Development of android-based learning module in metal fabrication techniques for vocational high school 2 Klaten

A Nuryanto, D Erestio, A Pamungkas and H Pratiwi
Department of Mechanical Engineering Education, Universitas Negeri Yogyakarta, Indonesia

E-mail: apri_nuryanto@uny.ac.id

Abstract. This study aims to develop an android-based learning module and find out the level of feasibility of learning module development in vocational high school 2 Klaten. This study uses ADDIE models, which are analysis, design, development, implementation, and evaluation. This study involved 37 respondents (students) to determine the feasibility of the android-based learning module that was developed. Data was obtained by the questionnaire and analysed by changing the average score into a percentage. The result of this study was android based learning module products on metal fabrication techniques subject for XI grade students. The feasibility test showed that the feasibility level of learning module validated by media experts obtained 77.90% with the category of eligible. The feasibility validated by material experts showed an overall average of 86.39% with the category very eligible, and from the results of the user obtained an overall average of 78.53% with the eligible category. From the feasibility test it could be concluded that the android module development could be used as one of the learning media in metal fabrication subject.

1. Introduction

Education is something that is very important for people. The importance of education for humans is to make them develop optimally and be able to carry out their obligations in this world [1]. Education is very important for the reconstruction or reorganization of experiences that add meaning to experiences and increase the ability to add to subsequent experiences. Furthermore, in terms of education, it includes 4 essential elements [2]. The first is that there is an element of development, then a relationship is established between the two parties, namely educators and students, third is the development of self-potential and the last one takes place in 3 scopes, namely the family, within the school, and the community.

The complexity of the existing education encourages the government to apply standards that direct education in achieving maximum results. Due to this reason, government of Indonesia set the national education standards in government regulations number 15 in 2005 concerning national education standards. There are 8 national education standards that have been determined, which are graduate competency standards, content standards, process standards, education standards and educational personnel, facilities and infrastructure standards, management standards, education financing standards, and education assessment standards. National education standards have 3 functions i.e. planning, implementation, and supervision in order to realize the quality Indonesian education.

The national education standards that have been determined have a very important role in the ongoing process of education, one of which is the standard of facilities and infrastructure. Standard facilities and infrastructure cover the needs required to encourage the success of education such as educational media, educational equipment, books / learning resources and other equipment. Books or learning resources contain the material needed in a competency and there are various types, one of which is the learning module. Subject materials that are packaged together in a systematic and interesting manner are separated according to the topic of each material called the learning module. Modules can also be
understood as learning materials that are created in writing in such a way that readers are expected to be able to understand and study the content of the material [3].

Metal fabrication engineering are subjects which scope includes competency skills and knowledge. This subject contains metal treatment and aspects in it which include designing, cutting, forming, joining and finishing [4]. The scope of this subject includes skills and knowledge. This subject is not only limited to theoretical teaching and learning activities but also practice in workshops to train student competency skills. Before the practical learning activities, students must understand the theory first so that the practical activities could be run smoothly and students could achieve the maximum results [5].

The use of technology in education certainly also helps in the learning process and is expected to increase efficiency and effectiveness in education. A researcher conducted a study which concluded that e-modules are more interesting, fun and not boring [6]. The other study showed that there is a significant increase in achievement in the experimental group students after using improved learning media [7]. The using of interactive learning media is important to be used in learning process [8].

A research on the development of protista learning modules based on android mobile learning platforms to improve cognitive learning outcomes of cass XI students of senior high school 1 Sewon showed that the use of android-based mobile learning modules could improve student learning outcomes [9]. Research on the development of mobile application-based learning media using the application inventor in engineering mechanics subjects in vocational high school 3 Yogyakarta has been done by the other researcher. They concluded that there is a positive impact on the use of mobile-based media on student learning outcomes [10]. Research conducted by a researcher on android-based mobile learning module development in high school students for static fluid material showed that the developed learning module is interesting, easy to use and useful. Looking at the studies that have been carried out above, it is concluded that smartphone-based learning modules are very helpful and beneficial for the learning process [11].

Metal fabrication technique in vocational high school 2 Klaten is a new subject so that there is no learning module that is in accordance with the curriculum. Although basically there is no module, it does not mean that there are no other learning resources. There are other learning sources, in the form of some different printed books, but it is only used in the school environment and the content is not specific to metal fabrication engineering subjects. This reduces student interest in learning if students have to search for various books to study in one semester. This also makes it difficult for teachers to find relevant references for metal fabrication engineering subject. The existing printed books are only contained text and two dimension images, so that it becomes difficult for students to understand, where metal fabrication engineering is subject that require competency skills and cover various aspects as described above. The learning material that is suitable for this subject is the one that is able to provide examples which are easy to understand such as in video or animation. Because existing learning resources are only limited to printed books, it makes it difficult for students to understand the material.

Based on the problems described above, it is necessary to develop a metal fabrication technique learning module. This module is expected to increase the students’ motivation in the learning process both independently and in class. The product developed is a digital-based learning module, which is android-based for metal fabrication engineering subjects at vocational high school 2 Klaten.

2. Methods
This study uses the research and development (R & D) research method, which aims to create products and develop existing products. This study developed an android-based learning module product on a smartphone for the XII grade metal fabrication engineering subject at vocational high school 2 Klaten.

The product’s feasibility level was also analyzed. The development model used is the ADDIE development model with the following steps: analysis, design, development, implementation, and evaluation [12]. This research was conducted at vocational high school 2 Klaten, in the even semester of the 2019/2020 school year using the revised 2013 curriculum. This school was chosen as a place of research because it has a background problem that must be solved and is in line with the criteria that can support the development of this research.
The procedure for developing this learning module application consists of 5 stages. The first stage is the preparation stage. The preparation stage is the stage that preparing both hardware and software tools and preparing the syllabus and content. The second stage is the manufacturing stage process using android studio where the images, materials and videos that have been prepared are processed into application forms with the programming language. The third stage after the learning module application has been completed is testing on various types of devices and various versions of android. After the limited test results state that the application is good and ready to use, validation is carried out by media experts and material experts. The last stage is sharing the application to users, which are students from class XI majoring in metal fabrication and manufacturing engineering.

The instrument used was a questionnaire instrument with a Likert scale of 5 answer choices. The questionnaire instrument was validated by an evaluation expert. The data collection technique for validating media experts involved 3 media experts using a questionnaire with a total of 20 questions and divided into 4 aspects. The validation of material experts involved 3 material experts using a questionnaire instrument totaling 20 questions and divided into 3 aspects. User responses by students using a questionnaire instrument totaling 22 items and divided into 4 aspects.

The data analysis technique used was descriptive which determine the feasibility level of the product. The data obtained are in the form of values from a 5-point Likert scale questionnaire where: very good (5 points), good (4 points), okay (3 points), poor (2 points) and very poor (1 point). The point value obtained is then converted into a percentage by comparing the points obtained with the maximum points multiplied by 100. The percentage results are then changed in the form of category sentences based on table guidelines according to Arikunto [2].

3. Results and Discussion
The development of an android-based learning module was carried out using the android studio application with some help from other applications in making the content and material content. The results of the development of a learning module application are in the form of a file in .apk format called modern module which can be installed on at least Android 4.1 Jelly Bean.

The learning module application has several features. On the main menu page features a button to enter the material page, manual page, developer page and reference page. The display after the main menu page when pressed on the material button will enter the material page, the material page contains firut in the form of learning objectives, material descriptions, material images, video sample materials and practice questions. The material page display contains the question practice button, when pressed it will go to the question practice page. The question practice page contains questions according to the existing material.

The next result is the validation test results from media experts and material experts. Media expert validation was carried out to see the level of validity of the media used in the learning module application. Media validation is seen from the aspects of ease of use, display, media integration and technical quality. Media validation was carried out by competent experts in the field of learning media. The media expert was given a validation questionnaire with 20 questions using a Likert scale to measure the feasibility of the media used.
The results of the percentage of media feasibility is depicted in figure 1 (a). From the results, it could be seen that the highest score is obtained by display aspects and the lowest score is obtained by technical quality. If the score are converted into sentences, the ease of use aspect with a value of 77.30% was categorized under the eligible criteria, the display aspect with a value of 81.00% was categorized under very appropriate criteria, the media integration aspect with a value of 78.30% was categorized under eligible criteria, and the technical quality aspects with a value of 75% was categorized as eligible criteria. Based on the percentage results from 4 aspects, the final average percentage is obtained as a category of media eligibility criteria for learning module application products. The final average percentage is obtained with a value of 77.90%, so that the media validation of the learning module application developed is categorized in the eligible criteria.

The results of the percentage of material feasibility is illustrated in figure 1 (b). Based on the result, it could be concluded that that the highest score is obtained by instructional quality aspects and the lowest score is obtained by material conformity. If the score are converted into sentences, the material conformity aspect with a value of 83.30% was categorized under very appropriate criteria, the content quality aspect with a value of 86.67% was categorized in the very appropriate criteria, and the instructional quality aspect with a value of 89.17% was categorized under the very appropriate criteria. Based on the results of the percentage of these 3 aspects, then the final average percentage value is obtained as a category of material eligibility criteria for the developed learning module application. The final average percentage value obtained is 86.39%, so that the material validation in the learning module application is categorized in the very appropriate criteria.

Research on user responses to the learning module application is carried out to determine the feasibility of the product based on the user experience response (figure 2). The level of feasibility is seen from 4 aspects, i.e. ease of use and navigation, clarity of content, display and instructional quality.
results of the research on student responses to the learning module application in the aspect of ease of use and navigation showed that it obtained a percentage of 81.30% categorized in the very appropriate criteria, the aspect of content clarity obtained a percentage of 80.54% categorized in the very appropriate criteria, the beauty aspect obtained a percentage of 78.05% categorized in the eligible criteria, and instructional quality aspects obtained a percentage of 74.23% categorized in the eligible criteria. Based on the percentage results of 4 aspects, the final average is obtained as a category of eligibility criteria for learning module applications developed based on the results of user responses. The final average percentage value obtained was 78.53%. Based on the final average percentage value, it is concluded that the learning module application developed is categorized in the eligible criteria.

4. Conclusion

The development of an Android-based learning module in the XI grade metal fabrication engineering subject at vocational high school 2 Klaten was carried out using the ADDIE (analysis, design, development, implementation, evaluation) development model. The product that was successfully developed in this study was a learning module in the form of an application based on the Android operating system. Learning module applications that use android-based smartphones as student learning companions help facilitate students in learning and increase student learning motivation. The learning module application provides features in the form of learning material accompanied by pictures and video examples and features of practice questions to measure the level of student understanding. The learning module application developed has been tested and can be used in various types and types of smartphones. The Android-based learning module application on the metal fabrication engineering subject has been tested for the feasibility of media and material. The media feasibility test by media experts obtained a final average score of 77.90% in the eligible category. The material feasibility test by material experts obtained a final average score of 86.39% in the very appropriate category. So that overall it can be concluded that the learning module application is very feasible to use. The results of user responses by students to the learning module application were followed by 37 students with a final average score of 78.53% in the eligible category and received positive comments from students, so it can be concluded that the learning module application product is suitable for use by students as a companion in the learning process.

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