Development Of Android-Based Learning Media With Social Constructivism Approach As Supporting Students' Self-Regulated Learning In Vocational School

Khoirudin Asfani[1],*, Muhammad Bakhrur Rizki[2]
Faculty of Engineering, Universitas Negeri Malang, Malang, Indonesia
[1]khoirudin.asfani.ft@um.ac.id; [2]rizkiassunny12@gmail.com
*corresponding author

Article Info

ABSTRACT

Observations and interviews at SMK in Malang City had been carried out. The results were (1) the lack of students' adaptation in following the learning process; (2) students' lack of awareness of the importance of the learning process; (3) lack of student learning independence; (4) the use of technology media that was deemed inappropriate during learning; and (5) the learning outcomes of some students who hadn't reached the score standard. This research and development were aimed to develop, test the feasibility, and determine the effectiveness of learning media in the form of the "M-KJD" application on students' self-regulated learning. This research and development used ADDIE development model. Material validation by 2 experts and media validation by an expert obtained results in the form of a very good product feasibility score. The results of the product testing to 2 large groups got a score stating the high feasibility of the application and the influence level of the media on students' self-regulated learning stated "very influential". From the results of this study, it could be concluded that (1) the feasibility of the product developed after going through the evaluation stages as a whole obtained the results in the form of "very feasible" criteria and (2) the implementation of the product in learning was able to increase student learning independence with results in the form of fairly good criteria.

I. INTRODUCTION

The use of learning media to support the learning process is very important both for teachers to make it easier to convey the material, as well as for students to make it easier for students to capture the essence of what is conveyed by the teacher [1], [2]. Moreover, the 2013 curriculum system which has begun to be implemented in various schools in Indonesia requires five basic learning experiences which have been stated in the Regulation of the Minister of Education of the Republic of Indonesia Number 81A of 2013. Multimedia is the use of several media that present information by combining one or more text, graphics, animation, images, video, and sound [3]. By using the media, one can describe proportional thinking learning steps,

from the start the communication relationship may be formed [4]. By using the media they (in this case the teacher) explain the stages of learning with proportional thinking, starting from connections to possibilities. The results showed that interactive visual media could increase the motivation and learning achievement of fourth grade students in the matter of integer arithmetic operations [5].

SMK Negeri 4 Malang is one of the schools that has implemented the 2013 curriculum in Malang City. Students are required to be active and no longer an object in the learning process. Teacher only as a facilitator in learning. However, when viewed from the results of the Mid-Semester Examination, it can be seen that the average results obtained by students have not reached the expected score standard.

Based on interviews with several students of class in Computer and Basic Network subjects regarding the results of the Mid-Semester Examination which on average students have not reached the expected score standard, the results show that students are still passive when learning and there is no desire to seek information related to the lessons they receive. This causes students to absorb less of the material being studied so that after the learning process students still do not understand the material taught by the teacher.

Referring to the constraints and problems obtained from the results of interviews with several students of class in Computer and Basic Network subjects, utilization of Information and Communication Technology (ICT) has great potential as a solution to these problems, especially the increasingly rapid development of ICT so that various aspects of life have implemented technology including aspects of education. Utilization of technology in the educational aspect is commonly referred to as Electronic Learning (E-learning) where E-learning has the effect of transforming conventional education into digital form, both in content and system [6]. One type of E-learning is Mobile Learning (M-learning). Using Mobile Learning (M-learning) technology, students will be able to access and enjoy the learning materials and able to learn anywhere and anytime without being limited by space and time [7], so that it will support students' self-regulated learning [8].

In the development of M-learning, one of the media environments is a smartphone that operates on the Android system. The Android operating system makes special learning media for students packaged in the form of software or applications, because the features of Android are very possible to be developed in the world of education. These features include full support for media that can integrate and combine various things such as text, audio, images, video and animation or what is commonly referred to as Interactive Multimedia learning media, the use of interactive learning media is needed, interactive learning media itself can be interpreted as an active learning medium, meaning that it is designed to be able to give back orders to users to carry out an activity [9].

Based on the previous explanation, this study seeks to develop interactive multimedia learning media based on Android in basic computer and network subjects aimed at students of SMK class X in the computer engineering and informatics engineering program. It is hoped that the product developed will become an alternative learning media that is able to be a solution to problems related to the low of students' self-regulated learning.

II. METHODS

This research is a type of research and development, where the research method used is to produce certain products and test the effectiveness of these products. In this study, the product developed is an Android-based interactive multimedia learning media with a social constructivism approach called Mobile Computers and Basic Networks (M-KJD) which is expected to support students' learning needs during the learning process and as long as students want to use it to learn anywhere and anytime. anytime, so as to increase student learning independence.

This M-KJD application learning media development model uses the ADDIE model which consists of five stages: analysis, design, development, implementation, and each stage will go through an evaluation process [10]. A chart of the stages of the ADDIE development model is shown in Fig. 1.
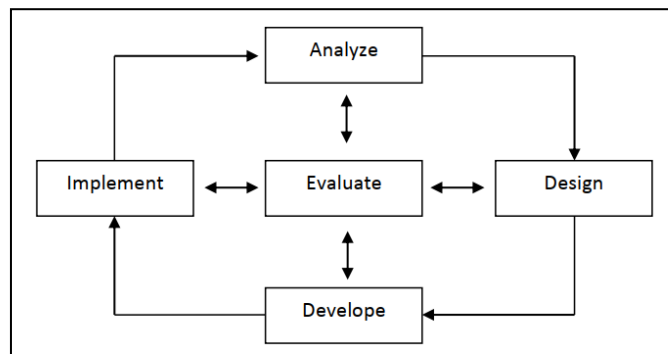

Fig. 1. Five Stages of ADDIE Development Model

Analysis stage carried out at the beginning of the study. This is done with the aim of knowing the initial conditions in the school, where it is known that the problem is at a fairly low level of student learning independence.

The design stage is done by designing the application to be made. Based on the results of the survey, 100% of students in the research destination SMK have their own personal smartphone. Almost all smartphones used have the Android operating system. Therefore, the application created will support smartphones with the Android operating system and require internet access to download them. In use, the application can also be run in an offline network.

The Development stage is carried out after the design has been completed. This stage is carried out with the help of media experts, materials, and several test students to obtain the feasibility of the application so that it is ready to be carried out in large-scale group testing. The results of the revision are expected to be able to maintain the feasibility and reliability of the developed application. In more detail, this section will be explained in the sub-chapter Validation by Experts.

The implementation stage is carried out by involving vocational students for research purposes. From the implementation stage, the results will be used as a study in the form of data analysis used to reveal the level of students' self-regulated learning after using the application. For further discussion will be discussed in the sub-chapter Testing with Large Groups.

Validation by Material Expert

Material expert validation is carried out to determine whether or not the application learning media developed and to find out the shortcomings and potential of the product that has not been maximized in terms of the quality of the material contained in the learning media. Validation of material experts is carried out by validators of 2 material experts who have taught Basic Computer and Network subjects with a minimum of 1 year teaching experience or have taught subjects relevant to Basic Computer and Network lessons.

Validation by Learning Media Expert

Media expert validation is carried out to determine whether or not the application learning media developed is feasible and to find out the shortcomings and potential of the product that has not been maximized in terms of the quality of the application learning media. Media expert validation is carried out by media expert validators who have expertise in mobile learning by teaching in mobile learning courses.

Large Group Testing

The product that has been developed will be tested on 2 major groups, namely 2 class X with the Multimedia Expertise Package at SMK Negeri 4 Malang. The data collection instrument used in the research and development of this application learning media is in the form of a questionnaire. The results of data collection will be analyzed qualitatively and quantitatively.

Qualitative data consists of suggestions, comments, and additional information on the instrument sheet in the form of a product feasibility validation questionnaire for material experts and media experts, and a product feasibility validation questionnaire instrument sheet and a learning independence questionnaire for students. It was analyzed descriptively qualitatively with three paths, namely: data reduction, data presentation and drawing conclusions [11].

Quantitative data in the form of assessment results from product feasibility validation questionnaires by material experts, product feasibility questionnaires by media experts, and product feasibility and independent learning questionnaires for students. The data were analyzed using descriptive analysis techniques in the form of percentages. The following is a quantitative data processing technique using a descriptive percentage formula [12] as follows (1)

$$Va = \frac{\sum TSEV}{S-max} x100\%$$
$$(1)$$

where Va is Validity Score, $\sum$ TSEV is total score of empirical validity, and S-max is the maximum expected score.

III. RESULT AND DISCUSSION

The results of the development are interactive multimedia learning media based on Android with the name Mobile Computer and Basic Network "M-KJD" which contains three basic competencies or three materials from Computer and Basic Network subjects, namely: Computer Network Installation, IP Addressing on Computer Networks , and Sharing Resources on Computer Networks. Making this M-KJD application utilizes one of the open source frameworks of JavaScript that is used to create multi-platform applications (Android and IOS), namely React Native.

This M-KJD application can be run on android smartphones and computers with the help of an android emulator, this application is semi-online offline where there are features that can be used offline and online. The minimum required

specifications of an android smartphone or the minimum configuration of an android emulator can be seen in Fig. 2.

Fig. 2. M-KJD Application's Minimum Specifications

After determining the minimum specifications, the application user interface is created. Several pages have been made by complying with the rules of layout and appropriate coloring to make it easy and comfortable to use when learning. Some of the results of user interface development are shown in Figure 3.
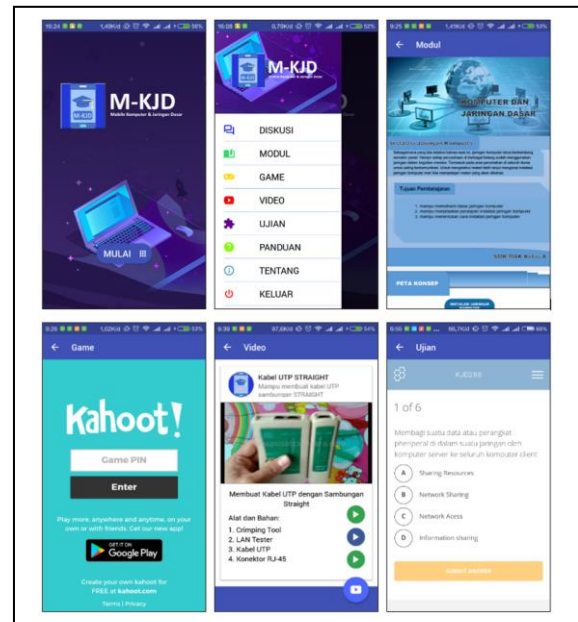

Fig. 3. M-KJD Application's User Interfaces

Material Experts Validation Results

Validation of the feasibility of the M-KJD application learning media product in terms of material was carried out by

2 material experts. Validation by material expert 1 gets an average percentage value of 84.52% and validation by material expert 2 gets an average percentage value of 90.48%, so that the average percentage value of the two material experts gets 87.50%. According to the eligibility criteria, the validity of the percentage results are in the range of 85.01% - 100.00%, which means that the level of feasibility of the android-based interactive multimedia learning media product "M-KJD application" is included in the Very Eligible category or can be used without revision.

Media Experts Validation Results

The validation of the feasibility of the M-KJD application learning media product in terms of media by media expert. Validation of product feasibility by media experts was carried out 2 times with the first validation getting an average percentage value of 81.25% with revisions according to suggestions, after the M-KJD application learning media was revised according to suggestions, a second validation was carried out which got an average value percentage of 100.00%. According to the eligibility criteria, the validity of the percentage results are in the range of 85.01% - 100.00%, which means that the level of feasibility of the android-based interactive multimedia learning media product "M-KJD application" is included in the Very Eligible category or can be used without revision.

Large Group Application Testing

Trial of interactive multimedia learning media based on Android "M-KJD application" to 2 major groups, namely class X Multimedia C and class X Multimedia B from SMK Negeri 4 Malang. The trial of the M-KJD application learning media is intended to obtain 2 assessments, namely: an assessment of the level of product feasibility and an assessment of the level of student learning independence.

Data Analysis

The results of product feasibility validation by material 1 and material 2 experts as shown in Table 1 show that the learning media for the M-KJD application in terms of material is included in the Very Appropriate category. This statement is reinforced by result from research relevant to this study that material expert validation is included in the very feasible category if the results are included in the range of 85.01% - 100.00%, so that the material presented is relevant to the standard content of basic competencies and learning objectives [13].

The results of product feasibility validation by media experts as shown in Table 1 can be stated that the M-KJD application learning media product is very suitable to be used for research without revision. This statement is also reinforced that media expert validation is included in the very feasible category if the results are included in the range of 85.01% - 100.00% so that the media can be operated smoothly and easy to use [13].

The assessment of the product feasibility level obtained an average percentage score of 85.31% from class X Multimedia C and 87.59% from class X Multimedia B, so that the average percentage value from the test results for the two large groups

was 86.45%. According to the eligibility criteria, the validity of the percentage results is in the range of 85.01% - 100.00%, which means that the level of feasibility of the android-based interactive multimedia learning media product "M-KJD application" is included in the Very Eligible category or can be used without revision. This statement is also reinforced that the results of product feasibility trials are included in the very feasible category if the results include into the range of 85.01% - 100.00% so that the media can be operated smoothly, easy to use, and helps in the learning process [13].

The assessment of the level of student learning independence got an average percentage score of 80.52% from class X Multimedia C and 83.17% from class X Multimedia B, so the average percentage value from the test results for the two large groups got 81.85 %. According to the validity eligibility criteria, the percentage results are in the range of 70.01% - 85.00%, which means the level of influence of the Android-based interactive multimedia learning media "M-KJD application" on student learning independence is included in the category of Good Enough or Can used with minor revisions. Overall, the results of data analysis are shown in Table 1.

TABLE I.   DATA ANALYSIS RESULTS

Data	Respondent	Score	Max. Score	%
Validation by material expert 1	Validator	71	84	84,29
Validation by material expert 2	Validator	76	84	90,48
Validation by media expert	Validator	80	80	100
Product feasibility level measurement	Students	4331	4560	86,45
Self-regulated learning level Measurement	Students	4270	4800	80,52

IV. CONCLUSION

The product produced in this research and development is an Android-based interactive multimedia learning media with a social constructivism approach with the name Mobile Computer and Basic Network "M-KJD" which contains three basic competencies or three materials from Computer and Basic Network subjects for students SMK class X Computer and Informatics Engineering Expertise Program, namely: Computer Network Installation, IP Addressing on Computer Networks, and Sharing Resources on Computer Networks.

The learning media for the M-KJD application was developed in order to increase the learning independence of students of class X Vocational High School in the Computer and Informatics Engineering Expertise Program. The M-KJD application learning media has gone through several stages of testing. Based on the data from the validation and trial results,

the learning media for the M-KJD application can be concluded. As follows: (1) product design and development can be completed properly based on needs analysis; (2) the overall feasibility through the evaluation stage obtained a very feasible criterion response; (3) the effect of the product on the independence of the user obtained a response from the user with quite good criteria.

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