The Design of Video Technology Based on Scientific experimental for Geometrical Optics Subject as ICT Implementation

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Abstract: This research aims to produce media learning in the form of experimental video on the geometrical optics that meets good qualifications which include aspects of validity, practicality and improving learning outcomes. This research is a type of research and development Research and Development (R&D) with the Borg ang Gall model. Development and videos on research on reflection and refraction using applications, which will later produce an experimental video on physics learning in schools to improve student learning outcomes.

1. Introduction
Knowledge and Technology are always developing and progressing, in accordance with the times and the development of human thinking. The Indonesian nation as a developing country will not be able to progress as long as it has not improved the quality of our nation's human resources. The quality of life of a nation can improve if it is supported by an established education system. With an established education system, it allows us to think critically, creatively, and productively.

The development of science and technology (Science and Technology) has implications for each generation in various sciences. Especially in the field of education that demands a learning system that can be implemented effectively and efficiently. The use of information and communication technology in the field of education is known as e-education, which is an electronic-based educational system. Information technology can display new features in the world of education, multimedia-based teaching systems (which involve text, images, sounds) can present something interesting (Triwahyuni: 2005).

Simply put, IPA is a collection of knowledge that is arranged systematically about natural phenomena. The development of science is not only demonstrated by a collection of facts but also by the emergence of scientific methods and scientific attitudes. It can be concluded that the definition of science includes four things: Product, Process, Application and attitude. Each definition is Product: constitutes facts, principles, theories, laws. Process: is a problem solving procedure through scientific methods. The scientific method follows observation, preparation of hypotheses, design of experiments, experiments or investigations, testing hypotheses through experimentation, evaluation, measurement, and drawing conclusions. Application: is the application of scientific methods or work and physical concepts in everyday life. Attitude: manifested through curiosity about objects, natural phenomena, living things, and causal relationships that cause new problems but can be solved through correct
procedures. Therefore physics is open ended because it always develops following the changing patterns of dynamics in society.

2. Methods
This research includes the type of research and development or known as Research and Development (R & D). (Ranberg, 1974). In the field of education, Borg and Gall (1988) states that research and development (R & D), is a research method used to develop or validate products used in education and learning. Research and Development Methods are research methods used to produce certain products, and test the effectiveness of the product. (Sugiyono, 2009).

The development research procedure was modified from the Borg and Gall development research procedure described as follows:

3. Results and Discussion
The product developed in this study is a more structured practical guideline in the form of experimental videos that are equipped with a 5M scientific approach (Observing, Asking, Trying, Analyzing, and Communicating). Besides this experimental video is also equipped with text and sound to make it easier to understand the contents of the video. Physics experiment videos arrive at the data processing stage so they look more real because they can see the test results.

Research on the development of physics-based video experiments on information and communication technology using Borg and Gall. This stage consists of ten stages.

3.1 Information Collection
The first step in the development of physics and video experiments based on information and communication technology is to collect information and analyze the needs of educators. The stages
carried out in the form of literature study, field surveys, and determine the basic problems faced by educators and students. The interview results obtained information that the implementation of physics practicum has not been maximized due to the lack of laboratory facilities, making it difficult for students to do the practicum.

3.2 Design
Developing products in accordance with the needs of students by designing product designs. The design process includes 2 aspects, namely aspects of the model and aspects of the content. The design of this physics experiment video consists of an opening, a content and a closing section.

3.3. Manufacture
Manufacture of physics and video products based on information and communication technology using the Movie Maker Software.

Figure 1: cover video of light refraction experiment on parallel plan glass
3.4 Limited field testing

- The validity level of physics experiment videos

The activity carried out is the assessment of development products by media experts. The assessment is conducted to determine the quality of the product before it is used and assessed by participants. An assessment conducted by an expert uses an instrument in the form of a questionnaire, data and suggestions provided are used as a consideration for improving the media.

Table 1 results of the evaluation of the validator of media experts

| Assessment aspects | Video | Rating result | Category |
|--------------------|-------|---------------|----------|
| Display aspect     | 1     | 83.0 %        | Very valid |
|                    | 2     | 85.1 %        | Very valid |
|                    | 3     | 82.5 %        | Very valid |

The validator’s evaluation of the physics experiment video based on the developed information and communication technology is in the very valid category. From the average results of the assessment it can be concluded that the physics video experiment based on information and communication technology that has been developed can already be used and has been feasible to be tested on a limited scale in the field.

4. Conclusion

The conclusion of the development of scientific experiment videos as physics learning aids for students obtained data based on the results of the media validator can be concluded that the physics experiment videos based on information and communication technology that have been developed can already be used and have been feasible to be tested on a limited scale in the field and can help students in the learning process in the classroom about physical phenomena in optical geometry material.

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