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Learning Media for Introducing the Khulafaur Rasyidin Using the Multimedia Development Life Cycle Method

Said Alkhudri Lubis
[1]Department of Informatic Engineering, Faculty of Computer and Engineering, University of Harapan Medan, Medan, Indonesia
[1]alkhudrisaid83@gmail.com

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ABSTRACT

The use of Augmented Reality (AR) technology in the field of education is rapidly advancing, including in the teaching of Islamic history. This study aims to design and develop an interactive and engaging AR-based learning medium for introducing the Khulafaur Rasyidin, the first four caliphs in Islamic history. The Multimedia Development Life Cycle (MDLC) method is employed as the development framework, consisting of six stages: concept, design, material collection, development, testing, and distribution. Through this learning medium, students can learn about the history of the Khulafaur Rasyidin in a more interactive and visual manner using AR technology. Each caliph is introduced with comprehensive information in the form of text, audio, and 3D models that can be viewed through mobile devices. Based on trials conducted with 15 respondents, 95.96% agreed, 4.20% were uncertain, and 0% disagreed. This indicates that this AR-based learning medium significantly enhances students' understanding compared to conventional learning methods. The use of AR technology combined with the MDLC development approach has proven to be effective in creating an engaging, interactive, and easy-to-understand learning experience. This medium can serve as an innovative solution for introducing the history of the Khulafaur Rasyidin to students across various educational levels.

Corresponding Author:

Said Alkhudri Lubis
University of Harapan Medan
Email: alkhudrisaid83@gmail.com

1. INTRODUCTION

Islamic religious education plays a very important role in developing the character and religious understanding of students. An important aspect of religious education is learning about Islamic history and important figures, including the Khulafaur Rasyidin, who were the first four caliphs in Islamic history after the death of the Prophet Muhammad SAW. The early period of the Khulafaur Rasyidin civilisation began after the death of the Prophet Muhammad SAW [1]. The Khulafaur Rasyidin, consisting of Abu Bakar ash Siddiq, Umar bin Khattab, Utsman bin Affan, and Ali bin Abi Thalib, were Islamic religious figures in the fields of da'wah, government administration, and law enforcement. However, the introduction to the Khulafaur Rasyidin is often considered by some students, especially in formal educational environments such as elementary and middle schools, as uninteresting material. This is because the teaching methods tend to be monotonous and text-based, which can be boring for students. It is no longer the era in education where teachers deliver material from the beginning to the end of the lesson, which is tiring and boring for students [2]. In addition, in a study conducted by Muhammad Rumansyah, he concluded that there was a significant difference in the effect between teaching using interactive learning media and conventional teaching. The use of interactive learning media [3] had a

more positive effect than teaching where the teacher only explained in front of the class. The average score for understanding science concepts among students in the interactive module group was 55.79, while the average learning outcome for the control class was 44.53. There was a difference of +11.26, which means that learning using interactive modules had a more positive effect on students' understanding of science concepts than learning using conventional modules.

In this digital era, where information technology is developing rapidly and multimedia has become an important part of everyday life, there is an urgent need to develop more interactive and engaging learning methods [4]. One method that can be used to increase students' interest and understanding of this material is to use the Multimedia Development Life Cycle (MDLC).

MDLC is a systematic approach to developing learning media that covers various stages from needs analysis to design, development, implementation, and evaluation. This method allows developers to create learning media that is not only informative but also interactive and engaging for students. The advantage of the MDLC method is that it has more detailed and very clear stages [5]. The MDLC method is applied to the design of applications using augmented reality technology. Augmented Reality (AR) is a technology that combines the real dimension and the virtual world in real-time to provide an immersive and interactive experience [6][7][8][9]. AR makes the story of the Khulafaur Rasyidin more interactive and interesting. In addition to listening and reading materials, students also have the opportunity to see illustrations of the Khulafaur Rasyidin figures and interact directly with virtual objects of paintings of the Khulafaur Rasyidin. This is expected to increase students' interest in learning, understanding, and remembering information [10].

Thus, this study aims to create an Android-based application that can provide knowledge about the Khulafaur Rasyidin figures. In the study conducted by Khaerul Khamzah and his team, which produced an educational game about introducing the heroes of the proclamation by applying the MDLC method [11], there is also research by Naufal Afif Hawari and Erwin Dwika Putra comparing the MDLC and Vilamil methods, concluding that the analysed methods each have their own advantages and disadvantages, so it is impossible to determine which method is better. However, the advantage of the MDLC method is that it has more detailed and clearer stages than the Vilamil-Molina method [5]. Then there is research by Fery Iqbal Fauzy, Yusuf Sumaryana, and Aso Sudiarjo, who successfully produced an augmented reality application for recognising houses of worship by applying the MDLC method and obtained an N-gain score of 57.39%, which is classified as quite effective as a learning aid [12]. In this study, the developed application will also undergo a testing phase to assess the effectiveness, reliability, and feasibility of the system as a learning medium [13]. This application is expected to increase students' interest and activity in learning about the Khulafaur Rasyidin, as well as improve their learning outcomes. Based on the above background, the author is interested in researching the Khulafaur Rasyidin using the MDLC method with the aim of educating the younger generation to learn more about the history of past leaders. So this research is titled “LEARNING MEDIA FOR INTRODUCING THE RIGHTEOUS CALIPHS USING THE MULTIMEDIA DEVELOPMENT LIFE CYCLE METHOD”.

2. METHOD

2.1. System Analysis

This section outlines the concepts and design phases of the research, using the structured Multimedia Development Life Cycle (MDLC) methodology. MDLC is an effective framework for creating high-quality multimedia learning applications. It consists of six key stages:

a. Concept: Define the application's goals and target users.
b. Design: Create the program's structure, style, and interface.
c. Material Collecting: Gather necessary assets such as images, videos, and audio.
d. Assembly: Develop the application by integrating all collected materials based on the design.
e. Testing: Run the application to check for errors.
f. Distribution: Analyse the completed application for potential future improvements.

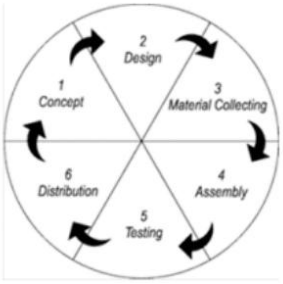


Figure 1. MDLC Design Process

2.2. Requirements Analysis

This application design requires specific hardware and software to ensure an efficient and effective development process. Selecting the right specifications is crucial. Hardware refers to the physical components of a computer that provide a platform for software. This section details both the specific hardware used for this research and the general hardware requirements. Specific Hardware: This outlines the exact hardware specifications used in this study.

Table 1. Hardware Requirements

Device	Description
Laptop	MSI Thin -15
Processor	Intel I5 Gen 13h
Memory	8GB RAM
Mouse	Logitech
Smartphone	Redmi 10
Graphics Processing Unit	NVIDIA Geforce RTX 4050

General Hardware: This lists the minimum hardware specifications required to design the application.

Table 2. General Hardware Requirements

Device	Description
Laptop	Asus X441U
Processor	Intel I3 Gen 8
Memory	6GB RAM
Mouse	Logitech
Smartphone	Any type with Android specifications
Graphics Processing Unit	NVIDIA Geforce MX 3

Software is the non-physical part of a computer that acts as an interface between the user and the hardware. The following software was used for the application design:

Table 3. Software Requirements

Software	Description
Operating System	Windows 11 Home
Unity	Unity 2022.3.39.f1
Blender	Blender 4.2
Canva	Web Version
Visual Studio	Visual Studio 2022

2.3. Application Design

This section details the application design process, which uses the structured MDLC (Multimedia Development Lifecycle) method. This approach ensures a systematic workflow through six key stages: concept, design, material collecting, assembly, testing, and distribution. The concept involves defining the application's purpose and target users. The goal is to develop an educational medium for learning about the Khulafaur Rasyidin.

The design focuses on creating the application's structure, theme, appearance, and requirements. This includes developing activity diagrams and storyboards. Use Case Diagram: A diagram that visualises the relationship between the user (actor) and the system, showing how they interact.

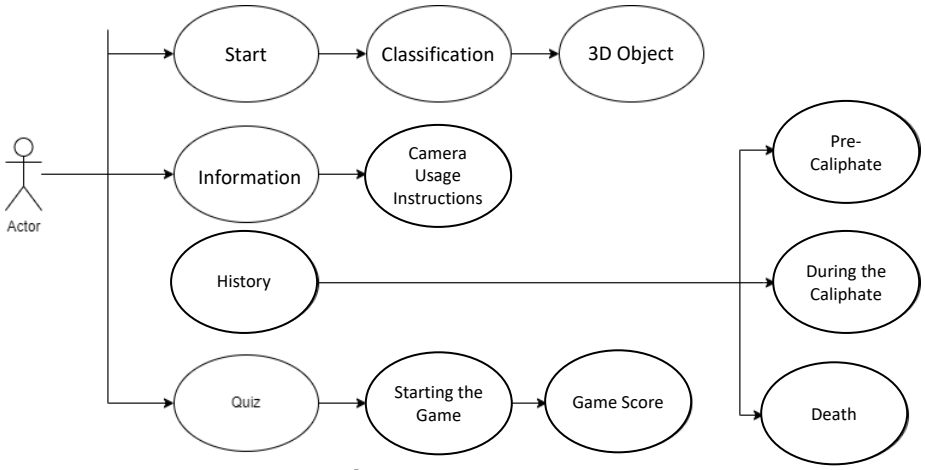


Figure 2. Application Design Use Case Diagram

Activity Diagram: A diagram that maps the flow of the system and the user's actions, from start to finish.

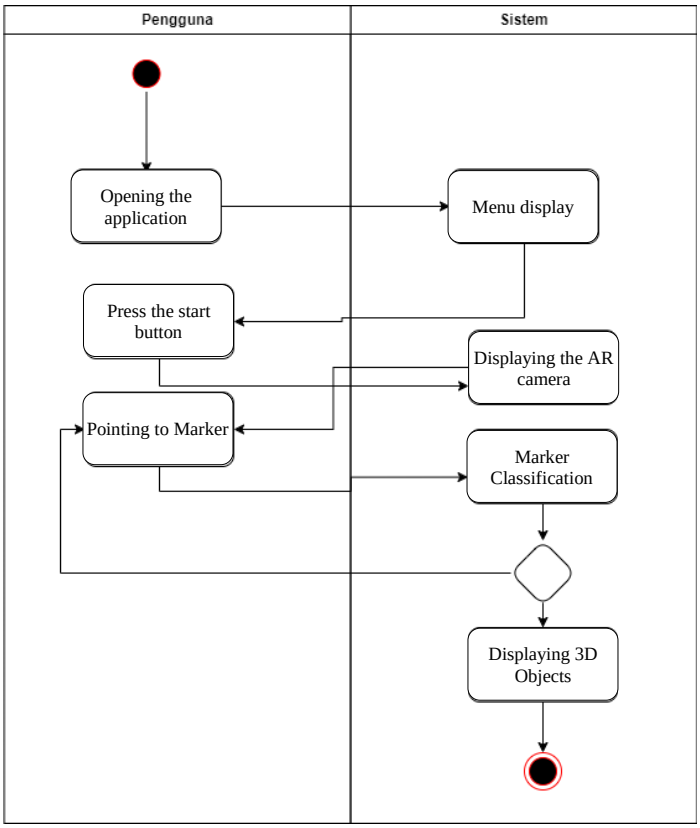
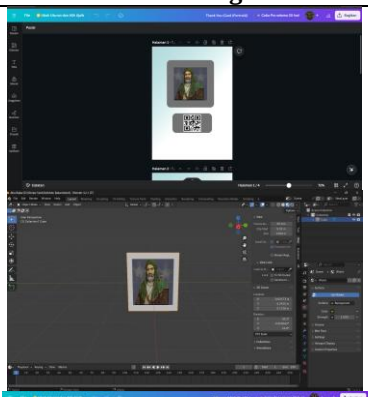


Figure 3. Activity Diagram

Application Storyboard: A visual tool that uses a series of illustrated frames to plan the application's flow. It serves as a guide for the user interface design, ensuring a user-friendly and consistent experience.

The material collecting involves gathering all necessary assets, including marker assets (for AR targets), 3D models, and UI assets. 3D assets are created using Blender 3D, while markers and UI assets are made with Canva.

Table 4. Assets Required for Design

Asset Name	Asset Image	Usage
Marker Asset		An image that will be printed to serve as a marker. It functions as a target on the AR camera to display 3D objects.
3D Asset		An object that will be displayed when the marker is detected. This object will be displayed on the AR along with a description explaining the 3D object.
UI Asset		As a display on the application so that the application has aesthetic value and is user-friendly.

The assembly brings all the concepts and assets together to build the application. The development process follows the structure laid out in the activity diagrams and storyboards.

Splash Screen: A brief opening screen displaying the developer's logo or name before the main menu appears.

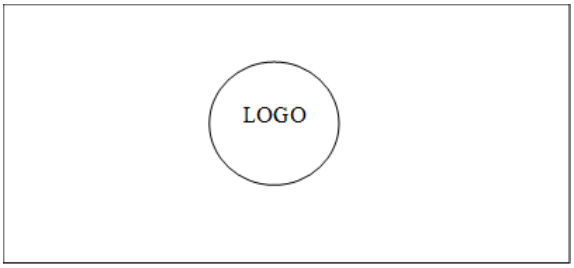


Figure 4. Splash Screen Design

The image above displays the following: a) The Unity logo is shown first. b) This is followed by the Universitas Harapan Medan logo, identifying the institution where the application was developed. Main Menu: The central navigation screen with buttons to access different parts of the application or exit.

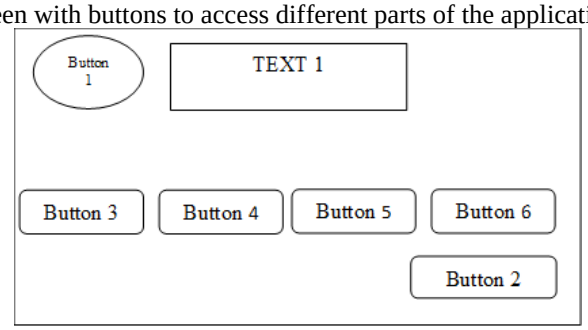


Figure 5. Main Menu Page Display Design

The following descriptions correspond to the image above: a) Text 1: Displays the application's title. b) Button 1: A toggle button to turn the background audio on or off. c) Button 2: The exit button to close the application. d) Button 3: The Start button, which leads to the AR camera. This is where markers are detected to display 3D objects, their names, and descriptions. e) Button 4: The Info button, which directs the user to a page explaining how to use the application. f) Button 5: Navigates to a multiple-choice quiz game. g) Button 6: Contains information about the history of the Khulafaur Rasyidin.

AR Camera View: The main AR interface that activates after pressing "start". It projects 3D objects when it detects a marker.

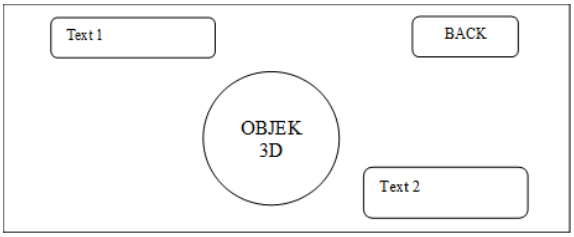


Figure 6. Camera Start Display Design

The following descriptions correspond to the image above: a) Text 1: Displays the name of the art from the projected 3D object. b) The 3D object is projected when the marker is detected. c) Text 2: Contains a description of the art from the 3D object. d) The BACK button returns the user to the main menu.

Information Page: An instructional screen that explains how to use the AR camera.

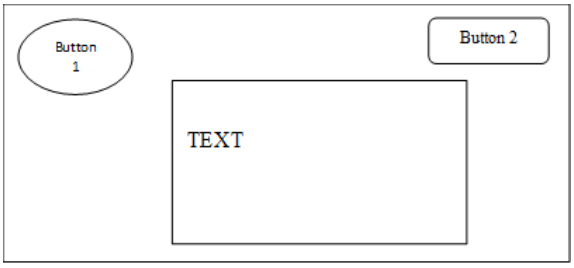


Figure 7. Information Display Design

The image above displays the following: The text provides instructions on how to use the AR camera to make the 3D object, its name, and a description appear. The logo visually demonstrates these instructions. Button 1 is an audio toggle to turn the sound on or off. Button 2 is a button to return to the main menu.

History Page: A section containing information about the caliphs' history, divided into three parts.

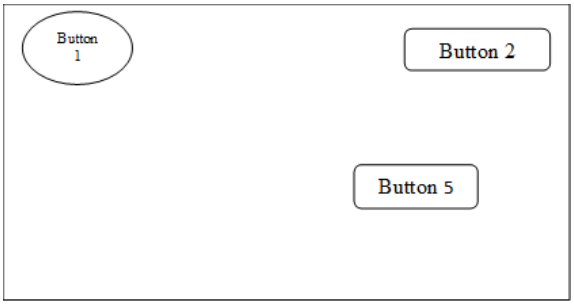


Figure 8. History Display Design

Based on the image, here are the descriptions of the buttons: Button 1: A toggle to turn the background audio on or off. Button 2: Returns to the main menu. Button 3: Provides historical information from before the caliphate period. Button 4: Provides information about the caliphate period itself. Button 5: Gives historical details about a caliph's death.

Game Page: A quiz game featuring multiple-choice questions.

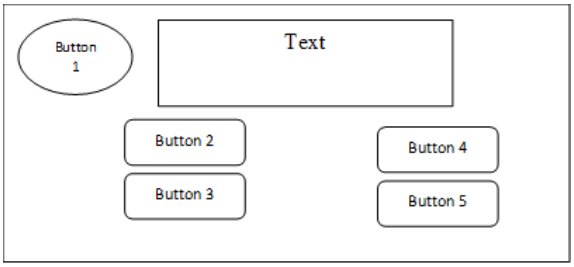


Figure 9. Game Display Design

Based on the image, here are the descriptions: The text displays a quiz question related to the Khulafaur Rasyidin. Button 1 is an audio toggle to turn the sound on or off. Buttons 2, 3, 4, and 5 contain the multiple-choice answer options for the question.

3. RESULTS AND DISCUSSION

3.1. Design Results

This section presents the final application design, which includes the Testing and Distribution phases of the MDLC method. The various screens of the application are shown to confirm that it functions as intended.

The splash screen displays the Unity logo followed by the Universitas Harapan Medan logo for 3 seconds, identifying the university where the application was developed.

Figure 10. Splash Screen Display

This is the main screen of the application, containing menu buttons that navigate to different pages.

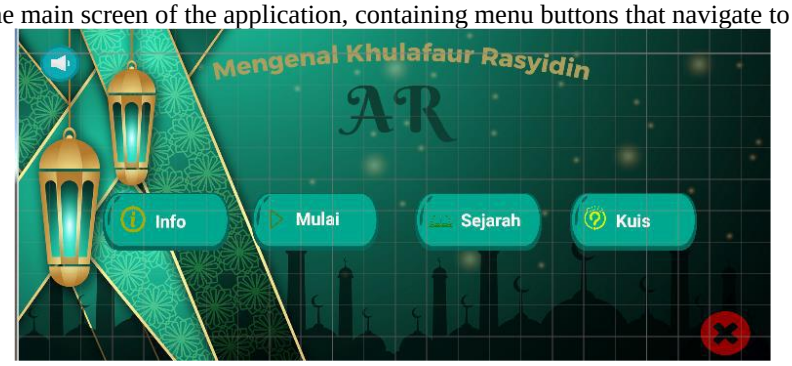


Figure 11. Application Startup Display

Information page provides text-based instructions on how to use the AR feature. It only contains text and a button to return to the menu.

Figure 12. Usage Information Display

This screen shows the Augmented Reality (AR) view. When the camera detects a marker, it projects a 3D object along with its name and a description.

Figure 12. AR Camera Display When Detecting Markers

This page contains text that explains the history of the caliphs. It only displays text and a button to return to the menu.

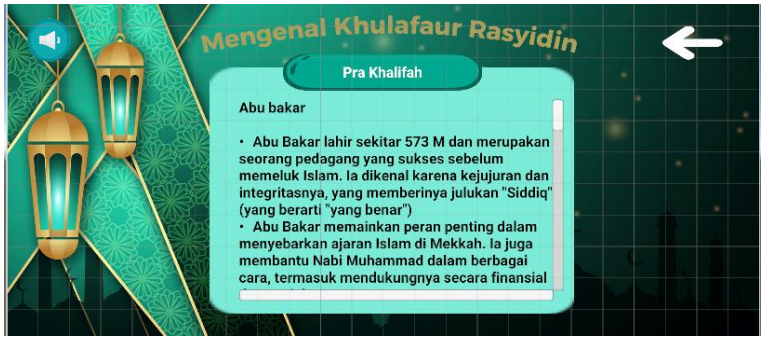


Figure 13. History Display

In addition to AR, the application features an interactive quiz with multiple-choice questions related to the application's theme.

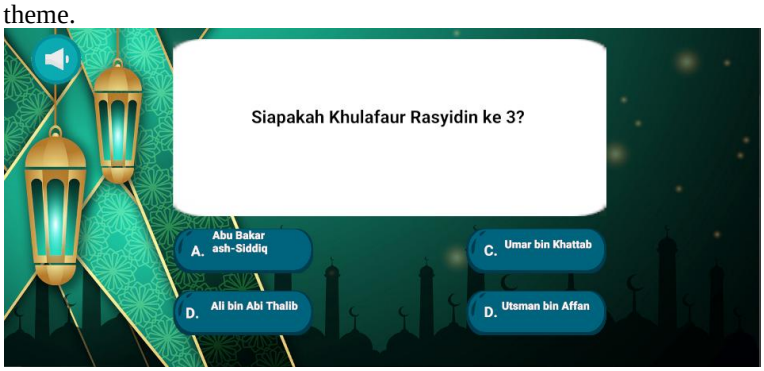


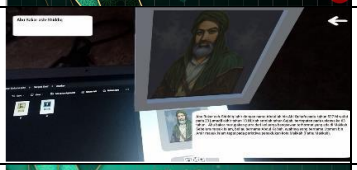
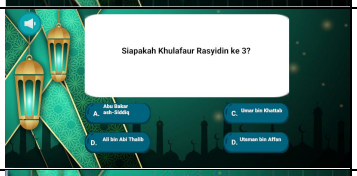
Figure 14. Quiz Display

3.2. Testing

The testing phase involves running the application to check for errors and ensure it functions correctly. A black-box testing method was used to verify that the application matches the original design and to find any bugs or glitches before its official release.

Table 5. Blackbox Testing

Initial Design	Application Results	Application Display	Valid/ Invalid
Displaying the main menu page containing the Start Camera, Quiz, History, Info, and Exit buttons.	When the application runs, the initial display shows a splash screen with the logo of Universitas Harapan Medan.		Valid

Displays the main menu page containing the Start Camera, Quiz, History, Info, and Exit buttons.	The main menu contains buttons for starting the camera, quizzes, history, usage information, and exit to exit the application.		Valid
When the camera starts when the marker is detected, it will display a 3D object.	The camera detects markers and then 3D objects appear according to the detected markers.		Valid
The Material Page displays text explaining how to use the camera.	Displays text containing application usage and a back button to return to the main menu.		Valid
Contains questions related to the Khulafaur Rasyidin with multiple choice questions.	Displays questions with multiple-choice question types.		Valid
Contains buttons explaining the pre-caliphate period, the caliphate period, and the deaths of the Khulafaul Rasydin.	Contains buttons explaining the pre-caliphate period, the caliphate period, and the death of the Khulafaul Rasydin.		Valid

3.3. Distribution

As the final stage of MDLC, this phase involves distributing the application to elementary school students. The primary goal is to provide a new learning tool for introducing the Khulafaur Rasyidin.

Figure 14. Distribution of Applications to Elementary School Children

After receiving the application, users are given a survey to gather feedback and evaluate their experience. The results of this survey will be used for future development.

Table 6. Respondents' Answers

Question	Diagram Image	Description
This application provides accurate and useful information about the Khulafaur Rasyidin.		100 percent of people answered Agree.

The Augmented Reality feature in this application helps me understand the material better.		100 percent of people answered Agree.
The user interface (UI) design of this application is easy to navigate and user-friendly.		100 percent of people answered Agree.
The learning materials provided in this app are presented in an interesting and engaging way.		92.3 percent of people answered Agree and 7.7 percent answered Undecided.
This app runs smoothly without technical glitches or performance issues.		100 percent of people answered Agree.
The guides or tutorials in this app are clear and helpful in understanding how to use it.		92.3 percent of people answered Agree and 7.7 percent answered Undecided.
The guides or tutorials in this app are clear and helpful in understanding how to use it.		100 percent of people answered Agree.
Additional features such as quizzes or mini-games in this app enhance my learning experience.		92.3 percent of people answered Agree and 7.7 percent answered Undecided.

This application is suitable for use by various age groups, from children to adults.		A total of 84.6 percent of people said Agree and 15.4 percent said Undecided.
The content in this application is relevant and in line with the learning objectives about the Khulafaur Rasyidin.		92.3 percent of people answered Agree and 7.7 percent answered Undecided.
This application makes me more interested in learning more about the Khulafaur Rasyidin.		100 percent of people answered Agree.

Overall, the survey results showed that 95.96% of respondents agreed with the application, 4.20% were undecided, and 0% disagreed. This indicates that this AR-based learning medium significantly improves student understanding compared to conventional methods.

4. CONCLUSION

The study concludes that the Multimedia Development Lifecycle (MDLC) is an effective and systematic framework for designing an Augmented Reality (AR) learning application about the Khulafaur Rasyidin. The application significantly enhanced student interest and motivation in learning this subject, as evidenced by overwhelmingly positive feedback from respondents. Students felt more engaged, leading to increased participation and a deeper understanding compared to conventional learning methods.

Based on these findings, it is suggested that future development should focus on expanding the application's compatibility to include iOS and other devices. Additionally, new features could be added to meet user needs, and alternative development methods should be explored to compare their effectiveness.

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