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DEVELOPMENT OF ANDROID ASSISTED E-MODULES ON WIRELESS NETWORK MATERIALS FOR CLASS XI STUDENTS OF COMPUTER NETWORK ENGINEERING

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ABSTRAK

This study aims to develop an Android-assisted e-Module on wireless network material for class XI students of computer and network engineering that is valid and practical. The subject of this research is class XI majoring in computer and network engineering at SMKN 1 Bandar Lampung, amount 34 people. The method used in this research is R&D with a development model which includes the steps of ADDIE analysis (preparation and needs analysis), design (designing the product to be developed), development (testing content, constructs, and media experts), product implementation (planning, preparation, teacher perception test and student readability), evaluation. This research and development resulted in a valid and practical product. This android-assisted e-Module that was developed has been validated and meets the criteria for a good and appropriate learning media to use, where the average content expert test result is 3.54, validation by constructor is 3.66 and validation test by media expert is 3, 69 with a very valid category. Android-assisted e-Modules also get very good scores from the student readability test with an average of 85% and also get an average of 97% from the teacher's perception test assessment.

keywords*: *android, e-Modul, wireless network.

INTRODUCTION

The development of the times occurs rapidly, bringing the world into the era of the industrial revolution 4.0, making human life faced with various technologies in conveying and obtaining information. The rapid development of technology causes changes in human behavior. This has changed the development of the world's education system. The rapid development of science and technology (IPTEK) makes the education system more innovative in conveying information to students.

21st century education demands education in the world to integrate knowledge, skills, attitudes, and skills in using technology and information. The use of technology

in learning is considered very important in developing 21st century learning skills. Therefore, the learning carried out must utilize technology, one of which is using electronic teaching materials (e-Modules). e-Modules have the advantage of being able to provide digital information in the form of text, images, videos that can be presented in three-dimensional or 3D according to (Raihan, et al, 2018). The existence of teaching materials will make it easier for teachers to design the teaching and learning process, while for learning materials will help them increase their learning abilities (Riyanda & Suana, 2019).

Printed student books have limitations in terms of presentation material. The limitations of print media provide an opportunity to integrate textbooks with the latest information technology (such as e-Modules), electronic products that support 21st century skills through student books. This indicates that there are teaching materials and learning media that are integrated with information technology. This is in line with research conducted (Warsita 2008) regarding forms of learning technology development that must produce products, one of which is learning media used as learning resources. (Dwiningsih et al. 2018) added that the current global generation is very sensitive to advances in information technology, so they have a very good ability to develop knowledge using technology.

Based on research (Herawati & Muhtadi, 2018), the electronic module is an effective module in influencing student learning outcomes. Android-based learning is able to enable students to learn with high motivation because of their interest in multi-product systems. Android-based e-Modul is a product that is considered quite ideal nowadays. Because it supports the use of multi-products (audio-visual integration in the form of video), high interactivity, and multi-source learning (with internet network connection) so that it can complement the shortcomings that exist in textbooks. Android-based e-Modules were chosen because Android is a very popular operating system used compared to other systems. This is due to the nature of Android, which is complete, open and easy to carry around because it is small. According to the results of the preliminary research that the researcher did, 91% of students had android.

In fact, both among students and teachers, the use of android smartphones in the field of education still needs to be improved, given the ability of students to understand different lessons, the existence of interesting learning media that can be studied

independently is expected to increase student motivation in learning. The characteristics of android-based learning media have a high level of flexibility and portability so that students are not only glued to the learning provided by the teacher at school but students have other alternative learning resources that can be studied independently at home, or wherever they want. This is very effectively used during the current corona virus pandemic because there is a great need for interesting, accessible and easy-to-understand sources of teaching materials. Generally, learning that is done offline or face-to-face now has to be done online.

The results of the analysis of the preliminary study using a questionnaire aimed at 40 students from 8 vocational schools spread over several districts in the province of Lampung stated that learning Broad-Based Network Technology on Wireless Networking material in schools was less motivating and aroused interest in learning, so that students expected good learning. interesting by presenting innovative media or teaching materials because 75% of students stated that the learning resources used by the school were too monotonous and difficult to understand, and 87% of students stated that so far they had used the internet as a learning resource in the classroom. Based on the results of the analysis aimed at students and teachers in general, it can be said that the media and teaching materials used by teachers and students are less innovative and fun, and most students have difficulty understanding the material presented in the teaching and learning process, so 90% of teachers and students students need interesting, practical, and motivating learning materials that are equipped with attractive visual images and also have videos in them.

METHOD

The method used in this development research is Research and Development (R&D) where the development research aims to produce a certain product and test the feasibility of the product according to (Sugiyono 2015). This study uses mixed methods, consisting of qualitative data and quantitative data. The sampling technique was carried out by purposive sampling. Data collection was carried out by giving questionnaires to teacher students in Bandar Lampung. The instrument uses a Likert scale with four choices, namely (1) invalid, (2) valid, (3) valid, (4) very valid. The complete e-Module development is provided in the form of a file as an attachment to the assessment instrument. The development assessment instrument is given in the

form of a google form. The results of the assessment of the respondents were analyzed by calculating the average score obtained for each component of the e-Module development, then converted to a qualitative statement according to Table 1.

Table 1. Expert Assessment and Test Score

Skor rata-rata	Keputusan
3,25>-4,00	Very Valid
2,50<-3,25	Valid
1,75<-2,50	Less Valid
1,00<-1,75	Invalid

Source: (Ratumanan & Laurens, 2011)

RESULTS AND DISCUSSION

This research develops a product in the form of an Android-assisted e-Modul that is valid and practical.

1. Analysis

The analysis stage is carried out by collecting important information related to problems that occur in broad-based network technology learning. Data collection activities were carried out using Google from aimed at teachers and vocational students in Lampung Province. A needs analysis was conducted on eight vocational schools in Lampung, consisting of 5 broad-based network technology teachers and 41 students.

Based on the results of a preliminary study that the researcher conducted on 41 vocational students in Lampung stated that it was very difficult to learn network-based technology including wireless network material due to several factors such as the teacher only giving assignments without being given an explanation, difficulty in doing assignments, too many assignments, insufficient teaching materials. interesting addition, students stated that it was easier to understand the lesson if there were pictures or videos. This shows that the teaching materials used are not optimal.

Another difficulty in teaching wireless network material during the COVID-19 pandemic is time constraints. The time available for each lesson is only one meeting a week. So the teacher is very difficult to complete the material. As many as 66.7% of teachers have used e-Modules in broad-based network technology learning, but 88% of students stated that they only use the internet. When learning during a pandemic like now, students state that the teacher only gives assignments without teaching them

first. This causes 80.9% of students to find it difficult to learn broad-based network technology online and as a result as many as 55% of students spend time playing gadgets.

2. Design

This activity starts from designing learning devices: setting learning objectives, designing material components, designing instruments and tools for evaluating learning outcomes, and designing the appearance of the android application. The steps taken are as follows:

a. Module Product Design Design

The design of this e-Module is made based on a problem that contains several activities in analyzing and responding to problems critically. Making a problem-based e-Module design is done with the help of the Microsoft Word application and to design the cover and layout. Then, the completed e-Module design is uploaded to the android application. The following is the display of the e-Modul which is accessed via cellphone, it can be seen in Figure 1.

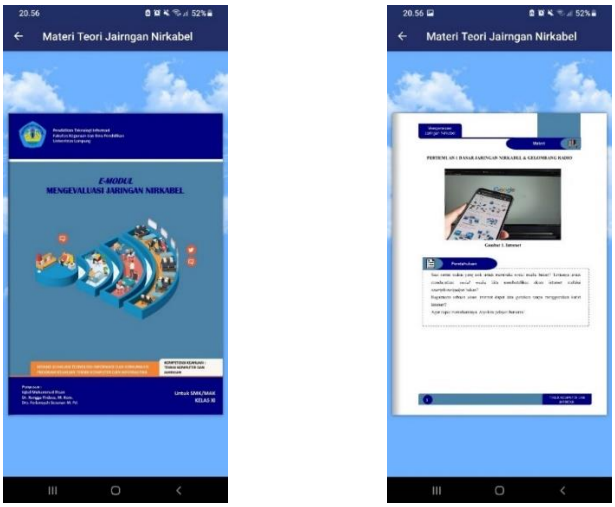

Figure 1. Display of e-Module

This problem-based e-Module consists of 3 parts, namely the initial part consisting of cover, preface, table of contents, user manual, core competencies, basic competencies, and concept maps. Next, the content section contains material which includes 3 meeting activities for students. At the end (closing) contains practice questions and bibliography.

b. Android Application Design

Android applications are made using the Android Studio program, which consists of 6 main menus. There is a menu, learning objectives that contain 4 sub-menus, namely core competencies, basic competencies, competency indicators and learning objectives. Furthermore, there is a menu of instructions containing instructions for using the application. The material menu consists of 2 submenus, namely theory and practicum. Video menu to view material activities from practicum. Exercise menu for evaluation of learning. As well as a menu about which there are profiles of the application and module makers. The display of the application is presented in Figure 2.

Figure 2. Android application display

c. Preparation of Validation and Practical Instruments

The process of compiling this instrument begins with the creation of a grid for each test, until a questionnaire is produced in the form of a check list. The product validity test instrument consists of content or material aspects, constructs, and media and design aspects which can be seen in the Appendix. The practicality test contains a product readability test which can be seen in the Appendix and a teacher perception questionnaire regarding the implementation of the developed e-Module.

3. Development

The next stage is product development in accordance with the design that has been made. This stage produces an e-Modul which is then tested for validation.

Table 2. The results of the validity test analysis

No.	Validator	Test Type	Score	Qualitative Statement
1	Expert 1	Content Validity	3,52	Very Valid
		Construct Validity	3,64	Very Valid
		Media Validity	3,68	Very Valid
2	Expert 2	Content Validity	3,56	Very Valid
		Construct Validity	3,68	Very Valid
		Media Validity	3,7	Very Valid

a. Product validity test

The product validation test was carried out by two validators consisting of a lecturer in Information Technology and Computer Science Education at the University of Lampung. Validity test includes construct, content and media expert test.

1) The construct expert test consists of 8 statements on the suitability aspect of the cover display and 12 statements on the content aspect of the e-Module, 11 on the language aspect, 3 on the aspect of the presentation of learning activities, 10 on the e-Module media presentation, 3 statements on the color aspect, 1 statement on the sub-material title, and 1 on the instructions, with an average score of 3.54 which is qualitatively categorized as very valid.
2) The content expert test consists of 9 statements on the cover aspect and 10 statements on the content aspect with an average score of 3.66 which qualitatively is categorized as very valid.
3) The media expert test consists of 9 statements on the cover aspect and 10 statements on the content aspect with an average score of 3.69 which is qualitatively categorized as very valid. The average result for these two aspects is 3.63 qualitatively categorized as very valid. This shows that

the quality of the material, construct, media, and design of the e-Module developed is very good. Some suggestions for improvement given by the validator have also been carried out by researchers.

4. Implementation

After the e-Module is valid, then proceed to the implementation stage. At the implementation stage, a practicality test is carried out. The practicality test consists of a product readability test for students and teacher perceptions to determine the suitability of the needs, attractiveness and readability of the e-Module teaching materials as potential users of the developed product.

Table 3. Practicality Test Assessment

Presentase	Kriteria
0,00%-20%	Very low practicality/impractical
20,1%-40%	Low practicality/less practical
40,1%-60%	Moderate practicality/pretty practical
60,1%-80%	High practicality/practical
80,1%-100%	Very high practicality/very practical

Source: (Suprijanto et al., 2016)

1) Teacher's Perception Test

The teacher's perception questionnaire regarding the implementation of e-modules in the future aims to see the implementation of the developed product. The teacher's perception questionnaire was tested on 2 teachers of wide-based network technology at SMK. The teacher's perception questionnaire consists of three learning meetings and 1 practicum material as well as an assessment of the ease of use of the e-Modul in which there are 20 statements that are rated on 4 scales from not good to very good. The average percentage obtained from filling in the perception questionnaire by the teacher is 97% with a very good category. These results can be seen in detail in the Appendix. Based on the results of the teacher's perception, the e-Module developed can be used in learning during the COVID-19 pandemic, as well as face-to-face.

2) Product Readability Test

The readability test questionnaire was given to students consisting of 20 statements and 4 rating scales, namely (1) not good, (2) not good, (3) good, and (4) very good as in the Appendix. The results of the readability test obtained an average percentage of 85% with a very good category. This shows that the e-Module developed can be easily understood by students.

5. Evaluation

The last stage of this development research is evaluation. This evaluation stage is carried out to see the activities at each stage of the development procedure are appropriate and running well or not. This evaluation is carried out at each stage of the development procedure, namely at the analysis, design, and development stages. In addition, an overall evaluation was also carried out on the e-Module product developed for 2 vocational wide-based network technology teachers. Evaluation at the analysis stage adds a statement aspect to the needs analysis questionnaire. Evaluation at the design stage should use library sources that are authentic and easily understood by students as well as a wider platform so that it can be used on various types of smartphone OS so that e-Modules become interesting and effective learning media to use. Evaluation at the development stage is the e-Modul validation test. In the validation test, e-Module improvements are made based on suggestions for improvement from the validator.

CONCLUSION

The android-assisted e-module that was developed has been validated and meets the criteria for a good and appropriate learning media to use, where the average content expert test result is 3.54, validation by constructor is 3.66 and validation test by media expert is 3, 69. The android-assisted e-Module also got a very good score from the student readability test with an average of 85% and also got an average of 97% from the teacher's perception test assessment.

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