Wahdatul Ulum Course Mobile Application Using Software Development Life Circle (SDLC) Method

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Abstract

During a pandemic like now, ways to improve the quality of learning activities really require the application of technology and learning tools to support the process of teaching and learning activities. Technological developments make it easier to access existing learning tools. Today's learning tools must be accessible to many people and without any limitations of space and time. The application will be made as attractive and interactive as possible for its users. The application is designed to be mobile based and uses the Android operating system. Application development is supported by Google Android. The designed learning mobile device application includes syllabus, RPS, open materials and other supports. The application will be made as attractive and interactive as possible for its users. The application is designed to be mobile based and uses the Android operating system. Application development is supported by Google Android. The software development model used is the Software Development Life Circle (SDLC) model.

Keywords: *Learning Media, Mobile Applications, Android, Wahdatul Ulum, Software Development Life Circle (SDLC).*

1 Introduction

In line with the development of the UIN North Sumatra Medan campus, which is an Islamic campus that has the concept of science, and not only Islamic science but Islamic science; not only in science but also in the development of civilization, then the reintegration of science is a necessity. The integration of knowledge can be referred to in terms of Wahdatul Ulum[1].

In 2021 at UIN North Sumatra Medan, precisely in the Odd semester of T.A. 2021/2022 Wahdatul Ulum becomes a course and one of the university's mandatory courses. The wahdatul ulum course is something new, especially for new students. Next, an interdisciplinary approach is carried out, which applies approaches to research, study and development of social life, as well as crossing many scientific disciplinary boundaries to create a holistic approach[2].

Based on the background presented, the author will design a mobile-based interactive learning tool application that can be used by lecturers and students in teaching and learning activities. Mobile-based applications have advantages including cheaper costs, can be used anywhere. Mobile devices are also lighter than books or laptops and easy to carry anywhere. Unquestionably, integrating mobile devices as an educational asset also exposes the gap between those who can afford to have rapid access to the internet connection and those who cannot[3]. So far there have been several existing applications but they are still static in the sense that users cannot immediately change, add and delete material. Therefore, it is necessary to redesign applications that are dynamic in nature so that it is easier to customize existing materials.

Of course, students have learning difficulties and the difficulty level of each subject is different for each student. [4]. The learning device application designed includes syllabus, RPS, teaching materials and other supports. The application will be made as attractive and interactive as possible for its users. The application is designed to be mobile based and uses the Android operating system.

Application development is supported by Google Android. E-learning media makes learning activities more meaningful because students and teachers can continue face-to-face learning with e-learning through online discussion [5].

2   Literature Review

In this section the theories used in theoretical research are referred to as following: Learning media diversity is an inevitable challenge that needs to be addressed, even in the post-pandemic era. Students have the opportunity to acquire knowledge through various forms of media. Among these, Google Classroom stands out as a highly effective medium. It seamlessly integrates into the teaching and learning process, making it a valuable tool even after the pandemic[6].

Characteristics of mobile applications are developed with various and different approaches to mobile application developments. The data reveal that the design dan combination of different methods have an influence on the characteristics of each mobile application Each[7]. In the current digital era, mobile learning is one type of learning development that is expanding quickly. The rise of numerous learning applications that come with learning resources in the form of applications is indicative of the impact on the field of education. An application for building client-server-based mobile learning on digital simulation subjects was developed by previous research[8].

Currently one of the most widely used operating systems, Android is an open-source operating system that runs on smartphones and tablet PCs, encouraging programmers to develop their own applications, including educational media (specifically, Android-based learning media)[9]. Presently, there's a notable shift towards utilizing Android-based devices for swift and convenient access to information. Against this backdrop, this research endeavors to explore the ongoing development of Android-based learning media innovations, with the goal of enhancing the efficiency and effectiveness of the learning process.

Kodular is an App Developer Website with features similar to MIT App Inventor to develop Android applications using Block Programming. Kodular-assisted Android-based interactive learning media can combine several aspects into one application. Comprehensive stages are also offered through this media in performing complex activities such as suit pattern making, where traditional models such as job sheets can support learning through practical methods less[10].

One descriptive and prescriptive aspect of software development is the software lifecycle. It covers a range of topics and stages, from planning to application testing and deployment. Every task is completed in a unique manner based on the specifications. The Software Development Lifecycle is the term for these processes (SDLC). A common process for creating software or systems is called SDLC.[11]. Planning, analysis, design, implementation, and system maintenance are the first aspects of the SDLC.

In previous research conducted with the title Android-Based Mobile Application for Vocabulary Learning. This result was consistent with the novel findings indicating that using VocApp software can help students' vocabulary grow. Increased vocabulary makes it easier for kids to write and talk. The researchers demonstrated VocApp, a smartphone application. VocApp will assist students in analyzing their vocabulary, calming their worries, modernizing the teaching and learning approach, creating aesthetically pleasant environments, and helping them to correct and retain their vocabulary as well as the language associated with it. Based on the investigation's findings, the researcher concluded that the "Mobile Application VocApp based on Android for Learning Vocabulary for Grade Ten" was a suitable model for vocabulary acquisition. There were six phases in the model implementation processes.[12].

Furthermore, in previous research conducted with the title Creating My Science App, an Android-Based Learning Resource on the Solar System for Elementary Schools Using a SETS Approach. The educational tool created is the My Science App, an Android-based learning tool that uses the SETS (Science, Environment, Technology, and Society) strategy to teach primary school pupils about the solar system through media production, validation, and trials. Every media feature has been effectively designed contextually using the SETS technique. The features that are available are the application's instruction feature, which provides instructions on how to use it; the solar system

material's core competencies and basic competencies are contained in the CC & BC (core competencies and basic competencies) features; the material feature, which contains material integrated with SETS; and the simulation feature, which offers PhET simulations about the solar system[13].

From the results of several previous studies, the author explains several similarities and differences which will be used as a reference in system development and design. In table 1 below you will see several differences from previous research in terms of technical application design:

Table 1. Differences and Similarities with Previous Research.

No.	Study	Previous	Latest
1	Mobile Based	Yes	Yes
2	Android Operating System	Yes	Yes
3	Dynamic Interface	No	Yes
4	Using CPanel	No	Yes

From the table 1 above it can be seen that this research is newer than the previous research, there are at least 2 updates including the use of Dynamic Interface and using cpanel.

3   Research Method

The method used in this research is development research (Research & Development) which aims to produce certain products, and test the effectiveness of these products. In developing this research software, the Software Development Life Cycle (SDLC) model was used. SDLC is the process of modifying and creating a system, as well as the methodological model used in system development. The waterfall model, which was the original software development life cycle (SDLC) approach, depicts the software development process as a sequential, linear flow[14]. Planning, requirement analysis, software modeling and design, coding, documentation, testing, deployment, and maintenance are the primary steps in the development process. The SDLC model used for this research is the Waterfall model. The waterfall method is a work method that emphasizes sequential and systematic phases. The procedure is named after a waterfall because it flows "down" in a single direction. The stages of the waterfall method must be followed in order for it to be implemented[15].

Stages carried out in the development of this system is to use the waterfall method presented in Figure 1:
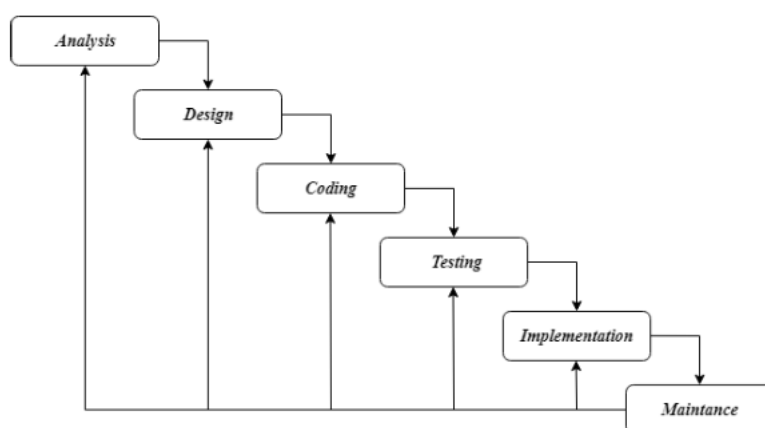

Figure 1. Waterfall Stages

In Figure 1, the stages of development in the waterfall method are:
1. Requirements gathering and analysis

Gather complete requirements for analysis and define what needs are to be achieved by the program. Information can be obtained through interviews, discussions, or surveys.
2. Design

Perform software design design as an estimate before code is generated. System design can be made using Flowchart, Mind Map, or Entity Relationship Diagram (ERD).

3. Implementation

This implementation is the stage where all designs that have previously been made are converted into program codes. The resulting code is still in the form of modules that must be combined at a later stage.

4. Integration & testing

At this stage, the modules that have been made previously are combined and tested to find out whether the software made is in accordance with its design and function or not.

5. Verification

At this stage, the user or client directly conducts testing on the system, whether the system is in accordance with the approved pliers or not.

6. Operation & maintenance

This stage is the last stage of the waterfall model. The system has been completed and carried out maintenance. Maintenance in the form of fixing errors that were not found in the previous step.

The data collection techniques used in this research in accordance with the waterfall model are:

1. Interview

This interview process was carried out at FST UIN North Sumatra Medan to obtain information by conducting a dialogue with the wahdatul ulum lecturer, namely Mr. Ali Darta, M.A, who was deemed able to provide the information the author wanted. The purpose of this interview is to find out what learning tools are needed for the Wahdatul Ulum course, then interviews will also be conducted with stakeholders, namely media and application experts in the context of discussions regarding the design of learning media applications.

2. Discussion

Discussions were held with lecturers who taught the Wahdatul Ulum course, stakeholders, and the UPM faculty. The purpose of this discussion is to determine what materials will be developed later in the Wahdatul Ulum course, design plans for application design and then UPM will provide input on the design of learning media that will be created.

3. Surveys

Surveys were conducted on learning media users, including lecturers and students. The purpose of this survey is to validate the feasibility of the designed learning media and input from users regarding the application design.

4   Results and Analysis

The outcomes of the five-stage cycle of analysis, design, development, implementation, and assessment that is the ADDIE model learning design scheme are presented.

System Requirements Analysis

The need for learning media is a vital component in the learning process. The use of learning media is still very limited to the use of whiteboards and personal computer devices. The use of cellphones and smartphones by students has increased. Almost all students have cellphones, some have also used smartphones.

At the analysis stage, preliminary research was conducted by conducting observations and interviews. Interviews were conducted with the head of the study program as the head of the computer science study program at UIN SU as well as the lecturer in algorithm and programming courses. The purpose of the study was to obtain the data needed for the design stage.

The development of Android application learning media focuses on delivering theories and tutorials related to the eight subjects outlined in the algorithm and programming course syllabus. These subjects include the fundamental concepts of algorithms and programming, algorithms themselves, data types, looping, selection, arrays, functions and procedures, and pointers.

System Design

Targeting, evaluation tools, exercises, content, and analysis of instructional materials, lesson plans, and media choices are all part of the design phase.

At this stage the software requirements that have been obtained are translated into a representation of the form of software that will be created as shown in Figure 2.
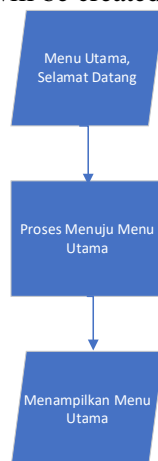

Figure 2. Main Page Flowchart

In Figure 2, the software requirements that have been obtained are translated into a representation of the form of software that will be created. The software representation is depicted in the form of diagrams, flowcharts and display images.

The results of design development on the main menu to realize desired desires in accordance that will be created as shown in Figure 3.

Figure 3. Main Menu Flowchart

In Figure 3, the user login contains a menu: materials, quizzes, online discussions and videos. The following is an illustrated main page flowchart design.

System Testing

The following are the results of the validation carried out on material experts as shown in table 2.

Table 2. Validation from Material Expert

No	Pernyataan	Penilaian				
		1	2	3	4	5
1	2	3				
1.	Relevansi materi dengan KD				√	
2.	Materi yang disajikan sistematis				√	
3.	Ketepatan struktur kalimat dan bahasa mudah Dipahami				√	
4.	Materi sesuai dengan yang dirumuskan				√	
5.	Materi sesuai dengan tingkat kemampuan siswa				√	
6.	Kejelasan uraian materi				√	
7.	Cakupan materi berkaitan dengan sub tema yang				√	

	Dibahas					
8.	Materi jelas dan spesifik				√	
9.	Gambar yang digunakan sesuai dengan materi				√	
10.	Contoh yang diberikan sesuai materi				√	
	Jumlah Frekuensi				**10**	
	Jumlah Skor				**40**	
	Jumlah Total Skor	**40**				
	Rata-rata	**4**				
	Presentase	**80 %**				
	Kriteria	**Sangat Valid**				

In Table 2, the validation results obtained from the material expert assessment show that the indicators assessed in this aspect are adequate, good and very good. The total score obtained is 40 and the average score is 4. After being converted to a scale of 5, the criteria are very valid.

System Implementation
The following is the result of the program that is run:
1. Login Page

The login menu consists of a username and password. Username and password are connected directly to the database. If it does not match the existing data then you cannot enter to access the next page as shown in Figure 4.

Figure 4. Login Page

In Figure 4, it can be seen that the username and password data were entered directly by the admin. Username and password data for changes to student name and NIM.

2. Main Page Menu Display

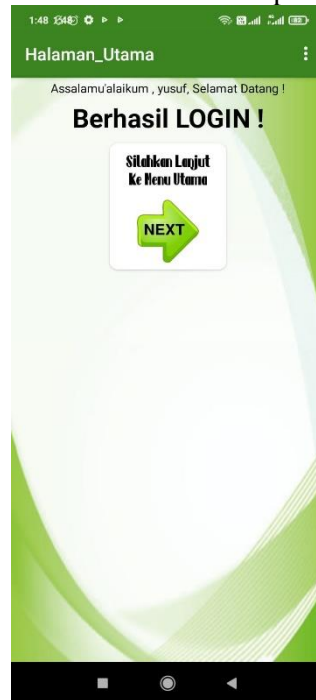The main menu displays the results of username and password validation as shown in Figure 5.

Figure 5. Main Page Menu Display

From Figure 5, it can be seen that if the username and password are correct then you will go to the main page and a notification will appear that you have successfully logged in. Next, you can enter the next menu, namely the main menu:

3. Main Menu Display

The main menu display consists of several menus that can be selected by the user. Several menus consist of Materials, Quizzes, Data Sharing, and Videos as in Figure 6.

Figure 6. Main Menu Display

From Figure 6, it can be seen that the data is connected directly to the respective database and users can only use it without being able to edit the existing menus. Admin can change and add menus.

4. Material Page View

The material page is the result of selection from the main menu when the user selects the material tab as shown in Figure 7.

Figure 7. Material Page View

In Figure 7, it can be seen that the material is displayed in PDF viewer form and can be downloaded. Users can only view and display if they want to add and edit material, they must go through a database that can be accessed by the admin.

5. Quiz Page View

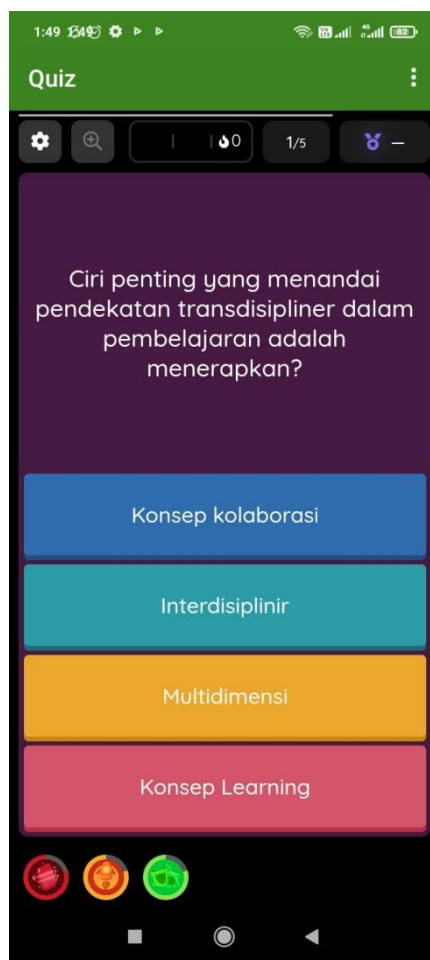The quiz page displays the results when selecting the quiz menu as shown in Figure 8.

Figure 8. Quiz Page View

In Figure 8, it can be seen that the quiz is in the form of multiple choices which are connected directly to the database and when the user chooses an answer, after completion the assessment results will immediately appear. Quizzes can be added and edited from the admin menu. Quizzes can also be made in the form of essay tests and so on.

5   Conclusion

To conduct further research on the Mobile-Based Wahdatul Ulum Interactive Learning Device Application related to more materials and advanced programming. Hopefully this research is useful for change and towards a digital campus, especially at UIN North Sumatra Medan and hopes to be a reference for further development.

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