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Development of an Augmented Reality-Based Digital Module For Islamic Religious Education Subjects

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Abstrak

This study aims to address the challenges in Islamic religious education, particularly the need for more engagement and interactivity in teaching Shalat procedures. The research developed an augmented reality (AR)--based digital module tailored for students at SDN 30 Matirowalie, utilizing the ADDIE development model. The module integrates 3D visualizations to enhance students' understanding and engagement. The research employed a mixed-methods approach, combining quantitative surveys and qualitative evaluations to assess the module's effectiveness. Data were collected from 30 students and validated by media and content experts. The analysis revealed that the AR module significantly improved student engagement and comprehension, with 95.34% of students responding positively. The module was rated "Excellent" in terms of display, ease of use, quality, and sound by the validators. The study's novelty lies in the integration of AR technology into Islamic education, offering a personalized, interactive learning experience that overcomes the limitations of traditional methods. This research not only contributes to the field of educational technology but also provides a framework for applying AR in other educational contexts.

Keywords: *Augmented Reality, Islamic Education, Shalat Procedures, Educational Technology*

Introduction

Multimedia technology can assist in creating a high-quality learning environment through various media such as text, graphics, sound, and animation (Darman et al., 2021; Erni et al., 2023; Lestari & Wirasty, 2019; Miftah, 2018). The utilization of multimedia in interactive learning has proven to have a positive impact on the teaching and learning process, even more effectively than traditional learning methods. Moreover, if interactive multimedia-based learning is combined with teacher guidance, it can enhance students' abilities to acquire knowledge and skills. Virtual Reality (VR) is a technology that allows users to interact with computer-simulated environments, either based on authentic objects or animations (Ashgan et al., 2023; Elmqaddem, 2019; Mitre-Ortiz et al., 2023). VR has numerous opportunities for continued development in various fields, including educational media. For example, Agushinta et al. developed a VR application for the human excretory system, which suggests that the practices of ablution and prayer could also be applied using three-dimensional VR animation.

According to Anugrah et al., (2017); Oktavia & Frindo, (2020); Wahana & Marfuah, (2019), the five daily prayers (Shalat) are the most fundamental pillars of Islam after the declaration of faith (Shahada). They are obligatory for every Muslim, both men and women, in any condition, whether in safety or fear, in health or sickness, while residing or travelling, with each condition having specific ways of execution according to the circumstances. According to Fitriyanti et al., (2023); Saing & Harfiah, (2021); Saputra et al., (2015), the teaching of Shalat is still predominantly done through conventional means, such as books and oral instruction from teachers or religious instructors. This method makes it difficult for students to understand the

practices without fully demonstrating them. Mair, (2018); Mulyani et al., (2021); Sahputra et al., (2020) suggest that one solution to increase student interest and understanding is to use educational media applications. Educational media applications have been adopted as tools for delivering content, particularly in the form of augmented reality (AR) Edugames.

Based on the above background, the research questions in this study are: How can we design and develop an application for teaching Shalat movements as an educational medium at SDN 30 Matirowalie? And, what are the user responses regarding the design of the Shalat teaching application as an educational medium at SDN 30 Matirowalie?

Method

The system development method used in this study is Research and Development (R&D) with the ADDIE development model. The collection method uses five methods, namely Analysis, Design, Development, Implementation, and Evaluation.

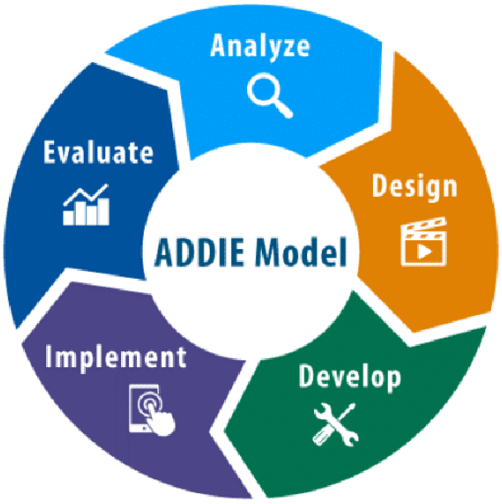


Figure1. ADDIE Development Model

a. Analysis

The first stage in the ADDIE development model is analysis. At this stage, an evaluation of needs is carried out through observation of students at SDN 30 Matirowalie. The study includes an assessment of the learning methods used (Donthu et al., 2021; Mercado Rueda, 2023; Morgan, 2022).

b. Design

The second stage in the ADDIE model is known as design or design. The goal is to ensure that the media created meets the needs of users (Caetano et al., 2020; Reeves & Reeves, 2023; Zielhuis et al., 2022).

c. Development

In the third stage of the development process of ADDIE, the focus is on development. Augmented Reality-based applications were created for Islamic Religious Education subjects (Dasen, 2022; Gauvain & Richert, 2023; Jayasooria & Yi, 2023) .

d. Implementation

The fourth stage in the ADDIE development model is implementation. After the learning media has reached the stage where material experts and media experts declare that the product is suitable for use, the next step is to conduct a trial with teachers and at SDN 30 Matirowalie. The product trial aims to evaluate the response of teachers and students after using the learning media, as well as to test the feasibility of the media based on the assessment of the teachers (Damschroder et al., 2022; Fatima & Elbanna, 2023; Fernandez et al., 2019)

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e. Evaluation

At the evaluation stage, users assess the learning media. After the assessment stage is carried out by the teacher and the students are finished, improvements will be made if there are suggestions for input.

Result

The development of the augmented reality-based digital module for Islamic religious education began with an analysis phase. The application developed is intended for students at SDN 30 Matirowalie. The content of the application is based on the Curriculum Level Education Unit (KTSP) syllabus used at SDN 30 Matirowalie, Kota Palopo, focusing on teaching the procedures of Shalat. The presentation of the material within the application includes explanations in the form of audio and 3D objects.

The second phase was the design. This phase included the creation of a use case diagram, activity diagram, and interface design. Detailed specifications were required during the design phase to ensure clarity and to avoid the need for new decisions in later stages. The use case diagram illustrates the system being developed. The digital module features three main screens: the "Splash Screen," which appears when the digital module is accessed; the "Main Menu," which presents two accessible buttons, namely "Main Page" and "Instruction." The "Main Page" contains the core content of the digital module, presented in 3D AR format, while the "Instruction" section provides guidance on how to use the digital module.

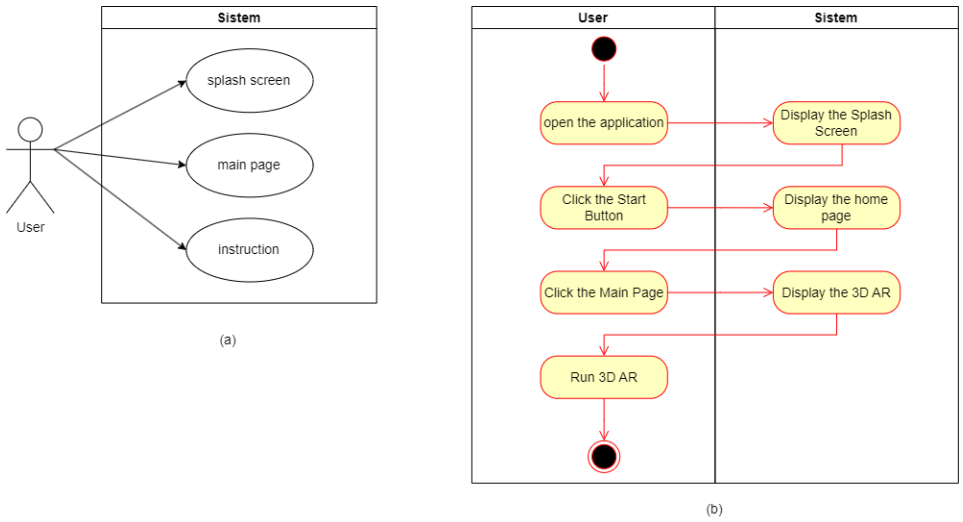


Figure 2. Use Case (a) Activity Diagram (b)

The subsequent illustration, referred to as Figure B, depicts the activity diagram of the designed system. The presented activity illustrates the overall use of the digital module. Initially, when the user opens the application, the system displays a "Splash Screen." Following this, the user clicks the "Start" button, prompting the system to present the main page. On the main page, the user can select the "Main Page" option, which then activates the 3D AR feature. Once on the "Main Page," the user can engage the 3D AR feature by selecting the appropriate option. The system will render the AR display in a 3D format according to the activated function. This workflow represents a straightforward yet effective process for executing the AR functionality within an application, beginning with the application launch and culminating in an interactive AR experience.

The third phase of this research is the development phase. The digital module was constructed using Unity 3D software to integrate the provided 2D and 3D components, and Blender software was employed for character development and the creation of 3D motion forms. Following the conducted analysis, the image below illustrates the interface of the developed digital module. The image shows the interface that appears after the Splash Screen, which includes a "Start" button that directs the user to the next screen.



Figure 3. Splash Screen

To enhance the Islamic educational atmosphere, specifically focused on the procedures of Shalat, the interface of this digital module was designed with a green color scheme and a golden dome as the main background. This design choice reinforces the Islamic theme of the digital module.



Figure 4. AR 3D Display

The image above illustrates the content of the developed digital module. The concept behind using this digital module is that when the main page is clicked, a camera scan feature will appear to scan an image and display the corresponding 3D view of the module. As shown in the 3D scan image, there are four buttons: a home button to return to the main menu, an auto button, a play button, and a next button to proceed to the following material.

The next phase after the digital module was completed was implementation. The implementation phase involved demonstrating the digital module at SDN 30 Mattirowalie, specifically to 30 students there. Before using the media, the students were instructed to install the media on their respective mobile devices. Afterward, a brief explanation of how to use the teaching module was provided to the students, and following its use, they were directed to fill out a questionnaire as feedback on the digital module.

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The evaluation of this digital module was conducted with 30 students as active users of the module. The questionnaire used for the students employed a Guttman scale with two alternative answers. The questionnaire consisted of five combination questions. The results of the students' responses are presented in the table below

Table 1. Accumulated Student Responses

No	Indicator	Answer		Sum	Percentage Answer Yes	Criterion
		Yes	No			
1	Presentation of Interesting Materials	30	0	30	100%	Excellent
2	3D AR clarity provided	30	0		100%	Excellent
3	Students' curiosity abilities	26	4		86.67%	Excellent
4	Media skills in improving student understanding	29	1		96.67%	Excellent
5	Ability in student learning motivation	28	2		93.33%	Excellent
	Jumlah	143	7	30	95.34%	Excellent

Based on the accumulated student responses regarding the use of the educational media, it can be concluded that the students provided very positive feedback. All students (100%) agreed that the material was presented in an engaging manner and that the 3D AR media used was clear, resulting in both aspects being rated as "Excellent." Additionally, the majority of students (86.67%) felt that the media used was able to increase their curiosity, and 96.67% of students agreed that the media helped improve their understanding. In terms of learning motivation, 93.33% of students reported being more motivated due to the media used in the learning process. Overall, student responses indicated a very high level of satisfaction, with an average of 95.34% of students providing positive feedback, which means the overall criteria were also rated as "Excellent."

The final phase involved evaluation. In addition to the students, the digital module was also evaluated by media experts, content experts, and Islamic religious education teachers at SDN 30 Mattirowalie. The first evaluation conducted was black box testing to determine the functionality of the developed digital module. As shown in the graph below, the results of the black box testing demonstrated that the digital module met its functional requirements, and it can be concluded that the module was successful and met expectations.

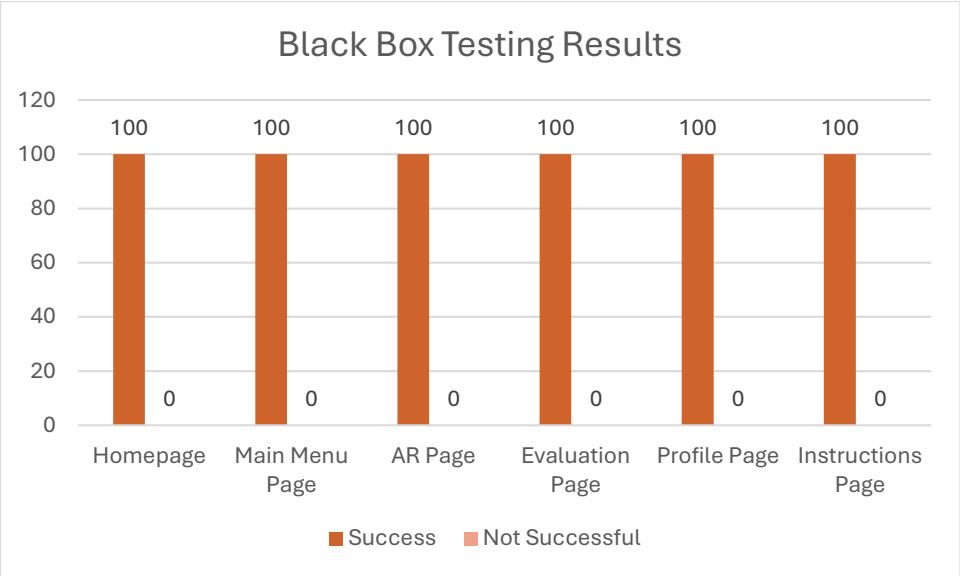


Figure 5. Black Box Test Results

The media expert evaluation was conducted by two validators who are specialists in their respective fields. Based on the results of the media expert evaluation, as depicted in the diagram, it can be concluded that the media received favorable ratings on all aspects assessed by both validators.

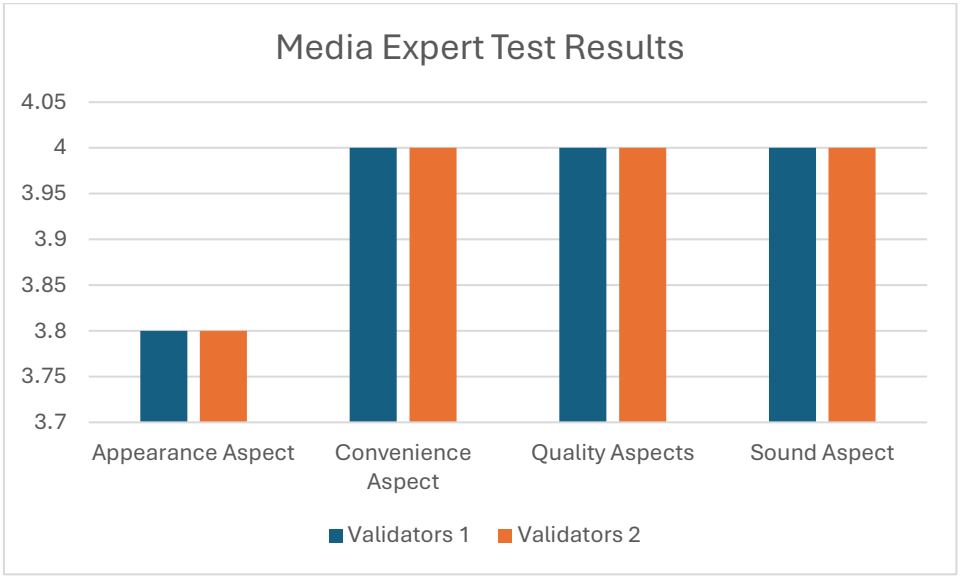


Figure 6. Media Expert Test Results

In terms of display, both validators assigned a score of 3.8, indicating that the media display is rated as nearly perfect, although there is some room for improvement. The aspects of ease of use, quality, and sound all received perfect scores (4) from both validators, signifying that the media is very easy to use, of high quality, and has adequate sound. Overall, the results of these evaluations demonstrate that the media is excellent and meets the expected standards in terms of display, ease of use, quality, and sound.

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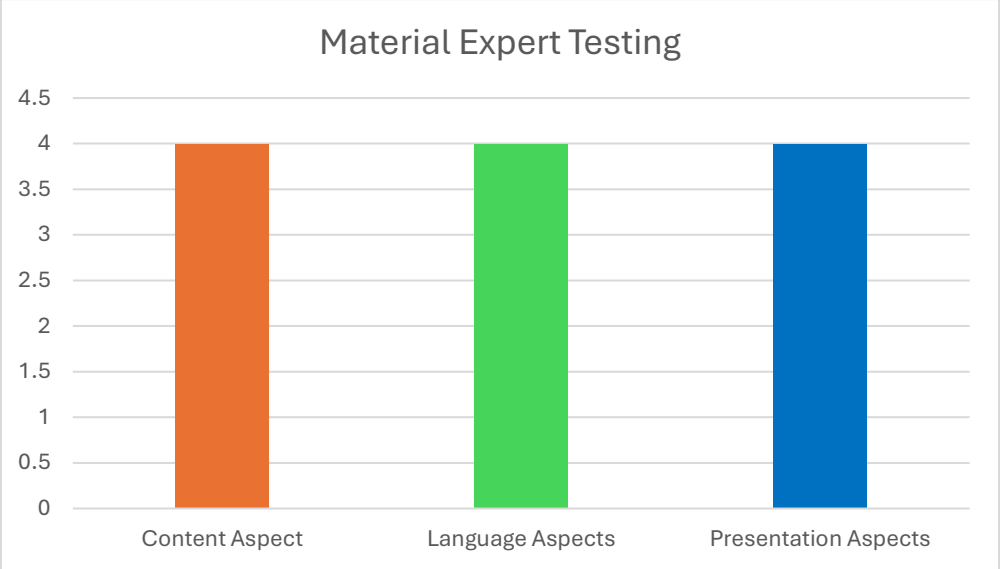


Figure 7. Material Expert Test Results

Based on the material expert testing diagram, it can be concluded that all assessed aspects—namely the Content Aspect, Language Aspect, and Presentation Aspect—received a perfect score of 4. This indicates that the material tested is of excellent quality in terms of content, language usage, and presentation. These results reflect that the material has met high standards in all aspects evaluated by the experts.

Discussion

This study highlights the significant challenge of the lack of engagement and interactivity in the presentation of materials within Islamic religious education. This issue often results in a shallow understanding of Islamic concepts among students, which is a common problem in Islamic education in Indonesia. Previous research has established that traditional teaching methods, which often lack dynamic and interactive elements, can lead to reduced student engagement and comprehension (Darman et al., 2021; Erni et al., 2023).

To address these challenges, this study proposes an innovative solution: the development of an augmented reality (AR)-based digital module. This module leverages AR technology to present educational content in a direct and interactive manner through digital devices, visualizing Islamic concepts in an engaging 3D format. The key advantages of this module include the personalization of learning to meet the needs of individual students, the development of technological skills, and the provision of efficient evaluation and feedback mechanisms for teachers.

The findings of this research align with existing literature that supports the integration of multimedia and AR in education as effective tools for enhancing student learning experiences (Ashgan et al., 2023; Elmqaddem, 2019). The use of AR not only addresses the limitations of conventional teaching methods but also opens new avenues for more innovative and effective approaches to Islamic religious education in Indonesia. By offering a more engaging and interactive learning experience, the AR-based module has the potential to significantly improve students' understanding and retention of key Islamic concepts.

Furthermore, the implications of this research extend beyond Islamic education. The successful application of AR in this context suggests that similar approaches could be adapted for other educational subjects and cultural settings, providing a versatile tool for enhancing

student engagement and learning outcomes across various disciplines. This study contributes to the growing body of research on educational technology and underscores the importance of embracing innovative methods to address the evolving needs of learners in the digital age.

Conclusion

This study successfully developed and implemented an augmented reality (AR)-based digital module designed for Islamic religious education, specifically focusing on the teaching of Shalat procedures. The AR module, which integrates interactive 3D visualizations, was shown to significantly enhance student engagement and understanding, addressing the longstanding challenges associated with traditional, non-interactive teaching methods. The positive feedback from students and the validation from educational experts underscore the module's effectiveness in improving learning outcomes.

Furthermore, this research demonstrates the potential of AR technology to transform educational practices, offering personalized and interactive learning experiences that cater to the needs of modern students. The findings suggest that AR can be a valuable tool not only in Islamic education but also in a broader educational context, paving the way for more innovative and effective teaching methods in various subjects.

Overall, this study contributes to the growing body of literature on educational technology and highlights the importance of adopting innovative approaches to meet the evolving needs of learners. Future research should explore the long-term impacts of AR-based learning tools and their applicability across different educational settings.

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