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Research Article

Interactive Media Design for Augmented Reality–Based Hajj Ritual Learning Using Muslim Sadiq 3D

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Abstract: Learning Hajj rituals requires innovation to overcome the limitations of available media, one of which is through the utilization of the integration of the Android platform with Augmented Reality technology. The Muslim Sadiq application on smartphones displays 3D objects related to the practice of Hajj rituals. This study aims to explain the design of interactive media based on Augmented Reality as an innovation in learning Hajj rituals, expected to improve student understanding through a more visual, interactive, and contextual learning experience. This media design method adopts two stages of the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), namely the needs analysis and media design stages. This study reveals that learning Hajj rituals requires interactive and applicable media to overcome the gap between theoretical understanding and the practice of Hajj worship in real life. The designed media utilizes AR technology to create a simulation of Hajj implementation and supports experience-based learning. Although the design has considered technical and pedagogical aspects, this media is still in the design stage and has not been tested or implemented directly. Therefore, further research is needed to assess the effectiveness of this media in learning Hajj rituals.

Keywords: Augmented Reality; Digital Simulation; Interactive Media; Learning Design; Manasik Hajj

1. Background

Hajj rituals are essentially learning activities aimed at providing an understanding of the procedures for performing the Hajj. This learning is not only intended for prospective pilgrims, but is also important for students so they gain an early understanding of the fifth pillar of Islam (Putra et al., 2024).

However, the media used in Hajj rituals learning has been limited to photos, audiotapes, videos, and PowerPoint slides. These media are conventional, static, and less interactive, thus failing to create an engaging learning experience (Agustina et al., 2023). As a result, learning becomes less engaging, reduces motivation, and results in low student enthusiasm for the material presented.

Based on this, information and communication technology can be utilized as a learning medium to address these issues. The use of interactive digital media has emerged as a promising alternative to increase the effectiveness of Hajj rituals. One increasingly popular learning innovation is Augmented Reality (hereinafter referred to as AR) (Garzón, 2021). This technology allows users to explore 3D content that can be brought into the real world through devices such as smartphones or tablets (Hakim, 2018).

According to Abdullah & Noor (2024), the use of AR technology is not merely a technological trend but also a response to the need for a more dynamic and relevant learning approach for the younger generation. Several studies have explored the use of AR

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in Hajj rituals. For example, research by Purnama Sari et al. (2024) found that using AR in the learning process increased student interest compared to conventional media.

Based on the description above, the problem can be formulated as follows; (1) How to design learning media for Hajj rituals based on Augmented Reality using Muslim Sadiq 3D; (2) What are the advantages and disadvantages of designing learning media based on Augmented Reality in learning Hajj rituals. In this study, interactive media based on Augmented Reality was developed through two stages of the ADDIE instructional development model (Analysis, Design, Development, Implementation, Evaluation). The first stage, namely Analysis, focused on identifying the learning needs of Hajj rituals and various obstacles that arise in the application of conventional learning media. Furthermore, the second stage, namely Design, involves designing interactive media concepts that include visual, interactive and immersive aspects based on Augmented Reality technology to increase student involvement and understanding.

2. Theoretical Study

Understanding Interactive Media

Interactive media is a new technology with enormous potential to transform the way we learn, access information, and entertain. In short, interactive media is the most popular new learning method among various learning multimedia (Mustika Ilmiani et al., 2020). Therefore, it can stimulate students' attention, interest, thoughts, and feelings during the learning process, leading to the achievement of learning objectives (Hendrawati, 2024).

Interactive media is an effective way to stimulate students' desire to learn. In this learning process, students are required to be active and respond to the material presented by the teacher. The media used can provide responses to students' interactions with each other. (Harahap et al., 2025)

Based on its type, interactive media is divided into four types, namely: (1) e-learning-based interactive media, (2) web/site-based interactive media, (3) software-based interactive media, (4) Android application-based interactive media. (Indartiwi et al., 2020).

Augmented Reality (AR) in Learning

Augmented Reality (AR) is a technological innovation that presents a new learning medium in Indonesia. It can help develop critical thinking and a deeper understanding of scientific investigation concepts among students. Augmented Reality, also known as Mixed Reality (MR), is a technology that enables the integration of the real world with the virtual world. (Hendrawati, 2024).

Augmented Reality (AR) is a technology that combines two-dimensional and/or three-dimensional virtual objects into a real three-dimensional environment and then projects these virtual objects in real time (Hakim, 2018). However, unlike virtual reality, which completely replaces reality, AR only adds to or complements existing reality (Ardhianto et al., 2012).

In learning Hajj rituals, AR offers a more dynamic, visual, and interactive approach, facilitating student understanding that is difficult to grasp conventionally. By presenting learning materials in a more engaging and dynamic way, students become more engaged and enthusiastic in the learning process (Abdullah & Noor, 2024).

Theoretical Basis in the Development of Interactive Media Based on Augmented Reality

Multimedia Cognitive Theory

This theory, developed by Richard E. Mayer, explains that learning becomes more effective when information is presented simultaneously through visual and verbal channels, because this helps the process of understanding through the stages of selecting, organizing, and integrating information (Mayer, 2002). In the context of Augmented Reality (AR)-based Hajj learning, the presentation of interactive visualizations can optimize information

processing, making it easier for students to understand the procedures and pillars of the Hajj.

Constructivism Learning Theory

This theory was developed by Jean Piaget and Lev Vygotsky, emphasizing 2 priority principles in learning, namely: (1) that learning cannot be obtained passively, but actively by the student's cognitive structure; (2) the use of cognition is adaptive and helps organize through real experiences that students have. (Suryana et al., 2022)

Constructivism-based learning in AR can be implemented by encouraging students to build their own understanding through exploration, interaction, and direct experience using Augmented Reality technology. (Mustafidah & Sidiq, 2019)

Previous Research on Augmented Reality-Based Interactive Media for Hajj Ritual Learning

Several previous studies have used interactive media based on Augmented Reality (AR) in learning:

First, Sodiki Abdullah & Iqbal Noor (2024) showed that the use of AR offers a more dynamic, visual, and interactive approach, facilitating the understanding of Islamic religious concepts that are difficult to understand conventionally.

Second, Dian Resha Agustina & Yuthsi Aprilinda, et al (2024) showed that the application of learning Hajj rituals can improve the understanding of Hajj pilgrims about how to perform the Hajj pilgrimage easily and flexibly.

Third, Pajar Sidiq & Hindayati Mustafidah (2019) showed that there was an increase in public interest in learning the procedures for the Hajj pilgrimage, and based on the results of testing this virtual reality application, it is suitable for use as a basis for learning Hajj rituals.

Based on the theoretical studies presented, interactive media based on Augmented Reality (AR) has significant potential to enhance the interactivity of Hajj rituals learning. By adopting the Multimedia Cognitive Theory and Constructivism approach, AR media supports experiential, exploratory, and contextually interactive learning. Through the application of this technology, Hajj rituals learning is expected to not only become more engaging but also more applicable to students' real lives, thus helping them develop a deeper understanding of the Hajj procedures.

3. Research Methods

In compiling this article, data collection was carried out through library research. Library research is research in which data collection is carried out by collecting data from various literatures (Sarjono, 2008). The data analysis technique was carried out using a descriptive-analytical approach. In this study, the author read and collected other people's written works related to the research conducted for data collection, as well as library sources. In addition, data collection was obtained from articles, journals, and books, which were useful for reviewing relevant literature related to the design of Interactive Media in Learning Hajj Rituals Based on Augmented Reality.

4. Results And Discussion

Analysis of Needs and Problems in Learning Hajj and Umrah Rituals

The main problems behind media development

Learning Hajj rituals in Islamic Religious Education (PAI) often faces various obstacles. A literature review and interviews with teachers and students revealed several key issues underlying the development of this media:

First, the delivery of Hajj rituals material in educational institutions is often still conventional, such as lectures, static images or videos, which do not provide a visual and interactive experience for students. (Agustina et al., 2023).

Second, there is a lack of interactive media in Hajj rituals learning. Most schools use only textbooks and modules as primary resources, without technology-based media to support student understanding (Harahap et al., 2025).

Third, student participation in Hajj rituals learning is suboptimal. This is due to learning methods that are less able to stimulate active student involvement (Mayer, 2002). On the other hand, the need for media that provide exploration- and simulation-based learning experiences is increasing along with technological developments.

Based on these problems and needs, designing interactive media based on Augmented Reality (AR) in learning Hajj rituals is considered the right solution to increase the effectiveness of learning and student involvement in understanding the procedures and pillars of Hajj.

Media Name and Type

The media developed in this research is named Muslim Sadiq 3D: Interactive Simulation Based on Augmented Reality in Learning Hajj Rituals. This media is an interactive learning media that utilizes Augmented Reality (AR) technology to provide a more in-depth and engaging learning experience for students. Through 3D simulations, animations, and interactive visualizations, students can explore the procedures for performing the Hajj pilgrimage, including the pillars and obligations of Hajj, in a more realistic and contextual way. This media is also designed to support experiential learning, so it is expected to increase student understanding and engagement in the Hajj Rituals learning process. In addition, this media can be an alternative solution for learning Hajj Rituals practicals that are limited by time, place, and cost.

Media Specifications

Muslim Sadiq 3D is designed with the following specifications:

First, the platform: This application is Android and iOS based and can be downloaded via Google Play Store and App Store.

Second, technology: using Augmented Reality (AR) technology equipped with 3D animation, narrative text, sound, and interactive video.

Third, the main features: 1) 3D Animation: Students can first choose the animated human character as desired; 2) Interactive Simulation: Students will carry out the Hajj procedures according to the pillars of Hajj and complete the mission until it is completed, students follow the instructions on the screen to carry out the rituals (for example, circling the Kaaba when performing tawaf); 3) Voice Over and Narration: Explanations of the Hajj rituals are given through audio and text to improve students' understanding.

Fourth, security and accessibility: The application can be used offline after being downloaded, so students are not dependent on an internet connection.

Innovative Aspects of Media

Augmented Reality-based interactive media presents a number of innovations that differentiate it from conventional media.

First: experiential learning, where students not only passively acquire knowledge through reading or listening, but also directly engage in interactive simulations that allow them to explore the series of Hajj rituals.

Second, the visualization of abstract concepts, which allows moral values that are invisible to be visualized concretely, so that they are easier to understand, especially for students with visual and kinesthetic learning styles.

Third, increased student interactivity and engagement, because compared to lecture methods or the use of textbooks, AR encourages active student involvement in the learning process**.**

Analysis of the Advantages of Sadiq Muslim Hajj Learning

First, it increases student participation. Interactive media allows students to be more actively involved in learning. By using the Muslim Sadiq 3D application, students can

directly engage in discussions, simulations, and interactions related to the learning material (Iksan & Semarang, 2012).

Second, improving digital skills. Teachers can also utilize interactive media to enhance students' digital skills, which are crucial in this digital age. In addition to learning religious material, students also learn to use technology efficiently, preparing them to face future digital challenges (Harahap et al., 2025).

Third, monitoring student progress in real time: Technology-based learning platforms allow teachers to monitor student progress in real time. Teachers can view student progress, identify areas requiring more attention, and provide timely feedback (Mustika Ilmiani et al., 2020).

Analysis of Weaknesses in Sadiq Muslim Hajj Learning

Although Muslim Sadiq 3D offers various advantages, this application also has some limitations that need to be considered for further development:

First, dependence on infrastructure and internet access: Technology-based learning requires devices and a stable internet connection. In some areas, this can be a major obstacle for students and teachers (Putra et al., 2024).

Second, distraction and misuse of technology: Technology can be a source of distraction for students, such as access to social media or irrelevant content, which can disrupt their focus on the subject matter. (Purnama Sari et al., 2024).

Third, difficulties in classroom management: Online or technology-based learning may be more difficult to manage, especially in terms of monitoring overall student participation and engagement, thus requiring better managerial strategies. (Yusup et al., 2023)

5. Conclusion

This study successfully designed an Augmented Reality (AR)-based learning medium for Hajj rituals, called Muslim Sadiq 3D. Based on a needs analysis, this medium was developed to address the main challenges in Hajj rituals, such as the use of learning media that tends to be monotonous and less interactive, thus decreasing student motivation and interest in learning and understanding Hajj procedures. Furthermore, the lack of innovation and use of technology in the learning process leads to student boredom and lack of interest.

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