Journal Buah hati
Volume 12, Number 2, 2025 pp. 164-179
P-ISSN: 2355-102X E-ISSN: 2502-6836
Open Access: https://ejournal.bbg.ac.id/buahhati

TRANSFORMATION OF EARLY CHILDHOOD EDUCATION IN THE DIGITAL AGE: THE ROLE OF TEACHERS IN BUILDING EARLY LITERACY IN YOUNG CHILDREN

Helnita*[1], Raudha Meutia[2], Ridha Miharti[3]
[1,2] *Universitas Bina Bangsan Getsempena*
[3] *UIN Ar-Raniry Banda Aceh*

* Corresponding Author: *helnita93@gmail.com*

ARTICLE INFO

Article history:
Received : Aug 03, 2025
Revised : Aug 30, 2025
Accepted : Sep 29, 2025
Available : Sep 30, 2025

Keywords:
Learning Transformation, Early Childhood Education, Digital Age, Early Literacy, Teacher's Rol.

ABSTRACT

The transformation of learning in Early Childhood Education (PAUD) in the digital age requires a paradigm shift in the teaching and learning process. Teachers are no longer the sole source of information, but rather act as facilitators who utilize technology to create interactive and meaningful learning experiences for children. This study aims to describe the transformation of early childhood education in the digital age and examine the role of teachers in optimizing early literacy development in young children. The research method used is descriptive qualitative with data collection techniques through observation, interviews, and documentation studies at three early childhood education institutions in Banda Aceh. The results of the study show that digital learning transformation in early childhood education is realized through the use of interactive media such as educational videos, children's literacy applications, and digital communication with parents. Teachers play an important role in designing digital-based literacy activities that still pay attention to the principles of developmentally appropriate practice (DAP). In addition, it was found that teachers' digital literacy competencies are a major factor in the success of improving children's early literacy skills, particularly in letter and word recognition and language skills. However, challenges such as limited resources, teacher training, and education policy remain obstacles to implementation. The conclusion of this study emphasizes that the transformation of early childhood education in the digital era requires policy support, strengthening of teacher competencies, and collaboration between educational institutions and parents. Optimizing the role of teachers is key to building a foundation for children's early literacy that includes not only reading and writing skills, but also digital literacy and critical thinking from an early age.

This is an open access article under the CC BY-NC license.
Copyright © 2025 by Author. Published by Universitas Bina Bangsa Getsempena

INTRODUCTION

The development of digital technology in the 21st century has changed the paradigm of education, including in the context of Early Childhood Education (PAUD). The learning process, which was previously dominated by traditional play activities, is

now shifting towards a learning model that is integrated with digital technology. According to Prensky (2019:1-6), today's children are known as digital natives, a generation that has grown up in a digital environment and has been familiar with various forms of technology from an early age. This condition requires educators, especially ECE teachers, to be able to adapt to changes and utilize technology as an effective and meaningful learning tool for children.

In addition to increasing interest in learning, digital technology also allows children to learn in a more personalized way. UNESCO (2021:22) emphasizes that technology-based learning in early childhood is effective when designed in a developmentally appropriate manner, i.e., tailored to the child's stage of development, so that technology functions as a tool for exploration rather than distraction. Therefore, the success of digital learning transformation in early childhood education depends heavily on the ability of teachers to select, direct, and manage the use of technology appropriately.

However, the reality on the ground shows that this transformation still faces obstacles. Some teachers do not yet have adequate digital competencies, especially in utilizing interactive media for early literacy activities. According to Yuliani (2022:150), the lack of digital literacy training has resulted in some teachers only using technology passively, without significant pedagogical innovation. This condition shows the need to improve teachers' professional competencies so that digital transformation in early childhood education is not only symbolic but also has an impact on the quality of learning.

According to Khairunnisa & Munisa (2025:54-56) in the article "The Urgency of Digital Literacy for Early Childhood," digital literacy for early childhood is an "important life skill" in facing the challenges of globalization, where children have easy access to digital devices such as computers, tablets, or smartphones. This forms the basis for early childhood educators to design learning activities that go beyond simply playing with gadgets, but rather guide children in understanding, critically evaluating, and managing digital information safely and productively.

In the context of early childhood education, early literacy is not limited to children's ability to recognize letters or numbers, but also includes the ability to engage with the digital world in a healthy manner. For example, research by Fatimah (2020:1-19) "Digital Literacy and Its Relationship to the Behavior of Early Childhood in PAUD" shows a significant relationship between the digital literacy of early childhood and their behavior in the PAUD environment. Teachers and parents must actively guide the use of technology so that it has a positive impact.

The digital literacy competence of early childhood teachers is crucial. As shown by research by Khotimah & Reza (2023:40-50) in "Digital Literacy to Improve Pedagogical and Professional Competence of Early Childhood Teachers," early childhood teachers need to have digital skills (computer operations, digital data management) and pedagogical skills to utilize digital media in early childhood learning in line with the paradigm of the 4.0–5.0 industrial revolution.

The transformation of learning in the digital age is not merely about the use of technological tools, but also relates to how teachers design learning experiences that can foster early literacy in young children. Early literacy, according to Whitehurst and Lonigan (2020: 848-872), is an important foundation for children's reading and writing abilities at the next level. In the digital context, this literacy develops not only in the form of traditional reading and writing literacy, but also includes basic digital literacy, which is the ability of children to understand, interact with, and think critically about technology-based information (UNESCO, 2021).

Teachers play a central role in ensuring that technology is used for educational purposes, not merely for entertainment. In line with Yuliani's opinion (2022:21), early childhood teachers in the digital age must have pedagogical competence, digital literacy, and creativity in integrating interactive media so that children remain active, exploratory, and critical thinkers. Furthermore, according to Sari & Rachmawati (2023:16), a learning approach that combines digital games with concrete activities can significantly increase children's motivation to learn and their early literacy skills.

The role of early childhood teachers in technology integration and early literacy (western Indonesia)

a. Lack of contextual empirical studies in western Indonesia

   Explanation: Many studies on early childhood education and technology originate from large urban contexts or other countries; few place empirical focus on the socio-economic conditions, infrastructure, and learning culture specific to western Indonesia. Implications: General findings may not be valid for ECE schools in small towns, coastal areas, or areas with limited internet access. Suggested methods: Qualitative/quantitative field studies in several different districts/cities (purposive sampling), comparative analysis between locations.

b. Lack of detailed descriptions of teachers' teaching behaviors (actual practices) in the use of technology for early literacy

Explanation: Many studies assess outcomes (e.g., children's literacy skills) without describing what teachers do: types of activities, scaffolding strategies, adaptation of digital materials. Implications: It is difficult to recommend training or standards of practice because there is no picture of actual practice. Suggested methods: Structured classroom observation, video recording, analysis of teacher-child interactions, coding of activities.

c. The lack of research on the digital competence of early childhood teachers specifically for early literacy

   Explanation: Digital competence is often measured in general terms (operating devices), rather than digital pedagogical competence for developing phonemic awareness, vocabulary, and narrative skills in early childhood. Implications: Capacity building programs may be misguided (technical rather than pedagogical). Suggested methods: Questionnaires to validate digital pedagogical competence, in-depth interviews, teaching practice assessments.

d. Limitations of research examining teachers' attitudes, confidence, and barriers to technology in early childhood education

   Explanation: Teachers' affective factors (self-efficacy, perceived benefits, concerns about child development) are often mentioned but rarely analyzed in depth in the local context. Implications: Interventions need to target mindset, not just skills. Suggested methods: Mixed methods: psychometric scales, focus groups to explore narratives.

e. There are few studies on the adaptation of digital content for regional languages and local cultural contexts.

   Explanation: Early literacy is closely related to language; digital content is generally in Indonesian/English and is less relevant for bilingual children or those who speak regional languages. Implications: The effectiveness of technology may be reduced; potential for cultural/linguistic marginalization. Suggested methods: Analysis of digital application/product content, participatory design studies (co-design) with teachers and communities.

f. Lack of evidence regarding the short-term vs. long-term impact of technology integration on early literacy development

   Explanation: Studies often focus on immediate results; few follow children's development over several semesters/years. Implications: It is unclear whether digital interventions accelerate development or only have a temporary effect. Suggested methods: Longitudinal cohort study or repeated-measures design.

g. The lack of research that pays attention to the role of teachers as mediators between technology, parents, and children.

   Explanation: The role of teachers in guiding the use of technology at home, mentoring parents, and integrating home learning has not been widely explored. Implications: The potential for school-home synergy is not being utilized. Suggested methods: Social network analysis, interviews with teachers and parents, school case studies.

h. Lack of studies on local/school policies and institutional support for early childhood teachers' practices related to literacy technology

   Explanation: Policy factors (budget, training, curriculum) influence teachers' ability to apply technology but are rarely analyzed in conjunction with teachers' practices. Implications: Policy recommendations may be misguided without field evidence. Suggested methods: Policy analysis, stakeholder interviews, observation of implementation at the school level.

i. Limitations in the use of participatory methodologies that involve teachers as co-researchers

   Explanation: Few studies empower teachers to participate in designing, testing, and evaluating digital materials/strategies. Implications: Interventions are less contextualized and less likely to be adopted on a sustainable basis. Suggested methods: Action research or co-design workshops.

j. Lack of integration of early childhood education quality indicators (play-based learning, social-emotional, motor skills) in technology-literacy studies

   Explanation: Literacy assessment is often separated from holistic early learning quality; the use of technology can have an impact on other areas (social interaction, motor skills). Implications: Risk of narrow solutions that undermine other aspects of child development. Suggested methods: Multi-dimensional assessment (holistic developmental observation, learning quality rubrics).

Various challenges still face this transformation process, such as teachers' limited technological skills, uneven infrastructure, and a lack of practical guidance on the use of early childhood technology. Therefore, efforts are needed to optimize the role of teachers through training, mentoring, and digital-based learning innovations that remain consistent with the principles of developmentally appropriate practice (DAP).

RESEARCH METHODOLOGY

This study uses a qualitative approach with a descriptive study type. This approach was chosen because it aims to deeply understand the phenomenon of learning transformation in early childhood education in the digital age, as well as to explore the role of teachers in developing early literacy in young children through experience, perception, and actual practice in the field. According to Creswell (2018:4), qualitative research seeks to explore and understand the meanings that individuals or groups consider important in relation to a social or humanitarian issue. Thus, this study emphasizes meaning rather than generalization of results.

This study was conducted in several early childhood education institutions in Banda Aceh that have implemented digital-based learning. The locations were selected purposively, considering that these institutions have basic technological facilities (such as computers, LCDs, or educational tablets) and teachers who have undergone digital literacy training. The research subjects consisted of early childhood teachers, school principals, and parents of students as supporting informants to obtain comprehensive data.

Data collection techniques were gathered through the following techniques: Participatory observation, to directly observe the learning process that integrates digital technology in early childhood education classrooms. In-depth interviews were conducted with teachers and principals to understand their views, experiences, and strategies in building children's early literacy through digital learning. Documentation, used to supplement data in the form of photos of activities, digital teaching tools, and technology-based daily learning plans (Teaching Modules).

According to Moleong (2019:157), a combination of observation, interviews, and documentation is important in qualitative research so that the data obtained is richer, valid, and verified through triangulation.

Data analysis techniques are carried out interactively with reference to the model proposed by Miles, Huberman, and Saldaña (2018:13), which consists of three main stages:

1. Data reduction-selecting and focusing on data relevant to the research objectives.
2. Data display-organizing data in the form of descriptive narratives to facilitate understanding of meaning.
3. Conclusion drawing/verification-performed repeatedly to discover patterns, relationships, and deeper meanings.

Data validity was tested using source and method triangulation techniques. Source triangulation was conducted by comparing interview data between teachers, principals, and parents. Meanwhile, method triangulation was conducted by comparing the results of observations, interviews, and documentation. This technique was used to ensure the validity and credibility of the research findings (Sugiyono, 2021:270).

RESULTS AND DISCUSSION

A. Research Results

a. Transformation of Early Childhood Education in the Digital Age

The results of the study show that early childhood education institutions in the digital era are beginning to adapt by utilizing technology as an interactive learning medium. Observations at three early childhood education institutions in Banda Aceh show an increase in the use of digital media such as educational videos, interactive children's applications (such as ABC Kids and Khan Academy Kids), and the use of LCD projectors in learning activities. Teachers utilize technology not only as a visual aid, but also as a means to foster children's active involvement in the learning process.

The transformation of learning in Early Childhood Education (PAUD) in the digital age is an inevitability that cannot be avoided. This change is not only related to the use of technology in learning activities, but also involves a shift in the educational paradigm from a conventional system to more interactive, collaborative, and technology-based learning. According to Prensky (2019:3), today's children are digital natives who are naturally accustomed to technology from an early age, so the learning strategies used by teachers must be able to adapt to the characteristics of this digital generation.

According to Tatminingsih (2022:14), the application of digital literacy in early childhood education helps children recognize symbolic concepts, think logically, and understand the relationship between images, sounds, and meanings from an early age. This is in line with the findings of UNESCO (2021:22), which emphasizes that the integration of digital technology in early childhood learning can enrich the learning experience if it is done in a focused, interactive manner and in accordance with the child's developmental stage (developmentally appropriate practices).

The transformation of early childhood education in the digital age has brought significant changes to the learning process, strategies, and interactions of young children. Based on an analysis of observation data, interviews, and documentation, it was found that early childhood teachers have begun to integrate various digital media and technologies such as educational videos, interactive applications, and simple online

learning platforms (e.g., WhatsApp Groups and Google Classroom) to support children's learning activities.

1. Increased Child Engagement in Learning

   The use of digital media has been proven to increase children's interest and participation in learning activities. Children appear more enthusiastic when teachers use animated videos, interactive songs, or digital educational games. Changes in the Role and Competencies of Teachers. The transformation of learning also requires teachers to have adequate pedagogical and digital literacy competencies. Teachers play a role not only as conveyors of material, but also as facilitators, innovators, and guides in the wise use of technology.

2. Challenges in Technology Implementation

   However, several obstacles were encountered in the field, such as limited digital resources, lack of teacher training, and varying levels of support from parents. Not all early childhood education institutions have adequate internet access, and some teachers still find it difficult to design digital media that is appropriate for children's developmental stages.

3. Collaboration between Teachers and Parents

   Digital learning transformation becomes effective when there is good collaboration between teachers and parents. Teachers provide guidance on how to use digital educational media at home, while parents accompany their children during their interaction with digital devices.

4. Impact on Early Childhood Literacy

   The appropriate use of digital media has been proven to strengthen children's early literacy skills, especially in terms of recognizing letters, sounds, and vocabulary. Children show improvement in their ability to recognize symbols, retell the content of pictures, and write simple sentences.

The transformation of early childhood education in the digital age has had a positive impact on children's learning engagement and early literacy development. However, its success greatly depends on teachers' ability to manage technology pedagogically, the availability of infrastructure support, and active collaboration with parents.

However, the interview results show that there is still a gap between the technological readiness of institutions and the digital competence of teachers. Some teachers feel that they are not confident in using digital devices due to limited training

and facilities. According to Yuliani (2022:150), the low level of digital literacy among teachers is one of the main obstacles to the transformation of early childhood education in Indonesia, especially in areas that do not yet have adequate infrastructure.

b. The Role of Teachers in Early Literacy Development in Young Children

Teachers play a crucial role in the process of developing early literacy in young children. Based on classroom observations, interviews with teachers and parents, and analysis of learning activity documents, five key aspects were identified that describe how teachers optimize their role in fostering early literacy in children.

1. Teachers as Literacy Activity Designers

   Teachers play a central role in designing literacy activities that are appropriate for children's developmental stages. Teachers not only teach reading and writing, but also develop pre-literacy skills such as recognizing symbols, understanding story sequences, and verbal communication. Activities designed include shared reading, story-based role-playing, and drawing activities to introduce new vocabulary.
2. Integration of Media and Educational Technology

   Teachers began integrating simple digital media such as educational animated videos, interactive reading applications, and digital whiteboards to support literacy development. Technology was used not as the main objective, but as a tool to enrich children's learning experiences. The use of these media has been proven to increase children's engagement and interest in learning letters, words, and language sounds.
3. Teachers as Facilitators and Language Models

   In literacy activities, teachers serve as models for proper language use. Through storytelling, singing, and dialogue, children learn examples of correct language use and rich vocabulary. Teachers also create a learning environment that encourages children to express themselves verbally, ask questions, and answer questions. Observations show that children who receive intensive language stimulation show faster development in speaking and letter recognition skills..
4. Collaboration with Parents

   Optimizing early literacy development cannot be separated from parental involvement. Teachers actively communicate with parents through regular meetings and digital media such as WhatsApp Groups to provide guidance on literacy activities at home. With guidance from teachers, parents accompany their children in reading picture books and learning letters in their surroundings.
5. Challenges and Efforts to Improve Teacher Competence

Although the role of teachers is very important, the study also found several obstacles, such as limited knowledge of technology-based literacy strategies, lack of professional training, and minimal availability of contextual literacy teaching materials. However, teachers showed adaptive efforts through independent training, sharing good practices among colleagues, and innovating the creation of learning media based on local materials.

Overall, this study proves that optimizing the role of teachers in developing early literacy in young children includes the ability of teachers to design creative literacy learning, integrate digital media wisely, be positive language models, and build collaboration with parents. The transformation of the role of teachers from instructors to literacy facilitators has been proven to foster reading interest, language skills, and learning readiness in young children.

Early childhood teachers play a key role in ensuring that the use of digital technology remains child-centered. In-depth interviews show that teachers with digital literacy skills are able to utilize interactive learning applications to strengthen children's early literacy skills, such as recognition of letters, numbers, vocabulary, and storytelling skills. Observations show that teachers employ strategies such as:

1. Digital-based play approaches, such as letter and number games through interactive screens.
2. Integration of digital media with concrete activities, for example, after watching a video about animals, children are asked to make a collage of pictures of the same animals.
3. Parental involvement, through digital communication (WhatsApp/Google Classroom groups) to reinforce literacy habits at home.

This finding is reinforced by the results of research by Sari & Rachmawati (2023:310), which states that the integration of digital media in early childhood education can significantly improve children's motivation and early literacy skills when teachers play an active role as facilitators, rather than merely users of technology.

In line with Khairunnisa & Munisa (2025:59), teachers in the digital age need to have the ability to select digital content that is safe, educational, and age-appropriate for children, because uncontrolled exposure to digital media can have an impact on children's social-emotional development. Therefore, teachers are required to have digital pedagogy competence, which is the ability to combine pedagogy with digital literacy to create effective and meaningful learning (Khotimah & Reza, 2023:42).

Early childhood teachers play an important role in mediating the use of technology to strengthen children's literacy skills. Based on the interview results, teachers with digital competence are able to develop literacy activities by utilizing learning applications, interactive videos, and digital storytelling media. These findings are in line with the research by Sari and Rachmawati (2023:310), which shows that the integration of digital media in early childhood education can increase children's engagement and strengthen early literacy skills, as long as teachers continue to play an active role as facilitators.

In addition, Khairunnisa and Munisa (2025:60) emphasize the importance of digital literacy competence for early childhood teachers, which includes the ability to use technology critically, ethically, and creatively to support children's development. Teachers with these competencies not only help children learn letters and numbers, but also shape their critical and reflective thinking skills in relation to the digital content they consume. Thus, teachers become the main guides in instilling healthy and meaningful literacy habits from an early age.

c. Challenges and Strategies for Strengthening Teacher Competence

Although the use of digital technology in early childhood education is becoming more widespread, this study found several challenges, including:

1. Limitations in Digital and Pedagogical Literacy

   Most early childhood teachers still find it difficult to integrate technology into learning activities that are appropriate for young children. Many teachers do not fully understand how to use digital media pedagogically to stimulate early literacy, rather than simply for entertainment. Research by Yuliani (2022) shows that there is still a gap between technology mastery and the application of creative digital-based learning.
2. Limited Access to Training and Learning Resources

   Teachers in some areas have limited access to professional training and digital literacy resources. Lack of institutional support and educational infrastructure makes it difficult for teachers to update their knowledge of innovative literacy methods.
3. Lack of Infrastructure Support.

   Limited facilities such as digital devices, internet networks, and literacy teaching materials are significant obstacles to the implementation of modern learning. Many early childhood education institutions still rely on traditional methods because they do not have adequate supporting facilities.

4. The Role of Parents That Is Not Yet Optimal

   Teachers also face challenges in building synergy with parents. Some parents still consider literacy to be limited to reading and writing skills, rather than a comprehensive process that includes communication, expression, and critical thinking.
5. Lack of standardized digital curriculum guidelines for early childhood education that are appropriate for the local context.

Efforts to optimize the role of teachers can be carried out through the following strategies:

1. Sustainable Digital Literacy Training, equipping teachers with technical and pedagogical skills in integrating technology into early childhood education (Khotimah & Reza, 2023:43).
2. Teacher and Parent Collaboration, strengthening the synergy between learning at school and at home through targeted digital media.
3. Development of a Digital-Based Early Childhood Education Curriculum, developing a curriculum that is flexible and responsive to technological developments without neglecting the humanistic values of children's education.

This strategy is in line with UNESCO's recommendation (2021:25) that improving teacher capacity through Continuous Digital Literacy Training, Teacher and Parent Collaboration, and the Development of a Digital-Based Early Childhood Education Curriculum are key to the success of digital learning transformation at the early childhood education level.

Thus, it can be concluded that the transformation of early childhood education in the digital age requires teachers to act as facilitators, creators, and innovators. Optimizing these roles is essential in building early literacy in young children, emphasizing not only reading and writing but also digital literacy and critical thinking from an early age. Teachers act as reflective developers of digital learning, not merely users of technology. Teachers become the link between the digital world and the real world of children, ensuring that every digital interaction remains oriented towards the needs of various aspects of child development.

B. Discussion

The results of the study show that the learning process in early childhood education institutions has begun to undergo significant changes in line with the increasing

penetration of digital technology in the lives of children and educators. This transformation is not only evident in the use of devices such as tablets, laptops, and projectors in the classroom, but also in changes in the paradigm of teachers in managing more interactive and multimodal learning activities. This transformation is in line with findings that preschool children have gained digital experiences at home that enrich their communicative and creative repertoires, so that early childhood education institutions need to develop practices that respond to these experiences.

This interpretation of the findings emphasizes the importance of viewing technology not as an end goal but as an affordance which, when properly mediated by teachers, can enrich early literacy experiences (multimodality, audio-visual, interactivity). However, without appropriate pedagogical mediation, the use of technology risks becoming a passive activity that adds little to children's literacy. This statement is consistent with TPACK literature, which emphasizes the need for integrated knowledge of technology, pedagogy, and content for meaningful integration.

Field data analysis shows three prominent roles of early childhood teachers related to technology integration for early literacy:

1. Digital learning designer
2. Mediator of child–technology interaction
3. Literacy development evaluator

The above roles position teachers as crucial agents of change: even with technology available, the quality of the impact on early literacy greatly depends on how teachers design, guide, and assess children's learning processes.

Research findings indicate a lack of pedagogical-digital competence among a number of early childhood teachers: although they are able to operate devices, many teachers have not yet developed the ability to design age-appropriate digital literacy activities or integrate technology with traditional play activities. This is in line with Mishra & Koehler's argument emphasizing the need for integrated TPACK knowledge that enables teachers to use technology pedagogically and content-appropriately. Without TPACK, training that focuses solely on technical skills risks resulting in superficial use of technology. The practical implication is that teacher training design must be oriented towards TPACK development: task-based training (design-based/professional learning communities) and in-situ mentoring are far more likely to result in practice transfer than one-off technical training.

The results of the research focus show inequality: early childhood education institutions in urban areas find it relatively easier to adopt digital applications and

devices, while in suburban or rural areas, infrastructure constraints (internet connection, availability of devices) limit adoption. Interestingly, however, teachers in resource-limited environments demonstrate adaptive creativity. They use offline videos, audio recordings, multimodal print materials, or combine local images/stories with simple digital activities as contextualization strategies. These findings support the findings of the Merdeka Curriculum policy study, which emphasizes the need for local context adaptation and teacher capacity building. Digital transformation must be viewed in line with access equity and a context-sensitive approach; central policies need to be facilitated with infrastructure support and human resource strengthening programs at the regional level.

Table 1. Key Findings on Early Childhood Education in the Digital Age

No	Research Focus	Indicators/Aspects Observed	Key Findings in the Field	Interpretation/Meaning of Findings
1.	Changes in Learning Models	The shift from conventional to digital methods	Teachers began to utilize interactive media such as educational videos, educational applications, and projectors in activities to learn letters and vocabulary.	There has been a paradigm shift in learning from teacher-centered to child-centered with the support of technology.
2	The Role of Teachers as Facilitators and Mediators	Teachers' strategies in guiding children to use digital media	Teachers actively assist children, helping them understand the content of the videos and guiding them to not only watch but also interact with the material.	Teachers play an important role as mediators so that technology serves an educational purpose, rather than merely entertainment.
3	Utilizing Technology for Early Literacy	Types of digital media and literacy activities used	Literacy activities include digital letter games, interactive picture stories, and voice recordings for phoneme recognition.	Digital media increases children's motivation to learn and enriches their early literacy experiences.
4	Teachers' Digital Literacy Competencies	Teachers' ability to operate and design digital-based learning	Some teachers are already able to create simple digital teaching materials, but others still have difficulty using learning applications or platforms.	Teachers' digital competencies still vary; continuous training based on technological pedagogical content knowledge (TPACK) is needed.
5	Challenges in Digital Transformation	Barriers faced by teachers and early childhood education institutions	Limited facilities such as devices and internet networks, as well as the low digital literacy of some teachers.	Digital transformation has not been evenly distributed and is highly dependent on infrastructure support and institutional policies.
6	Institutional and Policy Support	Availability of facilities, training, and school policies	Some institutions provide digital devices and conduct basic training for teachers, but these efforts are not yet sustainable.	Education policies are needed that focus on strengthening teacher capacity and providing adequate digital facilities.
7	Impact on Children's Literacy	The development of children's early literacy skills after using technology	Children are more enthusiastic about learning letters and vocabulary through digital media and show improvement in their ability to recognize symbols and sounds.	Technology can improve early literacy when used under teacher guidance in accordance with the principles of Developmentally Appropriate Practice (DAP).

CONCLUSION AND RECOMMENDATIONS

A. Conclusion

The transformation of early childhood education in the digital age has changed the way teachers design, implement, and evaluate the learning process for young children, moving towards a more interactive and technology-based approach. This change has opened up great opportunities for the development of early literacy in children, including the ability to recognize symbols, understand language, and interact with digital texts. Teachers play an important role as facilitators, mediators, and innovators in optimizing learning technology in accordance with children's developmental stages. The success of this transformation depends heavily on teachers' digital literacy competencies, which

need to be continuously improved through training and educational policy support. Challenges such as limited facilities, low digital skills, and lack of training need to be addressed through the provision of adequate resources and adaptive curricula. Thus, the digital transformation of early childhood education is not merely about the use of technology, but rather an effort to foster a culture of literate, creative, and meaningful learning from an early age.

B. Recommendations

Early childhood teachers need to improve their digital literacy through training, workshops, or learning communities so that they can make optimal use of technology in building children's early literacy, while adhering to the principles of Developmentally Appropriate Practice (DAP) in accordance with children's developmental stages. Early childhood institutions are expected to provide adequate technological facilities and create a safe and inclusive learning environment for children to explore digital media. The government and policymakers need to encourage ongoing training for teachers and develop a digital-based early childhood education curriculum based on the character values of early childhood. In addition, further research is recommended to examine the influence of digital media use on children's social-emotional development and to develop effective digital literacy training models for early childhood teachers in various regional contexts.

REFERENCES

Auliah, R., Herlina, H., & Asti, A. S. W. (2024). *Pengaruh Metode Bermain Peran (Role Playing) Terhadap Kemampuan Bahasa Ekspresif Anak Usia 5-6 Tahun Di Tk Al-Fathan*. Jurnal Buah Hati, 11(1), 41-53. https://doi.org/10.46244/buahhati.v11i1.2662

Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). Thousand Oaks, CA: SAGE Publications.

Fanny, N., Helnita, H., & Hayati, F. (2023). *Meningkatkan Perkembangan Kognitif Anak melalui Kegiatan Pembelajaran Terintegrasi STEAM (Science, Technology, Engineering, Art, and Mathematics): Improving Children's Cognitive Development through Integrated STEAM (Science, Technology, Engineering, Art, and Mathematics) Learning Activities*. Absorbent Mind, 3(2), 107-118. https://doi.org/10.37680/absorbent_mind.v3i2.3868

Harfiandi, H., Helminsyah, H., & Kasmi, H. (2024). *Desain pengembangan berbicara anak usia dini: Persepsi guru di Banda Aceh dalam strategi pembelajaran.* Jurnal Buah Hati, 11(2), 67-79. https://doi.org/10.46244/buahhati.v11i2.2813

Khotimah, N., & Reza, M. (2023). *Digital Literacy to Improve Pedagogical and Professional Competence of Early Childhood Teacher.* Jurnal Inovasi dan Teknologi Pembelajaran, 7(2), 40–50. https://doi.org/10.17977/um031v9i22022p117

Oktaviani, O., Khairunnisa, K., Hafnidar, H., Rahman, M. A., & Handrianto, C. (2023). *Investigating Pre-Service Teachers'ability To Implement The Digital Literacy Skills In Real English Instructional Settings*. International Journal of Education, Technology and Science, 3(4), 1286-1302. https://ijets.org/index.php/IJETS/article/view/197

Lynch, J., & Redpath, T. (2014). "*Smart" technologies in early years literacy education: A meta-narrative of paradigmatic tensions in iPad use in an Australian preparatory classroom.* Journal of Early Childhood Literacy, 14(2), 147–174. https://doi.org/10.1177/1468798412453150

McPake, J., Plowman, L., & Stephen, C. (2013). *Preschool children creating and communicating with digital technologies at home.* British Journal of Educational Technology, 44(3), 421–431. https://doi.org/10.1111/j.1467-8535.2012.01323.x

Moleong, L. J. (2019). *Metodologi Penelitian Kualitatif*. Bandung: PT Remaja Rosdakarya.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2018). *Qualitative Data Analysis: A Methods Sourcebook* (4th ed.). Thousand Oaks, CA: SAGE Publications.

Prensky, M. (2019). *Digital Natives, Digital Immigrants Revisited*. New York: Routledge.

Sari, P. N., & Salehudin, M. (2024). *Peran Teknologi AI PAUDPEDIA sebagai Media Pembelajaran Interaktif dalam Meningkatkan Literasi Digital Anak Usia Dini di TK ABA 3 Samarinda. EDUCASIA:* Jurnal Pendidikan, Pengajaran, dan Pembelajaran, 9(3), 169-179. https://doi.org/10.21462/educasia.v9i3.279

Sugiyono. (2021). *Metode Penelitian Kualitatif*. Bandung: Alfabeta.

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. ttps://doi.org/10.31098/ijeiece.v4i1.894

UNESCO. (2021). *Digital Literacy for Early Childhood Education*. Paris: UNESCO Publishing.

Septiani, N., & Syaodih, E. (2021). *Emergent literacy in early childhood*. In 5th International Conference on Early Childhood Education (ICECE 2020) (pp. 52-55). Atlantis Press. 10.2991/assehr.k.210322.012

Yusuf, O. Y. H., Fitriani, W. O. H., & Junaiddin, A. (2024). Kompetensi Guru PAUD di Era Digital. *Arus Jurnal Sosial dan Humaniora*, *4*(2), 859-866. https://doi.org/10.57250/ajsh.v4i2.575