacy. This approach is essential in equipping children with the ability to interpret and produce meaning across various modes of communication in a digitally mediated world. The urgency of multiliteracy is further emphasized by the increasing exposure of children to digital media, which requires not only technical skills but also critical and ethical awareness (Salim, 2024).

The integration of technology in early childhood learning has been shown to positively influence language acquisition, problem-solving abilities, and cognitive development when implemented appropriately. However, excessive or unregulated use of digital media may pose risks to children's socio-emotional development, including reduced interpersonal interaction and potential behavioral issues. Therefore, a balanced and pedagogically grounded approach is necessary to ensure that technology serves as a tool for meaningful learning rather than a source of developmental disruption (Salim, 2024).

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In addition, the concept of AI literacy has emerged as a critical component of multiliteracy in the Society 5.0 era. Introducing AI-related concepts at an early age is considered strategic in fostering critical thinking, creativity, and ethical awareness among children. Rather than positioning children as passive consumers of technology, education systems must empower them to become active and reflective users who understand the implications of technological advancements. This perspective highlights the importance of integrating AI literacy into early childhood curricula as part of a broader multiliteracy framework (Handayani & Munastiwi, 2022).

Empirical studies also indicate that multimodal learning media, such as illustrated storybooks and educational games, play a crucial role in supporting children's language development and engagement. These media provide diverse representations of meaning, allowing children to explore language through visual, auditory, and interactive modalities. Teachers and parents have expressed a strong need for such resources to facilitate effective learning experiences that align with children's developmental characteristics (Sulistyaningrum et al., 2025).

Moreover, the integration of moral and religious values within multiliteracy-based learning has been found to positively correlate with children's cognitive abilities, particularly in problem-solving and critical thinking. This finding underscores the importance of adopting a holistic approach to education that combines cognitive, emotional, and spiritual development. In the context of Indonesian education, where religious and cultural values play a significant role, multiliteracy serves as a bridge between technological competence and character formation (Masykuri et al., 2024).

Nevertheless, the implementation of multiliteracy in early childhood education faces several significant challenges. One of the most prominent issues is the disparity in infrastructure and human resources. Many PAUD institutions, particularly in rural or underdeveloped areas, lack access to adequate technological facilities and internet connectivity. Additionally, teachers often have limited digital competence and face difficulties in integrating technology effectively into their pedagogical practices. This gap highlights the need for comprehensive professional development programs and policy support to ensure equitable access to quality education (Suteki & Sulistyowati, 2024; Abbas et al., 2025).

Another critical issue is the uneven adoption of advanced technologies such as AI in early childhood education. While some institutions with sufficient resources have begun experimenting with AI-based learning tools, many others remain at a basic level of digital integration. Furthermore, empirical research on the implementation of AI literacy in PAUD is still limited, indicating a significant research gap that needs to be addressed. This lack of evidence-based practices poses challenges for policymakers and educators in designing effective and scalable interventions (Handayani & Munastiwi, 2022).

The challenges are further compounded by concerns related to children's character development and religious moderation. The widespread exposure to digital content, coupled with limited parental supervision and digital literacy, increases the risk of children encountering inappropriate or harmful information. This situation underscores the importance of integrating values education within multiliteracy frameworks to promote ethical awareness and responsible digital behavior. Strengthening children's moral and religious foundations is essential in navigating the complexities of the digital age (Sugianto, 2025; Syahrin et al., 2026).

Additionally, the implementation of multilingual approaches such as OTOL presents coordination challenges among educators. Effective implementation requires consistency, collaboration, and alignment of teaching strategies across different languages. However, many institutions struggle with maintaining such coordination, leading to inconsistencies in learning outcomes. This issue highlights the need for structured planning and continuous evaluation to ensure the effectiveness of multilingual education in early childhood settings (Andari et al., 2025).

From a managerial perspective, many early childhood education institutions face limitations in terms of leadership, supervision, and continuous assessment. Weak institutional management and limited understanding of educational innovation hinder the successful implementation of multiliteracy-based learning. These challenges indicate that the transformation of PAUD in the Society 5.0 era requires not only pedagogical innovation but also strong institutional governance and strategic management (2022).

Based on the above discussion, it is evident that while the transformation of early childhood education and the adoption of multiliteracy approaches present significant opportunities, they also reveal substantial gaps in implementation, particularly in the Indonesian context. Previous studies have largely focused on isolated aspects such as digital literacy, technology integration, or character education, but there is still a lack of comprehensive research that integrates these dimensions into a cohesive multiliteracy framework tailored to early childhood education in the Society 5.0 era. This gap highlights the need for a more holistic and contextually relevant approach to multiliteracy-based learning.

Therefore, the novelty of this study lies in its integrative approach to multiliteracy in early childhood education, which combines technological literacy, cultural values, moral-religious education, and multilingual competence within a unified pedagogical framework. This study seeks to provide a contextualized model that addresses the specific challenges and opportunities of implementing multiliteracy in PAUD within the Indonesian educational landscape.

Accordingly, the primary objective of this study is to analyze and develop a multiliteracy-based learning framework for early childhood education that is adaptive to the demands of Society 5.0 while remaining grounded in local cultural values and holistic child development principles.

## **METHODOLOGY**

This study employs a qualitative research approach with a descriptive-analytical design to explore and develop a multiliteracy-based learning framework in early childhood education within the context of Society 5.0. The qualitative approach is considered appropriate as it allows for an in-depth understanding of complex educational phenomena, particularly the integration of technological, cultural, and pedagogical dimensions in PAUD settings. This research adopts a library research and field-based inquiry strategy. The library research involves a systematic review of relevant scholarly articles, policy documents, and theoretical frameworks related to multiliteracy, early childhood education transformation, and Society 5.0. Meanwhile, the field component is conducted through selected early childhood education institutions to capture contextual practices and challenges. The subjects of the study include early childhood teachers, school principals, and education stakeholders who are purposively selected based on their experience in implementing innovative and technology-integrated learning practices.

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The data collection techniques consist of in-depth interviews, observation, and documentation studies. In-depth interviews are conducted to obtain detailed insights into teachers' perceptions, competencies, and challenges in implementing multiliteracy-based learning. Observations are used to examine real classroom practices, including the use of digital media, multimodal learning strategies, and child engagement. Documentation studies involve analyzing curriculum documents, lesson plans, and institutional policies related to learning innovation. The data are analyzed using an interactive model of qualitative data analysis, which includes data reduction, data display, and conclusion drawing/verification. Data validity is ensured through triangulation of sources and techniques, as well as prolonged engagement and peer debriefing. This analytical process aims to generate a comprehensive and contextualized understanding of multiliteracy implementation and to formulate a relevant learning framework aligned with the demands of Society 5.0.

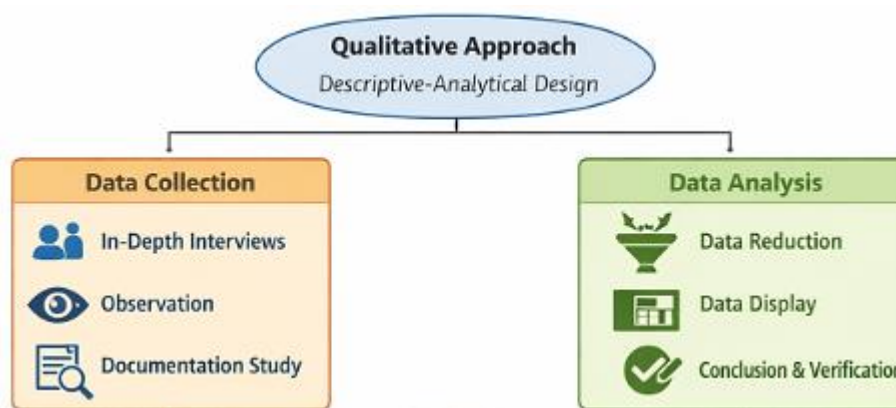


Figure 1. Diagram Conceptual Research

## RESULTS AND DISCUSSION

Based on the data collected through in-depth interviews, observations, and documentation studies, this research identified several key dimensions in the implementation of multiliteracy-based learning in early childhood education within the context of Society 5.0. The findings highlight variations in technological integration, pedagogical practices, value incorporation, and institutional readiness across different PAUD settings. These dimensions are systematically presented in the following table.

Table 1. Implementation of Multiliteracy-Based Learning in Early Childhood Education

No	Dimension	Findings	Challenges	Implications
1	Technological Integration	Use of digital media, educational games, and limited AI-based tools	Limited infrastructure and low digital competence of teachers	Need for teacher training and infrastructure development
2	Pedagogical Approach	Application of project-based learning, multimodal activities, play-based	Lack of consistency in implementation and limited pedagogical innovation	Development of structured multiliteracy learning models

3	Multiliteracy Skills	Development of digital, visual, and language literacy	Unequal exposure to multiliteracy practices among students	Integration of multiliteracy into curriculum design
4	Cultural and Moral Values	Integration of religious values and local culture (ethnopedagogy)	Influence of digital content and weak parental supervision	Strengthening character education within digital learning
5	Multilingual Learning (OTOL)	Initial implementation of multilingual exposure in some institutions	Coordination issues among teachers and inconsistency across languages	Need for collaborative teaching strategies
6	Institutional Management	Supportive leadership in some schools	Weak supervision, limited evaluation systems, and management understanding	Improvement of governance and continuous professional development

The findings demonstrate that multiliteracy-based learning in early childhood education has been partially implemented, particularly in aspects related to technology integration and pedagogical innovation. However, the level of implementation varies significantly depending on institutional capacity, teacher competence, and infrastructure availability. Technological integration, while increasingly present, remains at a basic level in many institutions, indicating that the transition toward Society 5.0-oriented education is still in progress. From a pedagogical perspective, the adoption of multimodal and project-based learning approaches reflects a positive shift toward child-centered education. Nevertheless, inconsistencies in implementation suggest that teachers require more structured guidance and professional development to effectively apply multiliteracy principles in classroom practices. Similarly, the development of multiliteracy skills among children is not yet evenly distributed, highlighting the need for a more systematic and inclusive curriculum framework.

The integration of cultural and moral values emerges as a critical component in balancing technological advancement with character education. However, external challenges such as exposure to digital media and limited parental involvement pose risks to children's holistic development. In addition, the implementation of multilingual learning through the OTOL approach shows promising potential but requires stronger coordination and institutional support to ensure effectiveness. Finally, institutional management plays a crucial role in determining the success of multiliteracy-based learning. Weak governance, limited supervision, and insufficient evaluation mechanisms hinder the sustainability of educational innovation. Therefore, a comprehensive approach that combines pedagogical, technological, and managerial improvements is necessary to optimize the implementation of multiliteracy in early childhood education within the Society 5.0 framework.

## Discussion

The findings of this study reveal that multiliteracy-based learning in early childhood education (ECE) within the context of Society 5.0 has been implemented in a fragmented

yet progressively evolving manner. This condition reflects a transitional phase in which educational institutions are attempting to align pedagogical practices with the demands of technological advancement while maintaining humanistic and cultural values. In line with the research objective—namely, to analyze and develop a multiliteracy-based learning framework that is adaptive to Society 5.0—the discussion elaborates on how various dimensions of multiliteracy are conceptualized, implemented, and challenged in the context of PAUD.

Conceptually, multiliteracy in early childhood education extends beyond traditional reading and writing skills to encompass digital literacy, ecological literacy, multilingual competence, and moral-religious literacy. This broader conceptualization aligns with the paradigm of Society 5.0, which emphasizes the integration of advanced technologies with human-centered values. The results of this study confirm that PAUD institutions have begun incorporating multiple forms of literacy into their learning practices, although the depth and consistency of implementation vary significantly. This finding supports the argument that multiliteracy is not merely an instructional approach but a comprehensive framework that integrates cognitive, social-emotional, and ethical dimensions of child development (Aini et al., 2023).

From the perspective of digital literacy, the findings indicate that the use of digital media such as educational applications, videos, e-books, and learning management systems has become increasingly common in early childhood classrooms. However, the level of sophistication in using these technologies remains relatively basic, with limited integration of advanced tools such as AI and adaptive learning systems. This condition reflects a gap between the theoretical potential of digital literacy and its practical implementation in PAUD settings. Previous studies have shown that digital literacy, when effectively integrated, can enhance children's cognitive development, language acquisition, and social-emotional skills (Saleha et al., 2022; Pereira et al., 2021). Similarly, the use of interactive multimedia and gamified learning environments has been found to improve engagement and motivation among young learners (Maulidia et al., 2023; Abbas et al., 2025).

Nevertheless, the findings also highlight significant challenges related to digital literacy implementation, particularly concerning infrastructure limitations and teachers' digital competence. Many educators still rely on conventional teaching methods and face difficulties in integrating technology meaningfully into their pedagogical practices. This issue is consistent with previous research emphasizing that teacher readiness is a critical factor in the successful implementation of digital literacy in early childhood education. Continuous professional development programs are therefore essential to enhance teachers' digital skills and pedagogical innovation (Pereira et al., 2021; Farisia & Syafi'i, 2024; Supa'at & Ihsan, 2023).

In addition to digital literacy, multilingual literacy emerges as an important dimension of multiliteracy in PAUD, particularly in the context of globalization and cultural diversity. The implementation of the One Teacher One Language (OTOL) approach in some institutions reflects an effort to develop children's linguistic competence and intercultural communication skills. This approach is consistent with research indicating that early exposure to multiple languages can enhance cognitive flexibility, cultural awareness, and communication abilities (Andari et al., 2025; Kirsch & Hornberger, 2024; Papadopoulos & Bisiri, 2024). However, the findings reveal that the implementation of multilingual learning is often hindered by coordination challenges among teachers and the lack of consistent instructional strategies. This suggests that

multilingual education requires not only pedagogical innovation but also strong institutional collaboration and planning.

Eco-literacy also plays a crucial role in multiliteracy-based learning, particularly in fostering environmental awareness and sustainable behavior among young children. The use of storytelling, educational videos, field trips, and 5R (Reduce, Reuse, Recycle, Replace, Repair) practices reflects an effort to integrate environmental education into early childhood learning. This finding aligns with previous studies emphasizing the importance of introducing ecological values at an early age to develop environmentally responsible behavior (Ninsiana et al., 2024). However, the integration of eco-literacy is still relatively limited and often depends on individual teacher initiatives rather than systematic curriculum design. This indicates a need for more structured approaches to incorporating environmental education into multiliteracy frameworks.

Another important dimension identified in this study is moral and religious literacy, which is particularly relevant in the Indonesian context. The integration of religious values into digital and multiliteracy-based learning reflects an effort to balance technological advancement with character education. The use of technology, including AI-based Qur'anic learning applications, demonstrates that digital tools can be utilized to support moral and spiritual development (El-Laudza, 2021; Risnawati & Permadi, 2025). This finding reinforces the idea that multiliteracy should not be viewed solely from a technological perspective but must also encompass ethical and cultural dimensions. However, challenges such as exposure to inappropriate digital content and limited parental supervision highlight the need for stronger collaboration between schools and families in guiding children's digital behavior.

In terms of pedagogical strategies, the findings indicate that project-based learning and STEAM (Science, Technology, Engineering, Arts, and Mathematics) approaches are increasingly adopted in multiliteracy-based learning. These approaches enable children to develop critical thinking, creativity, collaboration, and problem-solving skills through integrated and experiential learning activities. This is consistent with previous research showing that STEAM-based learning is effective in fostering 21st-century skills in early childhood education (Wulandani et al., 2022). Furthermore, the integration of digital literacy into lesson planning, implementation, and evaluation reflects a shift toward more holistic and technology-enhanced pedagogical practices (Saleha et al., 2022).

The role of parents in supporting multiliteracy development is also highlighted in this study. Home-based literacy practices, particularly those involving digital media, play a significant role in shaping children's learning experiences. Parental mediation is essential in ensuring that children engage with digital content in a safe and meaningful manner. This finding is supported by research indicating that family involvement is a key factor in the success of early literacy development, especially in the digital age (Soyoo et al., 2023). Therefore, efforts to strengthen multiliteracy in PAUD must also involve parents as active partners in the learning process.

Despite these positive developments, the findings reveal several persistent challenges that hinder the effective implementation of multiliteracy-based learning. One of the most significant challenges is the digital divide, which affects access to technology and the quality of learning experiences. Institutions with limited resources struggle to provide adequate technological infrastructure, resulting in unequal learning opportunities among children. This issue is consistent with previous studies highlighting the impact of socio-economic disparities on educational access and quality in the digital era (Abbas et al., 2025).

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Another challenge relates to the quality and appropriateness of digital content used in early childhood education. Not all digital resources are designed to support developmental needs, and some may even have negative effects on children's behavior and well-being. This highlights the importance of selecting and designing age-appropriate, culturally relevant, and pedagogically sound digital materials. Educators must therefore be equipped with the knowledge and skills to evaluate and utilize digital content effectively (Hakh, 2025).

Furthermore, the integration of moral and cultural values within digital learning environments remains a complex issue. While technology offers numerous opportunities for innovation, it also presents risks related to cultural erosion and ethical concerns. This underscores the importance of adopting a balanced approach that integrates technological advancement with the preservation of local values and identity. In this regard, ethnopedagogical approaches can serve as a valuable framework for contextualizing multiliteracy-based learning in accordance with cultural and religious values (Aini et al., 2023).

From a managerial perspective, the findings suggest that institutional leadership and governance play a crucial role in facilitating the implementation of multiliteracy-based learning. Schools with strong leadership and clear vision are more likely to adopt innovative practices and support teacher development. Conversely, weak management and lack of supervision hinder the sustainability of educational innovation. This indicates that efforts to promote multiliteracy in PAUD must be supported by effective institutional management and policy frameworks.

Overall, the discussion demonstrates that multiliteracy-based learning in early childhood education is a multidimensional and dynamic process that requires the integration of technological, pedagogical, cultural, and managerial elements. While significant progress has been made, there are still considerable gaps that need to be addressed to achieve a more holistic and equitable implementation. The novelty of this study lies in its integrative perspective, which combines various dimensions of multiliteracy into a unified framework tailored to the Indonesian context and the demands of Society 5.0.

Thus, this study contributes to the development of a conceptual and practical understanding of multiliteracy in early childhood education, emphasizing the importance of a human-centered approach that balances technological innovation with character development. By addressing the identified challenges and leveraging existing opportunities, multiliteracy-based learning has the potential to enhance the quality of early childhood education and prepare children for the complexities of the future.

## **CONCLUSION**

This study concludes that multiliteracy-based learning in early childhood education within the context of Society 5.0 requires an integrative and human-centered framework that combines digital, multilingual, ecological, and moral-religious literacies in a coherent pedagogical design. The findings indicate that although elements of multiliteracy have been implemented in PAUD practices particularly through digital media use, STEAM-based learning, and value integration their application remains partial and uneven due to limitations in teacher competence, infrastructure, and institutional management. Therefore, to answer the research

objective, this study emphasizes that an adaptive multiliteracy learning framework must be systematically developed by strengthening teacher professional capacity, integrating culturally responsive and value-based content, utilizing technology in a balanced and pedagogically meaningful way, and fostering collaboration between schools and families. Such a framework is essential to ensure that early childhood education not only equips children with 21st-century competencies but also nurtures their holistic development in alignment with the humanistic principles of Society 5.0.

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