Development of Physics Learning Media on Rotational Materials Based on Interactive Multimedia

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Abstract. Development of learning media is important to be done to help the process of learning physics. The purpose of this research is to develop learning media on the material of rotational dynamics. The media is created using Photoshop software, Corel Draw and Macromedia Flash. This Media consists of opening pages, which contain competencies, materials, games, evaluations and creator pages. This media displays images, animations related to subject matter and games that attract students in learning physics. The results of the development in the form of instructional media are intact so that they can be used by both teachers and students.

1. Introduction.

Indonesia's educational position is currently in a transition from the era of industrial technology to the era of information and communication technology (ICT) or also known as the e-learning era [1]. The use of information and communication technology is an effective and efficient way of conveying information. So this has great potential to improve the quality of learning, especially in displaying physical phenomena and animation. Many abstract and imaginative things can be conveyed through computer simulations, exercises and physics experiments that students can do by using programs that have been designed to do this. Surely this is as an inculcation and reinforcement of the concept of physics in problem solving [1]. The teacher must be able to make various learning designs or instructional media so that the teaching and learning process runs well [2]. Abstract concepts are difficult to understand if only explained in two dimensions, so that media is needed for abstract concepts of matter [3].

Mastery of the electrical concepts of students taught by interactive multimedia-based learning is higher than students taught conventionally. The average level of mastery of the electrical concept of students in the experimental group is higher than the control group. This indicates that the use of interactive multimedia effectively supports the physics learning process for prospective teachers [4]. The use of interactive multimedia on the material Temperature and heat both influence the mastery of concepts and critical thinking skills of students [5]. Utilization of Multimedia in the subject matter of optical devices can improve student learning outcomes by 57.25% [6]. the use of interactive multimedia based on learning styles is more effective than conventional learning in increasing mastery of the introductory concepts of solid physics [7].

Unique to virtual reality applications in modern life, Second Life (SL) offers unparalleled opportunities for research and exploration and learning experiences as part of distance learning.
curriculum assignments [8]. The simulation laboratory in an android mobile phone that has been validated by an expert can be used as a learning medium for high school students [9].

Based on observations at SMA Negeri 1 Tapung, judging by the value of the Odd Semester Exams in three class of science there are no students who reach KKM which is 70. This is also felt strange by the teaching teacher, because when the teacher presents a lesson, students can take it, but when the test is not reach the KKM target. In the Rotational Dynamics Material the teacher said by explaining what is in the book, this is done because Rotational Dynamics and is a dense material. There are 8 meetings or 16 x Lesson hours. Although there are 8 meetings, the Rotational Dynamics material contains many formulas that must be understood by students. In a subsequent interview it was discovered that the physics textbooks provided by the school could only be used at school by students, and could not be brought home. So we need a media that can be taken home and used as a reference by students in repeating lessons that have been delivered by the teacher. In addition, relevant descriptions are needed so that what is conveyed by the teacher is the same as what is received by students.

2. Methodology

This research uses the Research and Development (R&D) method. The process of developing instructional media refers to the 4-D development model with the define stage, the design stage, the develop phase, and the disseminate stage. The process begins by gathering material about the Dynamics of Rotation and equilibrium of rigid bodies, looking for any images or experiments and sample problems needed to be animated. Learning media are created and developed according to preliminary data. This interactive learning media is created using three pieces of software, namely Corel Draw, Photoshop and Macromedia Flash.

Corel draw is used to create images or parts of the animation that will be put together, such as heads, facial expressions, bodies, forms of simple tools needed to make animations in accordance with the material. Photoshop is used for artistic fields or beautifying objects, refining or selecting so that it is proportional, color is suitable and pleasing to the eye. Macromedia flash is intended to combine animation objects for each animation that will be created, so that it can move, move, rotate or change shape. Besides macromedia flash is used to convert media from the basic display to be operated with Android or with a computer or laptop.

3. Results and Discussion

Figure 1 is an image created with Corel Draw software, in Figure 1a there is no rotation while in Figure 1b and 1c objects undergo rotation. With different and interesting coloring making it easy for students to memorize the process of object rotation.
button on the media (2.f), contains an explanation and the name of the learning media and the name of the developer (2.g)

| No. | Learning Media Section | Explanation |
|-----|------------------------|-------------|
| a   |                        | Several kinds of expressions are generated. Made with Corel Draw and moved or combined with Macromedia Flash to form a synchronous movement. This person's animation is intended to function as a study partner or teacher. |
| b   |                        | The initial display contains:  
1. Competencies, this button contains basic competencies and indicators.  
2. Material, Contains material from Material Dynamics of Rotation and Equilibrium of rigid bodies.  
3. Games, contain simple games  
4. Instructions, instructions for using the available buttons.  
5. Developer, contains an explanation of the product and the developer / creator  
6. Exit, exit button from media. |
| c   |                        | The material at the first meeting, in the form of a moment of force and given a picture consisting of an explanation of the shaft point, the force, the direction of rotation. Next to the picture there is a play button to go to the animation on the material Moment style. With this animation students can imagine the process of torsion in the wrench playback. |
| d   |                        | Animation of the process of torque (rotation). Students can operate the animation by pressing the Play, Pause or Stop buttons. With this, students are expected to be able to understand the events of torque or object rotation. |
Animation of the process of spinning on rigid bodies. Where in the rigid body is composed of many separate particles, each of which has a mass.

In the instructions for using the media explained the function of the button on the media, so students and teachers can easily operate it.

In this section the names of the media are explained and a brief explanation, besides containing the names of physics learning media developers.

Figure 2. Final Results of Learning Media

With this animation students are expected to be interested in learning physics, especially material Dynamics of Rotation and Equilibrium of rigid bodies. This is because with the appropriate color composition, an animated form that makes it easy for students to understand the purpose of the material then ease of use and carrying. This happens because a book containing hundreds of pages is enough to download and is on the cellphone, so students can repeat the lesson anywhere and anytime, without having to carry a book.

4. Conclusions

Making instructional media is very necessary in the teaching and learning process. Mastery of some software is needed in the process of making learning media. With the learning media, teachers and students will be easy to learn the lesson, this is because the media produced contains about animation which serves to depict something abstract into reality.
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