

Integrating Digital Learning Innovation in Islamic Early Childhood Teacher Education for Sustainable Development

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ABSTRACT

Developing digital-based early learning competencies among pre-service teachers is essential, as technology has become an important medium to support effective, engaging, and child-centered learning in Islamic early childhood education. However, integrating digital innovation in teaching practice remains a challenge for many students in Islamic Early Childhood Teacher Education programs. Current research shows that student teachers often struggle with limited digital literacy, lack of confidence in using technology, and inadequate exposure to innovative pedagogical tools. This study uses a qualitative descriptive approach and aims to identify the factors that support the development of digital learning competencies among pre-service Islamic early childhood educators. The subjects consisted of five participants: four early childhood education students and one lecturer in an Islamic higher education institution. Data were collected through semi-structured interviews regarding challenges and enabling factors in applying digital learning strategies. The findings revealed key issues such as limited access to digital resources and insufficient training. However, factors that contribute to developing digital-based teaching skills include guided digital lesson planning practice, the use of child-friendly interactive media, and collaborative peer learning. This study highlights the need for continuous training, curriculum restructuring, and institutional support to promote sustainable digital innovation in Islamic early childhood teacher education.

Keywords: *Digital-learning innovation; PIAUD; Pre-service teachers, Sustainable Development.*

INTRODUCTION

Digital learning innovation has become an essential part of modern education, including Islamic Early Childhood Teacher Education. In today’s globalized era, technology plays an important role in enhancing learning effectiveness, improving interaction, and creating meaningful learning experiences for young children. For pre-service early childhood teachers, developing the ability to integrate technology in teaching is necessary to ensure that learning activities are engaging, child-centered, and aligned with Islamic moral values. Without proper digital learning skills, it becomes difficult for teachers to provide learning experiences that stimulate children’s curiosity, creativity, and holistic development.

However, incorporating digital learning strategies into teaching practice remains a challenge for many pre-service teachers in Islamic higher education institutions. Similar to how speaking skills in language learning require correct structure and confidence, digital teaching skills require appropriate knowledge of learning applications, interactive media, and age-appropriate instructional

approaches. Many students still struggle with limited digital literacy, lack of confidence in operating technological tools, and insufficient exposure to innovative digital learning methods. These challenges can hinder the creation of effective early learning environments, especially when technology is intended to support meaningful and sustainable educational practices. Therefore, it is crucial for Islamic Early Childhood Teacher Education programs to emphasize the development of digital learning competencies. By integrating technology into their teaching practice, pre-service teachers can enhance children's engagement, support early cognitive and social development, and build learning environments that reflect the needs of the 21st century. Furthermore, the incorporation of digital learning aligns with the principles of sustainable development, particularly in promoting inclusive, equitable, and quality education across diverse learning settings.

METHODS

Subjects of Research

The subjects of this research consisted of a total of five participants from an Islamic higher education institution offering an Early Childhood Teacher Education program. The participants included four pre-service early childhood education students who were currently enrolled in courses related to digital learning and instructional media, and one lecturer who was responsible for teaching and supervising the digital learning course. The student participants were selected based on their active involvement in coursework and teaching practice activities related to early childhood education. Meanwhile, the lecturer participant was chosen due to their direct role in guiding students' learning processes and evaluating instructional implementation. The selection of these subjects aimed to obtain in-depth information regarding the challenges and supporting factors in integrating digital learning innovation into Islamic Early Childhood Teacher Education.

Instruments and Interview Questions

This research employed a qualitative approach. To identify the factors influencing the integration of digital learning innovation in Islamic Early Childhood Teacher Education, the researcher conducted interviews to explore both supporting and inhibiting factors experienced by the participants. Therefore, a set of six interview questions was developed to obtain detailed and relevant information from the participants. The interview questions focused on the participants' experiences in using digital learning tools, instructional strategies, and the challenges encountered during the teaching and learning process. The interview questions were as follows: 1) How do you integrate digital learning tools into early childhood education learning activities?. 2) What types of digital media or platforms do you frequently

use in preparing and delivering learning materials?, 3) What challenges do you face when implementing digital learning in early childhood education contexts?, 4) What challenges do students encounter when engaging with digital learning activities?, 5) Does the institutional environment (campus facilities and policies) support the integration of digital learning in the Early Childhood Teacher Education program?, and 6) How does the classroom or learning setting support or hinder the use of digital learning innovation during teaching activities?

Data Collection

Data for this research were collected through in-depth interviews conducted directly with the participants. The interviews were held on campus at mutually agreed times, either in the classroom or in a designated discussion space, to ensure that participants felt comfortable sharing their experiences and perspectives. During the interview sessions, the researcher used an audio recorder to document the conversations in order to maintain accurate and complete data. The recording process was carried out with the participants’ consent. In addition to audio recordings, the researcher also took field notes to capture key points and contextual details that supported data interpretation. The information obtained from these interviews was used to identify both the challenges and supporting factors in integrating digital learning innovation within the Islamic Early Childhood Teacher Education program. The interview results then served as the basis for the findings and discussion of the study.

RESULTS AND DISCUSSION

The results of this study were obtained through in-depth interviews with four pre-service early childhood education students and one lecturer from the Islamic Early Childhood Teacher Education program. The interview data indicated that the integration of digital learning innovation plays a significant role in supporting students’ readiness to design learning activities that are suitable for young children and aligned with Islamic educational values. The student participants reported that exposure to digital learning tools such as interactive storytelling applications, educational games, digital flashcards, and learning management platforms encouraged them to explore more creative teaching approaches.

These tools also helped them understand how to create learning experiences that engage children’s sensory, emotional, and cognitive development. However, the effectiveness of digital innovation was found to depend on the level of digital literacy the students possessed, as some required more guidance in navigating technological platforms. The lecturer participant emphasized that while digital tools provide rich opportunities for learning, their integration must be accompanied by continuous mentoring, reflection, and structured instructional planning. The lecturer noted

differences in students’ confidence levels when applying digital tools in teaching practice: some students confidently experimented with various applications, whereas others struggled with both technical use and lesson organization. Several challenges were identified in integrating digital innovation, including limited internet connectivity, inconsistent access to devices, and varying levels of technological familiarity among students. Despite these challenges, both students and the lecturer agreed that digital learning innovation supports sustainable development in education by strengthening independent learning habits, promoting adaptability, and preparing future teachers to work in increasingly digital learning environments. Overall, the results suggest that while digital innovation enhances learning experiences in Islamic Early Childhood Teacher Education, successful implementation requires institutional support, ongoing training, and opportunities for hands-on practice to ensure sustainability and effectiveness.

Question 1: How do you integrate digital learning tools into early childhood education learning activities?

Table 1. Factors in Integrating Digital Learning Innovation in Islamic Early Childhood Teacher Education

Participants	Students’ answers
1	I use interactive videos and educational apps during learning sessions to make the activities more engaging for children
2	I integrate digital storytelling and online quizzes to help children understand concepts in a fun way.
3	I combine traditional play-based activities with digital tools like drawing apps and educational games.
4	I use platforms like Zoom or Google Classroom to provide learning activities that children can follow at home.
5	I encourage children to participate in simple coding games and interactive songs to develop both cognitive and language skills.

CONCLUSION

Integrating digital learning innovation in Islamic Early Childhood Teacher Education is essential for promoting effective and sustainable early learning. The use of innovative technologies supports the development of young children’s cognitive, language, and social-emotional skills while enhancing the quality of teaching and learning practices. This study employed a qualitative approach through interviews with educators and students to explore the factors influencing the integration of digital learning tools in early childhood education. The findings reveal that the successful integration of digital innovation depends on several key factors, including the availability of digital tools and platforms, educators’

instructional strategies, institutional support, and the learning environment. Educators reported that using interactive videos, educational apps, and online platforms such as Google Classroom or Zoom increased student engagement, facilitated learning, and encouraged active participation. However, challenges such as limited access to devices, unstable internet connection, and students’ difficulty in using digital tools were also identified as barriers to effective implementation. Institutional support, including policies, training, and adequate classroom facilities, plays a significant role in overcoming these challenges. In conclusion, the integration of digital learning innovation in Islamic Early Childhood Teacher Education contributes significantly to enhancing early learning outcomes and preparing future educators to utilize technology effectively. It is recommended that institutions provide continuous professional development, sufficient digital resources, and supportive learning environments to maximize the benefits of digital innovation in early childhood education for sustainable development

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