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Integration of Digital Technology in Islamic Religious Education Learning: A Qualitative Study on Teachers' Competence and Implementation Models in Secondary Schools

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ABSTRACT

Purpose – The advancement of digital technology has significantly transformed the field of education, including Islamic Religious Education (PAI) learning. In Indonesia, the increasing number of internet users and the adoption of technological devices reflect a broad digital transformation. The Merdeka Belajar program demonstrates the government's commitment to digitizing education, including PAI. However, in rural areas such as Gunungkidul Regency, integrating technology into PAI learning still faces challenges, such as limited infrastructure readiness and teachers' digital competence. Therefore, this study aims to identify the level of digital technology utilization in PAI learning, evaluate teachers' digital competence, analyze the impact of technology integration on learning effectiveness, and develop a digital technology integration model relevant to the local context.

Design/methods/approach – This study employs a qualitative approach with a descriptive method. Data were collected through observation, in-depth interviews, documentation, and surveys involving 30 PAI teachers from 19 senior high schools (SMA) in Gunungkidul Regency, selected using a purposive sampling technique. The analysis is based on the Technology Acceptance Model (TAM) and Technological, Pedagogical, and Content Knowledge (TPACK) frameworks to understand technology acceptance and teachers' digital competence.

Findings – The findings indicate that the utilization of digital technology in PAI learning is relatively widespread, with platforms such as Google Classroom, Moodle, and Edmodo being used. However, there are still gaps in infrastructure and teachers' digital competence, particularly in creating interactive digital content. Most teachers still rely on simple presentation media and have not fully optimized technology for innovative learning. The integration of technology has been proven to enhance accessibility and interactivity in learning; however, it also poses challenges such as students' dependency on technology and the limited training opportunities for teachers. To address these challenges, this study proposes a technology integration model that focuses on improving teachers' digital competence, ensuring equitable infrastructure distribution, developing digital content, and implementing a hybrid learning model.

Research implications – The findings provide recommendations for teachers, policymakers, and educational institutions to enhance the effectiveness of digital-based PAI learning. Several strategic steps are proposed, including intensive training for teachers in digital content creation, equalizing access to technology in remote areas, and implementing a hybrid learning

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model that combines conventional methods with digital technology. Furthermore, improving students' digital literacy is also a crucial step to ensure that the integration of technology in PAI learning goes beyond mere accessibility and fosters a deeper understanding of Islamic values.

1. Introduction

The development of digital technology has become an inseparable part of modern society, including in the education sector. The significant increase in the number of internet users and the adoption of technological devices in Indonesia in recent years indicate a widespread digital transformation. Internet users in Indonesia reached 212.9 million as of January 2023, representing approximately 77% of the total population (*We Are Social*, 2023). This phenomenon is driven by improved internet connectivity, mobile device penetration, and the popularity of social media platforms such as TikTok and Instagram, which increasingly influence user preferences in accessing video-based content. In the context of education, this digital transformation creates both opportunities and challenges for educational institutions to integrate technology into the learning process (*We Are Social*, 2023).

At the global level, the adoption of technology in education has become a priority. For instance, approximately 74% of schools in the United States have implemented one-to-one device programs, although there are challenges in updating devices without additional funding support. Indonesia, particularly through the Merdeka Belajar program, has also demonstrated a commitment to digitizing the education sector, including in Islamic Religious Education (PAI) learning. However, despite these opportunities, PAI learning in Indonesia, particularly in rural areas such as Gunungkidul Regency, faces significant challenges. These challenges include teachers' readiness to adopt technology, limited infrastructure, and a lack of innovation in teaching methods, which often remain conventional (Hasnida et al., 2024).

Previous studies have extensively explored the potential and challenges of digital technology in education. The Technology Acceptance Model (TAM) is one of the most frequently used theoretical frameworks for assessing technology acceptance in learning (Davis, 1989). Studies reveal that perceived ease of use and usefulness of technology influence users' acceptance of online learning platforms (Masrom, 2007; Zaineldeen & et al., 2020). On the other hand, research highlights how technology utilization can enhance the effectiveness of PAI learning through the development of applications based on the Qur'an and Hadith (Dzulkifli, 2021; Marzuki & Syahrial, 2020). Additionally, studies emphasize the importance of developing teachers' digital competencies to support the successful transformation of technology-based learning (Lazim et al., 2021; Sprenger & Schwaninger, 2021).

In Indonesia, several studies highlight the limitations of technology adoption in the education sector. Research indicates that technology infrastructure in rural areas remains inadequate (Hasnida et al., 2024), while the low level of digital literacy among PAI teachers hinders the optimization of technology in learning. Furthermore, the limited training based on the Technological Pedagogical and Content Knowledge (TPACK) model also poses challenges in integrating technology into the learning process.

Although various studies have highlighted the benefits and challenges of integrating digital technology in PAI learning, several research gaps remain unaddressed. First, most previous studies have focused on urban educational settings, neglecting the specific challenges faced in rural areas such as Gunungkidul Regency (Population Gap). Second, there is a need to explore technology integration models relevant to the local context, including the influence of cultural and infrastructural factors on technology adoption (Practical-Knowledge Conflict Gap). Third, the limited research

examining PAI teachers' digital competencies specifically indicates a knowledge gap in understanding educators' readiness to implement digital technology in learning.

Additionally, empirical studies on the impact of digital technology integration on PAI learning in rural areas remain scarce (Empirical Gap). This study aims to address these gaps by exploring the use of digital technology by PAI teachers in Gunungkidul Regency, identifying teachers' digital competencies, and analyzing the impact of technology integration on PAI learning.

This study aims to:

a. Identify the extent of digital technology utilization by PAI teachers in senior high schools in Gunungkidul Regency.
b. Evaluate PAI teachers' digital competencies in utilizing digital technology to support learning.
c. Analyze the impact of digital technology integration on the effectiveness of PAI learning in Gunungkidul Regency.
d. Develop a relevant and contextual digital technology integration model for PAI learning in Gunungkidul Regency.

This study is expected to provide both theoretical and practical contributions. Theoretically, it enriches the literature on digital technology integration in PAI learning, particularly in rural areas. Practically, the findings of this study can offer recommendations for teachers, policymakers, and educational institutions in designing strategies for digital competency development and infrastructure to support more relevant and effective PAI learning in the digital era. Thus, this study has the potential to support the transformation of Islamic education in Indonesia, in line with the demands of the Fourth Industrial Revolution and the increasingly advanced digital era.

2. Literature Review

2.1. *Islamic Education and Islamic Religious Education (PAI)*

The concept of Islamic education is often debated in various literatures, particularly concerning its definition and scope. Al-Abrasy defines Islamic education as an effort to transform individuals in terms of behavior, both innate and acquired from the social environment (Lubis & Asry, 2020). Basri further emphasizes that Islamic education aims to enhance human quality in accordance with innate nature (fitrah) and external teachings that shape it (Sholihah & Maulida, 2020). This perspective is rooted in the understanding of the Qur'an, as stated in QS. Ar-Rum: 30, which indicates that humans are created with an inherent nature to draw closer to religious values.

According to Yusuf Al-Qardhawi, Islamic education encompasses the holistic development of intellect, heart, spirit, and body, preparing individuals to face challenges in both peaceful and conflict-ridden situations (Ridjaludin, 2008). Meanwhile, Toto Suharto asserts that Islamic education covers all aspects of human life, including physical, mental, spiritual, emotional, aesthetic, and social dimensions, aiming to create a balance between worldly and afterlife needs (Mukrimaa et al., 2016).

Islamic Religious Education (PAI) focuses on the structured transmission of Islamic values. Ramayulis defines PAI as a conscious and planned process aimed at shaping individuals with faith, piety, and noble character, in accordance with the teachings of the Qur'an and Hadith (Ramayulis, 2015). According to Permendikbudristek No. 8 of 2024, PAI is designed to develop cognitive, affective, and psychomotor aspects in an integrated manner (Kemendikbudristek, 2022). Moreover, this approach integrates conceptual understanding with the application of Islamic values in daily life (Muhaimin et al., 2017).

2.2. *Integration of Digital Technology in PAI Learning*

The integration of technology in PAI learning is supported by various modern educational theories, such as social constructivism, cognitive multimedia theory, and digital literacy theory. Social constructivism, as proposed by Vygotsky, emphasizes that learning occurs through social interaction and collaboration (Vygotsky et al., 2016). In the context of PAI, this approach is relevant for understanding Islamic values through group discussions and cross-cultural interactions.

Cognitive multimedia theory (Mayer, 2002) suggests that effective learning occurs when information is conveyed through a combination of images and text, optimizing the brain's visual and verbal capacities. The use of digital technology, such as animated videos to illustrate Islamic stories, enhances students' understanding of Islamic values.

Approaches like the Technology Acceptance Model (TAM) (Davis, 1989) provide a framework for understanding technology adoption by students and teachers. Key factors such as perceived ease of use and perceived usefulness serve as significant predictors of successful technology implementation in PAI learning (Zahro & Nugraha, 2021).

The Technological, Pedagogical, and Content Knowledge (TPACK) model is also an important reference for digital technology integration. TPACK highlights the necessity of mastering content, pedagogy, and technology simultaneously to create effective learning experiences (Mishra & Koehler, 2009). Meanwhile, the SAMR (Substitution, Augmentation, Modification, Redefinition) model offers guidelines for progressively transforming learning quality through technology (Arantes, 2022).

In PAI, the application of social values through digital technology enables students to comprehend contemporary issues such as tolerance, radicalism, and ethics in social media use. Digital technology serves as a medium for delivering content relevant to daily life, reinforcing students' understanding of Islamic values (Yusuf, 2020).

2.3. *Digital Competency in PAI Learning*

The development of teachers' digital competencies is a key element in the success of technology-based learning. These competencies include information literacy, communication, educational content creation, digital security, and problem-solving skills in education (Blyznyuk, 2019). In the context of the Industrial Revolution 4.0, digital competencies also play a role in enhancing creativity and innovation in teaching (Lase, 2019).

The integration of digital technology into Islamic Religious Education provides a holistic approach to creating dynamic, relevant, and effective learning experiences. Modern educational theories, technology integration models, and digital competency development serve as fundamental pillars supporting the success of technology-based PAI learning. The proper implementation of these approaches will enrich students' understanding of Islamic values and prepare them to face challenges in the digital era.

3. Methods

3.1. *Research Design*

This study employs a qualitative approach with a descriptive method, aiming to provide an in-depth depiction of the phenomenon under investigation (Denzin & Lincoln, 2018). This approach was chosen due to its relevance in comprehending phenomena through the collection and analysis of context-rich data (Creswell, 2018). A qualitative descriptive approach enables

researchers to interpret data within the context of specific situations and social interactions (Merriam & Tisdell, 2016).

3.2. *Participants and Research Location*

This study was conducted in 19 senior high schools (SMA) across Gunungkidul Regency, consisting of 11 public schools and 8 private schools (Documents from the Education and Secondary Affairs Office). The primary respondents comprised 30 Islamic Religious Education (PAI) teachers from these schools (Documents from the Ministry of Religious Affairs of Gunungkidul Regency, 2023). A purposive sampling technique was employed to determine the data sources, ensuring that selected participants had direct relevance to the research objectives (Patton, 2015). This strategy ensured that the collected data originated from individuals with pertinent experience and knowledge related to the research focus.

3.3. *Data Collection*

Data were collected using multiple methods, namely:

a. Observation: The researcher conducted direct observations of PAI learning activities in senior high schools, adhering to participant observation principles to gain an in-depth understanding of the context (Spradley, 2016).
b. Interviews: In-depth interviews were conducted with PAI teachers to explore information regarding teaching practices and encountered challenges (Kvale & Brinkmann, 2009).
c. Documentation: Official documents such as syllabi, lesson plans (RPP), and learning outcome reports were analyzed as supporting data (Bowen, 2009).
d. Questionnaires: Questionnaires were used to complement information obtained through interviews and observations, as this instrument can provide relevant additional quantitative data (Creswell, 2018).

All collected data were systematically recorded and organized to support further analysis (Spradley, 2016).

3.4. *Data Analysis*

The data analysis process in this study was conducted iteratively and involved four main stages:

Data Collection: Data were gathered from various sources using the predetermined methods (Yin, 2018).

a. Data Condensation: The collected data were summarized, focused, and filtered to identify key patterns and themes (Miles et al., 2019).
b. Data Presentation: The categorized data were presented in narrative and tabular formats to facilitate interpretation (Bazeley, 2013).
c. Conclusion Drawing and Verification: The researcher critically and innovatively interpreted the compiled data to address the research questions. This interpretation was conducted while maintaining the validity and reliability of the data (Creswell & Poth, 2018).

3.5. *Ethical Considerations*

This study adhered to research ethics principles, including obtaining research permission from relevant institutions and informed consent from participants (Israel & Hay, 2006). Confidentiality of data and participant identities was maintained to ensure their privacy, in accordance with social research ethical guidelines (British Educational Research Association (BERA), 2018).

By employing this approach, the study aims to make a significant contribution to the understanding of PAI instructional implementation at the senior high school level in Gunungkidul Regency.

4. Results

4.1. *Utilization of Digital Technology in PAI Learning*

Based on observations conducted in 19 high schools (11 public and 8 private) in Gunungkidul Regency, it was found that the use of digital technology in PAI learning is quite extensive, albeit with varying levels of adoption. Learning Management Systems (LMS) are among the most widely used technologies, with platforms such as Google Classroom, Moodle, and Edmodo facilitating material organization, assignments, and digital interaction.

> "Each class is assigned a Google Classroom by the school administrator to facilitate assignment submission. LMS greatly assists both online and face-to-face learning."

(Interview with Mr. A, PAI Teacher at SMA N 01 Wonosari, September 5, 2023)

In addition to LMS, PAI teachers in various schools utilize digital presentation media such as Microsoft PowerPoint, Google Slides, and Canva to deliver more interactive lessons. Some schools, such as SMA N 02 Wonosari, have developed an internal LMS called Portal Belajar Smada, enabling interaction between teachers and students from content delivery to assessment.

> "With Portal Belajar Smada, we can provide structured materials. We are also beginning to develop video-based content to make learning more engaging for students."

(Interview with Mrs. F, PAI Teacher at SMA N 02 Wonosari, April 10, 2023)

Most schools have also adopted Computer-Based Testing (CBT) for examinations and assessments, with SMA N 2 Wonosari pioneering the implementation of digital exams, reducing paper usage, and enhancing assessment efficiency.

However, observations indicate a gap in infrastructure access. Schools in remote areas face challenges in internet access and device availability, impacting the optimal use of technology in learning.

4.2. *Digital Competence of PAI Teachers*

To evaluate teachers' digital competence, this study employed the Digital Competence Framework, which comprises five key aspects. The results of the digital competence mapping of PAI teachers are summarized in Table 1.

Table 1. Digital Competence Mapping of PAI Teachers in Gunungkidul Regency

Digital Competence Aspect	Key Findings
Information (Ability to search, evaluate, and use digital sources)	Most teachers have basic skills in searching for teaching resources but are still limited to Google Search and YouTube.
Communication (Ability to use technology for communication and collaboration)	WhatsApp Groups serve as the primary communication tool, but interactive discussion forums are rarely utilized.
Educational Content Creation (Ability to create interactive digital content)	Most teachers only use PowerPoint, while the creation of educational videos and podcasts remains low.
Security (Awareness of digital security and data protection)	Many teachers lack knowledge on how to protect student privacy, particularly when using open digital platforms.
Educational Problem Solving (Ability to troubleshoot technology-related issues in learning)	Teachers still struggle with troubleshooting LMS issues and integrating technology with conventional teaching methods.

"I still struggle to create educational videos. We need more training to develop digital content."

(Interview with Mr. R, PAI Teacher at SMA N 01 Semin, July 23, 2023)

4.3. *Impact of Digital Technology Integration on PAI Learning*

The impact of digital technology integration on PAI learning has shown mixed results, as summarized in Table 2.

Table 2. Impact of Digital Technology Integration in PAI Learning

Positive Impact	Negative Impact
Accessibility: Students can access materials anytime via LMS and educational videos.	Student Dependence on Technology: Some students prefer seeking instant answers rather than deeply understanding concepts.
Interactive Learning: The use of Kahoot! and Quizizz-based quizzes increases student participation.	Infrastructure Gap: Schools in remote areas experience limited internet access and device availability.
Flexibility: Hybrid learning models allow teachers to adapt lessons to student needs.	Low Digital Literacy Among Teachers: There are still challenges in creating innovative digital content.

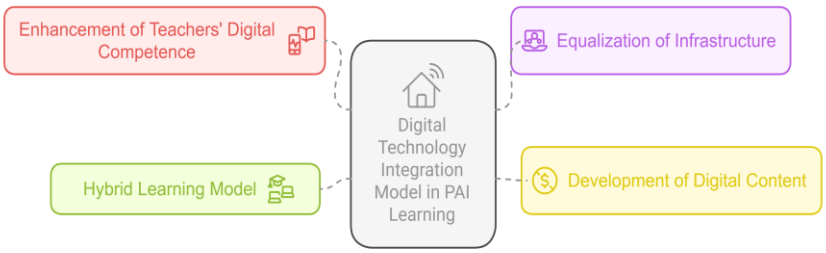
"Technology makes learning more engaging, but I worry that students may become too dependent on the internet and lack critical thinking skills."

(Interview with Mr. T, PAI Teacher at SMA N 01 Playen, October 12, 2023)

4.4. *Relevant Digital Technology Integration Model*

Based on research findings, the development of a digital technology integration model in PAI learning must consider four key aspects, as summarized in Figure 1.

Figure 1. Digital Technology Integration Model in PAI Learning



5. Discussion

The findings of this study indicate that the utilization of digital technology in Islamic Religious Education (PAI) learning in Gunungkidul Regency has developed significantly. However, challenges remain in terms of infrastructure and teachers' digital competence. Learning Management Systems (LMS) such as Google Classroom, Moodle, and Edmodo have been widely used, while the use of digital presentation media and Computer-Based Test (CBT) evaluations is also increasing. Nevertheless,

these findings also reveal disparities in technology utilization, particularly in schools located in areas with limited internet access.

These findings align with the Technology Acceptance Model (TAM), which states that technology adoption is influenced by perceived ease of use and perceived usefulness (Davis, 1989). In the context of this study, teachers who received technology training and had better infrastructure access demonstrated higher levels of technology adoption. However, this study also reinforces the argument that infrastructure and educational policies play a crucial role in the successful implementation of technology in religious education (Hasnida et al., 2024).

Furthermore, the findings indicate that the digital competence of PAI teachers remains limited in certain aspects, particularly in the creation of innovative digital content. Most teachers still rely on PowerPoint, while the use of educational videos, podcasts, and interactive quizzes remains minimal. This finding is consistent with research highlighting that the lack of training based on the Technological, Pedagogical, and Content Knowledge (TPACK) framework is one of the main barriers to teachers' digital skill development.

The study also supports the argument that the use of technology in Islamic education must be accompanied by a strengthening of religious values so that students not only focus on technical aspects but also develop a deeper understanding of Islamic concepts (Yusuf, 2020).

5.1. *Theoretical Contributions*

This study contributes to the development and expansion of technology integration models in PAI learning through several key findings:

a. Strengthening the TAM Model with Infrastructure and Teachers' Digital Literacy Factors
   - Unlike previous studies that focused solely on ease of use and the perceived usefulness of technology, this study demonstrates that infrastructure readiness and teachers' digital literacy levels have a significant impact on technology adoption in PAI learning.

b. Application of the TPACK Model in the Context of Islamic Religious Education
   - This study reinforces the TPACK model by highlighting the importance of balancing pedagogy, technology, and Islamic content in digital-based learning.

c. Implications of the Social Constructivism Model in Digital PAI Learning
   - The findings suggest that the application of technology in PAI can support social interaction and group discussions, in line with the Social Constructivism Theory (Vygotsky et al., 2016).
   - However, challenges remain in utilizing online discussion forums and more dynamic interactive platforms.

5.2. *Practical Implications*

The findings of this study have direct implications for educational policies and teaching strategies in digital-based PAI learning:

a. The Need for Intensive Training for PAI Teachers in Digital Content Creation
   - Teachers require training in developing educational videos, podcasts, and interactive quizzes to improve the quality of technology-based learning.
   - Training programs can be implemented through MGMP (Teachers' Working Group) and Educational Technology Centers to enhance teachers' digital competence.

b. Equal Distribution of Digital Infrastructure in Remote Areas
   - The government needs to improve internet access and provide technological devices in rural schools.
   - This policy is crucial to reduce the digital divide between urban and rural schools.

c. Implementation of Hybrid Learning Models for PAI
   - Combining face-to-face and digital learning can enhance teacher-student interaction while leveraging technological advantages.
   - Schools can adopt a blended learning approach to create a more flexible learning experience.

d. Strengthening Students' Digital Literacy to Avoid Overdependence on Technology
   - Students need to be educated on the ethical use of technology and the understanding of Islamic values in the digital era.
   - Islamic values-based digital literacy modules can be developed to balance technological and spiritual aspects.

Although this study suggests that digital technology has enhanced accessibility to PAI learning, several potential biases and alternative explanations need to be considered:

a. Teacher Perception Bias in Technology Evaluation
   - The findings of this study are primarily based on teacher interviews, which may reflect perception bias regarding technology use.
   - Future studies could incorporate student perspectives to gain a more comprehensive understanding.

b. Possible External Factors Influencing Results
   - Other factors such as school principal support, school policies, and organizational culture may also influence the success of technology implementation but have not been explored in depth in this study.

c. Limited Long-Term Effectiveness Evaluation
   - The long-term impact of digital technology integration on students' understanding of PAI has not been thoroughly measured.
   - Longitudinal studies are needed to assess how technology truly shapes students' religious understanding and character development.

5.3. *Future Research Directions*

Based on the findings and limitations of this study, several recommendations for future research are proposed:

a. Comparative Studies Across Different Regions
   - This study focuses solely on Gunungkidul Regency; therefore, comparative studies in other regions with different infrastructure characteristics are necessary.

b. Analysis from the Student Perspective
   - Future studies should explore students' experiences in digital-based learning and how technology influences their understanding of Islamic values.

c. Long-Term Evaluation of Digital Learning Model Effectiveness
   - Further research is required to assess how digital technology integration genuinely enhances students' learning outcomes and religious understanding over an extended period.

Overall, this study asserts that integrating digital technology into PAI learning has significant potential to enhance learning accessibility and interactivity. However, challenges related to infrastructure, teachers' digital competence, and students' dependence on technology remain obstacles that must be addressed. By strengthening teacher training, ensuring equal access to technology, and adopting hybrid learning approaches, digital-based PAI learning can be optimized to support the transformation of Islamic education in the digital era.

6. Conclusion

This study highlights that the integration of digital technology in Islamic Religious Education (PAI) learning in Gunungkidul Regency has enhanced accessibility and interactivity in learning. However, it still faces significant challenges in terms of infrastructure and teachers' digital competence. Referring to the Technology Acceptance Model (TAM) and Technological, Pedagogical, and Content Knowledge (TPACK), this study finds that infrastructure readiness and teachers' digital literacy are key factors influencing the successful adoption of technology.

The main contribution of this study is the reinforcement of the technology acceptance model in the context of religious education in rural areas, which has been relatively underexplored in previous studies. Additionally, this study emphasizes how the social constructivist model can be applied to digital-based PAI learning, particularly through the development of interactions within hybrid learning environments.

Practically, this study offers several recommendations to enhance the effectiveness of digital-based PAI learning, including intensive teacher training in digital content creation, equal access to infrastructure, and strengthening students' digital literacy to prevent over-reliance on technology. The policy implications of this study are also relevant for education policymakers in Indonesia and other developing countries facing similar challenges in the digitalization of religious education.

However, this study has several limitations. First, as this research focuses on teachers' perspectives, further studies involving students' perspectives are needed to gain a more holistic understanding. Second, the long-term impact of technology integration in PAI learning needs to be examined through a longitudinal approach to assess how technology influences the deep comprehension of Islamic values. Moreover, external factors such as school policy support and the role of school principals could also be significant variables that require further investigation.

For future research, it is recommended to use experimental or quasi-experimental methods to measure the effectiveness of digital-based learning models in enhancing the understanding of Islamic values. Additionally, comparative studies across regions or countries could be conducted to examine how differences in infrastructure and culture affect the adoption of technology in religious education. By addressing existing challenges and implementing appropriate strategies, the digitalization of PAI learning can be optimized to support the transformation of Islamic education in the increasingly evolving digital era.

Declarations

Author contribution statement

Diyah Mintasih made substantial contributions to the conception or design of the work and critically revised the manuscript for important intellectual content. Sukiman was responsible for the acquisition, analysis, and interpretation of data. Sigit Purnama supervised the research process and provided critical guidance throughout the project.

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Data availability statement

The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Interest's statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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