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Multimedia Design for Geometric Optical Material Using Professional Adobe Flash CS5 Software

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Abstract
This research is motivated by the importance of the basic physics II course as the basis for physics education programs. The use of modern tools that are in line with the demands of technological developments such as computers is one of the learning media that is popular with most students. This research aims to design learning media for Basic Physics II courses using professional Adobe Flash CS5 software on Geometric Optics material, as well as knowing students' perceptions of the media that has been developed. This research is development research (Research and Development). From the results of questionnaire trials on physics education students at Jambi University, semester 5, class of 2013, it was found that the instrument had high reliability and could be trusted for collecting research data. Meanwhile, data collection on students' perceptions of the media was carried out on physics education students at Jambi University, semester 3, class of 2014. After data collection and analysis, the average percentage was 82.47% (good). Based on the results obtained in the research, it can be concluded that the learning media design for the Basic Physics II course using Adobe Flash professional C56 software on Geometric Optics material is good/suitable for use.

Keywords: Geometric Optical Material; Multimedia Design; Professional Adobe Flash CS5 Software

INTRODUCTION

In the teaching and learning process in higher education, the presence of learning media is seen as one of the factors that can increase the effectiveness of the learning process. An educator must be able to master the methods and selection of appropriate media in teaching (Emda, 2011). The development of educational technology cannot be separated from the development of technology in general (Haryoko, 2009). This is because media has a function that can directly and indirectly influence students' motivation and interest in learning and the meaning of learning materials will be clearer (Arsyad, 2013). If you only use textbooks and whiteboards, this goal will be difficult to achieve. The word "Media" comes from Latin which is the plural form of "medium", literally meaning intermediary or introduction (Tejo, 2011). Media is anything that can convey and channel messages from sources in a planned manner so as to create a conducive learning environment where recipients can carry out the learning process efficiently and effectively (Mudani, 2013). This also allows learning goals to be achieved which ultimately can improve the learning process and outcomes.

Basic Physics course material requires supporting media as a complement to student textbooks because many concepts are only outlined in text, pictures and formulas, especially Basic Physics II.

However, based on the author's knowledge, not much media has been created for Basic Physics II, especially for Geometric Optics material. Geometric Optics itself is a branch of science that studies light, the properties of light propagation, such as reflection, refraction, and the principles of the path of rays. To describe how light and the properties of light propagate, media is needed that can describe and show it clearly and can be accepted by students.

One of the learning media that is popular with students is computer media. However, among the many computer software, Adobe Flash was chosen because it has many complete supporting features. Adobe Flash CS5 has several advantages with its newest features where the software has added and changed commands to make it easier for users to manage animations (Budi, 2013). The new version of Adobe Flash Professional is Adobe Flash Professional CS5. This version is much better than the previous version because Adobe Flash Professional CS5 has several advantages with its newest features where the software has added and changed commands to make it easier for users to manage animations. Therefore, the author tries to express the concept of Geometry Optics in a learning media using light material which usually appears as a group of light rays or also called light beams (Young, 2003), with the Adobe Flash Professional CS5 application so that the theory can be used. visible and accepted by students.

To express the concept of Geometric Optics in a learning medium using the Adobe Flash Professional CS5 application means that the author will carry out research in the form of R & D (Research and Development), where this research is carried out to develop a new or existing product and test its effectiveness. these products (Sugiyono, 2014).

RESEARCH METHODS

The research carried out is in the form of research and development or in English it is called Research and Development. Development research is research used to produce certain products and test the effectiveness of these products (Sugiyono, 2014). The development model used in this development research is a procedural model. Setyosari (2010) explains that, "A procedural model is a descriptive model that describes the flow or procedural steps that must be followed to produce a particular product." In this model research, there are three stages that must be passed, namely the initial stage (preparation), the creation stage (development), and the evaluation stage. Next, the questionnaire was analyzed using validity, reliability and scale analysis. Validation is a measure that shows the levels of validity or validity of an instrument (Arikunto, 2010).

RESULTS AND DISCUSSION

The following is an analysis of the needs and characteristics of students at Jambi University Regular Physics Education Study Program (1) The teaching and learning process takes place in the lecture room. There is a lack of learning media that supports the learning process, especially in Geometric Optics material (2) Students already have the skills to use various electronic devices , computer or laptop. (3) The characteristics of students at Jambi University are diverse.

The formulation of this learning objective is based on the GBPP used by the Jambi University Physics Education Study Program. Based on the GBPP, the learning objectives are:

a. General Instructional Objectives: After completing this lecture, students are expected to be able to apply various concepts of temperature and heat, thermodynamics concepts, concepts and properties of waves, optics, and basic physics in simple physics problems.
b. Specific Instructional Objectives: Students are able to explain various Optical concepts geometrically which include the reflection of light in a flat plane, a curved plane (mirror), the refraction of light in a flat plane and a curved plane (lens).

The main points in this media include reflection of light on a flat plane, reflection of light on a curved plane (mirror), refraction of light on a flat plane and refraction on a curved plane (lens). The results are shown in the following pictures:

Figure 1. Second cover view

Figure 2. Concept Map view

Figure 3. Third cover display (menu display)

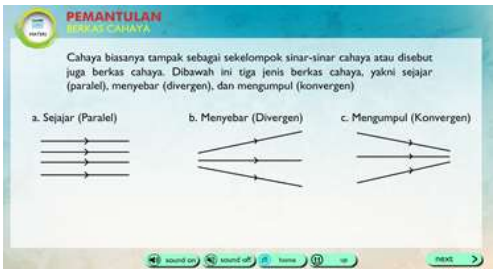

Figure 4. Material display 1

The results of the validation of learning media for the Basic Physics II course with Geometric Optics material using professional Adobe Flash CS5 software by a team of experts in stage I can be seen in table 1 below:

Table 1 Results of Phase I Validation of Geometric Optics Learning Media

No.	Assessment Aspects	Indicator	Validator I	Validator II	Suggestion
1	Contents	1. Material conformity with GBPP	√	√	
		2. Suitability of material in learning media with learning objectives	√	√	
		3. Clarity of material makes it easier for students to understand concepts	×	×	Adapt the material to the correct material concept
		4. Animated explanations make it easier for students to understand the material	×	×	Fix wrong animation
		5. The substance of the learning material is correct	×	×	Material is added and sorted according to concept
		6. Example questions and evaluations are adapted to	√	√	

		the material presented			
2	Construct	7. The design (consistency, format, color, organization, and appeal) of attractive media	√	×	To make the appearance brighter, adjust the *background image* to the material title
		8. Clarity of writing and animation	×	×	Fixed animation on flat mirror and curved mirror
		9. Animation and simulation relate to and support the explanation of concepts.	×	×	Match the animation to the concept
		10. Clarity of the sequence of presentation of learning material	×	√	Sort the material correctly
		11. The media is equipped with instructions for use	√	√	
3	Language	12. Media readability is clear	×	×	Correct any missing writing
		13. Writing in accordance with Indonesian language rules	×	×	Delete the writing of reflection and refraction on the concept map and replace it with Indonesian
		14. The language used is easy to understand	×	×	Use Indonesian, short and concise.
		15. The text used and the size are appropriate	√	√	

The results of the validation of learning media for the Basic Physics II course with Geometric Optics material using professional Adobe Flash CS5 software by a team of experts in stage II can be seen in table 2 below:

Table 2. Results of Phase II Validation of Geometric Optics Learning Media

No.	Assessment Aspects	Indicator	Validator		Suggestion
			I	II	
1	Contents	1. Material conformity with GBPP	√	√	No Revisions
		1. Suitability of material in learning media with learning objectives	√	√	No Revisions
		2. Clarity of material makes it easier for students to understand concepts	√	√	No Revisions
		3. Animated explanations make it easier for students to understand the material	√	√	No Revisions
		4. The substance of the learning material is correct	√	√	No Revisions
		5. Example questions and evaluations are adapted to the material presented	√	√	No Revisions
2	Construct	6. The design (consistency, format, color, organization, and appeal) of attractive media	√	√	No Revisions
		7. Clarity of writing and animation	√	√	No Revisions
		8. Animation and simulation relate to and support the explanation of concepts.	√	√	No Revisions
		9. Clarity of the sequence of presentation of	√	√	No Revisions

		learning material			
		10. The media is equipped with instructions for use	√	√	No Revisions
3	Language	11. Media readability is clear	√	√	No Revisions
		12. Writing in accordance with Indonesian language rules	√	√	No Revisions
		13. The language used is easy to understand	√	√	No Revisions
		14. The text used and the size are appropriate	√	√	No Revisions

From table 2 it can be seen that all validators have checked 'yes' on all aspects of the media validation questionnaire.

Learning media design for the Basic Physics II course using professional Adobe Flash CS5 software on Geometric Optics material through 7 stages. These stages include: Analysis of student needs and character, formulating learning objectives, formulating material points, compiling evaluation instruments, compiling media scripts/drafts, carrying out expert validation.

The following is an analysis of the needs and characteristics of students at Jambi University Regular Physics Education Study Program: 1. The teaching and learning process takes place in the lecture room. The material presented is quite extensive and has a high level of difficulty, while the time lecturers and students have to carry out learning activities is very limited. Thus, the learning process has not been able to convey material to students optimally. 2. Lack of availability of learning media that supports the learning process, especially Geometric Optics material 3. Students already have the skills to use various electronic devices, computers and laptops. 4. The characteristics of students at Jambi University are diverse. Some have a strong curiosity in studying physics material. However, there are also some who have a low sense of curiosity.

The next stage is formulating the material points. These material points are based on learning objectives. The main points in this media include reflection of light on a flat plane, reflection of light on a curved plane (mirror), refraction of light on a flat plane and refraction on a curved plane (lens).

The next stage after preparing the script is creating the media. The process of this stage is:

1. Collection of materials

In this stage the researcher collects various materials that will be included and used in the media. These materials are in the form of images, audio, animation and simulations which cannot be created by researchers themselves. These materials are taken from the internet or existing sources. Downloaded images, audio and simulations are not only used and inserted directly into the media, but most of them are used by researchers to create simulations and other images designed by researchers themselves according to material needs.

2. Making media materials

At this stage, materials are imported into learning media. The steps are as follows: Separating the teaching materials for each sub-section into their respective folders, Creating learning media templates with Adobe Illustrator CS5, Creating animations with Adobe Flash Professional CS5, Editing Simulations with Adobe Flash Professional CS5 and Combining all the files into in adobe flash professional CS5.

3. Publish the design results

After all the materials have been imported and combined into Adobe Flash Professional CS5, the next stage is to publish the media design results in EXE form. The media is published in EXE form with the aim that the media can be used on every laptop even if it does not have the Adobe Flash application on it.

Learning media for the Basic Physics II course with Geometric Optics material using professional Adobe Flash CS5 software has been completed. Validators will provide suggestions, critical assessments, opinions and input on the media that has been developed. Then, the media will be revised so that this learning media is deemed suitable for use by students.

Based on the results of the media validation, the validator suggests improving the media in the following aspects. Material in the media, don't blame the concept. Use simplified sentences. Match the animation with existing animation descriptions. Tidy up the animation and captions. Use several colors and shapes in the media design and adjust the background to the title. material, Use animation that does not distort the concept, Set media colors that are appropriate and not dark, Writing is adapted to EYD and Indonesian and Simplified sentence construction.

After carrying out revisions according to the validator's suggestions in stage I, stage II validation was carried out again. Results of validation of learning media for the Basic Physics II course with Geometric Optics material using professional Adobe Flash CS5 software by a team of experts. From the results of stage II media validation, it can be seen that all validators have checked 'yes' on all aspects of the media validation questionnaire. This means that the learning media for Basic Physics II courses with Geometric Optics material using professional Adobe Flash CS5 software is declared suitable for use.

CONCLUSION

Designing learning media for Basic Physics II courses with professional Adobe Flash CS5 software on Geometric Optics material by analyzing student needs and characteristics, formulating learning objectives, formulating material points, compiling evaluation instruments, compiling media manuscripts/prototypes, carrying out expert validation, carry out trials and revisions. The learning media for the Basic Physics II course with professional Adobe Flash CS5 software on Geometric Optics material can be said to be in the good category.

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