Development of 3D Animation-Based Learning Media With a *Scientific* on the Sub-theme of Colonial National Events in Grade V of SD Negeri 085115 Sibolga

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Abstract. This study aims to: (1) determine the feasibility of scientific-based 3D animation video learning media on the sub-themes of colonial era national events at SD Negeri 085115 Sibolga. and (2) to find out the effectiveness of learning media based on scientific 3D animation videos on the sub-themes of colonial era national events effectively at SD Negeri 085115 Sibolga. This type of research is Research & Development (R&D) with a 4-D development model. The research method consists of two stages, namely the first stage to develop learning multimedia and the second stage to test the effectiveness of the product. The results showed that the teaching media product developed was very feasible. Assessment of student learning outcomes based on pretest and posttest analyzed using N-Gain obtained an average gain value of 0.7 which is included in the high category. with the results of being able to increase interest and activity as well as being effective for improving student learning outcomes.

Keywords: Research Development, 3D Animation Video Media and Scientific

1 Introduction

The use of technology in education is still considered low compared to other fields such as industry, agriculture, transportation and communication. This is the opinion of [1]Tirtarahardja and Sulo (2005:47). The lack of use of technology, especially informatics, can be seen from how learning is carried out in the classroom. There is still a lot of learning using conventional methods. Whereas in this era of globalization the development of science and technology is very fast, especially in the fields of transportation, telecommunications, informatics and so on. Especially in bringing up the historical events of the Battle of Sibolga Bay, actual media is needed that can bring students back to experience the events experienced by their regional heroes to increase children's nationalism in accordance with the locality of the surrounding area.

A wide selection of software today is required to produce visually appealing media. The ability to understand the nuances of the app and the creator's individual creativity are both necessary to produce engaging content. Lumions is a program for creating three-dimensional animated films. One of the features of this app is that it is free and easy to use. 3D animation media based

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on the Lumions application is a cartoon video that can be filled with subject matter and[1] is suitable for elementary school students because of its interesting nature and humorous appearance. As schools rely on teaching aids to make learning and teaching easier, there is a push to create better teaching media.[2]

Students abilities can be improved by using instructional videos that are packaged and optimized for function. Taking a scientific approach to education is considered an appropriate method of teaching and learning. The scientific approach to education places emphasis on students rather than teachers as the main source of information (teacher centered) with the stages of observation, asking, trying, processing data, and communicate [2]Hosnan, M (2014: 37-76). There are several factors that cause most students still have not reached the KKM. Teachers still use traditional methods such as lectures and individual assignments even though the 2013 curriculum is a reference in the learning process in elementary schools. If teachers want to implement that year's curriculum, at least they must be able to master the scientific learning model.

Students are easily bored during the learning process because of the unavailability of learning resources that incorporate 3D animation or other interesting videos. In the sub-theme of national events during the colonial period, teachers were less innovative in developing learning media, especially those related to the Battle of Sibolga Bay. Students have difficulty understanding what their teachers teach because teachers often lack the time and ability to explain complex concepts. Many students do not pay attention when the teacher tells them to listen to the book; this is seen when students are asked to answer questions about the content.

Thus, educators must constantly experiment with new ways of teaching. Teachers should consider using computer-aided learning media to help students better understand the material and shift the focus of learning from teacher to student. Unfortunately, many learning media out there are not in line with student expectations. Media coverage is aimed at the general public and does not take into account the special needs of the school that will use it, so examples and illustrations in the media do not refer to the environment, and are not in accordance with the school curriculum.

One way to develop teacher learning media is to use educational technology to create learning media for students. More and more studies have shown that students benefit greatly from media-based learning. As a result, educators are working harder than ever to create media that meet the specific learning needs of students. One of the purposes of making this 3D animated video learning media is to make it easier for teachers to deliver material and help students better understand the material they are studying. The increase in the average student learning outcomes in the social studies subject experimental class at SMP N 6 Banjarmasin [2]Rahmatutullah's previous research showed an increase in student learning outcomes by 2.33 but it also showed an increase in student interest in learning. and a desire to participate in class activities. Students are better able to understand social studies concepts if they are able to observe them in action. Summary It is now possible to show animated films in the classroom as a means to teach social studies concepts that were previously only shown in textbooks.

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[1] [1] Umar Tirtarahardja dan La Sulo : Pengantar Pendidikan, Jakarta: Rineka Cipta, hlm. 47.

[2] [2]Hosnan, M. (2014). Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21. Bogor: Gralia Indonesia.

[3] Rahmatulla, M. (2011). Pengaruh pemanfaatan media pembelajaran film animasi terhadap hasli belajar. Jurnal penelitian pendidikan VOl.1, No. 1. pp 178-186.

Researchers are trying to develop educational media in the form of 3D animated videos with a scientific approach on the sub-theme of national events during the colonial period, because the results of the overall needs analysis show that teachers need learning media in this sub-theme.

2 Research methodology

In this case, it is a form of *research and development* (R&D). The purpose of this research is to create an educational media that focuses on the national events of the colonial era. The process of product development and validation is part of educational development research. Researchers seek to develop products that can be used effectively in education through research and development. Lumion 3D animation learning media was developed as a result of this research to help students learn more effectively

To conduct this research, we collected data from students at SD Negeri 085115 Sibolga who were given 3D animation-based learning media with a scientific approach in class V. Learning media and test results learning is the main focus of learning. There are four stages in the device development process as described by Thiagarajan in [4]Trianto (2011:190): defining; designing; develop; and disseminate.

3 Research result

Using the 4-D Thiagarajan model in product development of learning media products based on 3D animation videos with a scientific approach to achieve products that meet the criteria of appropriate, valid, and effective learning media.

3.1. Description of Development Stages

3.1.1. Description of the Defining Stage

At this stage, an initial analysis of the learning process was carried out at SD Negeri 085115 Sibolga to identify the main challenges in developing 3D animated video-based learning media with a scientific approach. Observing classrooms full of students during the teaching and learning process and reviewing previous student learning outcomes on the sub-themes of colonial era national events enabled researchers to identify problems in the learning process. Student learning outcomes are low below the Minimum Mastery Criteria when teachers use lecture techniques and are assisted by little media, including whiteboards and powerpoint presentations.

Then, the researchers analyzed the needs and identified the initial characteristics and behavior of students at SD Negeri 085115 Sibolga through a questionnaire distributed to 2 teachers and 27 students. The questionnaire contains a description of the definition of a 3D animated video on the scientific-based sub-theme of national colonial events, which aims to give respondents instructions about what to ask in the questionnaire given.

The results of the questionnaire distribution were 100% of teachers and 100% of students stated that 3D animation videos on the scientific-based sub-theme of national colonial events were needed in learning. explains the needs of the following 3D animation video learning media:

a. most of the students (68.96%) stated that they were not familiar with the 3D animation video learning media based on process skills on the sub-theme of the colonial period national events. A small percentage (31.03%) of teachers and students stated that they were familiar with learning media based on 3D animation videos on -based sub-theme of national colonial *scientific*

b. 100% of the total number of teachers and students said they did not apply learning media based on 3D animation videos on [3]the *scientific*.

c. based sub-theme of colonial-era national events *scientific*.

Furthermore, the results of the analysis of the characteristics of students, namely students show a visual learning style. Students are more interested in participating in learning activities that stimulate themselves through visual learning that they can see directly. By studying students' reactions to learning media based on 3D animation videos, researchers can learn more about how students respond to visual information. The development of this learning media certainly displays visual material in the form of writing, attractive images and concept maps to make it easier for students to master the learning delivered.

In the end, it was determined that task analysis led to concept analysis. In addition, task analysis on the sub-themes of national events during the colonial period refers to the Competency Standards and Basic Competencies at that time. Each student receives a mix of individual and group assignments when they receive their assignments from the teacher. Independent assignments are given in the form of questions in class discussions and assignments as homework. For group assignments, students are given a Student Activity Sheet containing questions and each student in the group discusses the question by digging up information beforehand from the text presented in the student book that has been developed.

3.1.2. Description of Design Stage

After obtaining the problem at the definition stage, then the design stage is carried out. Designing a media that is used in learning is the goal of this design stage. This is based on the preparation of learning objectives as a benchmark for measuring student understanding in the form of products, processes, psychomotor during and after learning activities. There are a number of questions in the test related to the sub-theme of national events during the colonial period, which include 50 evaluation questions. The validity of the evaluation questions is sought after being compiled. In media, valid questions will be used to measure audience understanding. Two sets of evaluation questions were used in this study. There are a total of 20 questions in each section. In June 2022, 27 fifth grade students of SD Negeri 085115 Sibolga tested the validity and reliability of this learning media evaluation. There is an attachment with valid and reliable test results. 25 of the 50 questions tested for validity, discriminatory power and difficulty were declared invalid, so that only 25 questions were used; but only 20 questions were used because they represent all the indicators that have been created.

Student needs and material characteristics are considered when determining which media to use. Student analysis, concept and task analysis, user characteristics, and implementation plans can all benefit from media that combines attributes from multiple sources. Acquiring the desired basic competencies and skills becomes easier with this. Lumion 6.0 and other supporting software such as *Cyberlink Powerdirector, Recforth, and Google Earth* were chosen by the

[4] [3] Trianto. (2011). Mendesain Model Pembelajaran Inovatif- Progresif. Jakarta: Kencana Prenada Media Grup.

researchers in this study to be used in making learning media. As a result of the software's extensive support for educational media creation, the team decided to go with Lumion 6.0.

Figure 3.1. 3D Animation media (*Lumion 6.0 apps*)

The material in the 3D animation video has 2 choices given by students, namely the national events of the colonial period and the history of the Sibolga Sea Battle. In the sub-theme there are explanations related to the material, there are also videos that are relevant and related to clarify the material presented.

The 3D animation learning video role credits are evaluated at the end of the evaluation stage, along with the music and layout. Then 20 multiple-choice questions are provided on a piece of paper related to the material on the National Event of the Colonial Period which has been shown on the 3D animated video that has been shown.

Before proceeding to the next step, the product design should be tested. Colleagues, such as professors or teachers in the same field of study, validate product designs. While it is possible that the validated device still requires revision based on input from the validator, it turns out that minor process improvements are needed if deficiencies are found in the future, according to the results.

3.1.3. Description of Development Stage

Validation of the developed media is Obtaining an initial design of 3D animation-based learning media with a scientific approach on the sub-theme of the colonial period national events is the understanding of this development stage. The above is based on three aspects, namely, learning aspects, 3D animation media material aspects and evaluation aspects, shows the average value of each 4.33 on the learning aspect, 4.67 on the 3D animation material aspect and 4.40 on the evaluation aspect. Overall these three aspects are in the "very feasible" category, which means that the use of 3D animation media with a *scientific* meets the needs of students.

Assessment of media experts on 3D animation learning media with a *scientific*, The above is based on four aspects, namely the design display aspect, the image display aspect, the animation display aspect and the attractiveness aspect, shows an average value of 4.71 for the design display aspect, 5.00 for the image display aspect, 4.80 for the animation aspect and 4.50 for the attractiveness aspect and media principles in 3D animation learning media with a *scientific*, which overall are in the "very feasible"", so it can be said that 3D animation learning media with a *scientific* can provide convenience for students to obtain the desired information.

Assessment of design experts on 3D animation learning media with a *scientific*, the above is based on three aspects[4], namely aspects of media design quality, graphic aspects, and linguistic aspects, shows an average value of 5.00 for the quality aspect of media design, 4.50 for the graphic aspect, and 5.00 for the language aspect and media principles in 3D animation learning media with a *Scientific*, which as a whole are in the "*very feasible*" category according to the criteria for determining the score range percentage of assessment according to [5]Sriadhi (2018: 1-15), so it can be said that the media 3D animation learning with a *scientific* can provide convenience for students to obtain the desired information.

3.1.4. Deployment Stage Description

After going through the expert validation and feasibility stages, the effectiveness of the learning tools developed for 3D animation media were tested through the pretest and posttest learning outcomes at the final stage of development, namely the dissemination stage.results of the first trial obtained the following results:

Table 3.1. Data of mastery learning outcomes trial i

Number	Range Numbers	Frequency	Percentage	Criteria
1	70-100	19	70.37%	Completed
2	0-69	8	29.62%	Unfinished Completeness
Amoun		27	100%	

Based on the results of data analysis in table 3.1. obtained data on student learning outcomes in the first trial as much as 70.37% or 19 students were declared complete. Meanwhile, 29.62% or 8 people have not completed it. The increase in student learning outcomes can be seen from the value of N-gain. Calculation results using *Ms Excel* obtained an average *gain* 0.32.value *gain* is interpreted into the criteria for the *gain* which is in the medium category. With these results, it can be concluded that students who use learning media using *Lumion 6.0* can improve learning outcomes in the sub-themes of national events during the colonial period.

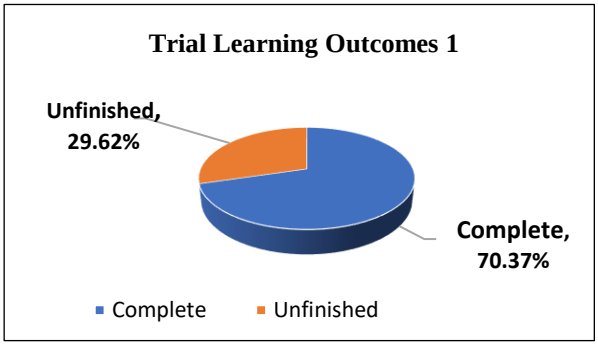

Figure 3.2 Mastery Diagram of Trial Learning Outcomes 1

The second trial needs to be done because there are still shortcomings that must be corrected, especially in the media section on the evaluation aspect where several problems were found. While the results of the second trial obtained the following results:

[4]Sriadhi, 2018. Instrumen Penilaian Multimedia Pembelajaran. Medan. Universitas Negeri Medan

Table 3.2. Result

Number	Range Numbers	Frequency	Percentage	Criteria
1	70-100	25	92.59%	Completed
2	0-69	2	7.41%	Unfinished Completeness
Amoun		27	100%	

Based on the results of data analysis in table 4.20 obtained data on student learning outcomes on the test try II as many as 92.59% or 25 students declared complete. Meanwhile, there are 7.41% or 2 people who have not completed it. Calculation results using *Ms Excel* obtained an average *gain* 0.70.value *gain* is interpreted into the criteria for the *gain* which is in the high category. Overall, the results of the second trial data analysis show that the 3D animation learning media with the *scientific* has met the effective criteria. Thus, it is known that the results of trial II are better than trial I.

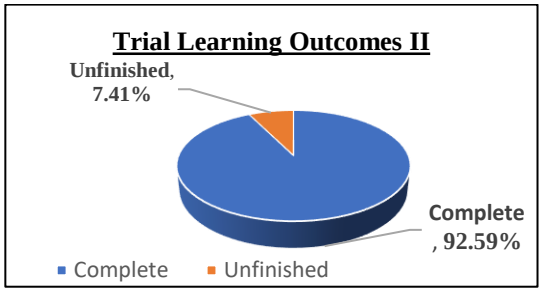

Figure 3.3 Mastery diagram of trial learning outcomes 2

This is because the learning media used in trial II is a revised learning media from learning media revision I, it can be concluded that the 3D animation learning media with the *scientific* developed has been effective.

4 Summary and Conclusion

Based on the results of the validation carried out, the 3D animation learning media product with a *Scientific* is declared suitable for use as learning media on the sub-theme of the colonial period national events to become an alternative learning resources, especially for fifth grade students on the sub-theme of colonial-era national events. Based on the results of validation and testing, 3D animation-based learning media with a scientific approach is very suitable for the sub-theme of national events during the colonial period. Thus, the media is very suitable to be used in the sub-theme of national events during the colonial period to support the effectiveness of the learning process. There are 4.23 media validation results and 4.26 media expert validation results in line with [6]Basori's research (2016).

Learning media is categorized as effective if students can understand the subject matter and student learning outcomes as expected. The percentage of classical completeness (PKK) of students was 88.89%. This PKK was obtained from the posttest of student learning outcomes after using 3D animation-based thematic learning media.

The increase in studen[5]t learning outcomes was analyzed using N-Gain obtained from pretest scores and posttest scores. The average gain of N-Gain is 0.70. The average is categorized as high because Gain > 0.70. Therefore, student learning outcomes increase after using 3D animation-based thematic learning media.

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