



Enhancing Digital Competence: A Comprehensive Digital Educational Games Training Needs Analysis for PAUD Teachers

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Abstract

This study assesses the digital competencies and training needs of early childhood education (PAUD) teachers in Kecamatan Batujajar, West Bandung Regency. emphasizing their use of digital educational games. A survey was conducted to evaluate teachers' skills and confidence with computer technologies and educational software. Results indicate a significant gap in digital literacy; most teachers lack fundamental computer skills and familiarity with digital tools, despite acknowledging their benefits for enhancing student engagement. This research advocates for targeted digital literacy training tailored to early childhood educators, focusing on both technical skills and pedagogical methods for effective technology integration. The study also recommends ongoing professional development to help teachers overcome technological barriers. This work is novel in pinpointing the specific digital adoption challenges faced by PAUD teachers and suggests focused training programs to enhance their digital capabilities, which is crucial for improving educational outcomes.

Keywords: digital educational games; digital literacy; early childhood education; paud teachers.

INTRODUCTION

The integration of digital technology into educational practices has become a pivotal focus of contemporary research, particularly as educators worldwide strive to enhance learning outcomes and prepare students for an increasingly digital world. In the context of early childhood education (ECE), digital tools, especially educational games, are recognized for their potential to support cognitive, social, and emotional development (Masri & Nurhayati, 2024). However, the adoption of these tools has been uneven, largely due to varying levels of digital literacy among educators and the availability of relevant training programs (Marsegi et al., 2023; Milyane et al., 2023; Musa et al., 2022; Winarti et al., 2022).

The concept of digital literacy extends beyond basic computer skills, encompassing the ability to critically engage with digital content and effectively use digital tools in pedagogical contexts. Studies by (Nuryanti et al., 2024; Ganicheva et al., 2019) emphasize the importance of digital literacy in modern education, particularly in fostering an environment where young learners can thrive in a technology-rich world. However, research has also shown that many early childhood educators lack the digital competence necessary to integrate technology into their classrooms effectively (Marsegi et al., 2023; Musa et al., 2022; Novitasari & Fauziddin, 2022; Nurhayati et al., 2023; Nurhayati, 2024; Nurhayati, Fitri, et al., 2024). Digital literacy in early childhood education extends beyond technical skills to include the strategic use of technology for enhancing pedagogical practices. One significant way this is achieved is with digital educational games, which serve as practical tools for enriching the learning experience. These games, when integrated effectively, can engage young learners and support various aspects of their development. Research by (Behnamnia et al., 2020; Parkash, 2022)

demonstrates that digital games can enhance problem-solving abilities, foster creativity, and improve social-emotional learning. According (Kavak, 2022) further emphasizes the potential of these games to promote collaborative learning and cognitive development. Thus, digital educational games are not just supplementary tools but are integral to modern pedagogical practices, underpinned by a strong foundation in digital literacy.

Despite the growing body of evidence supporting the use of digital educational games, their adoption in early childhood education has been inconsistent. Barriers such as a lack of familiarity with digital games, concerns about screen time, and challenges in selecting age-appropriate content have been documented in studies by (Kaimara et al., 2021; Dube et al., 2021). These challenges highlight the need for targeted professional development programs that can equip educators with the skills and knowledge to effectively integrate digital games into their teaching practices. Moreover, studies have shown that early childhood educators often feel unprepared to integrate digital tools into their classrooms, citing a lack of relevant training and support as key barriers (Musa et al., 2024; Musa & Nurhayati, 2024; Novitasari & Fauziddin, 2022; Winarti et al., 2022). This indicates a critical need for professional development programs that are specifically tailored to the needs of early childhood educators. Study by (Nuryanti et al., 2024; Kristiyanti & Nurhayati, 2024; Aisyah et.al., 2024) also emphasize the importance of providing early childhood educators with training that is both practical and relevant, enabling them to confidently use digital tools to support young learners' development.

While there is a substantial body of research exploring the benefits of digital educational games and the importance of digital literacy among teachers, there remains a significant gap in understanding how these factors specifically affect early childhood educators, particularly in developing regions like Kecamatan Batujajar. Despite the acknowledged benefits of digital educational games and the importance of digital literacy among educators, the specific impact on early childhood teachers, especially in less-developed regions such as Kecamatan Batujajar, has been underexplored. Research predominantly concentrates on primary and secondary education levels, overlooking the distinctive challenges faced by early childhood educators. These challenges are pronounced in regions like Batujajar, where limited access to technology, inadequate training resources, and a lack of institutional support exacerbate the digital divide. In Kecamatan Batujajar, empirical observations reveal that PAUD teachers often struggle with basic digital operations essential for implementing educational games. The infrastructure for digital education in these settings is typically underdeveloped, and teachers receive minimal ongoing technical support. Unlike their counterparts in more urbanized or developed areas, these educators face significant barriers to integrating technology into their teaching practices, not only due to infrastructural deficiencies but also due to a lack of tailored training programs that address their specific needs and contexts.

Most existing studies have focused on primary and secondary education, with limited attention given to the unique challenges and needs of early childhood educators. Additionally, while previous research has highlighted the importance of professional development in enhancing digital literacy, there is a lack of targeted studies that identify the specific training needs of PAUD teachers and how these needs can be addressed through tailored programs. This research introduces a distinct focus compared to previous studies, centering specifically on the unique challenges faced by early childhood educators in Kecamatan Batujajar, a less-developed region. Unlike prior research that broadly addresses digital literacy across primary and secondary educators in diverse contexts such as study by (Kumari & D'Souza, 2016), this

study narrows down to PAUD teachers in a localized setting. This approach allows for a deeper exploration of the specific barriers these educators face due to infrastructural deficiencies and limited access to technology, which are less pronounced in more urban or developed educational settings. This research aims to fill this gap by investigating the digital competency and training needs of PAUD teachers in Kecamatan Batujajar, with a particular focus on their familiarity with and use of digital educational games. By exploring these aspects, the study seeks to provide insights into the challenges faced by early childhood educators in adopting digital tools and to offer recommendations for enhancing their digital literacy through tailored professional development programs. Moreover, the study aims to provide a comprehensive understanding of the barriers to technology integration in early childhood education and to propose practical solutions for overcoming these challenges.

METHOD

This study employed a survey method to thoroughly examine the training needs of PAUD teachers in Kecamatan Batujajar, particularly in relation to the integration of digital educational games into their teaching practices. The survey approach was selected for its ability to efficiently gather both quantitative and qualitative data from a defined population, thereby facilitating a comprehensive understanding of the existing competencies, challenges, and training requirements among these educators (Iswahyudi et al., 2023; Nurhayati, Kurnianta, et al., 2024). The research was conducted in Kecamatan Batujajar, Kabupaten Bandung Barat, an area chosen for its diverse educational landscape that encompasses both urban and rural school environments. This diversity provided an ideal context for exploring variations in digital literacy and professional development needs among PAUD teachers. Moreover, Batujajar represents a region where limited research has been conducted on the use of digital educational tools in early childhood education, thereby offering a unique opportunity to contribute to the academic discourse in this field.

The target population consisted of all PAUD teachers within the district, and from this group, a sample of 20 respondents was selected using Simple Random Sampling. This technique was chosen to ensure the representativeness of the sample by providing each teacher in the population with an equal chance of selection. To execute this, each teacher was assigned a unique identifier, and a random number generator was used to select the 20 participants. This process ensured that the sample reflected the broader population's characteristics, thereby enhancing the reliability and generalizability of the study's findings. The demographic profile of the selected respondents was as follows: the participants ranged in age from 23 to 57 years, representing a broad spectrum of career stages. All respondents were female, consistent with the typical gender composition in early childhood education in the region. The educational background of the respondents indicated that 16 had completed high school (SMA), while 4 held a Bachelor's degree (S1). The teaching experience of the participants varied from 1 to 17 years, capturing both novice and seasoned educators. Notably, none of the respondents had previously received training in Information and Communication Technology (ICT), highlighting a significant gap in their professional development that this study aimed to address.

Data was gathered through a meticulously designed questionnaire that sought to capture a comprehensive range of information, including demographic details, current competencies in the use of digital educational games, challenges encountered in implementing these tools, and the specific training needs of the teachers. The questionnaire included both closed-ended

questions, which allowed for quantitative analysis, and open-ended questions, which provided richer qualitative insights into the respondents' experiences and perspectives. To ensure the validity of the research instrument, the questionnaire was reviewed by experts in early childhood education and educational technology. Their feedback was instrumental in refining the questionnaire to ensure that it was clear, relevant, and capable of accurately capturing the necessary data. The reliability of the instrument was assessed through a pilot test with a subset of the population, and Cronbach's alpha was used to confirm the internal consistency of the questions. The collected data were analyzed using a combination of descriptive statistics and thematic analysis. Quantitative data were processed using statistical software to generate summaries that highlighted the most common training needs, challenges, and existing competencies among the respondents. Descriptive statistics provided a clear and concise overview of the distribution of responses, allowing for the identification of key trends and patterns. Meanwhile, qualitative data from the open-ended questions were analyzed thematically, enabling the identification of recurring themes and providing deeper contextual insights that complemented the quantitative findings.

RESULTS AND DISCUSSION

The survey results present a detailed and nuanced understanding of the current state of digital competency, familiarity with educational games, and the training needs of PAUD teachers in Kecamatan Batujajar. These findings are organized into five primary domains: Digital Competency and Familiarity with Educational Games, Training Needs and Preferences, Challenges in Digital Integration, Perceived Importance of Training, and Preferred Training Content. The comprehensive survey result is presented in the Table 1. Below.

Table 1. Comprehensive Survey Result

Category	Option 1	Option 2	Option 3	Option 4	Total Responses
Demographics					
Age	23-57 years				20
Gender	Female				20
Educational Background	SMA (16)	S1 (4)			20
Experience					
Years Teaching PAUD	1-17 years				20
Previous ICT Training	Yes (0)	No (20)			20
ICT Usage and Confidence					
Frequency of Computer Use in Teaching	Never (12)	Rarely (8)	Often (0)	Always (0)	20
Familiarity with Educational Digital Games	Yes (2)	No (18)			20

Category	Option 1	Option 2	Option 3	Option 4	Total Responses
Confidence in Operating Computer	Not Confident (12)	Somewhat Confident (8)	Confident (0)	Very Confident (0)	20
Confidence in Using Educational Software	Not Confident (12)	Somewhat Confident (8)	Confident (0)	Very Confident (0)	20
Need to Improve Knowledge of ICT Use of Educational Software in Teaching ICT Skills	Yes (20)	No (0)			20
Frequency of Internet Use for Teaching Materials	Never (6)	Rarely (14)	Often (0)	Always (0)	20
Confidence in Operating Mobile Devices	Not Confident (6)	Somewhat Confident (14)	Confident (0)	Very Confident (0)	20
Confidence in Installing Apps on Mobile Devices	Not Confident (19)	Somewhat Confident (1)	Confident (0)	Very Confident (0)	20
Need to Improve Technical Skills Usage of Educational Digital Games	Yes (20)	No (0)			20
Frequency of Using Digital Games for Teaching	Never (20)	Rarely (0)	Often (0)	Always (0)	20
Difficulty in Using Educational Digital Games Training Needs	Yes (20)	No (0)			20
Need for Further Guidance on Digital Games Preferred Mode of Training	Yes (20)	No (0)			20
Preferred Mode of Training	Face-to-Face (20)	Online (0)	Hybrid (0)		20

Category	Option 1	Option 2	Option 3	Option 4	Total Responses
Interest in Collaborative Training	Yes (20)	No (0)			20

❖ **Digital Competency and Familiarity with Educational Games**

The survey uncovered a substantial gap in digital literacy among the respondents. Notably, 60% of the 20 teachers surveyed reported never using a computer in their teaching, while the remaining 40% indicated that they rarely use computers. Furthermore, a staggering 90% of respondents were unfamiliar with digital educational games, with only 10% demonstrating any awareness of these tools. This unfamiliarity extends to their confidence in using computers and educational software, with 60% of teachers expressing a lack of confidence in both areas. These findings point to a critical deficiency in foundational digital skills and a lack of exposure to educational technology among the teachers.

The low levels of digital competency and limited familiarity with educational games observed in this study are consistent with the findings of (Garcia-Delgado et al., 2023), who emphasized that a significant proportion of teachers worldwide lack the foundational digital skills required to integrate technology effectively into their teaching practices. This issue is particularly pronounced in early childhood education, where the adoption of digital tools has historically lagged behind other educational levels (Novitasari & Fauziddin, 2022; Nurhayati, Fitri, et al., 2024; Winarti et al., 2022). The lack of confidence in using computers and educational software among the respondents mirrors the findings of (Andyani et al., 2020), who demonstrated that teachers' self-efficacy in technology use directly influences their willingness and ability to integrate digital tools into their pedagogy. Moreover, the respondents' unfamiliarity with digital educational games is concerning, especially given the robust body of research that highlights the potential of these tools to significantly enhance student engagement and learning outcomes (Kavak, 2022; Tasliyah et al., 2020). Without exposure to or training in these digital tools, teachers are unlikely to leverage the benefits of educational games, which have been shown to support various dimensions of child development, including cognitive, social, and emotional skills (Dubé & Dubé, 2021; Kavak, 2022; Parkash, 2022).

❖ **Training Needs and Preferences**

The survey revealed a unanimous recognition among respondents of the need to enhance their ICT knowledge, with all 20 teachers expressing a strong desire for training. Despite this, none of the teachers had previously utilized educational software in their teaching, and all reported encountering difficulties in finding and effectively using digital educational games. The strong preference for in-person training, expressed by all respondents, underscores a clear demand for hands-on, interactive training experiences that can effectively bridge the existing digital literacy gap.

The unanimous demand for ICT training among respondents is indicative of a broader trend identified in educational research, where there is a persistent gap between teachers' recognition of the importance of technology and their actual utilization of it in the classroom (Amhag et al., 2019; Iskandar et al., 2023; Sulkipani et al., 2024). The preference for in-person training, as noted in this study, aligns with the findings of (Liao et al., 2021), who argued that face-to-face professional development sessions are more effective in building teacher confidence and providing the practical, hands-on experience necessary for successful technology integration. The respondents' preference for in-person training suggests that they

value interactive and supportive learning environments, where they can engage directly with trainers and peers, facilitating deeper learning and skill acquisition. The reported difficulties in finding and using digital educational games further emphasize the need for curated resources and structured training that guide teachers in selecting and implementing the most appropriate tools for their classrooms. This is consistent with the findings of Kimmons and Hall (2018), who highlighted the importance of providing teachers with concrete examples and models of technology integration to help them overcome barriers to adoption.

❖ Challenges in Digital Integration

The challenges identified by the respondents were multifaceted, reflecting both technical and infrastructural barriers. While 70% of the teachers reported using the internet only rarely to search for teaching materials, 30% indicated that they never use the internet for this purpose. This limited engagement with digital resources is compounded by a moderate level of confidence in using mobile devices—70% of respondents were somewhat confident—contrasted with 95% reporting a lack of confidence in installing applications. None of the teachers had participated in ICT training previously, highlighting a significant gap in professional development opportunities and raising concerns about their preparedness to integrate technology effectively into their pedagogical practices.

The challenges identified in this study, particularly the lack of confidence in using mobile devices and educational software, align with the findings of (Wang, 2021), who documented similar obstacles in their research on technology integration in classrooms. The absence of prior ICT training among respondents further exacerbates these challenges, as highlighted by (Akram et al., 2022), who identified inadequate training as a significant barrier to effective technology use in education. These findings are also consistent with (Prieto et al., 2019) concept of "second-order barriers" to technology integration, which include teachers' beliefs, attitudes, and confidence. While first-order barriers, such as access to technology, are essential, overcoming second-order barriers is crucial for the successful integration of digital tools into teaching practices (Sánchez-Prieto et al., 2019). This study suggests that professional development programs should address both types of barriers, providing not only the necessary technological resources but also fostering a supportive environment that builds teachers' confidence and shifts their attitudes towards technology. The moderate confidence in using mobile devices but a lack of confidence in installing applications indicates a need for more specific, task-oriented training. This aligns with (Love et al, 2020) argument that professional development should focus on the specific skills teachers need to perform essential tasks, rather than offering generalized technology training that may not directly address their day-to-day needs.

❖ Perceived Importance of Training

There was unanimous recognition among respondents of the importance of digital educational games in early childhood education, with all 20 teachers agreeing that such tools could substantially enhance learning outcomes. Additionally, there was widespread support for the inclusion of digital game training within professional development programs, with all teachers expressing a need for ongoing guidance and support in effectively using these tools. This reflects a shared belief that digital tools, when integrated thoughtfully and strategically, can play a pivotal role in enriching the educational experiences of young learners.

The unanimous belief in the potential of digital educational games to enhance learning outcomes, coupled with strong support for integrating such training into professional

development programs, underscores the urgency of addressing these training needs. This finding aligns with (Didion et al., 2020) research, which demonstrated that well-designed professional development programs can have a profound impact on teacher effectiveness and student outcomes. The findings from this study suggest that targeted training in digital educational games could play a crucial role in enhancing the pedagogical practices of early childhood educators. The respondents' expressed need for ongoing guidance and support also aligns with (Musa et al., 2024) emphasis on the importance of sustained professional development that provides teachers with continuous learning opportunities and fosters reflective practice. In the rapidly evolving field of digital education, where technologies and best practices are continually advancing, providing ongoing support is crucial to ensure that teachers remain adept at integrating new tools into their teaching.

❖ Preferred Training Content

The respondents expressed a strong interest in training that not only covers foundational digital skills but also delves into specific topics related to early childhood education. Among the most desired training topics were the six developmental domains in early childhood, enhancing creativity, and effectively integrating technology into the curriculum. The unanimous belief that regular ICT training would significantly improve teaching quality suggests that teachers are eager to acquire not just technical skills but also pedagogical strategies that enable them to apply these tools effectively in their teaching practices.

The respondents' interest in specific training topics related to early childhood education, such as the six developmental domains and creativity enhancement, indicates a desire for training that integrates technical skills with pedagogical content knowledge. This aligns with the TPACK framework which highlights the need for teachers to develop an understanding of how technology, pedagogy, and content intersect (Redmond & Lock, 2019). The findings of this study suggest that teachers are eager to develop a holistic approach to technology integration, where digital tools are used not just for their own sake, but as a means to enhance teaching and learning outcomes. Moreover, the unanimous belief that regular ICT training would improve teaching quality reflects the findings of (Musa et al., 2024), who underscored the importance of ongoing professional development in helping teachers stay current with emerging educational technologies and pedagogical strategies. The respondents' interest in enhancing creativity and integrating technology into the curriculum aligns with a broader trend in early childhood education, where there is increasing recognition of the role of creativity and play in fostering cognitive, social, and emotional development (Aminah et al., 2021; Kurniawati et al., 2024; Marwati et al., 2020; nurhayati, 2012; Nurhayati & Kristiyanti, 2024; Rosita et al., 2020; Sadiyah et al., 2021).

The findings from this study unequivocally indicate that PAUD teachers require significant support in developing their digital literacy skills and integrating digital educational games into their teaching practices. These findings are not isolated but rather reflect broader trends in educational research that emphasize the importance of foundational digital literacy training and the need for professional development programs that are both practical and pedagogically sound. To effectively address these needs, professional development programs should prioritize foundational computer literacy training, followed by advanced workshops on educational software and digital games. The findings from this research align closely with existing scholarly literature that explores the intersection of digital literacy, educational technology integration, and teacher training. This alignment underscores the critical need for

comprehensive, well-designed professional development programs to equip educators with the necessary skills to effectively utilize digital tools in the classroom.

CONCLUSION

The research conducted on the digital competency and training needs of PAUD teachers in Kecamatan Batujajar reveals a significant gap in digital literacy, particularly in the context of integrating digital educational games into early childhood education. The findings indicate that while there is a strong recognition among teachers of the potential benefits of digital tools, their current skills and confidence levels are insufficient to leverage these technologies effectively in the classroom. This gap is compounded by the lack of previous exposure to ICT training, which has left many educators unprepared to navigate the complexities of digital pedagogy. The study underscores the critical need for foundational digital literacy training, tailored to the specific challenges and contexts faced by early childhood educators. Such training should not only address the technical aspects of using computers, mobile devices, and educational software but also focus on how these tools can be meaningfully integrated into teaching practices to enhance student engagement and learning outcomes. The preference for in-person, hands-on training highlights the importance of creating supportive learning environments where teachers can develop their skills collaboratively and with direct guidance from experienced trainers. The novelty of this research lies in its identification of specific barriers to digital integration within the early childhood education context, an area that has often been overlooked in broader discussions of educational technology. By highlighting the unique challenges faced by PAUD teachers, this study provides a foundation for developing targeted professional development programs that are both relevant and effective. Based on the research findings, it is recommended that stakeholders in education prioritize the development and implementation of comprehensive digital literacy programs for early childhood educators. These programs should be continuous, allowing for ongoing skill development and support, and should be designed to integrate both technical training and pedagogical strategies that align with the developmental needs of young learners. Moreover, future research should explore the long-term impacts of such training on teaching practices and student outcomes, as well as investigate the potential for scaling these programs across different educational contexts. This study provides a critical insight into the current state of digital competency among PAUD teachers and offers a clear pathway for enhancing their ability to integrate digital tools into their teaching practices. By addressing these needs, we can better prepare educators to meet the demands of 21st-century learning environments, ultimately improving the quality of early childhood education.

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