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The Role of Students in the Early Childhood Islamic Education Program in the Digital Transformation of Early Childhood Education

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Abstract
This study examines the role of Early Childhood Islamic Education (PIAUD) students in supporting the transformation of digital learning in early childhood education. The research employs a qualitative case study approach involving 78 PIAUD students from Universitas Al-Qur'an Ittifaqiah Indralaya and STAI Kuningan, West Java. Data were collected through Likert-scale questionnaires and in-depth interviews, and analyzed using the interactive model of Miles and Huberman. The findings indicate that the majority of students demonstrate strong conceptual understanding, readiness, and positive perceptions toward digital learning implementation in early childhood settings. More than 80 percent of respondents agreed that digital learning is important and have implemented digital media during teaching practice. Students contribute as innovators, facilitators, mediators, and digital literacy advocates within PAUD institutions. However, challenges remain related to infrastructure, access, and the need for developmentally appropriate digital use. The study concludes that PIAUD students hold a strategic position as agents of digital transformation while maintaining pedagogical principles aligned with early childhood development.
Keywords: PIAUD students, digital learning transformation, early childhood education

Abstrak
Penelitian ini bertujuan untuk menganalisis peran mahasiswa Program Studi Pendidikan Islam Anak Usia Dini dalam transformasi pembelajaran digital pada anak usia dini. Penelitian menggunakan pendekatan kualitatif dengan desain studi kasus terhadap 78 mahasiswa PIAUD dari Universitas Al-Qur'an Ittifaqiah Indralaya dan STAI Kuningan Jawa Barat. Pengumpulan data dilakukan melalui angket skala Likert dan wawancara mendalam, kemudian dianalisis menggunakan model interaktif Miles dan Huberman. Hasil penelitian menunjukkan bahwa mayoritas mahasiswa memiliki pemahaman konseptual, kesiapan, serta persepsi positif terhadap implementasi pembelajaran digital di PAUD. Lebih dari 80 persen responden menyatakan pentingnya pembelajaran digital dan telah mengimplementasikan media digital saat praktik mengajar. Mahasiswa berperan sebagai inovator, fasilitator, mediator, serta penggerak literasi digital di lingkungan PAUD. Meskipun demikian, masih terdapat tantangan berupa keterbatasan fasilitas, akses teknologi, serta perlunya penerapan prinsip perkembangan anak dalam penggunaan media digital. Penelitian

ini menegaskan bahwa mahasiswa PIAUD memiliki posisi strategis sebagai agen transformasi digital yang tetap berlandaskan pada prinsip pedagogis dan karakteristik perkembangan anak usia dini.
Kata Kunci: Mahasiswa PIAUD, Transformasi Pembelajaran Digital, Pendidikan Anak Usia Dini

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Introduction

Over the past two decades, advances in technology and information have brought about significant changes in Indonesia, particularly in the field of education (Cholik, 2021). This digital transformation is now inevitable and is characterized by the integration of technology into learning processes, educational management, and interactions between educators, between educators and students, and others (E. Wahyudi & Nanda, 2025). The era of the Fourth Industrial Revolution and Society 5.0 places demands on the education sector to adapt quickly to these changes (Kahar et al., 2021).

Today, educational institutions can no longer rely solely on conventional or traditional methods. This necessitates the creative, innovative, and responsible integration of digital technology into the educational process (Hasmiza, 2025). In this context, early childhood education (PAUD) also faces the same challenge of adapting to the changing times without neglecting the principles of child development (Achmad, 2024).

Early childhood refers to the age range of 0–6 years, often referred to as the "golden age" of development (Loka & Sabila, 2024, Loka et al., 2022, Ahdad et al., 2023). During this phase, the brain grows and develops at a rapid pace, so appropriate stimulation is crucial to the child's future development (Nadlifah et al., 2023). The principles of early childhood education should be holistic, integrative, contextual, and play-based (Alfarizi & Loka, 2025). Therefore, the implementation of digital learning in early childhood education must be maximized. The use of technology in these institutions must take into account aspects of cognitive development (Salim, 2022, Loka & Diana, 2022, Loka, Diana, et al., 2022), social-emotional (Marzuki et al., 2025), language (Tamila & Loka, 2023), motor skills (Zulfa & Loka, 2024, (Abellia & Loka, 2026), as well as moral, religious (Putri & Loka, 2025), and artistic values, which form the foundation of a child's development (M. Wahyudi et al., 2024).

The digital transformation of learning in early childhood education is not merely about using devices such as laptops, projectors, or mobile devices in learning activities (Ulfah, 2025). However, the digital transformation in question involves a paradigm shift in educational management—from designing and implementing to evaluating learning (Bintang et al., 2024). Digital learning can take the form of interactive media, educational videos, educational games, and platforms for communication between teachers and parents (Mutmainnah et al., 2025). However, the challenge is ensuring that this technology truly supports children's development, rather than fostering dependency or causing other negative effects (Asmara et al., 2025).

Given the above circumstances, the role of educators becomes particularly important. Early childhood education teachers are expected to possess adequate digital literacy so they can effectively utilize technology. However, in practice, it is evident that not all teachers possess the necessary digital readiness and

competencies (Windayani & Sudarma, 2025). Some early childhood education institutions still face limitations in facilities, a lack of training, and low confidence in using educational technology. These conditions provide an opportunity for students in the Early Childhood Islamic Education (PIAUD) program to actively contribute to supporting the transformation to digital learning (Husin et al., 2024).

In light of the above, these PIAUD students are aspiring professional educators who are being prepared to possess pedagogical, professional, and social competencies, as well as strong personal character. During their studies, students are not only equipped with theories of child development and learning strategies but also with skills in using educational media and technology. As a generation raised in the digital age, students generally possess more adaptable technological literacy compared to many teachers who have long taught using conventional methods. This advantage presents significant potential for students to serve as agents of change in the digital transformation of early childhood education..

The role of PIAUD students in the transformation of digital learning can be realized through various forms of contribution (Kisno et al., 2023). *First,* students can serve as innovators in the development of creative digital learning materials tailored to the characteristics of young children (Hajar & Purnasari, 2025). For example, students can design interactive educational videos, PowerPoint-based educational games, or engaging digital visual media. *Second*, students can serve as facilitators who assist teachers in integrating technology into their Daily Lesson Plans (RPPH). Third, students can also act as mediators between schools and parents in providing education on the responsible use of devices by children (Jayadinata et al., 2025).

The concept of qualitative research, as explained by Sugiyono, emphasizes the importance of gaining an in-depth understanding of social phenomena from the participants' perspective (Haki & Prahastiwi, 2024). In the context of this study, the role of early childhood education students in the transformation of digital learning needs to be comprehensively examined through their direct experiences in the field. Furthermore, John W. Creswell's approach to educational research design also emphasizes that educational research must be able to address contextual issues that arise in teaching practice (Rohanita & Aizah, 2025).

The importance of this research is further underscored by the impact of the global pandemic over the past few years, which has accelerated the use of technology in learning, including at the early childhood education level. Although in-person learning has resumed, the use of digital media remains an integral part of educational innovation. This indicates that digital transformation is not merely a temporary solution but has become an integral part of the modern education system. Nevertheless, the integration of technology into early childhood education still requires a cautious approach. Educational organizations and child development experts emphasize that screen time must be limited and always supervised by adults. Therefore, PIAUD students, as future teachers, have a moral responsibility to ensure that the use of technology does not diminish the essence of play, social interaction, and concrete experiences—all of which are crucial for young children.

Research on the role of PIAUD students in the transformation of digital learning is important for providing an empirical understanding of students' tangible contributions to educational practice. Furthermore, the findings of this study are expected to serve as a basis for evaluation by the PIAUD program in improving its digital literacy-based curriculum. Consequently, PIAUD graduates will not only be

competent in conventional pedagogical aspects but also capable of adapting to developments in educational technology.

Based on the above discussion, it is clear that the transformation of digital learning in early childhood education is an unavoidable necessity. Early childhood education students hold a strategic position as agents of change who can bridge the digital literacy gap in early childhood education institutions. Therefore, this study aims to thoroughly analyze the role of early childhood education students in the digital learning transformation for young children, identify the challenges faced, and formulate recommendations for the development of digital learning that aligns with child development principles. With this study, it is hoped that the digital learning transformation in early childhood education can proceed in a more focused and humanistic manner, while remaining grounded in the needs and characteristics of young children. PIAUD students are not merely field practice participants but also key actors in driving educational innovations relevant to the demands of the times.

Methodology

This study employs a qualitative research design using a case study approach. This approach was chosen to gain an in-depth understanding of the role of students in the Early Childhood Islamic Education (PIAUD) program within the context under study, as well as to describe the phenomenon realistically based on the experiences and perspectives of the research subjects.

The research subjects consisted of 78 students in the PIAUD program from two institutions of higher education, namely Al-Qur'an Ittifaqiah University (UQI) in Indralaya and the Islamic College (STAI) in Kuningan, West Java. The student respondents ranged from those in their first semester to those in their final semester, ensuring that the data collected could represent the academic experiences and readiness of students at various stages of their studies.

Data collection was conducted through questionnaires and interviews. The questionnaire was used to gather data on students' perceptions, attitudes, and experiences regarding the research topic in general. The questionnaire instrument used a Likert scale with five response categories, namely:

1. Strongly Disagree,
2. Disagree,
3. Neutral,
4. Agree, and
5. Strongly Agree.

Meanwhile, in-depth interviews were conducted with several selected respondents to reinforce and clarify the data obtained through the questionnaire. The interviews aimed to gather more comprehensive information regarding the students' experiences, challenges, and perspectives on the phenomenon under study. The data analysis technique used in this study employed the Miles

and Huberman interactive analysis model, which consists of four stages: data collection, data reduction, data presentation, and drawing conclusions.

Result and Discussion

1. Research Findings

Based on the research findings obtained from the questionnaire distributed via Google Forms, the following data was collected.

Regarding question 1 on students' understanding of the concept of digital learning for early childhood, the results shown in the diagram below indicate that 16.7% were neutral, 65.4% agreed, and 16.7% strongly agreed. Thus, out of 78 students, 82.1% demonstrated an understanding of the concept of digital learning for early childhood.

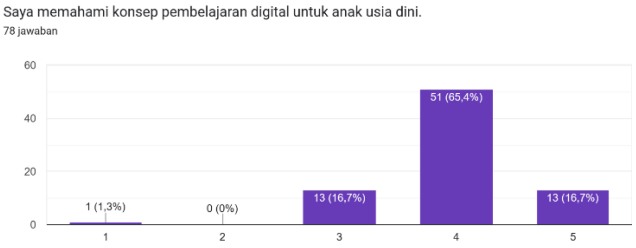

Figure 1: *I understand the concept of digital learning for young children*

Here are the results for the second question on the distributed form:

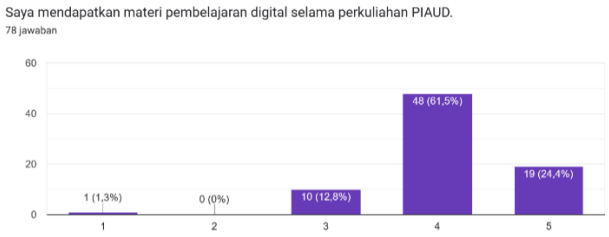

Figure 2: *I received digital learning materials during the PIAUD course*

Based on the data above, it was found that 12.8% of students reported being neutral regarding the digital learning materials provided during the course. Furthermore, 61.5% agreed and 24.4% strongly agreed. Thus, based on the data above, 85.9%—or 57 students—expressed positive views.

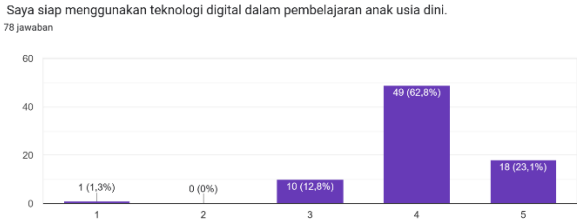

Figure 3: *I am ready to use digital technology in early childhood education*

As for the third question regarding readiness to use digital technology in early childhood education, 12.8% were neutral, 62.8% agreed, and 23.1% strongly agreed.

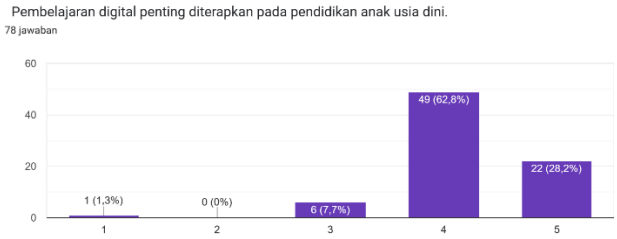

Figure 4: *Digital learning is important to implement in early childhood education*

Regarding the question of whether digital learning is important to implement in early childhood education, 7.7% were neutral, 62.8% agreed, and 28.2% strongly agreed.

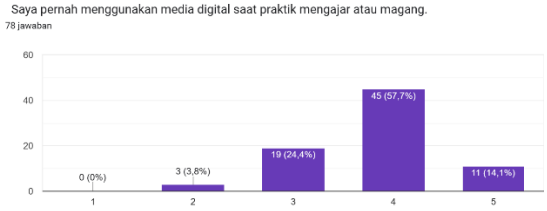

Figure 5*: I have used digital media during my teaching practice or internship*

When asked about the use of digital media during teaching practice or internships, 24.4% of students were neutral. Meanwhile, 57.7% agreed and 14.1% strongly agreed.

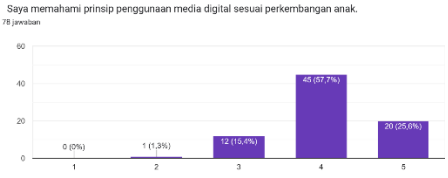

Figure 6: *I understand the principles of using digital media in a way that supports children's development*

Based on a question regarding the understanding of principles for using digital media with young children in a manner appropriate to their developmental stage, 15.4% were neutral, 57.7% agreed, and 25.6% strongly agreed.

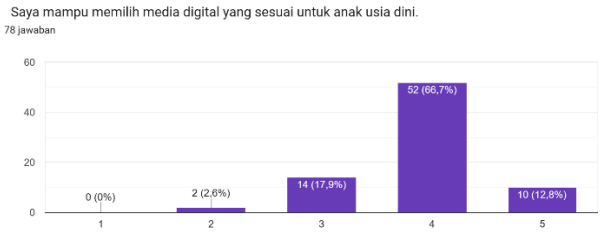

Figure 7: *I am able to choose appropriate digital media for young children*

When asked whether students are able to choose age-appropriate digital media, 2.6% disagreed, 17.9% were neutral, 66.7% agreed, and 12.8% strongly agreed.

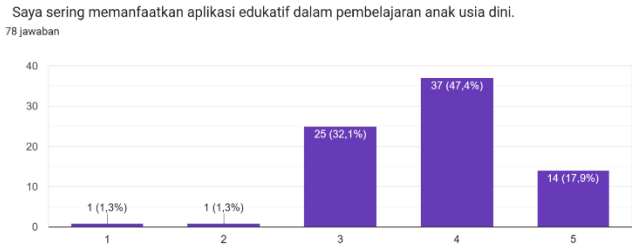

Figure 8: *I often use educational apps in early childhood education*

Students often use educational apps in early childhood education; 1.3% disagree or strongly disagree, 32.1% are neutral, 47.4% agree, and 17.9% strongly agree. The responses to this question were quite varied. There are answers across the entire spectrum. It is concluded that the use of educational apps in digital media is frequently employed by students, both in teaching practice and internships, with a result of 65.3%.

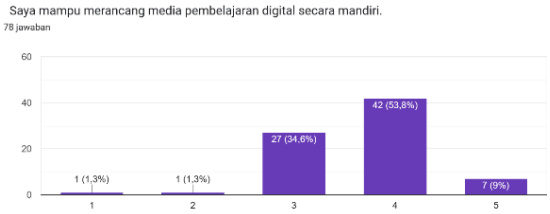

Figure 9: *I am able to design digital learning materials on my own*

This question pertains to designing digital learning materials independently. 2.6% disagreed, 34.6% were neutral, 53.8% agreed, and 9% strongly agreed.

Figure 10: *The use of digital technology boosts young children's interest in learning*

The use of digital technology increases children's interest in learning at this age. Regarding this statement, 6.4% of students responded neutrally. Meanwhile, 1.3% disagreed. Furthermore, 69.2% agreed and 23.1% strongly agreed.

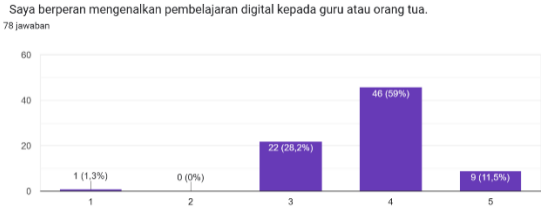

Figure 11: *My role is to introduce digital learning to teachers and parents*

Students play a role in introducing digital learning to teachers or parents; 1.3% of students strongly disagree, 28.2% are neutral, 59% agree, and 11.5% strongly agree.

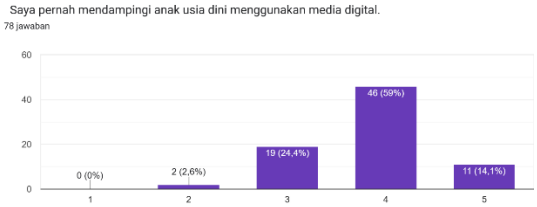

Figure 12: *I have worked with young children using digital media*

Students have assisted young children in using digital media. 2.6% disagree, 24.4% are neutral, 59% agree, and 14.1% strongly agree.

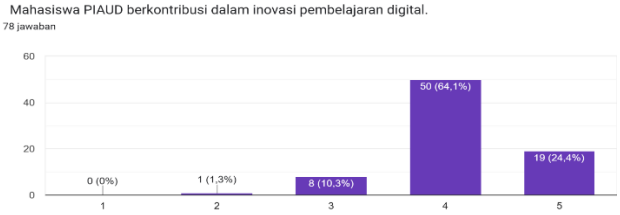

Figure 13: *PIAUD students contribute to digital learning innovations*

Early Childhood Education students contribute to innovations in digital learning. 1.3% disagree. 10.3% are neutral. 64.1% agree and 24.4% strongly agree.

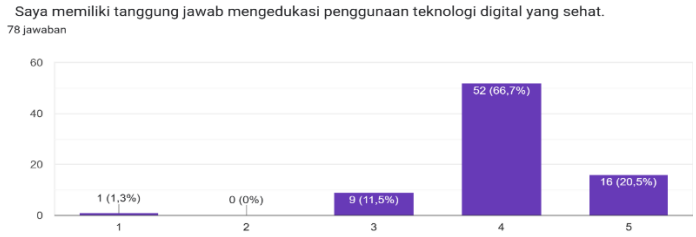

Figure 14: *I am responsible for promoting the healthy use of digital technology*

Students have a responsibility to promote the healthy use of digital technology. 1.3% strongly disagree. 11.5% are neutral. 66.7% agree, and 20.5% strongly agree.

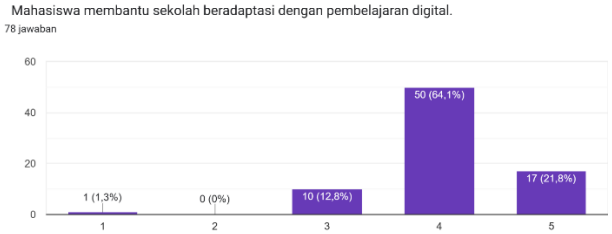

Figure 15: *Students are helping schools adapt to digital learning*

Students are helping schools adapt to digital learning. 1.3% strongly disagree. 12.8% are neutral. 64.1% agree and 21.8% strongly agree.

2. Discussion

Based on the results of the above study, the following is a discussion of this research:

a. Students' Understanding of the Concept of Digital Learning in Early Childhood Education

The research results indicate that the majority of students already have a good understanding of the concept of digital learning in early childhood. A total of 65.4% of respondents agreed and 16.7% strongly agreed, meaning that 82.1% of students understand the concept of digital learning. These findings suggest that early childhood education students have acquired a conceptual foundation regarding the integration of technology into early childhood learning during their coursework. Conceptual understanding is a crucial foundation because the implementation of technology in early childhood education is not only focused on the use of digital devices but also on alignment with principles of child development. This aligns with the view that digital learning in early childhood education must remain grounded in play-based activities, social interaction, and the holistic stimulation of children's development. In addition, a study by Nasution et al. (2025) found that the

integration of technology in learning has an impact on children's development, both cognitive and social-emotional. Furthermore, a related study by Bintang et al., 2024 found that the use of technology in early childhood education has an impact on children's development, particularly given the current era they are living in.

b. Availability of Digital Learning Materials in Lectures

A total of 61.5% of students agreed and 24.4% strongly agreed that they received digital learning materials during their studies. A percentage of 85.9% indicates that universities have begun integrating digital literacy into the PIAUD curriculum. This suggests that academic programs play a strategic role in preparing students as future educators who are adaptable to advancements in educational technology. The integration of digital materials into coursework is a key factor in fostering students' readiness to navigate educational transformation in the digital age. As indicated by a study conducted by Raprap (2025) the digital learning experiences gained in higher education will have a significant impact on graduates or students who will apply the material covered in their courses. In addition, another study (Kisno et al., 2023) indicates that the use of digital learning materials in lectures will have an impact on students' readiness to face the current digital transformation.

c. Students' Readiness to Use Digital Technology

The data shows that 62.8% of students agree and 23.1% strongly agree regarding their readiness to use digital technology in early childhood education. This level of readiness indicates that students have sufficient confidence in operating digital media during teaching practice. As digital natives, students tend to adapt to technology more quickly than educators who have long relied on conventional methods. This situation reinforces students' role as agents of change in the digital transformation of learning within early childhood education institutions. As a research by Azima and Rahayu (2025) shows, technology has a highly complex impact on today's students. Therefore, a holistic approach is needed in its utilization.

d. Perceptions of the Importance of Digital Learning in Early Childhood Education

A total of 91% of respondents agreed or strongly agreed that digital learning is important to implement in early childhood education. These findings indicate that students are aware of the urgency of technology-based learning innovations. However, the implementation of technology must still take into account screen time limits and adult supervision to ensure it does not hinder children's social and emotional development. This aligns with research (Jannah et al., 2023) indicating that parents or adults play a crucial role in guiding children in the digital age, particularly regarding the continuous use of gadgets. Thus, the negative impacts of such gadgets can be avoided. Additionally, research by Wulandari and Fauziah

(2024) suggests that screen time in early childhood affects children's social and emotional development.

e. Implementation of Digital Media in Teaching Practice

The research findings show that 71.8% of students have used digital media during their teaching practice or internship, indicating a shift from conceptual mastery toward operational competence in real-world contexts. This figure confirms that students do not stop at the stage of understanding digital learning as an academic discourse but have applied that knowledge in practical settings in a measurable way. This implementation serves as a key indicator because the effectiveness of digital transformation in early childhood education is largely determined by educators' ability to design learning experiences tailored to children's characteristics, rather than merely introducing devices or applications.

The use of digital media such as educational videos, interactive presentations, and educational apps provides opportunities to enrich the variety of learning stimuli, particularly in the visual-auditory domain, which tends to quickly capture the attention of young children. Educational videos can depict situations that are difficult to demonstrate in person in the classroom, such as natural processes, animated stories, or simple simulations that clarify concepts. Interactive presentations allow teachers or students to combine images, sounds, animations, and simple questions so that children are encouraged to respond actively. Educational apps, when chosen appropriately, can reinforce play-based learning through short tasks that stimulate cognitive, language, and fine motor skills.

Furthermore, the use of digital media in teaching practice also reflects students' ability to manage learning adaptively. Digital media allows for adjustments to the pace of learning, repetition of material without compromising the quality of delivery, and the provision of alternative activities when classroom conditions require redirecting children's attention. From a pedagogical perspective, media variety can help maintain children's engagement, reduce boredom, and broaden how children understand information through multisensory experiences. This situation reinforces the idea that appropriate digital learning can serve as a supportive tool for creating a more dynamic classroom that is responsive to the learning needs of young children.

Nevertheless, the progress made in the use of digital media must be viewed with caution. The quality of implementation is not measured solely by frequency of use, but also by the appropriateness of media selection, duration, and adult supervision—to ensure that technology does not replace the essence of play, social interaction, and concrete experiences that form the foundation of early childhood education. Therefore, students' contributions will be more meaningful when they are not only able to use media but also capable of

formulating clear learning objectives, assessing the appropriateness of content for children's developmental stages, and conducting simple evaluations of children's responses and learning outcomes following digital media use. Within this framework, the figure of 71.8% not only indicates technology adoption but also opens the door to viewing students as agents who can accelerate the transformation of digital learning in a more focused and responsible manner.

f. Understanding the Principles of Digital Media Use According to Children's Developmental Stages

A total of 83.3% of students agreed or strongly agreed that they understand the principles of digital media use according to children's developmental stages. This percentage confirms that students' focus extends beyond technical proficiency in operating devices; it has reached a more substantial pedagogical dimension—namely, selecting, organizing, and integrating digital media to align with children's developmental needs in cognitive, language, social-emotional, and motor skills, as well as the foundational values instilled in early childhood. This understanding is reflected in the students' ability to assess whether digital content fosters meaningful play activities, facilitates interaction, and provides appropriate stimulation without overwhelming children with overly abstract information or passive learning patterns. In other words, technology is positioned as a tool to enrich learning experiences, not as a substitute for the concrete experiences that are a hallmark of early childhood education.

These findings are crucial because inappropriate use of technology by young children has the potential to cause harmful effects, particularly when digital media is used without time limits, without supervision, or when the content is not developmentally appropriate. Potential risks include a decline in the quality of social interaction, a tendency toward dependence on screen-based stimulation, and a reduction in children's opportunities to develop emotional regulation and motor skills through direct physical activity. Therefore, a high level of understanding among students regarding the principles of digital media use can be viewed as a strategic asset to ensure that the transition to digital learning occurs safely and responsibly, with an emphasis on appropriate content selection, measured time management, and consistent supervision so that technology truly supports children's growth and development.

g. Ability to Select and Develop Digital Media

Most students (79.5%) reported being able to select digital media appropriate for children's ages, while 62.8% of students were able to independently design digital learning media. This ability demonstrates that students have taken on the role of learning innovators, capable of creating technology-based creative media that supports the learning process of young children.

h. Use of Educational Apps

A total of 65.3% of students reported frequently using educational apps in their learning, indicating that digital apps are beginning to become part of play-based learning strategies to enhance engagement among early childhood students. This use is typically driven by the need to provide interactive activities that quickly capture children's attention, offer immediate feedback, and help teachers diversify their teaching methods. The still relatively high percentage of neutral responses signals that this practice is not yet widespread and is likely influenced by contextual factors in the field, such as the availability of devices and internet connectivity at early childhood education institutions, school policies regarding device use, the ability of supervising teachers to support app integration, and opportunities for students to experiment with media during their internships. This situation may also reflect students' limited practical experience in selecting apps that are truly appropriate for children's developmental stages, leading some respondents to be cautious or to lack consistent usage patterns.

i. The Impact of Technology on Children's Interest in Learning

A total of 92.3% of students stated that the use of digital technology can increase early childhood learning interest, as visual and interactive media tend to quickly capture children's attention and make them more engaged in learning activities. Animations, moving images, sounds, and interactive features in educational apps or videos help children focus longer, spark curiosity, and encourage active participation—such as choosing, trying, and repeating learning activities—without feeling overwhelmed. This impact is even stronger when technology is used to reinforce play-based and exploratory learning, with measured duration and adult supervision, so that increased interest in learning remains aligned with children's social, emotional, and motor development needs.

j. The Role of Students as Agents of Digital Transformation

The research findings indicate that students are not merely users of technology but also play an active role in the transformation of digital learning, including:

1) introducing digital learning to teachers and parents,
2) guiding children in the use of digital media,
3) contributing to learning innovations,
4) educating others on the healthy use of technology, and
5) helping schools adapt to digital learning.

The majority of respondents (over 80%) agreed or strongly agreed with these roles. These findings confirm that PIAUD students hold a strategic position as facilitators, innovators, and digital mediators within the early childhood education (PAUD) environment.

Conclusion

The study confirms that students in the Early Childhood Islamic Education Program possess the readiness and ability to make tangible contributions to the transformation of digital learning for young children. The majority of students have understood the concepts and principles of using digital media in accordance with children's developmental stages, and these skills are reflected in field practice through the use of digital media during internships or teaching practice. The use of educational videos, interactive presentations, and educational applications is considered capable of increasing learning variety and strengthening children's engagement, so that young children's interest in learning tends to increase when technology is used appropriately and purposefully.

The role of students is not limited to that of technology users but has evolved into that of agents of digital transformation within the early childhood education (PAUD) setting. Students contribute by introducing digital learning to teachers and parents, guiding children in using digital media, designing technology-based learning innovations, promoting healthy technology use practices, and helping schools adapt to changes in digital learning. These findings position PIAUD students as strategic digital facilitators, innovators, and mediators, with the caveat that the effectiveness of implementation remains influenced by factors such as facilities, access to technology, and the consistency of guidance to ensure that the use of digital media does not have a negative impact on early childhood development.

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