The development of *Wayang Golek* Video as physics learning media in the concept of light

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Abstract - This study aims to develop *wayang golek* puppet show as a learning medium for physics subject, specifically on the concept of light. This research is a research and development that refers to the ADDIE model which includes 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation. The video playback for the *wayang golek* puppet show produced were developed by involving Grade VIII students of Terpadu Madani Model Junior High School. The resulting wayang golek puppet video products were analyzed by media experts and content experts using questionnaires. It was found that the average score of the content expert's assessment was 3.56 which belonged in the "Very Good" category, whereas the average score of the media expert was 3.73 which was categorized in the "Very Good" category. In addition, the resulting media was also analyzed by the teacher for its feasibility using questionnaires. The result obtained an average score of 3.00 and was categorized as "Good". Furthermore, the final product of the video media playback was also tested on students, and an average score of 3.27 was obtained. This is categorized as "Strongly Agree". The results of this study indicate that the *wayang golek* video media playback is feasible to be used as a medium for learning physics, especially regarding the light concepts for students.

1. Introduction

Physics is the science that underlies the birth of the industrial revolution from eras 1.0 to 5.0. But in reality, physics is often a scourge that is often feared by students, and not a few have turned into bombs for students because of their lack of understanding due to the lack of student interest in learning physics. So that student learning outcomes are low. This is caused by several factors, one of which is the lack of interest and variation in the learning process [1].

The facts that show in the field state that physics is one of the subjects that some students consider difficult [2]. In addition, there is still physics learning that is carried out only using the lecture method with a conventional approach, namely theoretical textual without involving students to be active and teacher-centered [3]. From the researcher's observations, it is found that students tend to be passive in accepting the learning materials delivered by the teacher. Students' curiosity and interest in the topic presented are lacking [4]. Widyatmoko, also stated that the subject of physics is still considered difficult by students and requires a lot of memorizing formulas [5]. Subali, et al, in their research stated that...
several factors or problems caused students to have difficulty understanding the teaching material, including difficulty concentrating, youth forgetting, feeling bored, not being creative, learning unpleasant atmosphere, and feeling stressed [6].

However, this can be overcome by increasing students' motivation in learning with the assistance of the appropriate learning media. Media is very necessary for learning. Media can play a helpful role in presenting and clarifying the subject matter [7–9]. The use of media as a companion in the learning process is increasingly needed to overcome problems that arise due to limited time, space, other mortality [10,11]. Learning media refers to anything which can be used to transmit information (learning materials), which is done in a way that can stimulate students' attention, interests, thoughts, and feelings throughout the learning activities to achieve learning goals. The use of media should be a part that teachers also focus on in preparing and carrying out every learning activity [12]. The purpose of using media in the learning process is to make the learning process more effective and efficient [13–15].

On the other hand, physics learning integrated with Indonesian culture is one formulation that is present as an alternative to creating meaningful learning in the classroom. The combination of teaching aids and culture makes physics learning easily understood by the students' eyes and ears, thereby accelerating the teaching and learning process and helping students comprehend physics material provided by the teacher [16–24]. One of the Indonesian cultures which continues to be a favor now by the Javanese community, especially adults, is the wayang golek puppet show. Its high level of effectiveness encouraged religious leaders in the past to use wayang as a learning medium.

Therefore, it is necessary to develop learning media that can help students in the learning process, which can be done by making the learning process more interesting. The learning media should also have a function to "accompany" students in learning and to foster a sense of belonging to their traditions and culture.

Thus, the researcher chose to develop physics learning media using the wayang golek puppet show video. Partly, it is because wayang is one of the indigenous traditions and culture of Indonesia, which has an interesting and flexible form in its use to bridge the learning process since wayang has both material and character elements (living things). In addition, wayang can also be considered as an art that represents Indonesian culture that must be preserved alongside to other traditions and cultures.

The results of research conducted by Septa, et al., indicate that the use of wayang as a medium for learning physics can improve student learning outcomes. This can be seen by the increase in the average learning outcomes of physics science learning in the cognitive and affective domains of students [1].

This study uses the same media, namely wayang, but is applied using different methods. In previous studies using classroom research methods, the method that researchers used in this study used development research or what is known as Research and Development (R&D), which is a research model used to produce certain products and test the effectiveness of these products [25].

This study aims to develop the wayang golek video puppet show as a physics learning video playback, specifically on the concept of light. The expected benefit from this research is that it can help students understand physics lessons better and get to know wayang as a form of national cultural preservation.

2. Method
This type of research is research development or known as Research and Development [25]. The product is developed in this study is a wayang golek puppet show video as a medium for learning physics. The ADDIE model used consists of four stages, namely Analysis, Design, Development, Implementation, and evaluation.
This research and development were carried out during the odd semester of the 2018/2019 academic year with the research subjects consisted of 31 students of Grade VIII Terpadu Madani Model Junior High School Palu.

The techniques utilized to collect data in this study were observation and questionnaire techniques. The questionnaires used in this study include validation and evaluation questionnaires for media experts, content experts, subject teachers, and students to determine the response to physics learning media using wayang golek puppet show video. The research instruments selected in this study were questionnaires distributed to media experts, content experts, subject teachers, and students as respondents.

The data analysis technique used to analyze the validation result data is done by calculating the average score based on the Likert scale assessment. The determination of this average analysis technique is based on the opinion of Ref. [26], which states that in order to determine the final score ranking for each research questionnaire item, the total score obtained is divided by the number of respondents who answered the assessment questionnaire. The formulation used to calculate the average score is as follows:

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$  \hspace{1cm} (1)

Note:
- $\bar{X}$: average score in each question item
- $\sum X$: sum of all scores in the question items assessment
- $n$: number of question items

To convert the average score obtained into qualitative data, the researcher classifies the scores as accordance with the following Table 1.
Table 1. Likert scale category

| Interval Score | Criteria          |
|----------------|-------------------|
| 3.25 ≤ $\bar{x}$ ≤ 4.00 | Very good (VG)   |
| 2.50 < $\bar{x}$ ≤ 3.25 | Good (G)         |
| 1.75 < $\bar{x}$ ≤ 2.50 | Poor (P)         |
| 1.00 ≤ $\bar{x}$ ≤ 1.75 | Very Poor (VP)   |

The analysis of data collected from student responses was similar to the analysis of product assessment quality. The average score from the response questionnaires was then converted into a qualitative form based on Table 2 below.

Table 2. Student responses category

| Average Score | Category             |
|---------------|----------------------|
| 3.25 ≤ $\bar{x}$ ≤ 4.00 | Strongly Agree (SA) |
| 2.50 < $\bar{x}$ ≤ 3.25 | Agree (A)           |
| 1.75 < $\bar{x}$ ≤ 2.50 | Disagree (D)        |
| 1.00 ≤ $\bar{x}$ ≤ 1.75 | Strongly Disagree (SD) |

3. Findings and Discussion

3.1 Research Findings

3.1.1 Analysis Stage
The stages of analysis carried out in this study include several ways, such as literature studies and on-field studies.

3.1.2 Design Stage
At this stage, the initial design which has been prepared is further developed into a single product in the form of video playback. This video was created using the Wondershare Filmora application and Sparkol Video Scribe software.

3.1.3 Development Stage
At this stage, the initial design which has been prepared is further developed into a single product in the form of a video. In the learning video that the researcher developed, the video discusses the concept of light, in which the light concept presented by the researcher is made more attractive and simple. In the video, the researchers presented interesting wayang characters, making it easier for students to better understand and attract students' interest in learning physics.

a. Product Development

Figure 2. The characters of *punakawan*
b. Validity and Feasibility
Validation is carried out by content experts and media experts by filling out the assessment questionnaire which has been provided. The results of the validation are as follows:

| Table 3. The Results of feasibility validation by content experts |
|---------------------------------------------------------------|
| No | Aspects                  | Score | Category |
|----|--------------------------|-------|----------|
| 1  | Content Feasibility      | 3.64  | Very Good|
| 2  | Display Feasibility      | 3.40  | Very Good|
| 3  | Contextual Assessment    | 3.63  | Very Good|
|    | Average                  | 3.56  | Very Good|

| Table 4. The Results of feasibility validation by media experts |
|---------------------------------------------------------------|
| No | Aspects                  | Score | Category |
|----|--------------------------|-------|----------|
| 1  | Display Quality          | 3.40  | Very Good|
| 2  | Display Design           | 3.80  | Very Good|
| 3  | Execution                | 4.00  | Very Good|
|    | Average                  | 3.73  | Very Good|

3.1.4 Implementation Stage

a. Student questionnaire responses

| Table 5. The analysis results of the average score of student questionnaire responses |
|-------------------------------------------------------------------------------------|
| No | Statements                                                                 | Average Score |
|----|-----------------------------------------------------------------------------|---------------|
| 1  | Physics learning media which utilizes wayang give motivation and boost my interest to study | 3.48          |
| 2  | I can learn actively and independently with the use of wayang golek as physics learning media | 3.13          |
| 3  | I can study as accordance with my own pace and studying intensity             | 3.06          |
| 4  | I prefer studying using wayang golek as physics learning media rather than only listening to the teacher's explanation | 3.13          |
| 5  | I can expand my knowledge through the use of wayang golek as physics learning media | 3.65          |
| 6  | I can understand the concepts of light with the help of the wayang golek as physics learning media | 3.29          |
| 7  | I like the display of the physics learning media design in the wayang golek as it has matching colour combinations and compositions | 3.35          |
8. The language used within the learning media can be easily comprehended 3.13
9. With the help of the physics learning media, it helps increasing students' will to study 3.23
10. I can use the wayang golek physics learning media anywhere and anytime 3.23

Score 3.27

b. The Feasibility Test by the Teachers

Table 5. The analysis of the feasibility test results by the teacher

| No | Aspect                | Average Total Score | Category |
|----|-----------------------|---------------------|----------|
| 1  | Content Delivery      | 3.00                | Good     |
| 2  | Linguistics           | 3.00                | Good     |
| 3  | Display Quality       | 3.00                | Good     |
| 4  | Display Design        | 3.00                | Good     |
| 5  | Implementation        | 3.00                | Good     |
|    | Average               | 3.00                | Good     |

3.1.5 Evaluation Stage

The evaluation stage refers to the process where one observes whether the product that has been developed is successful or not. This evaluation stage can occur at any of the four stages mentioned above. This evaluation is called formative evaluation, as its purpose is for revision. Based on the results of the research conducted, it was found that students enjoyed and strongly agree with the use of the media. Of course, this media needs to be revised and developed based on suggestions and comments given by the subject teacher and students, so that later, this media can be used as an innovative learning medium in the classroom.

3.2 Discussion

The final product of this research and development is in the form of an educational video developed using the Wondershare Filmora application and Sparkol Video Scribe. This learning media which has been developed can be operated on a smartphone, which is convenient as it can be used anywhere and anytime. Based on the content expert's assessment conducted by the physics lecturer of Tadulako University, the aspects assessed from this media include the feasibility of content, the feasibility of the content delivery, and the suitability with the contextual approach. The average assessment result obtained of the content feasibility test is 3.64 which is categorised in the "very good" category, whereas the average assessment of the content delivery feasibility test is 3.40, which is deemed as the "very good" category. In addition, the average assessment of the suitability test with the contextual approach is obtained as much as 3.63, which belongs in the "very good" category. The average score of the evaluations of the content expert is 3.56 and is categorized as "very good". From these results, the content expert stated that this teaching material was feasible of being tried out in the field with revisions.

The results of the media expert's assessment carried out by a physics lecturer at Tadulako University elaborated that the aspects assessed from this media include content delivery, linguistics, display quality, display design, and implementation. The average assessment result obtained from the content delivery aspect is 3.50 with the "very good" category, and the average assessment result from the linguistic aspect is 3.33 which is categorized in the "very good" category. The average assessment from the display quality aspect is 3.67 which is deemed in the "very good" category, whereas the average score from the display design aspect was 3.67 with the "very good" category. Last but not least, the average rating from the
implementation aspect obtained 4.00 which is categorised in the "very good" category. Overall, the average score obtained from the media expert, namely 3.63 and categorized as "very good". From these results, the media expert stated that this teaching material was feasible of being tested in the field with revisions.

Furthermore, a feasibility test for the implementation of the media was executed by the physics teacher of Terpadu Madani Model Junior High School Palu. The aspects assessed in the feasibility of this use were aspects of content delivery, linguistics, display quality, display design, and implementation. The average score of the assessment results from the aspect of content delivery is 3.00 with the "good" category. On the other hand, the average assessment from the linguistics aspect is 3.00 in the "good" category. Likewise, the average assessment from the aspect of display quality is 3.00 with category "good", and the average rating from the aspect of display design was 3.00 in the "good" category. Last but not least, the average score from the aspect of implementation obtained 3.00 which belonged in the "good" category. All in all, the average score of the feasibility test done by the teacher is 3.00 and is categorized as “good”. After the assessment was done by the content expert, media expert, and physics subject teacher, then the next stage was carried out by testing the students of their perspectives of the development of the physics learning media using wayang golek puppet in the form of videos. This was tested on 31 Grade VIII students of Terpadu Madani Model Junior High School. The purpose of carrying out this trial is to obtain a description of the students' responses to physics learning media using this developed puppet. The results of the analysis of student responses to this learning media using the ADDIE model developed, as the type of the statement is positive, then the score for each answer choice is as follows: 4 (strongly agree), 3 (agree), 2 (disagree), and 1 (strongly disagree).

The test was carried out on 31 students by filling out questionnaires that had 10 positive statement items with 4 options or choices. After conducting the analysis, it was obtained that the average score was 3.27, and based on Table 4.3 of the criteria for student response categories, the score is referred to the "strongly agree" category. From the results of the questionnaire which indicates the category of "strongly agree", it can be concluded that the physics learning media using wayang golek puppet videos that have been developed is suitable for use as a medium for learning physics because before the test was limited to 31 students of class VIII SMP Negeri Integrated Model Madani Palu, the video was first consulted with the supervisor with the intention of getting corrections and suggestions or video improvements. Then the video is improved according to the suggestions given. This is done repeatedly until the video is approved by the supervisor for validation to material experts, media experts, and subject teachers. Validation is carried out with the intention that this video that has been developed can identify its weaknesses and shortcomings so that the video is deemed suitable for use as a learning medium. This is in accordance with the results of research conducted by Zaenatun S, in his research concluding that the use of puppet props in learning to increase student activity and learning outcomes is declared suitable for use, where the use of puppet props is very effective and efficient in the learning process [27]. Anafi, in his research, shows that the implementation of learning using tools using puppet media shows that students have increased which is reflected in the enthusiasm of students in doing storytelling tasks [28].

This learning medium has its advantages and disadvantages in the research and development process, which meant that it requires a field trial phase. The advantages of this media include practicality in use, using case examples in everyday life, the convenience as the media can be used anytime and anywhere, as well as displaying interesting wayang characters, making it easier for students to better understand and attract students to learn physics. Media supports student independent learning and can help increase students' knowledge about wayang, which is indigenous Indonesian culture. The disadvantage of this media is that the puppets used are not made of leather but are only made of yellow cardboard.
subject teachers, and students. However, this of course cannot be separated from the limitations of researchers while carrying out this research, such as the lack of knowledge of researchers related to the process of making this media which resulted in a long time. Thus, it can be said that it is still in the learning process and continues to learn for development research.

4. Conclusion

Based on the results of the findings analysis and discussion above, several statements can be concluded from this study: The research on developing physics learning media using puppets is carried out based on the ADDIE model development steps, namely Analysis, Design, Development, Implementation, and Evaluation. The validation results provided by the content expert, media expert, and the subject teacher, as well as 31 students, stated that the product was valid and feasible for use.

As a result of the content expert analysis, an average score of 3.56 was obtained and it was categorized in the "very good" category, whereas the analysis of the media expert's assessment obtained an average score of 3.73 and was categorized as "very good". Additionally, the analysis of the feasibility test by the teacher obtained an average assessment score of 3.00, which was categorized as "good", and the results of the analysis of student questionnaire responses obtained an average score of 3.27 and were categorized as "strongly agree". This indicates that the product of physics learning media using wayang golek puppets developed can be used as a learning medium in the classroom.

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