Development of Android-Based Learning Multimedia for Electrical Lighting Installation Courses in Vocational High School

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ABSTRACT

The goal of this study is to develop android-based learning multimedia in the subject of electric lighting installations at the Electrical Power Installation Department Vocational School. Mastery of this competence is important for students as one of the requirements for graduation and a provision in their lives. In the current pandemic conditions, the teaching and learning process is carried out using an online method, making it difficult for students and teachers. Therefore, it is necessary to make a tool to help the teaching and learning process. In the teaching and learning process, multimedia that utilizes sound, images, and videos in it will increase students' interest in participating. As a result, Android-based learning multimedia was made to help students and teachers in facilitating the teaching and learning process. The resulting media gets a decent value from the results of media and material validation. Student responses show a very good level of satisfaction with the media.

Keywords: Learning Multimedia, Android, Electrical Lighting Installation.

1. INTRODUCTION

Indonesia is currently trying to get out of the global COVID-19 pandemic. One of the efforts made by the government in overcoming this pandemic is issuing social distancing policies and emergency PPKM in several areas (COVID-19, 2021). The Ministry of Education, Culture and Research Technology also issued a policy to limit face-to-face learning activities in schools. So that students must take part in distance learning activities or known as online. In carrying out the learning process, many students face difficulties in following the subject matter presented by the teacher online. Therefore, it is important to develop learning media that can be used by students independently to make it easier to understand the subject matter presented [1].

Educators are expected to increase the quality of learning by exploring and creating interesting forms of learning. Teachers must have seven domains in competence, one of which is designing teaching method and teaching content [2]. The development of technology will facilitate learning process, and of course this will have an impact on learning outcomes. However, the reality faced is different from the expectation that there

are still many schools or educational institutions, both formal and non-formal, whose learning process is carried out without the help of technology [3].

Due to the current world condition that is being hit by the COVID-19 pandemic, face-to-face learning has been discontinued in several schools. Instead, students must study at home or online, so It is critical to provide students with distant or online learning tools that they can use independently [4]. On the basis of the findings of the observations in several Vocational Schools majoring in Electrical Power Installation Engineering in the city of Medan, it was found that the use of learning media in supporting online learning activities was still not optimal. This is because there is no learning media that can be used by students independently. Another factor is the failure to grasp the subject matter caused by the lack of self-awareness of students to study independently at home. As a result, the achievement target of student competence has not been achieved.

The solution that can be done to overcome the problems is the development of learning media. The development of learning media should be strived to take advantage of the advantages possessed by the media. Learning media is designed to overcome obstacles that

may arise in the online learning process [5]. Learning media can be used in the teaching and learning process as a tool to stimulate students' desire to learn [6]. The most important factor in achieving successful learning in schools is creating engaging, innovative, and creative learning media [7].

Android-based media development is expected to improve student literacy. Learning by using learning media allows students to focus on the content. Learning media contains complete media elements which include animated audio, video, text, and graphics that allow users to interact interactively through the available features [8]. This research aims to produce multimedia as a learning medium for Android-based Electrical Lighting Installations. The resulting multimedia can later be accessed online by students anywhere and anytime via an android smartphone. This multimedia is expected to assist students better understand the subject matter and skills in participating in online learning activities.

2. STUDY OF LITERATURE

2.1. Multimedia

Multimedia is a combination of several media formats such as text, images, animation, film, video, and sound which aims to present information [9-10]. There are four important components in multimedia, first there is computer that coordinates what is seen and heard. Second, there is a network that connects users and information. Third, there is navigation that used to navigate the information network for users. Fourth, multimedia must provide a place to storing, processing, and communicate information [10].

2.2. Electrical Lighting Installation Courses

Electrical Lighting Installation (IPL) training courses are one of the training courses that must be taken by class XI SMK students with electrical power installation engineering skills. In this IPL training, there are several main materials that must be mastered by students. These materials include applying the General Regulations for Electrical Installation, planning the layout of components, calculating the cost of Electrical Lighting Installation, installing installation components, calculating the amount of load, determining the size and type of safety and checking the installation results. Students must be able to achieve minimum completeness in this training subject to be able to continue to the next class.

2.3. Android

Android is a mobile and tablet operating system. Users can interact with devices and run the applications through the operating system [11]. Smartphone is a device that uses the Android operating system. Operating system, middleware, and apps comprise the Android platform, which is based on Linux [12]. Android is one of the mobile operating systems that is growing in the midst of today's smartphone competition. The Android operating system is a comprehensive, open source platform designed for mobile devices. As of now, Android is the most widely-used OS in the community, because it gives users many choises of application. Google's Android operating system gives developers the freedom to create new applications that are compatible with the platform [13].

3. METHOD

This research adapts research and development methods in developing media. Borg and Gall say that research and development (R&D) methods are the processes used to develop and validate a particular product. This method can be used to build and validate a product[14]. The 4-D (Four D Models) development model was adopted, which stands for define, design, develop, and disseminate[15]. The 4-D development model (Four D Models) used in this study can be seen in Figure 1.
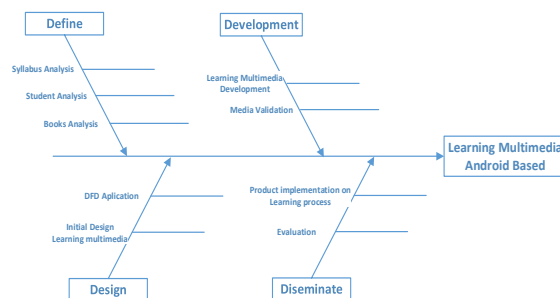

Figure 1. Ishigawa diagram R&D method

At the define stage, what is done include (1) determining the basic problems experienced by students in the learning process, (2) knowing the characteristics of students and the difficulties experienced, (3) identifying the main tasks carried out by students according to core competencies (KI). and basic competencies (KD), (4) determine the material to be delivered through the media, and (5) formulate indicators of learning objectives to be achieved [15]. At the design stage, the activities carried out include (1) compiling tools to measure student understanding, (2) determining appropriate and relevant media for online learning, (3) selecting media formats, (4) conducting initial designs including: flowcharts, navigation flow, and storyboarding [15]. At the development stage, the activities carried out include: (1) preparing hardware and software requirements, (2) testing the feasibility of media by media experts and material experts, (3) implementing media in learning, 4) assessing students and teachers [15]. At the disseminate stage, what can be done is the dissemination of the use of media in the learning process. This stage is the final development process. It aims to distribute media for students and teachers to facilitate the teaching and learning process. The last process in the development of

this application is to evaluate the application that was built by involving the user and the validator.

The data collection instrument in this study adapted ISO 9126, which defines 6 software quality characteristics, namely: (1) Functionality, (2) Reliability, (3) Usability, (4) Efficiency, (5) Maintainability, (6) Portability. The student response questionnaire instrument uses the usability aspect with 4 indicators, namely: (1) Understandability, (2) Learnability, (3) Operability, (4) Attractiveness [16]. Furthermore, the data of this study were analyzed descriptively qualitatively based on quantitative data. The qualitative descriptive data analysis technique was used to change the average percentage to determine the criteria: 1) media eligibility and 2) student and teacher assessments. The conversion of quantitative to qualitative data is carried out on media feasibility test data from experts as well as student and teacher assessments [14].

4. RESULT AND DISCUSSION

The research was carried out at Imelda Private Vocational School, Medan. At the define stage, an analysis of the problems that occur is carried out. The analysis was carried out on learning methods, learning interests, learning motivation, facilities, tasks and assessment instruments. Based on the analysis of the needs and problems faced by students, the product resulting from this research is android-based multimedia. This application contains the topic of installing electric lighting installations. The material is delivered in the form of writing, video and animation.

At the design stage, product planning is carried out as a learning media in the form of Android-based multimedia in class XI Electrical Lighting Installation training courses. This design process includes 5 stages, namely: 1) Material preparation, 2) Test preparation, 3) Media selection, 4) Format selection, 5) Display design. The resulting multimedia design can be seen in Figure 2.
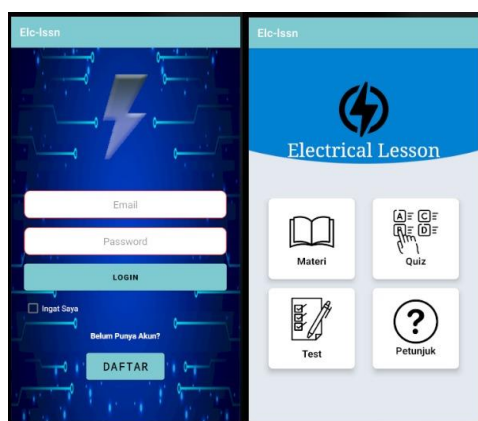

Figure 2. Home page on application

The next stage of development (develop) that is carried out is making the "User Interface" application using auxiliary software. Then proceed with the

validation process by a validator consisting of 3 multimedia experts and 3 subject experts. Validation is carried out to determine the level of media feasibility using an assessment sheet in the form of a questionnaire. After the media is considered feasible and the revision (improvement) is complete, it is tested in the learning process. The trial was carried out to get an assessment of the ease and usefulness of using the application from teachers and students. Data collection was carried out using an assessment sheet in the form of a questionnaire. Based on the validation that has been done, the results are shown in Table 1 and Table 2.

Table 1. Tabulation of Media Validation Results

No.	Instrument	Validator Score (%)			Average %	Category
		I	**II**	**III**		
1	Functionality	90	92	94	92	Very Good
2	Reliability	92	90	92	91	Very Good
3	Usability	90	90	90	90	Very Good
4	Efficiency	88	90	90	89	Very Good
5	Maintainability	90	92	90	91	Very Good
6	Portability	92	94	90	92	Very Good

Table 2. Tabulation of Subject Validation Result

No.	Instrument	Validator Score (%)			Average %	Category
		I	**II**	**III**		
1	Understandability	94	92	94	93	Very Good
2	Learnability	92	92	92	92	Very Good
3	Operability	90	90	90	90	Very Good
4	Attractiveness	92	94	90	92	Very Good
5	Readability	90	90	90	90	Very Good

Based on the data in Table 1, the overall average score of the validation of the learning results media for the Android-based Electrical Lighting Installation is 90.83% which is included in the range of values of 81% - 100% with very good value criteria. So the learning media for the Android-based Electrical Lighting Installation can be used as a learning medium and is said to be suitable for use with a few revisions.

Based on the data in Table 2, the overall average score of the results of the validation of the Android-based Electrical Lighting Installation learning subject is 91.40% which is included in the range of values of 81% - 100% with very good value criteria. So the learning material for Electrical Lighting Installation on the media designed can be used as subject matter and is said to be suitable for use as a support for online learning.

Student response questionnaires were given to students who had used Android-based learning media for Electrical Lighting Installation. This research was conducted at Imelda Medan Private Vocational School in class XI TITL 1 with a total of 20 students/respondents. Student response questionnaires have been validated before being given to students. The results of the assessment of the validation questionnaire can be seen in table 3. Based on the data in Table 3, an overall average

of 91% is obtained which is included in the range of 81%-100% with very good criteria. It can be said that the respondents responded very well to the existence of learning media for the subject of Electrical Lighting Installation which can be accessed using a smartphone with the Android operating system.

Table 3. Tabulation of User Trial Result

No.	Aspect	Average %	Category
1	*Understandability*	90	Very Good
2	*Learnability*	91	Very Good
3	*Operability*	89	Very Good
4	*Attractiveness*	93	Very Good

5. CONCLUSION

Based on the research that has been done, the use of Android-based learning multimedia in the learning process is possible. Based on the validation of multimedia experts and subject experts. This application got an average value of 90.83% from the media validation results and 91.40% from the subject validation results. The results of the trial use of this application received a very good satisfaction response with an average of 91% of the students of Imelda Medan Private Vocational School. This shows that this application can help SMK students to carry out the online learning process.

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