



Implementation of digital-based interactive learning in Islamic religious education subjects: A multi-site study at Madrasah Tsanawiyah in Palu city

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Abstract

This study aims to investigate the implementation of digital-based interactive learning in Islamic Religious Education and the role of teachers in implementing it at madrasah schools in Palu City, Indonesia. This study employed a qualitative approach with a multisite study design conducted at two Madrasah schools in Palu city. Data were collected through observations, in-depth interviews, and written document analysis. The findings reveal that the implementation of digital-based interactive learning consists of three main stages: planning, implementation, and evaluation. During the planning stage, teachers prepared learning modules and selected appropriate digital media and platforms. During the implementation stage, teachers utilized learning videos, digital presentations, Learning Management Systems (LMS), and internet-based learning resources to enhance interaction and student participation. During the evaluation stage, teachers employed digital-based assessments accompanied by feedback. Cross-site analysis indicates that the madrasah schools are more systematic and fairly effective but remain highly dependent on teachers' digital competencies. Supporting factors include school policies, digital facilities, and teacher motivation, while inhibiting factors include limited internet connectivity, unequal distribution of facilities, and varying levels of digital competence among teachers and students. The implications of this study emphasize the importance of strengthening teachers' digital competencies, providing adequate educational facilities, and supporting sustainable school policies. The findings are expected to serve as a reference for developing more innovative, interactive, and student-centered Islamic religious education learning.

Keywords: Interactive learning, Digital-based learning, Islamic education, Madrasah school

Introduction

Digital-based interactive learning emphasizes active student engagement through the use of digital media, online learning platforms, and various interactive features that enable dialogue, collaboration, and two-way feedback (Nurdin, Pettalongi, Askar, & Hamka, 2021) ^[14]. This approach is oriented not only toward mastery of material but also toward developing critical and reflective thinking skills and the ability to apply knowledge to real-life situations (Nurdin, Pettalongi, & Mangasing, 2019) ^[15]. Therefore, the success of digital learning is not determined solely by technological sophistication, but rather by how the technology is pedagogically integrated. In the realm of Islamic religious education, digital-based interactive learning has a more complex urgency. Islamic religious education functions not only to transmit religious knowledge but also to shape students' religious attitudes, values, and character. The learning process of Islamic religious education demands role models, internalization of values, and the continuous cultivation of religious practices. Challenges arise when these values must be conveyed through digital media, necessitating learning strategies that maintain the depth of meaning and spirituality. Nationally, the government's education digitalization policy, including the Ministry of Religious Affairs, encourages madrasahs (Islamic schools) to adopt digital technology-based

learning. Digital madrasah programs, the use of e-learning, and strengthening teachers' digital literacy are part of the strategic agenda to improve the quality of learning in madrasahs (Nurdin, Pettalongi, Ahsan, & Febrianti, 2023) ^[13]. This policy provides space for madrasahs to innovate, but at the same time demands readiness in human resources, infrastructure, and learning governance. At the implementation level, each madrasah has different dynamics and characteristics in responding to this digitalization policy. Differences in madrasah leadership, school culture, teacher competency, and students' social backgrounds influence how digital-based interactive learning is implemented (Zhang, 2007) ^[24]. Therefore, in-depth and contextual studies are essential to understand how this policy translates into real-life learning practices, particularly in Islamic religious subjects.

Palu City, as one of the educational centers in Central Sulawesi, has shown significant progress in the use of learning technology in Islamic schools. State Islamic Junior High Schools in Palu City have begun utilizing e-learning platforms, digital presentation media, and online learning applications as part of the teaching and learning process. However, the level of interactivity and quality of technology utilization varies among madrasahs. Palu Madrasah is one of the madrasahs that is a relatively progressive institution in developing learning and

religious programs. This madrasah is known for its strengthened Quran memorization program, structured religious activities, and efforts to provide technology-based classrooms. These conditions provide important capital for implementing digital-based interactive learning in Islamic Religious Education subjects, but also raise questions about how this digital interactivity is integrated with value-rich learning and religious habits.

Islamic junior high schools have distinct characteristics, with a prominent culture of academic and non-academic achievement. Various competitions and extracurricular activities reflect a competitive and dynamic learning environment. This situation has the potential to support the implementation of digital-based interactive learning, particularly in encouraging active participation and student motivation, including in religious education. Although both madrasas have utilized digital technology in their learning, there are indications that the use of digital media is still predominantly a tool for delivering material and evaluation, and has not been fully maximized to build in-depth pedagogical interactions (Askar, Nurdin, Pettalongi, Pettalongi, & Basire, 2025) [2]. Teacher-student and student-student interactions in Islamic religious education learning are often one-way, so the potential of digital technology as a means of value dialogue, religious reflection, and collaboration has not been fully managed.

Differences in infrastructure conditions, access to digital devices, and student readiness are also important factors in implementing digital-based interactive learning. Some students have limited access to devices and internet networks at home, which impacts the intensity and quality of their engagement in digital learning. This situation demands adaptive school policies and strategies to ensure inclusive and equitable learning. The digital competence of Islamic religious education teachers is a key determinant of the success of digital-based interactive learning. Teachers are not only required to be able to operate devices and applications, but also to design learning that encourages active participation, values reflection, and the formation of religious character through digital media. Variations in the competence and creativity of religious education teachers are important phenomena that require in-depth study. From a governance perspective, the support of madrasah principals, internal school policies, and the academic climate significantly influence the sustainability of interactive digital learning. Madrasahs with a clear vision for digital learning development tend to be more consistent in providing facilities, teacher training, and supporting regulations. Differences in policies and priorities between schools in Palu City have the potential to result in different implementation patterns.

Literature review

Digital learning concept

Digital learning is a transformation in the world of education that integrates information and communication technology as the primary tool in the teaching and learning process (Berger & Golan, 2024; Falloon, 2020) [3, 7]. A simple definition of digital learning is the use of digital devices such as computers,

laptops, tablets, or smartphones connected to the internet to support the delivery, storage, distribution, and evaluation of learning materials. Interactive-based digital learning is a learning process that utilizes digital technology and interactive media such as Google Classroom, Kahoot, Quizizz, or LMS to increase active participation, two-way communication, and student engagement in the teaching and learning process (Jabir, Nurdin, Saguni, & Mala, 2026) [8]. Digital learning is an approach that utilizes technology to create a more flexible, dynamic, and student-centered learning experience. Philosophically, digital learning was born from the demands of globalization and the development of the industrial era 4.0, which emphasizes the importance of digital literacy in education. Digitalization is not merely a technical innovation, but part of a shift in the learning paradigm: from teacher-centered learning to student-centered learning. In this context, the definition of digital learning also includes pedagogical aspects, namely how technology becomes a medium for fostering independent learning, creativity, and collaboration between students. This means that digital learning is not just about using online applications or platforms, but rather how technology is interpreted and optimized to support the achievement of educational goals.

From a practical perspective, digital learning can be defined as a series of technology-supported learning activities, ranging from access to multimedia-based learning materials and synchronous (real-time) and asynchronous (delayed) interactions to digital-based assessment processes (Mougiakou, Papadimitriou, & Virvou, 2020) [9]. This definition emphasizes that digitalization enables learning to take place without the constraints of space and time. Students can learn anytime and anywhere with internet access, while teachers can provide guidance and evaluation online. The main advantage of digital learning is its adaptive and personalized nature, allowing for differentiation of learning according to individual student needs. In the context of Islamic education, particularly in Islamic religious education, digital learning has a broader dimension. The definition of digital learning encompasses efforts to utilize technology to enrich students' spiritual and moral experiences, for example through interactive videos on worship, application-based simulations of worship practices, or online discussions on contemporary religious issues. Thus, digital learning not only teaches cognitive knowledge but also serves as a means of internalizing Islamic values contextually and in accordance with current developments. Referring to various definitions, it can be concluded that digital learning is an educational approach that combines aspects of technology, pedagogy, and socio-cultural context within a learning ecosystem. This definition emphasizes the integration between hardware (devices), software (applications and platforms), and humanware (teachers and students), which support each other to create an effective and meaningful learning process.

Characteristics of digital learning

The main characteristic of digital learning is its flexibility (Duncan, 1995) [5]. This flexibility is evident in the ability to

take place anytime and anywhere, without being tied to a traditional classroom (Alruthaya, Nguyen, & Lokuge, 2021) ^[1]. With the support of digital devices and an internet connection, students can independently access learning materials, whether in the form of text, video, audio, or interactive multimedia. This makes digital learning a solution to time and space constraints, while simultaneously encouraging the realization of the concept of lifelong learning. The second characteristic is the interactivity in the learning process. Unlike conventional learning, which tends to be one-way, digital learning allows for two-way or even multi-way interaction. Teachers and students can communicate directly through online discussion forums, chat features, or video conferencing. Digital applications are often equipped with interactive quizzes, polls, and simulations that stimulate active student involvement. This interactivity is the hallmark of digital learning, as it not only presents information but also builds participatory learning experiences. Therefore, the following are the characteristics of digital learning.

Information and communication technology-based learning

Digital learning is inseparable from the use of information and communication technology as the primary means of delivering material, interacting with, and evaluating learning (Cheruiyot & Molnár, 2026) ^[4]. This technology encompasses hardware such as computers, laptops, smartphones, and internet connections that support various online learning applications. In the context of Islamic Religious Education, information technology enables teachers to present more varied and engaging materials, for example through the use of Google Classroom, Moodle, Quizizz, Kahoot, and Edmodo to manage digital classes. Social media such as YouTube, Instagram, or TikTok Education can also be utilized to disseminate inspiring and educational religious content. Thus, Islamic Religious Education learning is not limited to the classroom but extends to digital spaces that are widely and flexibly accessible to students.

High interactivity

One of the main characteristics of digital learning is the high level of interactivity between students, educators, and the learning media itself (Faisal, Fernandez-Lanvin, De Andrés, & Gonzalez-Rodriguez, 2020; Nurdin & Aratusa, 2020) ^[6, 11]. This interactivity enables two-way and even multi-way communication (teacher-student-system), so that students act not only as recipients of information but also as active participants in the learning process. In Islamic religious education learning, for example, teachers can create interactive quizzes on Quranic interpretation, 3D animated prayer simulations, or online discussions on moral values in the Hadith (Rustina *et al.*, 2026) ^[22]. Through this interactivity, students can learn more enjoyably, participate actively, and receive instant feedback that strengthens their engagement and understanding of Islamic material.

Time and place flexibility

Digital learning has a key advantage in terms of flexibility. The learning process can take place anytime and anywhere, without being bound by time and space, as long as there is internet access. In Islamic Religious Education learning, this allows students to customize their learning schedules, for example, by reviewing learning videos on *tajwid*, morals, or Islamic history outside of school hours. This flexibility also supports self-paced learning, where students can adjust their learning pace according to their individual abilities. Thus, the concept of "lifelong learning," a core value in Islam, can be realized through an open and inclusive digital system.

Student-centered learning

The digital learning approach places students at the center of all learning activities (Northey, Bucic, Chylinski, & Govind, 2015) ^[10]. Teachers are no longer the sole source of knowledge, but rather act as facilitators, mentors, and guides. In Islamic Religious Education (PAI) learning, this means students are given the freedom to explore learning materials from various digital sources, such as tafsir e-books, Islamic scholarly articles, interactive sermon videos, and online study platforms. The teacher's role shifts to that of a facilitator, helping students critically analyze religious information to avoid being trapped by invalid digital content or hoaxes. This model fosters a sense of responsibility, spiritual independence, and critical thinking skills, which align with Islamic educational values.

Multimedia integration: Texts, images, audio, and videos

Another characteristic of digital learning is its ability to integrate various forms of media, text, images, sound, animation, and video to deliver material more engagingly and effectively (Qian, 2011) ^[19]. This combination of multimedia creates a richer, multisensory learning experience. In Islamic religious education, multimedia can be used to display videos of Islamic scholars' lectures, simulations of ablution and prayer procedures, audio recordings of Quranic recitations with correct *tajweed*, or infographics on moral values in everyday life. The use of multimedia not only strengthens students' retention of the material but also increases their motivation and emotional engagement in understanding Islamic teachings contextually and enjoyably.

Methodology

This study uses qualitative methods. In qualitative research, theory serves only as a guide for data gathering and analysis (Nurdin & Pettalongi, 2022; Nurdin, Stockdale, & Scheepers, 2016) ^[12, 18]. The data were collected through direct observation, in-depth interviews, and written document analysis at the research site (Rusli, Hasyim, & Nurdin, 2021; Rusli & Nurdin, 2022) ^[20, 21]. The research was conducted in two government madrasahs in Palu city, Indonesia. The researcher chose the school because it is a reputable government school that implements interactive digital-based learning in Islamic education. The results of this study can later serve as a reference and guideline for integrating local language into the teaching of the Islamic religion and for

making schools a model for other educational institutions. Data were collected through direct observation, focus group discussion, in-depth interviews, and written document analysis. The interviews involved the school principal, five teachers, and ten students. The interviews were recorded and transcribed. The transcripts were consulted with participants to obtain their consent (Nurdin, Scheepers, & Stockdale, 2022; Nurdin, Stockdale, & Scheepers, 2014) ^[16, 17]. The data analysis used a deductive approach, which can be interpreted as a research procedure that produces deductive data from interviews and field notes. Data analysis was conducted using thematic analysis from Strauss and Corbin (1998) ^[23]. The analysis started with open, axial, and selective coding. The final result of the data analysis is the set of themes identified.

Results and Discussion

Implementation of digital-based interactive learning in religious studies

The implementation of digital learning in religious studies begins with the development of digital-based modules for the religious subject group, a crucial initial step in the success of digital-based interactive learning. Based on observations, interviews, and documentation, the modules were developed not only to fulfill learning administration requirements but also systematically designed to integrate pedagogical, technological, and student characteristics. One such module is the teaching module for Islamic Cultural History, used as a learning tool by teachers. This module contains the subject's identity, phase and class, learning objectives, materials, strategies, media, and assessments, which serve as guidelines for learning implementation. The existence of this teaching module demonstrates that teachers have systematically planned learning activities before the learning process begins. This documentation serves as evidence that the learning implementation is based on learning tools developed in accordance with the provisions of the Independent Curriculum and serves as a reference for implementing digital-based interactive learning.

Observations of the learning process in digital classrooms also indicate that the modules developed accommodate the facilities available at the madrasah. Teachers adapt their lesson plans to the conditions of digital classrooms, which are equipped with devices such as laptops, Smart TVs, and internet connections. The modules are contextual and realistic, adapting to the existing learning environment. One teacher stated:

"Creating digital-based modules is one of the policies we have implemented to support the digitalization of learning in madrasahs. We encourage all teachers to utilize technology in developing learning tools to make the material more accessible to students. Through the use of technology, students can access a wider variety of learning resources, making learning more effective and aligned with current educational developments."

The Madrasah Principal explained that the implementation of digital-based modules has had a positive impact on the learning process. Teachers can present material more systematically and engagingly through various digital media, while students have

greater opportunities for independent learning through access to digital learning resources. As one teacher explained:

"In developing learning modules, I try to integrate various digital media to make learning more engaging and easier for students to understand. I usually use LCDs to display the material, instructional videos to clarify the concepts being taught, and an LMS to distribute materials and assignments. With these media, learning becomes more varied, and students appear more enthusiastic about participating in the lessons."

Another teacher stated that digital-based modules facilitated the organization of learning materials more systematically. The compiled materials could be stored, updated, and shared with students more easily than using conventional modules. Furthermore, assignments and learning evaluations could be conducted in a more structured manner through the digital platform. Interviews with students revealed that the use of digital technology in Islamic religious studies had a positive impact on their understanding of the material. Students found that learning using digital technology was more engaging, easier to understand, and helped them acquire a broader range of information than learning using only conventional methods. "Learning using digital technology is easier to understand because teachers not only explain the material verbally but also show videos and images to help us understand the lesson. This way, we remember the material more easily."

The use of a Learning Management System (LMS) in learning is also part of the planning outlined in the module. The LMS is used to distribute materials, assign assignments, and facilitate interaction between teachers and students. This indicates that the development of digital-based modules is not solely oriented towards face-to-face activities but also integrates online learning as part of the learning strategy. Based on the triangulation of observation data, interviews, and documentation, it can be concluded that the development of digital-based modules has been carried out systematically and integrated. The learning modules not only contain teaching materials but also encompass interactive learning strategies, the use of digital media, and strengthening student engagement. Support from madrasah policies, the availability of infrastructure, and the readiness of teachers and students are key factors in supporting the success of this planning stage. However, there are still technical obstacles that need to be overcome to optimize digital-based learning.

Digital media and platform selection

The selection of digital media and platforms is a crucial part of the planning stage for digital-based interactive learning in the Islamic religious subject group. Research results indicate that the media selection process is not random, but takes into account the suitability between learning objectives, material characteristics, student conditions, and available infrastructure. Research data also indicates that in designing learning, teachers have chosen a variety of digital media, such as Smart TVs for material presentations, learning videos as initial stimuli, and digital platforms such as Learning Management Systems (LMS) for distributing materials and assignments. This media

selection is tailored to the learning stages, with videos used in the apperception stage, digital presentations in the core stage, and the LMS platform for assignments and evaluations. The learning process also shows that media selection has taken interactivity into account. Teachers not only use media as a means of conveying information but also to stimulate discussion, question-and-answer sessions, and information exploration by students. This is evident in the use of videos followed by prompt questions and group discussions based on digital information.

In the context of a digital classroom environment, media selection is heavily influenced by the availability of facilities. All schools studied had facilities such as LCDs, internet connections, and other supporting devices that enabled optimal use of digital media. The principal explained that the use of digital media was not only aimed at keeping up with technological developments, but also as an effort to improve the quality of learning, making it more effective, interactive, and relevant to the demands of 21st-century education. One informant stated the following:

“The selection of digital media and platforms is part of our ongoing digital madrasah development program. We encourage teachers to utilize technology optimally in the learning process by selecting media that are innovative, engaging, and tailored to student needs. This way, learning can be more effective and increase student engagement.”

Religious education teachers explained that media such as instructional videos and digital presentations are frequently used because they can present material visually and engagingly. The use of these media is considered very helpful in explaining abstract material, making it easier for students to understand. Students said that they found video media and digital presentations very helpful in explaining abstract material. With images, animations, and visual explanations, students more easily understand the concepts taught compared to using only lecture methods. The use of digital media in learning provides a more engaging learning experience than conventional learning. Students feel more motivated to participate in learning. Students are more interested in learning when teachers use videos or presentations because the learning becomes more interesting and less boring. The material is also easier to understand because of the images and clear explanations.

From a documentation perspective, it was found that teachers had used various digital media in their learning, such as presentation files, learning videos, and the LMS platform used to upload materials and assignments. The documentation also showed student activity in accessing digital materials and completing assignments online, demonstrating that digital media and platforms had been integrated into learning planning. Based on the triangulation of observation, interview, and documentation data, it can be concluded that the selection of digital media and platforms in the madrasah was carried out in a planned and contextual manner. The selected media served not only as supporting tools but also as a means to increase student interactivity and engagement in learning. Support from

madrasah policies, the availability of infrastructure, and teacher competence were key factors in determining the effectiveness of digital media and platform selection. However, technical challenges such as internet connection stability persisted. The differences in learning success between schools lie in the planning stage, indicating that the success of interactive digital-based learning is determined not only by the use of technology, but also by the extent to which that technology is systematically designed and integrated into the learning modules.

Interactive interaction between teachers and participants in learning

Teacher-student and student-student interactions are key indicators in assessing the success of digital-based interactive learning in the Islamic religious studies cluster. The results of this study indicate that teacher-student interactions in learning occur dynamically and dialogically. Teachers not only deliver material but also actively provide stimuli in the form of provocative questions, video displays, and contextual cases that encourage students to think critically. This interaction is evident in the apperception stage and core activities, where teachers invite students to provide opinions, answer questions, and relate the material to everyday experiences. In the core activities stage, teacher-student interactions develop further through the use of digital media. Teachers facilitate students in searching for information online, then discuss the results together. In this process, teachers act as facilitators who guide, direct, and provide reinforcement for students' answers.



Fig 1: Teachers and students interactive learning

The photo shows the implementation of Islamic religious education learning that utilizes digital devices in the form of smartphones as a learning medium. Teachers play an active role in guiding and monitoring students directly during the learning activities, including providing direction and assistance to students who experience difficulties. Meanwhile, students use smartphones to access learning materials, complete assignments, or search for digital learning resources as directed by the teacher. Interaction between teachers and students takes place actively through mentoring, discussions, and providing feedback, so that the learning process is not only oriented toward the use of technology but also toward student involvement in building knowledge. This documentation

serves as evidence of the implementation of digital-based interactive learning that integrates the use of digital devices with teacher guidance to create an effective, active, and student-centered learning process.

Student-to-student interactions also demonstrate the development of social and communication skills. Students learn to respect others' opinions, present arguments logically, and collaborate in completing group assignments. This is one indicator of the success of digital-based interactive learning, which focuses not only on cognitive aspects but also on social and affective aspects. Research also shows that the use of digital media has a positive impact on increasing interaction in the learning process. One informant stated the following:

"The use of digital media is very helpful in increasing classroom interaction. I see students being more active in asking questions and providing responses when material is presented through videos, interactive presentations, or other digital media. Compared to conventional learning, they appear more enthusiastic about participating in the learning process."

Students feel more comfortable and interested in participating in learning using digital technology. According to students, the use of digital media makes the learning atmosphere more enjoyable, so they are not afraid or embarrassed to interact with teachers or classmates. Students feel more comfortable participating in learning when teachers use digital media because the atmosphere is more engaging. They find it easier to ask questions if there is material they don't understand and don't feel bored during the lesson. Teacher-student interactions are reflected in learning activities, such as group discussions, presentations of work results, and Q&A sessions involving all students. Documentation in the form of photos and recordings of learning activities shows that students are not merely sitting passively but are actively involved in the learning process. Learning interactions also tend to be more intensive and structured, but are still influenced by variations in methods and media use by teachers. Interactions between students are not fully optimal in all classes, especially when technology use is still limited. Research data also shows that teacher-student interactions have developed into active, dialogic, and collaborative interactions. Interactions occur not only between teachers and students, but also among students in the form of discussions and group work.

Conclusion

The implementation of digital-based interactive learning in Islamic religious education at madrasahs in Palu City has been carried out through three main stages: planning, implementation, and evaluation. During the planning stage, teachers developed digital-based teaching modules, selected appropriate learning media and platforms, and adapted the learning design to student characteristics and available facilities. During the implementation stage, teachers utilized various digital media such as learning videos, multimedia presentations, Smart TVs, Learning Management Systems (LMS), the internet, and learning apps to create more interactive, collaborative, and student-centered learning.

During the evaluation stage, teachers began implementing digital-based assessments through Google Forms, LMS, and various other evaluation apps. This implementation had a positive impact on increasing student engagement, learning motivation, material understanding, learning outcomes, and digital literacy. Teacher competence, the availability of digital facilities and infrastructure, madrasah policy support, student readiness, and the quality of the internet connection influenced the success of the implementation.

The role of teachers in the implementation of digital-based interactive learning in ISE has undergone a significant transformation. Teachers no longer function solely as transmitters of material, but have evolved into facilitators, motivators, innovators, guides, and managers of digital learning. Teachers play a role in designing technology-based learning, selecting appropriate media, guiding students in utilizing digital learning resources, creating active learning interactions, and conducting technology-based evaluations. The implementation of digital learning also encourages improvements in teachers' pedagogical competence and digital literacy, enabling them to be more creative and innovative in developing media and learning strategies. Thus, teachers are a key factor in determining the success of implementing interactive digital-based learning in madrasahs.

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