Development of Interactive Learning Multimedia Based on Adobe Flash in the Electric Motor Setup Course

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Abstract. This study aims to develop interactive learning multimedia in using and regulating electric motors. This research uses the ADDIE development model which consists of 5 main stages, namely: (1) Analysis, (2) Design, (3) Development and (4) Implementation, and (5) Evaluation. Based on the overall results of material expert validation obtained an average of 4.73, the validation results of interactive learning multimedia products from the material experts were categorized as very good. The overall results of media expert validation obtained an average of 4.75, so the validation results of interactive learning multimedia products from these media experts were categorized as very good.

Keywords: multimedia learning, electric motor

1 Introduction

Due to the fact that learning is an ongoing process that will continue as long as people are alive, education cannot be separated from the teaching and learning process. Learning can be seen as a process that is goal-oriented and one that involves doing through a variety of experiences [1]. Learning media is a tool for streamlining communication between teachers and students and for facilitating the teaching and learning process. Effective and efficient learning materials combine more than one medium, such as audio and visual components, are interactive, and are independent [2].

A change in the way technology is applied is also necessary for the development of prospective teachers' readiness for the educational environment of the twenty-first century. This includes using the computer as a tool that has the potential to transform how people learn, gather information, and customize it to improve performance and the ability to complete tasks quickly, precisely, and accurately, which increases productivity. [3].

Media encompasses anything that can be used to convey messages from one party to another in such a way as to stimulate the learner's thoughts, feelings, attention, and interests in such a way as to facilitate the learning process. [4]. Robert Heinich defines media as an information channel

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that connects the source of information and the receiver [5]. Additionally, the media plays a crucial role as a tool or method that serves as a conduit or channel for communication between the communicator and the communicant. [6].

Effective and efficient learning media can provide direction, help, guidance, and motivation through tutoring called tutorial learning media. The tutorial learning form can be done by a qualified supervisor in the use of a computer as a learning medium because the guidance helps students in solving learning problems in class [1]. One of the software that can be used in making learning media is Adobe Flash. This program is an animation program that is widely used by animators in producing professional animations.

Learning media has an important role in efforts to improve the quality of learning in Indonesia, global market demands, and curriculum based on a new paradigm of learning [6]. However, there are two problems faced regarding learning media in our educational institutions, namely the first is the limitation of media at this time the availability of learning media on various campuses is still lacking and uneven. There are campuses that are able to provide a variety of learning media in relatively large numbers, there are also those that still do not have the variety and number of learning media needed. This causes the variety and number of media used to vary. There are lecturers who use diverse and numerous media to the maximum, but there are also those who use them minimally. The media that is often used is print media (diktats, modules, handouts, textbooks, posters, magazines, newspapers, etc.), while the simple media that remains used is the whiteboard. Audio-visual media (overhead transparency, video/film, audio tapes, TV/radio broadcasts), and electronic media (computers, the internet) are still not intensively utilized, although in some places they have begun to be used.

Multimedia has helped to facilitate learning on campuses in recent years. Using a variety of technologies, students are becoming more engaged and easier to show or deliver stuff to [7]. Students can quickly locate information sources, pertinent topics, and new understanding from the material they find by using multimedia. In order to engage students in learning participation as a type of student-centered learning, it is crucial for them to identify the precise source of knowledge. [8].

Based on this fact, the alternative to solving it is to develop learning media in the form of interactive learning multimedia that is interesting and fun. Multimedia learning will be developed in the form of explanations of the use and arrangement of motorbikes in the form of audio, video, animation, and images that are interactive and can be used for independent learning.

In order to communicate with the public, multimedia is a collection of different media (file formats) in the form of text, images (vectors or bitmaps), graphics, sound, animation, video, interactions, and others that have been stored as digital files (computerized) [9]. Multimedia also refers to the presentation of information utilizing both words and images [10]. The phrase used here means that the information is presented verbally or verbally, for instance via text that is spoken or printed. What is meant by an image is that the material is presented in the form of a pictorial form or an image form. This can be in the form of using static graphics (including animations and videos). In textbooks, words can be presented as printed text and images can be presented as illustrations or other graphic forms. In general, the benefits that can be obtained are that the multimedia learning process is obviously more interesting, and more interactive, the amount of teaching time (lectures) can be reduced, the quality of learning learners can be motivated and boosted and teaching and

learning can be done anywhere and anytime (very flexible), and the attitudes and attention of learners can be improved and centered.

The five components of the multimedia learning model are as follows: a) the tutorial model, in which the instruction is given in a tutorial format; b) the Drill and Practice method, which aims to teach students to be proficient in a skill or to improve their understanding of a concept; c) a simulation model that simulates risk-related issues in the real world; d) experimental models, which are activities that are experimental in nature, and e) game models, which are games that use game models to learn media [2].The tutorial model is the learning model that will be used in the creation of this multimedia because it is a computer-programmed teaching material, students can respond to certain materials, student answers are evaluated by computer-based learning programs, and after each learning activity, students must repeat it or move on to the next one [11].

The computer program used in creating this learning medium is Adobe Flash. Adobe Flash is a program that is widely used by designers or programmers in designing animations to create web pages, and presentations for business purposes or learning processes, making interactive games, and other more specific purposes [12]. One of the advantages of Adobe Flash is the scripting language commonly called ActionScript which is able to support the design of animation from simple to complex and can also be used in making learning media [13]. The developed learning media presents material on the regulation of electric motors.

The use of multimedia learning is very closely associated with improving the expected quality of learning. The use of multimedia learning by educators is expected to create a more meaningful learning experience, facilitate the process of interaction between students and educators, fellow students, and students with experts in the field of science who are relevant anywhere, and enrich the learning experience of students. This is believed to be able to change the passive learning atmosphere of waiting, and educators as the only source of knowledge, become students actively discussing and searching through the various learning resources available, while educators play the role of facilitators who are equally involved in the learning process. The availability of a diversity of learning media and technology can help students flexibly to achieve their learning goals.

The development of learning media is very important to overcome the shortage and limited supply of existing media. In addition, media developed by educators themselves can avoid inaccuracies because they are designed according to their needs, resource potential and environmental conditions. More than that, it can also increase the creativity and innovation ability of educators so that the professionalism of educators is produced.

2 Method

The ADDIE development model has been modified for this research to leverage research and development. Research and data gathering, planning, initial product development, preliminary trials, initial product revisions, limited trials, and operational product revisions are all steps that are taken. The Electrical Engineering Education Study Program, Department of Electrical Engineering Education, Faculty of Engineering, Universitas Negeri Medan was where this study was conducted.

The data in this study were analyzed qualitatively, and the instruments used to collect the data were developed in accordance with the methods used to collect the data at each stage of the study, namely the use of questionnaires and observations during the expert development and validation stages. At the stage of data analysis techniques in accordance with the formulation of the problems

listed, this study conducted a feasibility test of Interactive Learning Multimedia by validating to validation experts. The validation data obtained will be analyzed with the following steps: (1) Validating Interactive Learning Multimedia to media and material experts on material experts, (2) Assessment instruments filled by media experts and material experts are checked, if there are deficiencies and discrepancies in the content and media that have been checked by media experts and material experts, interactive multimedia will be corrected, (3) Quantify the validation research of media experts and material experts according to the predetermined assessment weights, (4) Tabulate data, and (5) Calculate item percentages.

3 Results and Discussion

Based on the results of the needs analysis of the achievement of study program graduates and subject learning outcomes, interactive multimedia development was carried out in the Electric Motor Arrangement course to support the competence of graduates of the Electrical Engineering Education study program. Interactive multimedia design is done using the ADDIE model. The fifth stage must be done in developing interactive multimedia.

Stage 1 is to analyze students. At this stage, the first thing to do is analyze the characteristics of students. When the research team made observations, seeing the learning in the Electric Motor Arrangement course that students were less enthusiastic about participating in learning and did not focus on the learning delivered by the lecturer. In addition, the lack of use of media in learning is also a major factor that makes learning less than optimal. Stage 2 is planning and designing learning multimedia. At this stage, the research team designed and designed learning multimedia based on the material that had been prepared, namely a series of reversing motor rotation directions and a series of motor controllers working alternately. Stage 3 is an interactive multimedia development process. This stage is the stage of assembling all the materials and materials that have been packaged in the second stage according to research needs. The fourth stage is when the materials, medium, and technology are put into use. The target audience for the application of the produced media are professors and students. The created interactive multimedia must first undergo validation by media and subject matter experts before being used in classroom instruction. Expert evaluations of the learning media and the prepared materials are included in the validation of the developed media. Two media specialists and two material experts validated the product. Then, 10 (ten) students were also asked to respond to questions about media generated through interviews and questionnaires. This is carried out to enhance the evolving product. After receiving feedback from instructors, students, the media, and material validators, stage 5 is evaluation. The evaluation's findings are shown in the table below.

Validation of this learning material was carried out by 2 material experts, with the results as shown in Table 1 below.

Table 1. Material expert validation results.

No.	Material Aspects		Guidelines and Information	Multimedia Materials	Evaluation	Total	Mean Score & Assessment
1	Appraiser 1	Scores	18	58	39	115	4.79

		Items	4	12	8	24	Very Worthy
2	Appraiser 2	Scores	19	56	37	112	4.67
		Items	4	12	8	24	Very Worthy
Total Score			37	114	76	227	
Mean Skor			4.63	4.75	4.75	4.73	
Assessment Results			Very Worthy	Very Worthy	Very Worthy	Very Worthy	

An average score of 4.63 was obtained in the aspect of guidance and information, 4.75 in the aspect of multimedia content, and 4.75 in the aspect of evaluation, according to the findings of material expert validation in Table 1. The validation findings of interactive learning multimedia products from these materials experts were categorized as "Very Feasible" since the overall results of material expert validation obtained an average of 4.73.

Media experts in this study will validate related media and various other items that have been incorporated into the interactive multimedia that has been created. Validation of this learning media is carried out to 2 media experts, with the results as shown in Table 2 below.

Table 2. Media expert validation results.

No.	Material Aspects		Guidelines and Information	Program Performance	Systematics, Aesthetics, and Design Principles	Total	Mean Score & Assessment
1	Appraiser 1	Scores	13	49	122	184	4.84
		Items	3	10	25	38	Very Worthy
2	Appraiser 2	Scores	14	47	116	177	4.66
		Items	3	10	25	38	Very Worthy
Total Score			27	96	238	361	
Mean Skor			4.50	4.80	4.76	4.75	
Assessment Results			Very Worthy	Very Worthy	Very Worthy	Very Worthy	

An average score of 4.50 was obtained on the aspects of guidance and information, 4.80 on the aspects of program performance, and 4.76 on the aspects of systematics, aesthetics, and design principles from the validation results of media experts, as shown in Table 2. The validation results of interactive learning multimedia products from these media experts were categorized as "Very Feasible" because the overall results of media expert validation obtained an average of 4.75.

4 Conclusion

Based on the results and discussion, it can be concluded that interactive multimedia learning based on Adobe Flash in motor settings courses has a very decent level of feasibility from material

experts of 4.73 and media experts of 4.75. These Adobe Flash-based interactive learning multimedia has an attractive appearance accompanied by images, animations, video, and audio. The presentation of material on this learning media was developed based on a tutorial learning model. The tutorial model uses learning theories and strategies by providing material, sample questions, questions, test exercises, and replay questions.

The disadvantage of multimedia interactive learning model tutorials based on Adobe Flash is that the process of testing this product does not arrive at the effectiveness test but only comes to the stage of feasibility testing by experts. In addition, trials were not carried out on students due to limited research time. Therefore, for further development, the testing process not only reaches the stage of student response testing but can test the effectiveness of the media as well as testing carried out on operational trials (trials on a large scale).

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