

Development of Audio Visual Media for Distance Learning

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ABSTRACT

This study aims to develop audio-visual media for distance learning in high school physics material with the optical instrument sub-chapter. Distance learning uses a website-assisted problem-based learning (PBL) model. The learning website from the ministry of religion is used in this distance learning. The development method used in this research is the four-d (4-D) model. Expert validators and class XI students of MAN 3 Sleman as subjects in this study. Validation sheets are used to obtain expert validation results and response sheets to obtain student responses. Expert validators stated that the learning media developed were valid and included in the "very good" category. Student responses were also in the "very good" category. So that the audio-visual learning media with a problem-based learning model for distance learning is declared feasible and can be used in learning activities.

Keywords: Learning media, Audio visual, Distance learning, Optical tools

1. INTRODUCTION

The development of information and communication technology, big data systems and cloud computing has marked the industrial revolution 4.0 [1]. The real effect of the industrial revolution is the replacement of human labor by using robots that are more effective, cheap and efficient. The merger of the physical, digital, and biological worlds will change the pattern of human life and interaction [2]. In order to face the industrial revolution 4.0, people must carry out a new literacy movement. Literacy movements that must be owned by society, namely, 1) digital literacy, 2) technological literacy, and 3) human literacy. [3]

The rapidly developing automation shows signs that the world of education must adapt to the continuity of the program and its graduates to remain competent and ready to go through the Industrial Revolution 4.0. Educational transformation can be implemented through learning methods in facing challenges towards the Industrial Revolution 4.0 [4]. Qualified graduates who can master IT development must be possessed in order to be able to compete globally [5].

Adaptation of the world of education can be done by utilizing ICT in learning. ICT-based learning has a positive impact on students. ICT learning has an impact on the high abilities that 21st century students must master. ICT-based learning improves skills, scientific process ability, curiosity, caution, environmental care, and honesty [6]. Plus most students are still lacking in digital literacy [7]. Therefore, ICT-based learning must be applied to students [7]. Moreover, the internet is growing rapidly, so the use of ICT learning cannot be avoided.

The web is very suitable to be used as an ICT learning medium [8]. Using web learning can be packaged more attractively into an E-learning. E-learning can be used in the online era like today [9]. Using e-learning the discussion and learning activities is not limited to space and time [9]. So learning can still be done during emergencies that cause participants to be unable to carry out learning in class.

The emergency that has hit the entire world, namely the Covid-19 pandemic, requires the world of education to adjust. The spread of covid-19 is so fast that learning activities must be done remotely (learning from home). This situation requires learning activities to be carried out online, namely utilizing e-learning. The use of e-learning has advantages including that it can be accessed anytime. The use of e-learning can also improve learning outcomes [10].

The adjustment of education to the development of ICT is an effort so that learning activities can run effectively. Creating an atmosphere of learning and the learning process becomes the definition of education so that adjustments to ICT developments must be made. Adjustments must be made so that students can develop their potential so that they have the strength of self-control, personality, intelligence, noble character, and the skills needed. society, nation and state.

Adjustments made by MAN 3 Sleman in dealing with Covid-19 were made by implementing online learning (e-learning). Based on observations made, e-learning utilizes web learning from the Ministry of Religion. The learning web provided by the ministry of religion is good and complete for use in learning. But in practice online learning is done only by giving questions then students work on the questions. This results in decreased student interest in learning and students burdened with it. So it is necessary to do online learning innovations that are not just doing questions.

Distance learning requires learning media. Learning media that can be used during distance learning or e-learning is audio visual media. Instructional media with audio visual changes increase students' interest in learning [11]. So it is necessary to change e-learning activities from previously only giving questions to using audio-visual media.

Implementation of the 2013 Curriculum encourages and challenges physics teachers to be creative in facilitating students to understand physics theories and concepts and be able to apply them in solving physics problems. The learning model that is suitable to be used to overcome these problems is the problem-based learning (PBL) model. PBL is a learning model that trains students to work on authentic problems that are student-centered [12]. PBL can also be interpreted as a teaching model that uses problems as a focus to improve problem-solving skills [13]. In PBL, students are required to solve problems that are presented by digging up as much information as possible, then analysing it, and finding a solution.

The ability to solve problems is needed by students in learning physics. This is because problem solving activities can help students construct new knowledge and facilitate physics learning [14]. In the face of the challenges of the 21st century, teachers better prepare students to become investigators, problem solvers, critical thinking and creative. Therefore, learning that emphasizes increasing problem-solving abilities in students of MAN 3 Sleman needs to be done.

This problem needs to be overcome by conducting learning innovations. The learning innovation in question is the development of audio-visual learning media with problem-based learning models that can be applied in distance learning (e-learning).

2. RESEARCH METHOD

This research is included in the type of development research. The development model used is the four-d (4D) model. The stages in the 4D model consist of define, design, development, and disseminate [15]. A limitation is carried out in this development research, namely the development procedure is only carried out until the development stage. So that the procedure for developing audio-visual learning media with problem-based learning models for distance learning goes through three stages, namely define, design and development.

The define stage aims to find out the basic problems that occur in learning activities. The details of the activities carried out in the define stage consist of analyses, namely preliminary analysis, task analysis, concept analysis, and analysis of learning objectives. These analyses are not only aimed at finding problems in learning but also have the function of obtaining a variety of useful information for the product development process. This information is needed so that the products developed are really in accordance with the needs of students. The analysis was carried out by means of observation and interviews. Another result of the analysis is the formulation of development goals and learning objectives.

Based on the analyses carried out at the define stage, these results are used as the basis for the design stage. The results of the define stage analysis are used to determine the appropriate media, determine the media format, make the initial product design and also prepare the tests to be carried out.

At the development stage, product development activities are carried out. Development is carried out accompanied by two main activities in the development stage, namely expert validation and

product testing. Products that have been developed are validated by material experts and media experts. validation results in the form of a description of the feasibility of the media along with suggestions for improvements to be made Products should be revised based on suggestions from the validation stage. The results of the product revisions were then tested directly in learning activities. Audio-visual learning media trials with problem-based learning models were carried out on class XI students of MAN 3 Sleman. The purpose of the direct trial is to get responses from students to the product being developed. After the trial was carried out, it was revised. The revised result after the trial is the final product.

2.1. Research Instrumen

The instruments used in this study were expert validation sheets and student questionnaire responses. Validation sheets are needed in the expert validation stage to obtain data in the form of feasibility and expert advice on the product being developed. Student response sheets are used in the direct trial phase in learning. Student response sheets are used to obtain student response data.

2.2. Research Instrumen

The technical average score analysis is used to process data from expert validation and student responses. Validation data and student responses in the form of a 1-4 Likert scale are calculated the average of each aspect that is assessed. The average of each aspect is calculated using the formula 1:

$$\bar{X} = \frac{\sum \bar{X}_i}{n} \tag{1}$$

\bar{X} is an average, $\sum \bar{X}_i$ is the total score X and n is the number of participants. The average obtained is converted into a scale of for. First step is finding the ideal mean (\bar{X}_i) and the ideal standard deviation (SBi) in the following way: (\bar{X}_i) = $\frac{1}{2}$ (maximum ideal score+minimum ideal score), (SBi)= $\frac{1}{6}$ (maximum ideal score+minimum ideal score). The next step is converting a quantitative score to a qualitative one with the guideline for converting the score Table 1. [16]

Table 1. Score conversion

Scale interval formula	Interval	Category
$\bar{X} \geq \bar{X}_i + 1.SB_i$	$X \geq 3,00$	Very good
$\bar{X}_i + 1.SB_i > \bar{X} \geq \bar{X}_i$	$3,00 > X \geq 2,50$	Good
$\bar{X}_i > \bar{X} \geq \bar{X}_i - 1.SB_i$	$2,50 > X \geq 2,00$	Less good
$\bar{X} < \bar{X}_i - 1.SB_i$	$X < 2,00$	Not good

3. RESULT AND DISCUSSION

The results of the observations show that online learning due to Covid-19 requires innovation in learning media. Online learning activities that only work on questions make students feel uncomfortable in learning. Learning media need to be developed with specifications that can be used online. Therefore, audio visual media is a learning media that needs to be developed.

The ability to solve students' needs to have in understanding physics. In addition, the 2013 curriculum demands that problem-solving abilities must be possessed by students. The learning model that is suitable for improving problem-solving abilities is the PBL model. Therefore, audio-visual learning media with PBL learning models need to be developed.

At design stage it produces two things, namely the development guide and the product core. The development guide contains the development steps from start to finish. The core of the product contains content that will be included in audio-visual media, content in the form of video and sound.

At development stage the product is made and validated by experts. After receiving suggestions and product improvements, they were tried out on students to get a response. After that the final product is obtained. The following is a figure of the final product developed. The product figure consists of images of the problem orientation stages in Figure 1, Figure 2 and Figure 3. Figure 4 is a reinforcement material.



Figure 1 Orientation problems about binoculars



Figure 2 Orientation problem about the inverting lens

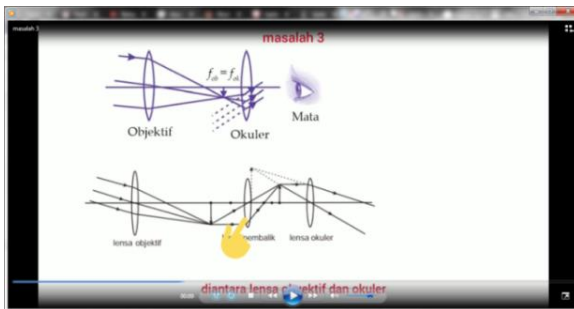


Figure 3 Orientation problem about earth binocular

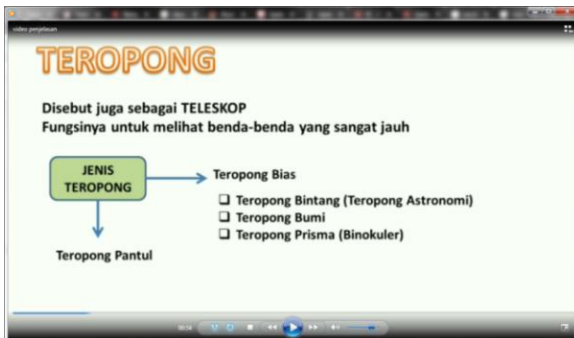


Figure 4 Reinforcement of binocular material

3.1. Validation

Validation by instructional media experts is carried out with a mechanism of providing development results to learning media experts who are then given an assessment of the media in the form of a questionnaire. The number of instructional media experts who gave an assessment of this media was 3 experts. Experts fill out a questionnaire to assess the developed media with the specified aspects. The aspects of learning media that are assessed are material aspects, learning design aspects, language aspects. The results of the media expert's assessment are presented in Table 2 below

Table 2. Expert validation results

Aspect	Average	Category
Content	3,60	Very good
Design	3,66	Very good
Language	4,00	Very good

Based on the average Likert score, the language aspect gets the highest score of 4 followed by the material and design aspects. When compared with table 1, these three aspects fall into the "very good" category so that it is feasible to support learning activities.

3.2. Student Response

Validation After the product is revised based on the advice of experts in the validation phase, the product is tested in learning. Students use learning media that are used in learning activities. The purpose of this trial is to obtain student responses to the learning media developed. In this trial, students responded to learning media in five aspects, namely (1) material, (2) design, (3) interest, (4) implementation, and (5) language. The results of student responses are shown in table 3 below.

Table 3. Results of students' responses

Aspect	Average	Category
Content	3,28	Very good
Design	3,75	Very good
Interest	3,32	Very good
Implementation	3,66	Very good
Language	3,11	Very good

Table 3 shows the results of the responses of students with the highest scores on the design aspect. The design aspect has an average score of 3,75. The aspects of implementation, interests, material and language respectively score below the design aspects. Overall, these five aspects get a "very good" category. Based on these results, the audio-visual learning media with problem-based learning models for distance learning are declared fit for use for learning activities.

4. CONCLUSION

The results of expert validation on audio-visual media with problem-based learning models for distance learning are declared valid to be used in learning activities. The three aspects of the assessment of the learning media developed are in the "very good" category. The students' responses to the five aspects of learning media developed also fall into the "very good" category. So that the audio-visual learning media with the problem-besed learning model are declared suitable for use in learning activities.

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