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The Utilization Of Augmented Reality (AR) Technology In Islamic Religious Education Learning In The Digital Era

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ABSTRACT

Augmented Reality (AR) technology opens new opportunities in Islamic Religious Education (IRE) learning in the digital era. IRE materials are often abstract, such as concepts of faith, worship, the history of the prophets, and moral values. With AR, these concepts can be visualized more concretely, for example, showing simulations of the Hajj and Umrah, reconstructions of Islamic historical events, or modeling the structure of mosques during the time of the Prophet Muhammad. This article aims to examine how AR can be applied in IRE learning, the resulting benefits, and the challenges of its implementation in educational environments. This study uses a literature study method (library research) by examining various scientific sources such as journals, books, research articles, and relevant reports that discuss the application of AR technology in educational contexts, particularly in religious learning. In the analysis process, all findings from various literatures are compared, categorized, and synthesized to identify patterns of benefits, obstacles, and the most effective pedagogical approaches in applying AR to IRE learning. The study results show that the use of AR in IRE can increase learning motivation, strengthen understanding of abstract religious concepts, and create interactive and contextual learning experiences. This technology also has the potential to build students' spiritual and cognitive engagement through more realistic visualizations. However, challenges faced include limited technological infrastructure, teachers' pedagogical skills in utilizing AR, and students' digital access and readiness. Therefore, an integrative strategy is needed between the curriculum, teacher training, and

educational policy support so that AR technology can be optimally utilized in IRE learning. The practical implications of these findings suggest that teachers need to receive AR-based training, schools need to prepare digital support facilities, and educational policymakers need to develop implementation guidelines that emphasize the integration of Islamic values in the use of AR.

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INTRODUCTION

The development of information technology has brought about significant changes in the world of education. The learning process is no longer merely a transfer of knowledge, as in conventional learning, but increasingly utilizes digital platforms to support the teaching and learning process. This transformation opens up opportunities to provide Islamic Religious Education material more contextually and interactively manner, while adapting the curriculum and teaching methods to ensure that spiritual values and character are maintained amidst the use of technology. (Miftahul Barokah, Rizki Febri Eka Pradani, 2024)

In Indonesia, including at SMP Negeri 9 Kota Probolinggo, Islamic Religious Education subjects, which previously relied heavily on conventional methods, are now shifting to the use of digital technology. (Miftahul Barokah, Rizki Febri Eka Pradani, 2024) By utilizing digital technology, teachers and students can use learning videos, mobile applications, and other interactive media to enhance students' independence and critical thinking.

In the digital era, students have grown up alongside technological advancements and easy internet access, often expecting a more visual, interactive, and contextually relevant learning experience. This, of course, makes text-based learning methods less engaging and can decrease motivation to learn Islamic Religious Education if not integrated with media capable of delivering in-depth and meaningful learning experiences. (Zuo Ruijia1, Li Wenling2, 2025) Therefore, innovation in learning media is essential to maintaining the relevance of Islamic Religious Education learning for the digital generation.

Despite the potential for utilizing high-tech devices, teachers will still face several obstacles when integrating technology, including limited internet access, limited digital competency among educators, the time burden of designing digital materials, and concerns about upholding religious values when material is presented in a technological format. Furthermore, disparities in access between regions can exacerbate differences in the application of digital innovation to Islamic Religious Education learning. All of these factors represent barriers that must be overcome for technology to have a positive impact on Islamic Religious Education learning. (Gege Li, Heng Luo, Di Chen, Peiyu Wang, 2023)

For the development of any educational application technological, domain specific, pedagogical and psychological aspects have to be considered. First and foremost an extendable (mobile collaborative) AR or VR system is needed as a platform to develop an application for real use in classrooms. (Kaufmann, n.d.) Therefore, Augmented Reality (AR) is present as a solution that offers the unique advantage of combining virtual objects into the real world so that students can interact with abstract visual representations, can see simulations of rituals or historical events more concretely, and obtain feedback. As the results of several studies show, AR is able to increase motivation, engagement, and conceptual understanding in various subjects, especially Islamic Religious Education subjects and aims to bridge abstract concepts into observable and experiential learning experiences. (Li et al., 2025) Augmented Reality (AR) technology opens new opportunities in Islamic Religious Education learning in the digital era. IRE materials are often abstract, such as the concept of faith, worship, the history of the prophets, and moral values. With AR, these concepts can be visualized more concretely, for example, by displaying simulations of the implementation of the Hajj and Umrah, reconstructions of Islamic historical events, or modeling the structure of mosques during the time of the Prophet. This article aims to examine how the use of AR can be applied in IRE learning, the resulting benefits, and the challenges of its implementation in educational environments.

However, previous studies tend to focus on the effectiveness of AR in general, while research specifically examining the application of AR in the context of Islamic Religious Education (IRE) learning at the junior high school level, especially in real-world situations such as limited access, teacher readiness, and the challenges of

integrating spiritual values, remains very limited. Furthermore, there is little research examining how AR can be practically adapted to the needs of the Islamic Religious Education (IRE) curriculum and the characteristics of students in schools. This gap underlies the importance of this research. And although various previous studies have shown that digital technology, including Augmented Reality (AR), has the potential to increase learning motivation, conceptual understanding, and student engagement, studies on the use of AR in Islamic Religious Education (IRE) learning still have several important limitations. First, most existing research focuses on general subjects such as science, mathematics, or language, while AR integration in Islamic Religious Education (IRE), particularly on abstract concepts such as faith, worship, and Islamic history, has not been studied in depth. Second, the available literature emphasizes the technological aspects of AR rather than its suitability for specific pedagogical models, resulting in a lack of structured AR integration frameworks, such as the Discovery Learning approach. Third, teacher competency, digital literacy, and institutional readiness are often cited as challenges, but are rarely analyzed specifically in the context of AR implementation in Islamic Religious Education (IRE) classes. Fourth, there are still limited systematic reviews synthesizing research findings from the past decade to evaluate the effectiveness, limitations, and barriers to AR implementation in Islamic education. This gap highlights the need for more in-depth research on pedagogical integration, teacher competency, and the challenges of the educational context to ensure the meaningful and sustainable use of AR in Islamic Religious Education (IRE) learning. So this research provides a contribution in the form of developing a structured AR integration framework, using the Discovery Learning approach, specializing in certain materials, and internalizing Islamic teaching values.

From the explanation above, this research aims to explore the various contributions of Augmented Reality (AR) technology to learning, the benefits it produces, the challenges faced, and its implications for future curriculum and learning development.

RESEARCH METHOD

This research employed a qualitative approach with a library research approach. The library research was conducted by reviewing various relevant written sources to gain an in-depth understanding of the use of Augmented Reality (AR) technology in Islamic Religious Education learning. This approach was chosen because the research focused on

collecting, analyzing, and synthesizing various existing research findings and theories without directly collecting field data.

The data sources in this study are secondary, obtained from various relevant and up-to-date scientific literature from the last 5-10 years (2015-2025). These sources include scientific articles from reputable national and international journals, scientific conference proceedings, academic books and theoretical references, research reports or studies from relevant educational and research institutions.

Data collection was conducted through documentation through literature searches in various online scientific databases, such as Google Scholar, DOAJ (Directory of Open Access Journals), ResearchGate, and ScienceDirect.

RESULT AND DISCUSSION

A. DEFINITION OF ISLAMIC RELIGIOUS EDUCATION LEARNING

Islamic Religious Education learning is a planned and systematic educational effort to foster faith, religious knowledge, morals, and religious skills in students so that they can internalize Islamic teachings as a guide for life. (Hardiyanti et al., 2023) IRE is one of the subjects taught in schools and plays a very strategic role in shaping students' strong personalities, both from a moral perspective and from a scientific and technological perspective.

According to several experts, Islamic Religious Education learning is not merely the transfer of knowledge but also a process of character formation and contextual religious identity. Religious teachings are taught while taking into account local culture, social needs, and contemporary developments, ensuring their relevance to students' lives. Therefore, conceptual studies of IRE emphasize normative, educational, and social functions. (Rahmat et al., 2025)

In a modern academic context, IRE learning is also viewed as a pedagogical process that must include clear strategies, media, and evaluation to achieve student competencies as stipulated in the curriculum. This definition places IRE on the same level as other subjects in terms of learning standards, namely having measurable objectives, achievement indicators, teaching materials, methods, and assessments.

Several recent studies emphasize that Islamic Religious Education learning is effective if it integrates a textual approach with a contextual and critical approach so that it can have digital ethics, religious tolerance, and social problems in the modern

era.

B. CHALLENGES AND OPPORTUNITIES OF DIGITALIZATION IN ISLAMIC RELIGIOUS EDUCATION

The development of digital technology in education opens up significant opportunities for IRE learning to become more interactive, active, and create comprehensive learning experiences. The use of technologies such as instructional videos, online learning platforms, mobile applications, and Augmented Reality (AR) allows for the transformation of abstract concepts into concrete forms, given that one of the characteristics of students is that they need to be shown concrete objects to facilitate their understanding of learning materials. Several studies have demonstrated the use of AR, as an interactive medium and multimedia content that can enhance motivation and understanding. (Ruzakki et al., 2024)

In addition to the above, there are challenges in implementing AR in Islamic Religious Education subjects, including limited internet access and devices, especially in remote schools. This is in line with research conducted by Umraniah and Sita Acetilena that one of the main obstacles in implementing AR in schools, especially in remote areas, is limited technological infrastructure. Many schools do not have adequate hardware such as smartphones or tablets needed to run AR applications. In addition, unstable or slow internet connections are a serious obstacle. AR often requires real time data access, so poor connections can hinder its use. Finally, many classrooms are not equipped with projectors or interactive screens that are optimal for displaying AR content effectively (Acetilena, 2024). Then there are the results of other studies such as AR training for Islamic Religious Education teachers (Lutfiah, 2024). In this challenge, not all Islamic Religious Education teachers master this AR media due to several factors, including the lack of special training for teachers to master the skills of using this AR. This aligns with research conducted by Seten Hartedi, who explained that his research found real challenges in implementing this technology, particularly related to infrastructure readiness, device availability, and teachers' digital literacy. Teachers at MA Ma'rifatul Ilmi are generally enthusiastic and open to technology, but not all have sufficient technical skills to develop or modify AI- and AR-based digital content. The principal also acknowledged that there is no specific training program for teachers regarding the

integration of AI and AR in learning, and technology-based learning is still carried out on the teachers' personal initiative. This demonstrates the importance of institutional support so that innovation is not merely incidental, but integrated into the madrasah's policies and curriculum. Developing an Islamic Religious Education curriculum that is responsive to technological developments is essential to ensure learning does not lag behind the needs of the times. (Hartedi, 2025)

Technology can fundamentally support distance learning, adapting content, methods, and pace to the specific needs of each student, and providing learning resources that are difficult for schools in remote areas to access. However, realizing this opportunity requires investment in infrastructure and inclusive policies. (Mintasih, n.d.)

To address the aforementioned issues, it is recommended to incorporate the strategic and pedagogical use of digital technology into the teaching and learning process to enhance learning effectiveness. However, this goes beyond simply using technology; it also involves leveraging technology to develop thinking skills, collaboration, and personalized learning, whether online, hybrid, or face-to-face, and based on values, such as the design of technology-based Islamic Religious Education learning materials that consider modern pedagogical values and principles. For example, the use of AR should not be merely a visual effect but should be directed toward strengthening textual understanding, religious practices, and moral reflection, thus making technology a tool, not an end in itself.

C. THE COMPETENCIES OF ISLAMIC EDUCATION TEACHERS IN THE DIGITAL ERA

IRE teacher competencies in the digital era include professional, pedagogical, personality, and social competencies, developed through digital competencies. Teachers are expected to be able to design pedagogically sound digital learning using a Learning Management System (LMS), a software program for managing, distributing, and monitoring online learning materials. For example, creating multimedia-based materials such as text, images/graphics, audio, video, and animation, which can be combined in various formats such as presentations (PowerPoint), e-books, podcasts, games, films, and interactive websites, integrating educational applications such as AR, and evaluating online learning with valid

instruments. Several studies over the past few years have shown that ICT proficiency is a prerequisite for IRE to remain relevant and effective in the digital era. (Abdullah, 2018)

In addition to technical skills, Islamic Religious Education teachers need to possess competencies that include identifying, analyzing, interpreting, and communicating the values inherent in Islamic Religious Education teaching materials. This is because several literatures indicate that in the learning process, there is an opportunity for the deliberate delivery of erroneous information that does not correspond to facts or data with the aim of leading opinions or provoking extreme or transgressive views or behaviors (Millah et al., 2023). Therefore, digital literacy competencies are important to prevent the misconception of Islamic Religious Education materials and to guide students to be more critical of reference sources from the internet.

On the other hand, pedagogical competencies are also shifting, requiring teachers to master blended learning design, project-based learning, and the use of technology-assisted formative assessment to provide rapid feedback. Several literatures indicate that teacher training and professional development programs focused on integrating ICT and Islamic Religious Education effectively improve teaching practices and teachers' skills in using digital media. Therefore, a policy of continuous professional development is a strategic necessity. (Fauziah, 2024) Other sources emphasize the need for teachers to receive holistic training programs that combine ICT, religious knowledge, and contextual pedagogy. (Pratama, 2025) This aims to ensure a seamless teaching and learning process, effectively integrating digital skills and the ability to instill Islamic values. Teachers are required to participate in digital training programs, increase their literacy skills from various sources, and set positive examples for their students. Technology use must be guided by integrity, exemplary morals, and tailored to the characteristics of students. As facilitators, Islamic Religious Education teachers must be able to balance technological innovation with character building, as this fosters a reflective attitude, openness to pedagogical reform, and commitment to the goals of religious education.

D. AUGMENTED REALITY INTEGRATION IN ISLAMIC RELIGIOUS EDUCATION LEARNING

In Islamic Religious Education learning, teachers can use several types of learning strategies and integrate them with interactive Augmented Reality (AR) media. This aims to demonstrate that learning strategies can be used not only for textual learning but also to create active, innovative, and interactive learning processes that can increase student participation and motivation. (Laumarang & Odja, 2023) In this context, one learning strategy that can be integrated with AR media is Discovery Learning for the History of Islamic Culture topic.

Discovery Learning is a learning model where students independently search for the material or concepts to be studied, and the teacher does not provide complete information to students regarding the concepts or materials to be studied. (Dari & Ahmad, 2020) The meaning of the above definition, discovery learning is a pedagogical strategy that positions students as discoverers of knowledge through observation, hypothesis testing, and reflection. Discovery Learning aims to encourage students to actively discover textual meaning in Islamic Religious Education materials, historical contexts, and ritual practices through meaningful experiences. This approach is in line with constructivism theory which emphasizes the formation of cognitive schemas through interaction with the learning environment. AR provides instructions that support the process of implementing Discovery Learning, namely additional layers of 3D objects in the real world, real interactions, and the ability to modify visual displays. The above characteristics allow students to directly explore religious symbols, ritual sequences, or historical maps visually without the need for physical access to the source.

The integration of AR into Discovery Learning steps must be planned, including problem formulation or question formulation, directed AR exploration, evidence collection/observation results, verification with Islamic legal sources, and value reflection. This integration process aims to increase active participation and student ability in formulating problems or questions. However, the teacher must also play a role as a facilitator, helping students master new skills and concepts and understand the application of Discovery Learning with AR.

The following are the steps for implementing Discovery Learning in Islamic

Studies subjects without AR integration:

Table 1. Steps and learning activities of the Discovery Learning method

No	Syntax	Learning Activities
1	*Stimulation*	At this stage, students are presented with unsolved problems, motivating them to investigate and solve them. At this stage, the teacher facilitates them by providing questions, directing them to read books or texts, and conducting learning activities that lead to discovery as preparation for problem identification.
2	*Problem statement*	Students are given the opportunity to identify as many problems as possible related to the learning material. One problem is then selected and formulated as a hypothesis or temporary answer to the problem.
3	*Data collection*	Next, students explore to gather relevant data or information by reading literature, observing objects, interviewing sources, conducting their own experiments, and so on. Students also attempt to answer questions or prove hypotheses.
4	*Data Processing*	Students process the data or information they obtained in the previous stage, then analyze and interpret it. All information, whether from readings, interviews, and observations, is processed, classified, tabulated, and even, if necessary, calculated in a specific manner and interpreted to a certain level of confidence.
5	*Verification*	Students conduct careful verification to test

		established hypotheses with alternative findings, linking them to the results of data processing. This stage aims to ensure the learning process runs smoothly and students become active and creative in solving problems.
6	*Generalization*	The final stage is the process of drawing conclusions that can be used as general principles and applicable to all similar events or problems, taking into account the verification results. Based on the verification results, principles are formulated that underlie the generalization.

The table above explains that teachers and students can systematically incorporate these stages into their lesson plans and implement them in their learning practices. In this context, teachers are allowed to select five or six steps; the important thing is that learning activities are carried out according to the stages and systematically.

The use of Augmented Reality (AR) technology in Islamic Cultural History (ISH) learning can be an innovation that aligns with the Discovery Learning strategy, because both emphasize active, exploratory, and meaningful learning experiences. Discovery Learning requires students to discover concepts or knowledge independently through a process of observation, experimentation, and analysis. Meanwhile, AR technology presents historical objects or events in the form of interactive 3D visualizations, so that students can interact directly with the material being studied in a more concrete way. In the context of ISH learning at the MTs level on the topic "The Development of Islamic Civilization during the Abbasid Daulah Period", teachers can integrate AR with the following Discovery Learning steps:

1. Stimulation: Teachers display AR media in the form of a virtual reconstruction of Baghdad during the Abbasid period using smartphones or tablets. This visualization

sparks students' curiosity about the advancement of science and culture during that period.

2. Problem Statement: Students are invited to observe the AR display and then directed to ask questions, such as: "Why did Baghdad become the center of Islamic knowledge?" or "How did Islamic technology and architecture develop during the Abbasid period?"
3. Data Collection: Using an AR application that displays prominent Muslim scientists (such as Al-Khwarizmi, Ibn Sina, and Al-Farabi) in holographic form, students observe and record important information about their contributions to Islamic civilization. This process can be combined with other relevant digital literature sources.
4. Data Processing, where students discuss their observations in small groups. They compare data from AR visualizations with information from textbooks and then conclude the main characteristics of Islamic progress during that period.
5. Verification, where students test their findings with teacher guidance. Teachers can provide additional simulations through AR, such as showing the Baitul Hikmah library or ancient astronomical instruments used by Muslim scientists, to strengthen understanding.
6. Generalization, where students draw conclusions about the factors that led to the glory of Islamic civilization and relate these conclusions to Islamic values such as the iqra' (the prayer of remembrance), the spirit of seeking knowledge, and the importance of innovation in life.

From the description above, it can be concluded that the learning steps that combine AR technology and Discovery Learning learning strategies in SKI subjects can be implemented through 6 stages, where in the initial stage the teacher displays AR media showing the buildings of the city of Baghdad, this aims to attract the attention of students and foster students' curiosity so that several questions arise such as factors that caused Baghdad to become a center of science, the development of science in Baghdad and others. After questions arise from students, the teacher can display AR in holographic form showing scientific figures during the Abbasid era, while students listen and dig up information then compare the information with the material in the book and finally students integrate the information obtained with the

values contained in the material. Through the use of Augmented Reality the printed page can become means to move students to animated interactive virtual environments. (Billinghurst, n.d.)

The above is in line with the results of research conducted by Seten Hartedi at Madrasah Aliyah (MA) Ma'rifatul Ilmi, showing that the use of Artificial Intelligence (AI) and Augmented Reality (AR) technology in Islamic Religious Education learning has begun to be implemented on a limited basis but has had a positive impact on student engagement and understanding. The data collection process was carried out through in-depth interviews with IRE teachers, students in grades XI and XII, and the principal of the madrasah, as well as direct observation of learning activities taking place in the classroom. During the observation process in grade XI IPA, IRE teachers were seen using AI-based applications such as Muslim Virtual Assistant and Quizziz Islami which allow students to learn independently, ask questions about the teaching material, and immediately receive automatic feedback. Teachers also use Augmented Reality media when explaining Islamic history material, especially the story of the Prophet Muhammad's migration to Medina. (Hartedi, 2025) Through the Android-based AR application, students can see a simulation of the hijrah travel route in 3D visual form on their device screens. This creates a much more interactive and immersive learning environment than conventional lecture methods.

In the research results of Seten Hartedi, it is explained that teachers use AR media when explaining material about the Prophet Muhammad's migration by displaying the route of the Prophet Muhammad's migration from Mecca to Medina, different from the context of this article which will show how the Kaaba and the Prophet's Mosque looked like during the Prophet's preaching in Mecca and Medina. The process of implementing AR is in line with the steps of the Discovery Learning strategy above, where students explore the AR model to find visual clues about the history and function of the building, then discuss them.

CONCLUSION

Based on the analysis and discussion, it can be concluded that Islamic Religious Education learning in the digital era requires synergy between Islamic values and the use of modern technology. An approach that integrates these two aspects makes the learning

process more relevant to the current context and creates an interactive and meaningful learning experience. IRE learning is not merely an activity of conveying religious knowledge, but also a process of developing students' character, morals, and spirituality to align with the demands of the digital era.

The development of digital technology has opened up vast opportunities for innovation in Islamic Religious Education learning, one of which is through the use of Augmented Reality (AR). This technology can transform abstract concepts into tangible visual forms, making it easier for students to understand the material and increasing their enthusiasm for learning. However, several obstacles remain, such as limited resources, low teacher digital literacy, and a lack of specialized training in its application. Therefore, support from educational institutions and government policies is essential to strengthen teacher competency and provide adequate technological facilities.

On the other hand, today's Islamic Religious Education teachers are required to possess comprehensive competencies, including technological mastery, digital literacy skills, cutting-edge pedagogical expertise, and strong moral integrity. The role of teachers is not merely as transmitters of knowledge, but also as guides capable of combining technology with Islamic values to ensure that learning remains grounded in morals and spiritual goals. Therefore, ongoing training and professional development are crucial steps to ensure teachers utilize digital media appropriately and effectively.

The application of AR in the Discovery Learning strategy has been proven to have a positive impact on the teaching and learning process. Through this technology, students can explore Islamic historical objects directly in three dimensions, such as the Abbasid Dynasty palace so that they gain a more in-depth, active, and reflective learning experience. The application of AR that is well designed not only functions as a visual aid, but also as a means of fostering an understanding of Islamic values and character building of students. In practice, teachers can apply learning steps that combine AR technology and Discovery Learning learning strategies in SKI subjects can be implemented through 6 stages, where in the initial stage the teacher displays AR media showing the buildings of the city of Baghdad, this aims to attract the attention of students and foster students' curiosity so that several questions arise such as the factors that caused Baghdad to become a center of science, the development of science in Baghdad and others. After questions arise from students, the teacher can display AR in holographic form showing scientific

figures during the Abbasid era, while students listen and dig up information then compare the information with the material in the book and finally students integrate the information obtained with the values contained in the material.

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