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Digital Creativity in Early Childhood Education: How Teachers Transform Apps, Games, and Animation into Play-Based Learning

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Abstract: Digital creativity in early childhood education requires more than the introduction of applications, games, and animation into classroom activities. This study examined how teachers transform digital tools into play-based learning that supports children's exploration, imagination, and creative expression. Using a descriptive qualitative design supported by simple descriptive statistics, the study analyzed data from 25 early childhood education institutions in West Java and nearby districts. Data were collected through semi-structured interviews, questionnaire responses, and classroom documentation, then analyzed thematically to identify patterns of digital play implementation, teacher mediation, child engagement, institutional support, and curriculum integration. The findings show that digital applications were used by all participating institutions, while most teachers had designed application-based learning, connected digital play to daily learning themes, and used digital media for art, sound, storytelling, and animation. Children were consistently reported as enthusiastic and curious, suggesting that digital play can become a powerful motivational entry point for creative learning. However, the study also identified a significant implementation gap: only a small proportion of institutions had integrated digital play into the curriculum. Barriers included uneven teacher digital competence, limited devices, insufficient learning time, unstable internet access, informal assessment, and weak documentation practices. The study concludes that digital creativity in early childhood education is most meaningful when digital tools are guided by teachers, connected to children's real-life experiences, integrated with non-digital play, and supported by institutional policy. The findings contribute a contextual understanding of the digital play paradox: high adoption and enthusiasm, but weak curricular embedding.

Keywords: digital creativity, digital play, early childhood education, play-based learning

INTRODUCTION

Early childhood education is increasingly expected to respond to children's participation in a world shaped by digital media, multimodal communication, and rapidly changing cultural practices. In this context, digital technology is no longer peripheral to children's everyday environments; rather, it has become part of the social, cultural, and symbolic resources through which children encounter stories, images, sounds, games, and forms of expression. For early childhood education, however, the central issue is not simply whether digital media should be present in classrooms, but how such media can be transformed into meaningful, developmentally appropriate, and play-based learning experiences. Early Childhood Education (PAUD) can be conceptualized as a foundational space for children's cognitive, social, emotional, and character development, while also recognizing that digital media may enrich learning when used to facilitate exploration, imagination, and creativity rather than passive screen exposure (Nurhayati & Novianti, 2024; Yuliya et al., 2020).

Current literature suggests that digital play in early childhood education should be understood as a pedagogical practice situated at the intersection of children's play, teacher mediation, digital literacy, and institutional readiness. Vygotskian perspectives emphasize that play contributes to symbolic thinking, imagination, self-regulation, and creativity, because children use play to move beyond immediate reality, experiment with roles, create rules, and construct alternative meanings. The

literature review further indicates that safe and developmentally appropriate digital media can support children's creativity, social skills, and interactive learning when selected carefully and used within pedagogically meaningful contexts(Nurhayati et al., 2024). Studies cited also show that digital learning media containing animation, images, sound, and music can support thematic learning in early childhood settings (Ghofur & Nurhayati, 2023), while digital works and animation-based activities may stimulate children's creative expression and future-oriented skills (Kurniawati et al., 2024).

Despite these possibilities, digital play in early childhood education presents a persistent research and practice problem. Digital tools are often adopted before they are pedagogically integrated. Teachers may use videos, games, quizzes, drawing applications, or animation tools, yet such use does not automatically become creative, child-centered, or curriculum-aligned. The broader literature shows that teacher digital literacy, confidence, beliefs about play, and professional development strongly shape whether information and communication technology is meaningfully embedded in play-based learning (Rappa & Hesterman, 2026). Teachers' concerns about screen time, limited knowledge of technology-mediated play, and insufficient confidence can constrain implementation even when access to devices is available (Ahmad et al., 2024; Bendini & Devercelli, 2022).

The general solution proposed across the literature is not the expansion of technology use alone, but the development of guided, reflective, and play-based digital pedagogy. Digital tools should extend inquiry, storytelling, collaboration, symbolic thinking, and creative production rather than replace hands-on, social, imaginative, and child-led forms of play (Madsen et al., 2023). This implies a shift from technology as an instructional add-on to technology as a mediated cultural tool within play. Such a shift requires teachers to design activities that connect apps, games, digital images, sounds, and animation to children's real experiences, curriculum themes, peer interaction, and opportunities for reflection.

Previous studies identify several specific pathways for strengthening digital play. One pathway is professional development that integrates technical fluency with play-based pedagogy. Reviews indicate that sustained, context-sensitive professional development—especially models emphasizing design thinking, reflective practice, collaboration, and classroom-based experimentation—helps teachers move from isolated experimentation toward meaningful ICT-infused play (Musa et al., 2024). A related pathway is the use of PK-TPACK-informed approaches, in which teachers' pedagogical knowledge of play and technological-pedagogical-content knowledge co-evolve through practice, enabling them to combine digital tools with storytelling, inquiry, multimodal communication, and curriculum objectives (Yan & Wen, 2025).

A second pathway concerns institutional and ethical conditions. The literature emphasizes that digital play depends on infrastructure, reliable internet access, leadership support, coherent curriculum guidance, and active parental engagement (Bendini & Devercelli, 2022). Leadership can support implementation by allocating time for teacher collaboration, encouraging reflective practice, and aligning ICT use with curriculum and assessment. Curriculum guidance is equally important because digital literacy goals in early childhood must be translated into concrete play-based activities, not left as abstract policy statements (Nuryanti et al., 2024). At the same time, ethical and wellbeing considerations must be embedded into digital play. Research on digital wellbeing cautions against overuse and the displacement of face-to-face, sensory, and imaginative play, arguing for adult mediation, balance, privacy, safety, and developmentally appropriate digital citizenship (Cao & Li, 2022).

Closely related studies therefore suggest that high-quality digital play should be guided, balanced, creative, and institutionally supported. International literature shows that early years practitioners differ in their use of ICT, with some using computers, cameras, audio recorders, and software regularly, while others use them only occasionally or not at all (Nurhayati et al., 2025; Nurhayati & Judijanto, 2025; Sung & Siraj-Blatchford, 2014). Digital play can be conceptualized as a social system in which children play in groups, assume different roles, and participate in technologically mediated social interactions(Edwards, 2021). However, important gaps remain, especially in low-resource and developing-country contexts. The recent researchs noted that robust evidence remains limited for Indonesian PAUD and similar settings, particularly regarding how local infrastructure, teacher professional development, curriculum

alignment, home–school relations, and culturally responsive tools shape digital play and creativity (Gjelaj et al., 2020; Nurhayati & Judijanto, 2026).

This study addresses that gap by examining how teachers in 25 PAUD institutions in West Java and nearby districts transform apps, games, and animation into play-based learning. It asks: how do PAUD teachers use digital applications and media to support children's exploration, imagination, and creativity; what patterns of child engagement, teacher assessment, institutional support, and curriculum integration are evident; and what model of guided digital play can strengthen creativity-oriented early childhood pedagogy? The novelty of the study lies in identifying a digital play paradox: digital applications are widely used and positively received by teachers, children, parents, and institutions, yet their integration into curriculum, assessment, documentation, and institutional systems remains limited. The scope of the study is therefore empirical and conceptual: it analyzes local PAUD practices while proposing a guided digital-play pathway that links teacher design, child exploration, creative production, reflection, assessment, documentation, parental involvement, and curriculum integration.

METHOD

This study used a descriptive qualitative design supported by simple descriptive statistics. The design was appropriate because the research aimed to understand how PAUD teachers transform digital applications, games, videos, and animation into play-based learning that supports children's creativity. The study did not test causal effects; instead, it mapped teacher practices, child responses, institutional support, and barriers to implementation. The study involved 25 PAUD institutions located in West Java and nearby districts, including Bandung, West Bandung, Bandung City, Garut, Bekasi, Purwakarta, and Indramayu. The institutions included TK, Kober/KB, RA, TPA, and related early childhood education settings. Six institutions participated through direct interviews, while 19 provided responses through Google Form questionnaires. In total, the participating institutions represented 1,202 children. Participants were teachers or institutional representatives who understood classroom learning practices and the use of digital media in PAUD settings.

Institutions were included if they met the following criteria: they were PAUD providers; they had experience using digital media, applications, games, videos, or animation in learning; the respondent was directly involved in teaching or institutional learning practice; and they were willing to provide information through interviews, questionnaires, or documentation. Institutions were excluded if they were not early childhood education providers or did not provide relevant information about digital play and creativity.

Table 1. Participant Demographic Profile

Category	Description
Number of institutions	25 PAUD institutions
Institution types	TK, Kober/KB, RA, TPA, and related PAUD settings
Location	West Java and nearby districts
Data sources	6 direct interviews; 19 questionnaire responses
Children represented	1,202 children
Mean enrollment	48.1 children
Enrollment range	12–135 children
Respondents	Teachers or institutional representatives
Main focus	Digital applications, games, animation, and creative play-based learning

Data were collected through semi-structured interviews, Google Form questionnaires, and documentation. The instrument contained 15 main questions focusing on three areas: how teachers facilitate exploration, imagination, and creativity through digital media; how teachers use educational applications, interactive games, and digital art tools; and how teachers assess creative play based on children's interests and classroom context. Documentation was used to support interpretation of classroom practices, including the use of laptops, projected screens, digital drawing, animation, and quiz-based learning platforms. The documentation was treated as contextual evidence rather than as a source for identifying individual children. The qualitative data were analyzed using thematic analysis. Responses were read carefully, coded,

and grouped into recurring themes. The main themes included digital application use, teacher strategies, child engagement, creative production, assessment practices, parental support, institutional support, barriers, documentation, and curriculum integration. Descriptive statistics were used to calculate frequencies and percentages.

Participation was voluntary. Respondents were informed about the purpose of the study, the type of information collected, and the academic use of the findings. Informed consent was obtained before interviews, questionnaire completion, and documentation use. Anonymity and confidentiality were maintained. Individual children were not identified, and the analysis focused on aggregated institutional patterns rather than personal evaluation. Documentation was used only to describe learning practices and not to expose children's identities. Trustworthiness was strengthened through triangulation of interviews, questionnaire responses, and documentation. The study also combined thematic analysis with descriptive statistics to provide both qualitative depth and empirical clarity. Recurring themes were developed from repeated patterns across institutions rather than isolated statements. The study acknowledges its limitations: the findings rely mainly on teacher self-reports, do not directly measure children's creativity outcomes, and cannot be generalized to all PAUD institutions in Indonesia. Nevertheless, the dataset provides relevant contextual evidence of how digital play is practiced in selected Indonesian PAUD settings.

RESULTS AND DISCUSSION

Widespread but Uneven Adoption of Digital Play

The first theme indicates that digital play had already entered classroom practice across the participating PAUD institutions, but its implementation varied in depth and consistency. All 25 institutions reported that they had used digital applications or digital media in learning activities. This suggests that digital technology was no longer perceived as an unfamiliar learning resource. However, the data also show that adoption did not necessarily mean systematic pedagogical design. Only 20 of the 25 institutions reported that they had designed learning activities based on a particular digital application. Thus, digital play was broadly present, but not always organized as intentional, structured, and repeatable pedagogy.

The interview and questionnaire data show that some teachers had moved beyond occasional digital use and had begun to design digital learning activities according to classroom themes. One participant explained, "Various applications can be used as learning media for young children. Teachers can also design learning activities according to the content expected by the school" (Teacher 01, interview, translated). This statement reflects a shift from using digital tools as supplementary media toward using them as resources for teacher-designed learning. Nevertheless, the finding that not all institutions had designed application-based lessons suggests that teacher capacity and planning experience remained uneven. Table 2 summarizes the empirical distribution of digital play implementation across the five major themes. The table is presented here to clarify the pattern of implementation without repeating all narrative findings in the text.

Table 2. Empirical profile of digital play implementation across five themes

Empirical theme	Dominant evidence from the dataset	Pattern shown in the data
Adoption of digital play	All institutions reported using digital applications	Digital play was widely present but not equally developed
Teacher pedagogical design	Most, but not all, teachers had designed app-based learning	Digital use was stronger where teachers could plan application-based activities
Child engagement and creativity	Institutions reported enthusiasm, curiosity, drawing, sound, and animation activities	Digital play was associated with active classroom participation
Assessment and documentation	Teachers used observation, checklists, products, and process-based judgments	Assessment existed but remained mostly informal
Institutionalization	Only a small number of institutions integrated digital play into the curriculum	Digital play remained weakly embedded in formal curriculum structures

The table shows a clear progression from adoption to institutionalization. Digital tools were widely used, yet their integration into formal curriculum structures remained limited. This finding establishes the empirical basis for the later discussion of the gap between classroom-level experimentation and institution-level curriculum embedding.

Teachers' Digital Tool Use and Play-Based Learning Strategies

The second theme concerns how teachers used digital tools and converted them into play-based learning strategies. The data show that teachers used a broad range of tools, including Canva, Wordwall, Quizizz, Scratch Jr, YouTube, Spin Wheel, Duolingo, Smart Hafidz, drawing animation applications, digital puzzles, educational games, and language-related applications. These tools were not used in a uniform manner. Teachers selected them according to learning themes, children's interests, available devices, institutional support, and their own familiarity with the applications. The strongest pedagogical pattern was the connection between digital activity and daily learning themes. Twenty-three institutions reported that they connected digital play with the topic of the day, children's everyday experiences, or real-world projects. One teacher described this process as follows: "After children played an educational game about animals, they drew or told stories about the animals they had learned about" (Teacher 02, questionnaire, translated). Another participant described the use of a quiz application to support sound recognition: "Children could recognize animal sounds through a digital quiz activity" (Teacher 03, questionnaire, translated). These excerpts show that digital play was most meaningful when it was extended into drawing, storytelling, recognition, discussion, or project-based expression. Table 2 classifies the digital tools reported in the data according to their pedagogical function. The purpose of this table is not to list every application individually, but to show how different tools supported different forms of play-based learning.

Table 2. Functional classification of digital tools used by teachers

Tool function	Examples of tools reported by teachers	Evidence of classroom use
Digital stimulus	YouTube, learning videos, animal-sound media	Used to introduce themes, songs, sounds, stories, and visual examples
Interactive play	Wordwall, Quizizz, Spin Wheel, puzzles, educational games	Used for recognition, recall, turn-taking, guessing, and playful participation
Creative production	Canva, Scratch Jr, digital drawing, drawing animation	Used to create images, animations, books, or visual artifacts
Language and religious learning	Duolingo, Arabic language apps, Smart Hafidz	Used to support vocabulary, language exposure, memorization, and culturally relevant learning
Hybrid digital–manual activity	Manual drawing followed by digital animation	Used to connect children's physical artwork with digital transformation

The data indicate that teachers' strategies varied from relatively simple stimulus-based use to more complex creative production. Video-based tools were commonly used to introduce content, while quiz and game platforms encouraged participation. Creative tools such as Canva, drawing animation, and Scratch Jr were more closely associated with children's production of visual or animated artifacts. This variation suggests that the pedagogical value of digital play depended not only on the tool itself, but also on how teachers embedded the tool within play, theme-based learning, and creative tasks.

Children's Engagement, Exploration, and Creative Production

The third theme shows that children responded positively to digital play. All participating institutions reported that children were enthusiastic and excited when using digital media. Teachers described children as curious, motivated, and eager to participate. One teacher stated, "Children became enthusiastic and curious when digital media were used in play-based learning" (Teacher 04, interview, translated). Another participant noted that digital activities sometimes continued beyond school: "Children brought the experience home and asked their parents to repeat what had been done at school" (Teacher 05, questionnaire, translated). These accounts suggest that digital play generated strong emotional and motivational engagement. The data

also show that children's opportunities for exploration were uneven. Nineteen institutions reported giving children time to explore applications independently, either flexibly or within a limited period. One teacher reported giving children approximately five minutes to explore an application. However, six institutions did not provide independent exploration time because of limited devices and limited instructional time. This finding indicates that children's agency in digital play was shaped by classroom resources and time allocation. Where devices were limited, children had fewer opportunities for direct manipulation and experimentation. Creative production emerged as one of the strongest empirical patterns. Twenty-three institutions reported using digital media for art, sound, drawing, or animation. One participant described a hybrid manual-digital activity: "Children first made drawings on paper, and then the drawings were turned into moving digital animations" (Teacher 06, questionnaire, translated). This example shows that digital play was not always separated from traditional early childhood media. Instead, digital tools extended children's manual artwork into animated, multimodal forms. Figure 1 summarizes the empirical pathway repeatedly identified in the data. The figure is presented after this explanation to show how teacher-led digital tool use moved toward child engagement, thematic connection, creative production, and documentation.

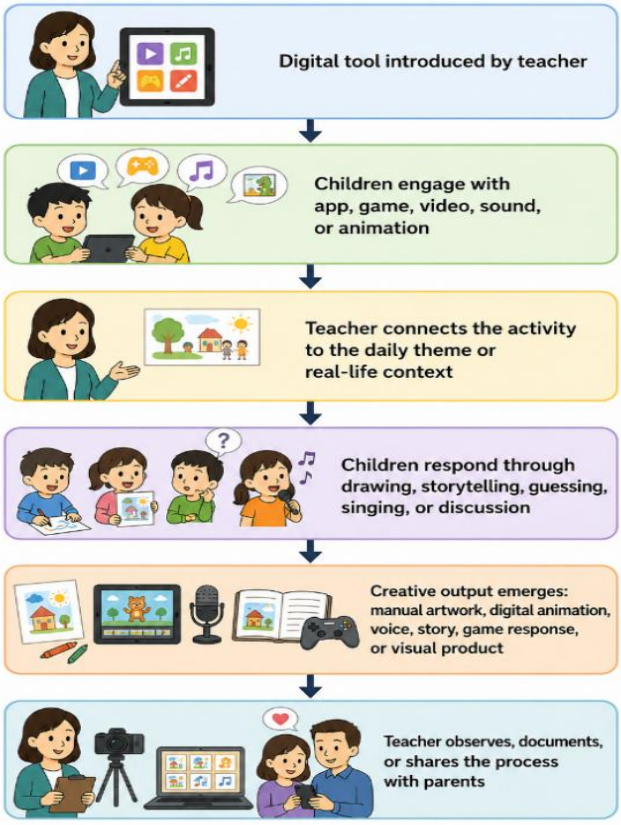

Figure 1. Empirical pathway from digital tool use to creative production
Source: Authors' analysis from the empirical data 2026

The figure captures the sequence found across several responses: digital play began with teacher facilitation, but it became creative when children produced, narrated, transformed, or extended the digital stimulus. This finding shows that digital creativity in the participating PAUD institutions was not merely a matter of children using devices; it involved teacher mediation, thematic connection, child response, and creative expression.

Assessment, Documentation, and Home–School Communication

The fourth theme concerns how teachers assessed and documented children's digital creativity. The findings show that assessment

practices existed, but they were mostly informal and varied across institutions. Teachers reported using observation, checklists, children's work, and process-based judgments. One participant emphasized the importance of process-oriented assessment: "Assessment of creativity in PAUD should focus on how children explore, experiment, and solve problems during the creative process, not merely on the beauty of the final product" (Teacher 07, questionnaire, translated). Another teacher explained the use of a structured checklist: "I use a checklist to assess children's creativity" (Teacher 08, questionnaire, translated). A further response suggested that assessment also considered character development: "Assessment is not only about children's work, but also about character development" (Teacher 09, questionnaire, translated). These excerpts indicate that teachers did not evaluate digital creativity only through final products. Some teachers considered exploration, experimentation, problem-solving, persistence, expression, and character-related indicators. Nevertheless, the data suggest that assessment was not yet standardized across institutions. There was no evidence of a shared rubric or common framework for assessing digital creativity. Observation remained the most frequently mentioned approach, while checklist-based and process-oriented assessment appeared in selected responses.

Documentation and communication with parents were also part of the digital play process. Many institutions shared children's work or learning documentation with parents. In some cases, sharing was limited to school-parent communication. In other cases, good practices were shared more widely through social media, professional learning activities, or teacher networks, with parental permission. One teacher explained, "Children's digital exploration results were shared with parents, and wider sharing was done with parental permission" (Teacher 10, questionnaire, translated). Another participant stated, "Good practices using interactive games were shared with other institutions after teacher training" (Teacher 11, interview, translated). Table 3 summarizes the assessment and documentation practices identified in the empirical data. The table is included to clarify the range of evidence used by teachers to understand children's creative development.

Table 3. Assessment and documentation practices reported by teachers

Practice type	Empirical evidence from teachers	Main aspect observed
Observation	Most teachers reported observing children during digital play	Engagement, curiosity, participation, and interaction
Checklist	Some teachers reported using checklists for creativity assessment	Structured indicators of children's creative behavior
Process-focused assessment	Teachers emphasized exploration, experimentation, and problem-solving	Creativity as process rather than final product
Product-based assessment	Teachers considered children's drawings, animations, or digital artifacts	Visible creative output
Character-related assessment	Some responses linked digital creativity with character development	Responsibility, confidence, persistence, and expression
Parent sharing	Institutions shared children's work or learning documentation with parents	Home–school communication and parental recognition
Wider dissemination	Some teachers shared good practices through social media or training networks	Professional learning and institutional visibility

The table shows that teachers had already developed practical ways to observe digital creativity, but these practices remained uneven. Documentation was useful for communicating with parents, but it had not yet become a systematic institutional mechanism for assessment, reflection, and professional learning.

Institutional Support, Barriers, and Curriculum Integration Gap

The fifth theme concerns the institutional conditions that enabled or constrained implementation. All participating institutions reported that parents supported children's digital creativity. Teachers indicated that parents generally responded positively when digital activities were framed as learning-oriented and creativity-enhancing. One participant stated, "Parents support children's digital creativity activities at school" (Teacher 12, questionnaire, translated). This support was important because children's digital learning experiences often extended beyond the classroom. Institutional support was also reported across the participating

settings. Support included device provision, Wi-Fi facilities, and internal teacher training. One participant noted, "The institution supports digital play by providing devices and internet facilities" (Teacher 13, questionnaire, translated). Another stated, "In-house training helps teachers learn how to use digital media in learning" (Teacher 14, interview, translated). These responses show that institutional support was present, at least in basic forms.

However, support did not eliminate implementation barriers. Teachers reported several constraints, including limited teacher skills, limited media and devices, limited instructional time, and unstable internet connection. One response summarized the main challenges clearly: "The main challenges are teachers' limited digital play skills, limited media and time, and unstable internet connection" (Teacher 15, questionnaire, translated). These constraints affected children's opportunities for exploration and teachers' ability to implement digital play consistently. The most important finding in this theme is the curriculum integration gap. Although all institutions had used digital applications, only four had optimized digital play as part of the school curriculum. This means that digital play was widely practiced but not yet fully embedded in formal curriculum planning. In many institutions, the activity remained occasional, teacher-dependent, or dependent on available facilities. One participant expressed the expectation that digital play should be directed toward meaningful creativity: "Children should use digital technology not for unnecessary things, but to develop and sharpen their creativity" (Teacher 16, questionnaire, translated). This statement reflects the aspiration for more purposeful digital learning, even though formal curriculum integration remained limited.

The five themes show that teachers in the participating PAUD institutions were beginning to transform apps, games, videos, and animation into play-based learning. Digital play supported children's enthusiasm, exploration, and creative production when teachers connected it to daily themes, real-life contexts, and expressive activities. However, the findings also show that digital creativity remained uneven. Teacher competence, infrastructure, time, assessment tools, documentation systems, and curriculum integration all influenced whether digital play became a sustained pedagogical practice or remained an occasional classroom activity.

Discussion

Interpreting Digital Play as Guided, Multimodal, and Creative Practice

The findings suggest that digital play in the participating PAUD institutions should not be interpreted merely as the presence of devices, applications, or screen-based activities in classrooms. Although all institutions had used digital media, the more significant finding is that teachers were beginning to transform apps, games, videos, sounds, and animation into play-based learning experiences. This interpretation is consistent with contemporary theories of digital play, which argue that digital play is not equivalent to passive screen exposure. Rather, it is a relational, multimodal, and sociomaterial practice in which children, teachers, digital tools, physical materials, classroom routines, and social interactions jointly shape learning (Masoumi & Bourbour, 2024).

This theoretical perspective is important because the empirical data showed that the strongest practices occurred when digital activities were connected to drawing, storytelling, sound recognition, animation, and daily learning themes. Such practices align with Vygotskian sociocultural theory, which views learning as mediated by cultural tools and social interaction(Marhamah et al., 2026). In this study, digital tools functioned as cultural mediators that supported imagination and expression when teachers guided children to move from digital stimuli toward creative production. The use of digital quizzes to recognize animal sounds or the transformation of manual drawings into digital animation illustrates how digital and non-digital materials can be combined to support symbolic expression and creative meaning-making. This is in line with postdigital and multimodal perspectives, which emphasize that young children's creativity often emerges through the interaction of speech, gesture, drawing, touch, sound, image, and digital output (Kewalramani et al., 2024).

Teacher Mediation and the Shift from Digital Use to Digital Pedagogy

The findings also highlight the central role of teachers in determining whether digital media become pedagogically meaningful. The data showed that all institutions used digital applications, but only some teachers had designed digital-application-based learning. This indicates that the critical issue is not access alone, but

pedagogical transformation. Digital tools do not automatically produce creativity; they require teacher mediation, planning, scaffolding, and contextualization. This finding is consistent with the literature on teacher digital literacy, pedagogical beliefs, and professional development. Prior studies indicate that teacher confidence, beliefs about play, and ability to integrate ICT into play-based pedagogy strongly influence the quality of digital play implementation (Bendini & Devercelli, 2022; Winarti et al., 2022). The present study supports this claim. Teachers who could connect applications to classroom themes, real-life experiences, and children's creative expression demonstrated more advanced pedagogical use than those who used digital tools only occasionally or as supplementary media.

The findings are also consistent with TPACK-oriented views of technology integration. Effective digital play requires teachers to align technological knowledge, pedagogical knowledge, and content knowledge. In the PAUD context, this means that teachers must select age-appropriate tools, connect them to play-based goals, manage exploration time, support children's creative responses, and assess the process rather than only the product. This supports the argument that digital play should be scaffolded and strategically integrated to sustain imagination, inquiry, and cognitive development (Alkhawaldeh et al., 2026).

The findings are broadly in line with international studies showing that digital play can support creativity, exploration, imagination, and problem-solving when it is open-ended, socially mediated, and connected to children's active production. For example, research on digital games and creative output reports gains in children's drawing innovativeness and storytelling richness after digital play interventions (Zhang & Chen, 2025). Similarly, studies on digital storytelling, programming-like activities, and atelier-based digital-nondigital practices show that digital media can support creative reasoning, multimodal expression, and exploratory problem-solving when guided by educators (Magnusson, 2021).

However, this study also reveals a tension that is particularly relevant to developing-country contexts. In higher-resource settings, digital play is often discussed in relation to sophisticated classroom design, atelier practices, coding environments, transmedia literacy, or AI-supported learning. In the PAUD institutions examined here, digital creativity was often built from accessible tools such as YouTube, Canva, Quizizz, Wordwall, Spin Wheel, drawing animation, and simple games. This does not contradict international literature; rather, it contextualizes it. The findings show that meaningful digital play in lower-resource contexts may emerge through low-cost, teacher-adapted, and hybrid practices rather than through advanced technological ecosystems(Susanti & Nurhayati, 2024).

The findings are also consistent with studies from other developing or resource-constrained contexts that identify infrastructure, teacher readiness, parental involvement, and policy alignment as major determinants of ICT implementation. Literature on low-resource and developing-country ECE contexts notes that robust evidence remains limited and that digital play is often constrained by device access, connectivity, governance, and professional development gaps (Güneş & Toran, 2022). The present findings strongly align with these concerns. Although teachers and parents were supportive, implementation remained constrained by limited teacher skills, insufficient devices, limited time, and unstable internet access. At the same time, the study partially contrasts with assumptions that developing-country ECE settings are primarily characterized by resistance to technology. The PAUD teachers in this study were not resistant; they were generally willing to use digital media and recognized its value for creativity. The main challenge was not rejection, but the absence of systematic institutionalization. This distinction is important because it shifts the policy question from "How can teachers be persuaded to use technology?" to "How can motivated teachers be supported to transform digital use into sustainable pedagogy?"

The Curriculum Integration Gap and the Digital Play Paradox

The most important theoretical contribution of this study is the identification of a gap between classroom-level adoption and curriculum-level integration. The findings show that digital media were widely used and positively received, yet only a small number of institutions had integrated digital play into formal curriculum planning. This pattern may be understood as a digital play paradox: digital play is accepted and practiced, but not yet structurally embedded.

This paradox is significant when read against literature emphasizing that digital play should be part of broader digital competence development rather than a separate or incidental classroom activity. Masoumi and Bourbour (2024) argue that digital competence in early childhood includes production, creativity, problem-solving, ethical awareness, and producer identity. If digital play remains occasional and teacher-dependent, these broader competencies are unlikely to develop consistently. Similarly, professional development literature emphasizes that curriculum guidance, leadership support, infrastructure, and parental engagement are necessary for moving from experimentation to sustainable practice(Fonsén & Heıkka, 2023).

The findings therefore suggest that PAUD digital creativity requires a multilevel ecosystem. At the classroom level, teachers need pedagogical strategies to connect digital media with play, imagination, and creative production. At the institutional level, schools need devices, internet access, documentation systems, assessment tools, and curriculum planning. At the family level, parents need guidance so that digital play supports creativity without becoming excessive screen exposure. This is consistent with literature emphasizing that digital play is situated within broader classroom, home, and policy ecologies (Gondiawati & Nurhayati, 2024; Moon, 2025).

The findings imply that future PAUD development should move beyond introducing more applications. The priority should be guided digital play: activities in which teachers intentionally connect digital tools with children's exploration, storytelling, drawing, sound, movement, collaboration, and reflection. Assessment should also become more systematic, focusing on process indicators such as curiosity, experimentation, problem-solving, collaboration, and expressive confidence. This direction is consistent with literature arguing that digital play supports creativity most effectively when it is open-ended, mediated by educators, and connected to multimodal production rather than passive viewing (Heljakka & Ihamäki, 2018). For research, the study indicates the need for deeper classroom observation, child-level creativity assessment, and comparative studies across rural and urban PAUD settings. The present study contributes contextual evidence from Indonesian PAUD, but it also shows that digital creativity in developing-country contexts cannot be understood through adoption rates alone. What matters is whether digital play becomes guided, creative, documented, assessed, and embedded in curriculum.

CONCLUSION

This study examined how teachers in early childhood education transform applications, games, videos, and animation into play-based learning that supports children's digital creativity. The findings show that digital play has become a visible and accepted part of learning practice in the participating PAUD institutions. All institutions reported using digital applications, and most had moved beyond basic media use by designing digital-application-based learning, connecting digital play to daily themes, and using digital media for creative activities such as drawing, sound exploration, storytelling, and animation. The main finding is that digital play in PAUD is promising but uneven. Teachers are not merely using digital tools as entertainment or supplementary media. In many cases, they transform digital content into contextual learning experiences: games become prompts for drawing and storytelling, videos become starting points for discussion, and manual drawings are extended into digital animation. These practices show that digital play can support children's imagination and creativity when it is active, multimodal, guided, and connected to real-life experience. At the same time, the study reveals a clear implementation gap. Although digital media were widely adopted and positively received by children, parents, and institutions, only a small number of PAUD institutions had integrated digital play into the formal curriculum. This finding shows that digital creativity remains largely dependent on individual teacher initiative rather than institutional systems. The barriers identified in the study—limited teacher competence, insufficient devices, limited time, unstable internet access, informal assessment, and weak documentation—indicate that successful digital play requires more than access to technology.

The implications are both pedagogical and institutional. Pedagogically, teachers need to design digital play as a balanced learning experience that combines child exploration, teacher guidance, non-digital materials, social interaction, and creative production. Digital tools should not replace hands-on and imaginative play; they should extend children's opportunities to

express, narrate, design, collaborate, and reflect. Institutionally, PAUD leaders need to strengthen teacher training, provide adequate infrastructure, develop clear procedures for safe digital use, create documentation systems, and integrate digital creativity into curriculum planning and assessment. This study contributes to existing knowledge by offering empirical evidence from Indonesian PAUD settings, where research on digital play and creativity remains limited. Its key contribution is the identification of the digital play paradox: high classroom-level adoption and enthusiasm coexist with weak curriculum integration and limited institutionalization. By highlighting this paradox, the study shifts the discussion from whether digital media should be used in early childhood education to how digital tools can be pedagogically transformed into meaningful, creative, and developmentally appropriate play-based learning. Future research should examine children's creative outcomes more directly through classroom observation, artifact analysis, and longitudinal designs. Further studies should also compare urban and rural PAUD contexts, investigate parental mediation of digital play at home, and develop practical assessment rubrics for digital creativity in early childhood education. Such research would strengthen the evidence base for designing digital play that is not only engaging, but also equitable, safe, creative, and pedagogically sustainable.

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