

The Development of Interactive Project Based E-Module in Visual Program Course

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ABSTRACT

The purpose of this study was to produce learning media in the form of project-based interactive e-modules and to find out the feasibility of the media based on expert testing. The development of this learning media is based on the unavailability of innovative teaching materials in the Visual Programming course at the Electronics Engineering Department, Faculty of Engineering, Universitas Negeri Padang. To produce the expected product, the development procedure used is the ADDIE model which consists of five stages, namely: analysis, design, development, implementation, and evaluation. The results showed the results of the interactive e-module design that had been developed in the Visual Programming course using an innovative project-based learning model were successfully applied and feasible to be implemented in the learning process.

Keywords: Development, E-module, Visual Programming, Project-Based Learning.

1. INTRODUCTION

The rapid development of technology encourages the replacement of print technology to the computer technology in learning activities. The module, which was originally a printed instructional media, was transformed into an electronic form so that it gave birth to a new term, namely electronic module or what is known as e-module. The electronic module or e-module is defined as an instructional media using a computer that displays text, images, graphics, audio, animation, and video in the learning process [1]. Smeets and Bus [2], revealed that electronic books that are inserted by multimedia features can enrich the reading books experience if used properly. Interactive electronic books are the best alternative that can contribute to improve the reading comprehension and reading interest.

E-modules can be combined with innovative learning models that are considered capable to improve learning outcomes. The learning model used in this research is project-based learning. Project-based learning is an approach to creating a learning environment that can encourage students to construct personal knowledge and skills. In recent years, many studies have revealed that project-based learning is very effective if it is actually applied in learning, including:

(a) increasing student motivation in the learning process [3]; (b) facilitate a better concept understanding process [4]; (c) increasing students' activity and academic performance [5]; (d) increasing the students' problem solving skill in various situations [6], and (e) improving students' social skills [7].

The project-based learning is considered suitable in the Visual Programming course. This course equips students by skills in developing visual-based programming applications using the Java programming language and MySQL databases. Mastery of concepts related to the subject matter greatly determines the quality of students in applying their knowledge in the world of work. Therefore, the development of this e-module in the project work is considered important to increase motivation, conceptual understanding, problem-solving abilities, and skills.

2. METHOD

The development model used is the ADDIE development model. The choice of ADDIE model is based on several considerations. First, the ADDIE model is presented in a simple and systematic manner. The stages in this model are very simple when compared to other design models. It is simple and

systematically structured; it makes the ADDIE model very easy for developers to learn. Second, the ADDIE model is relevant in developing a module [8]. Third, the research results show that development using the ADDIE model produces quality products and learning.

As stated by Martins, Hoskins, Brooks, and Bennett [9] that interactive multimedia module products developed by the ADDIE model have proven useful and can improve student learning outcomes. The similar thing was stated by Azimi, Ahmadigol and Rastegarpour [10], students who were trained by following the ADDIE model obtained high performance scores compared to traditional methods. It means product development that follows systematic steps ADDIE model, it guides developers to create quality and useful products. The ADDIE model consists of 5 (five) steps, they are: (1) analyze, (2) design, (3) development, (4) implementation and (5) evaluation. A summary of development research activities is visualized in Figure 1.

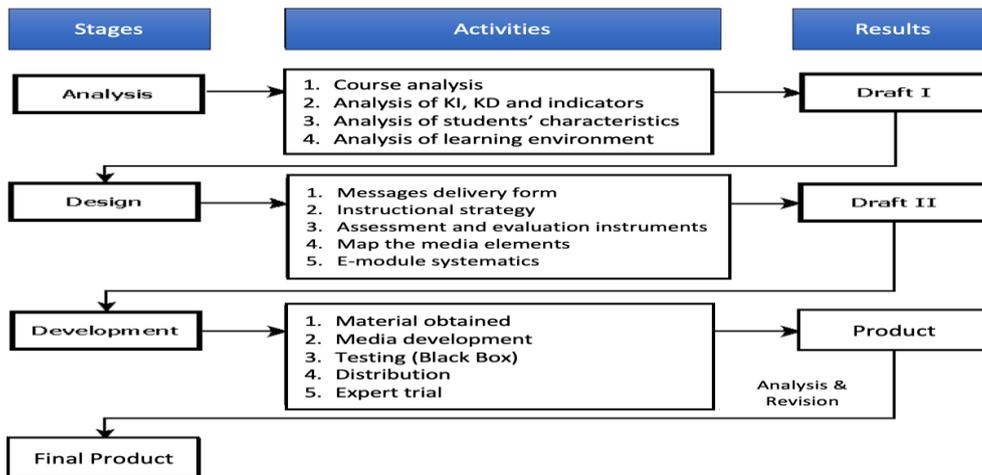


Figure 1 Activity Summary of ADDIE Model

3. RESULTS AND DISCUSSIONS

The teaching materials are developed in the form of modules that are packaged electronically or often referred to as e-modules. The choice of the teaching materials presentation in electronic form is based on several factors, including: (a) Technological developments have shifted the existence of printed teaching materials and encourage the use of electronic teaching materials because they are considered more practical, efficient, and can support all media components needed in learning such as images, audio, and video; (b) The electronic module adopts all the advantages and components contained in the print module; and (c) Based on the studies that have been conducted, electronic teaching materials have been proven to be effective in learning process.

The following is a view of the implementation of project-based interactive e-module development. The main page of the e-module is cover page which is presented in Figure 2.



Figure 2 E-module Cover Page

The e-module cover page is a page that connects users to all the contents of teaching materials. The components found on the home page include; a) module package menu, b) lesson material/content, and c) other supporting navigation.

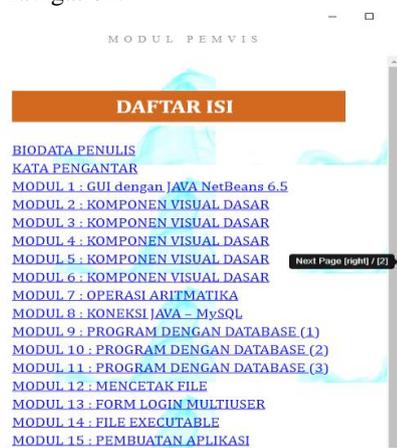


Figure 3 Material Page

The material page view is presented in Figure 3. The material presentation page was created using Adobe Flash CS6 and XML software. Users can access the content almost the same as printed books. Users can also access specific pages by turning page by page.



Figure 4 Job Sheet 1 Page (Short Theory)

Figure 4 describes the appearance of the job sheet 1 page that students must follow. Apart from materials, e-modules also provide interesting information and facts about the development of the information and communication world. The display of the interesting info page is presented on another page in the e-module.

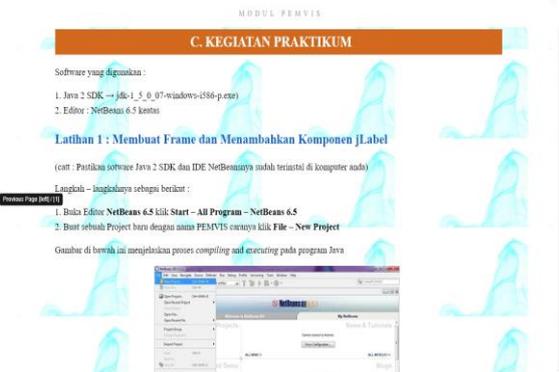


Figure 5 Job Sheet 1 Page (practical Activity)

In addition to job sheets in the form of a short theory, the e-module also provides job sheets for practical activities as shown in Figure 5.

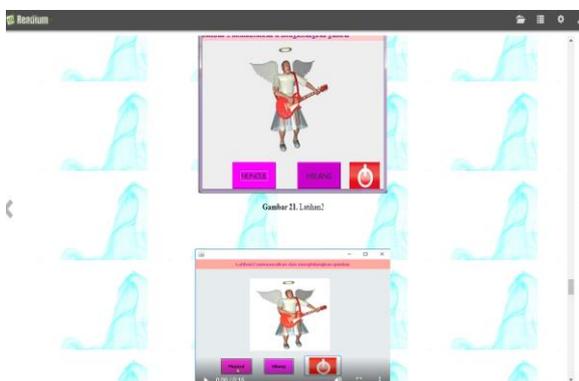


Figure 6 Job Sheet 1 Page (Video Running Program)

In addition to job sheets of short theory and practical activities, the e-module also provides video job sheets as shown in Figure 6.



Figure 7 Assignment of Job Sheet 1 Page (Assignment)

After students complete the activities through the given job sheet, they will be faced the assignments on the job sheet as shown in Figure 7.

The results of the contents review on the interactive e-module show that the content feasibility of teaching materials is 94%. First, the content of the e-module is delivered using language in daily conversations. Simple and attractive writing can create the impression as if the user is communicating directly with the teaching material. Apart from language factors, writing patterns also affect reading comprehension. The material in the e-module is interactive, using a fixed pattern in writing. It is conducted in reference to the opinion expressed by Tompkins [11], which states that students will find it easier to recognize important ideas and information when they understand writing patterns in the presentation of a material.

Second, based on a message delivery strategy. E-modules are able to trigger student interest and involvement in learning because they are designed in an attractive and simple way. The delivery of material does not only rely on text aspects but is also supported by multimedia components such as images, graphics, and animation. Multimedia provides many options for creative learning, facilitates the learning process through more interactive delivery of material and increases interaction between students and teachers [12]. Multimedia also has the potential to accommodate all learning styles because of there are various materials to be presented [13].

Third, based on evaluation techniques (assessment). In the e-module, projects are used as one of the assessment techniques used. This technique is able to encourage the challenging learning and improve problem-solving skills [14]. The project theme based on the problems and needs that occur in daily life.

Fourth, based on attractiveness and ease of use. The e-module interface design is considered to be able to attract students' interest and attention to learn. Attractiveness is one of the main reasons that triggers users, especially students, to view the content of e-

modules. The attractiveness of the display includes selecting color combinations, selecting fonts, selecting audio, video, and animation. The display design is also designed to be as simple as possible to make it easier for students to use it. According to Nurlifa, Kusumadewi, and Kariyam [15], there are several factors that affect ease of use, namely easy to learn, easy to be skilled, and easy to use.

Fifth, the teacher's manual is presented by clearly conveying the learning objectives and the answer keys to the competency tests at the end of each subject matter are also presented. The teacher's manual is also presented in a simple, concise, clear manner and is packaged in an attractive design. It makes the teacher as a user, really understands how to use it and what things need to be considered in the operation of interactive e-modules.

The results of the media review on the interactive e-module show that the feasibility of teaching materials from the media side is 98% with very good qualifications. Meanwhile, the lecturers' manual book is very well qualified with a percentage rate of 96%. There are several reasons so that the achievement of media quality at this excellent qualification are as follows.

First, an interactive e-module display using a simple system of organizing and color combinations. The interactive e-module display covers the opening page and the main page. The e-module interface design adopts the principles of the Gestalt theory [16], which consists of several principles, namely: 1) Proximity, 2) Similarity, 3) Closure, and 4) Continuity. This is intended to provide users comfort in reading the contents of the e-module. The text color matches the background color used. It means that if the text color used is dark then the background must use a bright color, and vice versa. The combination of text and background colors used, especially in the presentation of the material, is black and white.

Second, the image adjustment in the e-module is done so that the image does not look broken when displayed on either a computer screen or a projector; (2) pictures are placed near the text described (the principle of closeness according to Gestalt theory) to facilitate students in processing information through text and images, so that cognitive processes are not separated; (3) the image size adjusts to the page size, so that the distribution of text and images looks proportional; (4) the inclusion of the source is also applied in the use of image illustrations if the images used come from the internet. This is to prevent copyright infringement.

Third, the suitability of the audio used includes background music and sound effects. In e-module users, users will be accompanied by background music. The background music chosen is instrument music that is classified as music that is comfortable to listen (easy

listening). Background music serves to support the learning atmosphere using e-modules. Students who do not like the auditory learning style can turn off the music through it facility provided. Using audio in multimedia can increase interest or focus on the topic being presented. In addition, audio can compensate for any reading or learning problems students may have [17].

Sixth, the suitability of the video with the material characteristics to be delivered. The material characteristics in general are procedural knowledge (skills). The most appropriate effort so that students can quickly implement these skills is by video. Videos can support the learning process to encourage more autonomous, flexible and significant learning activities [18]. Videos are able to complement students' basic experiences when they read, discuss and practice. Video is also able to describe a process accurately and can be watched repeatedly [19]. In addition, the use of video can effectively focus students' attention because it presents visual and audio in its entirety without breaking students' concentration.

4. CONCLUSION

Teaching materials are produced as modules packaged electronically or sometimes referred to as e-modules. E-modules can cause student interest and learning participation due to their attractive and simple nature. Multimedia offers many innovative learning opportunities and encourages learning. Using multimedia audio may increase interest or emphasis on the presented subject. The video will help to learn to promote more autonomous, versatile, and meaningful learning experiences. The combination of text and background colors used, particularly in material presentation, is black and white. Images are placed near the text to help students process information. Audio suitability requires background music and sound effects.

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