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Development of Renderforest-Kinemaster-Based Science Learning Media Using Problem-Based Learning (PBL) Models on Magnetic Materials in Class IX of SMP Negeri 1 Siau East

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ABSTRACT

This research aims to 1). Develop and produce Renderforest-KineMaster-based science learning media using the Problem Based Learning model on Magnetism material, 2). Knowing whether the Renderforest-KineMaster-based science learning media using the Problem Based Learning model on Magnetism material is appropriate for use, 3). Knowing whether the Renderforest-KineMaster-based science learning media using the Problem Based Learning model on Magnetism material is effective. This study uses a 4D development model. The research subjects were class IX students of SMP Negeri 1 Siau Timur. The results of this study are 1) Media is developed by making media in the Renderforest application and enhanced with Kinemaster. 2). Media feasibility based on validation from material experts 92, 5% and media experts is 98.3% and based on the results of the questionnaire assessment of students 96%. 3). Posttest results of students 83.75 with a learning completeness percentage of 87.5%. The results of this study indicate that Renderforest-KineMaster-based science learning media using the Problem Based Learning (PBL) model on Magnetism material in class IX SMP Negeri 1 Siau Timur is appropriate and effective for use in the learning process.

INTRODUCTION

Current technological developments continue to experience enormous improvements and extend to almost all aspects of life. Even now the world is entering the era of Society 5.0 or society 5.0. Quoted from the official website of the Cabinet Office (CAO) Japan, Society 5.0 or Society 5.0 is a concept where people are able to overcome various kinds of challenges and problems encountered by utilizing various innovations that were born in the era of the industrial revolution, one of which is the internet. The Internet or Interconnected Network according to the Big Indonesian Dictionary (KBBI) is an electronic communication network that links computer networks around the world via telephone and satellite.. Onno W. Purbo argues that the internet is a medium that provides an efficient communication process by linking it with various applications (Prihatna, 2005:7). So Internetis a global communication network that connects computers and computer networks around the world so that humans can communicate and give and receive various information from anywhere and with anyone.

During the Covid19 pandemic for about 2 years, the learning process at SMP Negeri 1 Siau Timur also took place online. Now, after the pandemic, the learning process has returned to normal, namely face-to-face at school. Based on the results of brief interviews with 5 students about what they felt when learning was carried out online and face to face at school, they answered that they preferred studying at school with their friends, but the teaching method by the teacher was still preferred at the time. online learning because it uses interesting learning videos/animations. The teacher's teaching method in the classroom is mostly the lecture method, as well as assignments from printed books, causing students to get bored when learning takes place.

This unpleasant learning situation requires teachers to challenge themselves to be more creative in preparing the learning process. If a teacher does not do the learning carefully, is too abstract, or rarely uses learning media, it can result in the student not understanding (Setyawan & Wahyuni, 2019).Learning media is an essential factor that can help the learning process to be carried out successfully (Paat, Tumbel, Mokalu, 2022: 3). Nofriyandi, et al (2021) argue that learning media is a very important element that is more dominant for any success of the teaching and learning system.One of the learning media that can attract the attention of students is learning videos. Because according to Anggraini, Yacob, & Hidayat (2019), the effective use of media is an effort to attract the attention of students so that students can learn well and can be meaningful for the students themselves. There are many learning videos that have been circulating on YouTube. But as creative teachers, of course we are required to make learning videos whose content is adapted to the conditions of the school and culture in our area. One of the online media that can be used to make learning videos is Renderforest. Meanwhile, an android application that is easy to use for editing learning videos is KineMaster.

Renderforestis an online media for making various videos, animations, presentations which was founded in 2013. The Renderforest application is an online-based application that can be developed by teachers to make fun learning videos according to the needs of students. With a variety of video templates and animation features, this application can produce videos that are attractive to students so that they are interested in watching videos and learning the material provided.KineMasteris a mobile app or mobile application created by Nex Streaming from the United States. This application runs on

Android and iOS operating systems which are available for free on smartphones or smartphones. KineMaster can be used to edit videos, add audio or record sound, add greenscreen videos, insert various kinds of transitions and animations and more. Based on research on the development of kinemaster-based video learning media that has been carried out by Jasman and Sudirman in 2021, individual, small group and large group product test results obtained scores above 90%. So it can be said that the Kinemaster application is very helpful for teachers in making video learning media.

Natural Science is the study of natural phenomena in the form of facts, concepts, principles and laws that have been proven correct. The development of science learning media must be adapted to the conditions of the learning environment and students. The learning model and media used must be in sync with the material to be taught because one learning media will not be suitable for all subject matter. One of the learning models that are suitable for science subjects is the problem-based learning model or Problem Based Learning. In PBL, the problems given are the core of learning that can be solved through group work or independently, so that students get a variety of learning experiences,

Based on an interview from a science teacher at East Siau 1 Public Middle School, learning media is still not used by teachers in the learning process due to limited media available at school and also material that is still not understood by students so that it requires interesting learning media, namely Magnetism material. . Magnetism material that studies the properties of magnets, how to make magnets and remove magnets, must need the right media to assist the teacher in conveying the material. Due to the lack of learning media in schools, teachers only teach based on printed books, and use the lecture method which results in all learning coming from the teacher alone so that students are still unable to understand the material and learning objectives cannot be fulfilled.

METHOD

This development research uses the 4D research method, namely Define, Design, Develop, and Disseminate.

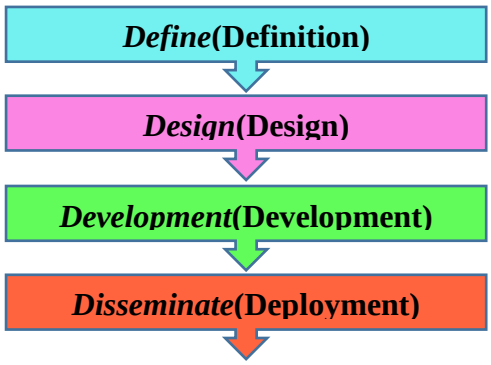

Figure 1. 4D Development Model Flow (Thiagarajan, DKK, 1974)

Define stageis the stage for defining the problems encountered and setting the terms of the learning process. The define stage has 5 steps, namely front-end analysis, learner analysis, task analysistask analysis), concept analysis (concept analysis) and formulation of learning objectives (specifying instructional objectives). Then enter the design or media design stage which consists of 4 steps, namely the preparation of the test, media selection, format selection, and initial design. After that enter the develop or development stage. At this stage the media will be validated by material experts and media experts to determine the eligibility of the media. After that the media will be tested on small groups and large groups. Students provide an assessment through a questionnaire instrument

to get the results of the feasibility of the media, and students are also given a pretest and posttest to measure the effectiveness of the media in the learning process.

The subject of this development research was class IX at SMP Negeri 1 Siau Timur. The small group limited trial consisted of 10 students and the large group consisted of 32 students. The material expert validators consisted of 1 Postgraduate Science lecturer at Manado State University and 1 Science teacher at East Siau 1 Middle School. The media expert validator is 1 lecturer in Postgraduate Science, Manado State University. The research was carried out in the even semester of the 2022/2023 school year.

Data Collection Instruments

The data collection instrument that will be used in this study is as follows:

a) Validity Sheet

The validity sheet is an assessment carried out by material experts and media experts to test the validity of the media being developed.

b) Questionnaire

The assessment questionnaire was carried out by students with the aim of obtaining students' responses to whether the media developed was effective

c) Test

The test used is the pretest to measure the extent of students' knowledge of the material to be studied and the posttest to measure students' abilities after the application of the developed media

Data Analysis Techniques

The data analysis technique used in this study was taken from the instruments provided and then analyzed according to the development research procedure

a) Learning Media Validity Analysis

Analysis of the validity of the learning media developed was obtained from the results of the assessment on the validity sheet which was filled in by material experts with assessment aspects in the form of aspects of Content Feasibility, Presentation Techniques and Language Feasibility, as well as the results of the assessment on the validity sheet filled in by media experts with assessment items Application Use, Display Media, and Visual Communication. Then the results are analyzed with the following steps:

- Tabulation of data by the validator obtained from 1 material expert lecturer, 1 media expert lecturer and 1 science teacher material expert at the school where the study was conducted. Data tabulation is done by giving an assessment score of 4, 3, 2 and 1 on the aspect being assessed. The formula used in this study is as follows:

$$\mathbf{P = \frac{\sum x}{\sum x_i} \times 100\%}$$

Information :

P = Percentage required

$\sum x$ = Number of answers from respondents

$\sum x_i$ = Total ideal value

100 = Fixed number

(Arikunto, 2006)

- Convert the average score obtained into a qualitative value in accordance with the evaluation of the product validity criteria of learning media development according to the following table:

Table 1. Product Validity Criteria

No.	Presentation (%)	Validity Criteria
1.	85 – 100	Very Valid (No Revision Needed)
2.	75 – 84	Valid Enough (No Revision Required)
3.	60–74	Less valid (Revised)
4.	0 – 59	Invalid (Revised)

(Jannah & Listyani, 2017)

- Analysis of data from student response questionnaires aims to determine the effectiveness and feasibility of learning media products developed. The student response questionnaire rating scale is as follows:

Table 2. Eligibility Criteria for Student Response Questionnaires

No.	Response Questionnaire Results	Validation Criteria
1.	3,1 - 4	Very Worth it
2.	2,1 - 3	Decent Enough
3.	1,1 - 2	Less Eligible
4.	0 - 1	Not feasible

b) Analysis of Learning Effectiveness (Student Learning Outcomes)

The effectiveness of learning is obtained from the learning outcomes of students in the form of a posttest. ForTo know the learning completeness of students, it is done using the following equation:

$$\mathbf{DP = \frac{F}{N} x\ 100\%}$$

Information :

DP = Percentage Number

F = Frequency/number of respondents' answers

N = Number of respondents

(Sudjana, 2009)

Calculates the average value and the percentage (%) of the average value by categorizing students' abilities, based on standard categorization techniques set by the department of education and culture. The effectiveness category uses the learning outcomes assessment criteria in the following table:

Table 3. Categories of Learning Outcomes

No.	Learning outcomes	Validation Criteria
1.	85 – 100	Very high
2.	65 – 84	Tall
3.	55 – 64	Currently
4.	35 – 54	Low
5.	0 – 34	Very low

(Arikunto, 2006)

c) Hypothesis testing

The hypothesis in this study consists of Ho and Ha where Ho is the development of Renderforest - Kinemaster-based learning media using the Problem Based Learning model cannot improve learning outcomes for class IX students of SMP Negeri 1 East Siau and Ha is the development of Renderforest - Kinemaster-based learning media with using the Problem Based Learning model can improve the learning outcomes of class IX students of SMP Negeri 1 Siau Timur.

RESEARCH RESULT

Defining Stage

At the definition stage, the researcher defined the problems faced at East Siau 1 Public Middle School, especially the science subject for class IX through interviews conducted with the teacher and 5 students. This is the initial step which is called the initial analysis. Researchers also conduct analysis on students, task analysis, namely what will be done and assigned to students, concept analysis, namely the selection of Basic Competences, and Competency Achievement Indicators and formulate learning objectives.

Design Stage

At this design stage, researchers began designing science-based learning mediaRenderforest-KineMaster on Magnetism material especially the first meeting. At this stage the researcher designed a knowledge assessment instrument, namely pretest and posttest, media selection and format selection so as to produce an initial product called Draft I. The researcher also designed validation sheets for material experts and media experts.

Development Stage

At the development stage, draft I will be validated by 2 material experts and 1 media expert.

Table 4. List of Validators

No.	Validator Name	Information
1	Dr. Djeli A. Tulandi, M.Sc	Material Expert
2	Wiranto J. Bororing, S.Pd	Material Expert
3	Dr. Meike Paat, M.Pd	Media Expert

The final validation results from the experts can be seen in the following table:
Table 5. Material Expert Validation Results

No	Aspect	Analysis	Validators	
			I	**II**
1	Content Eligibility	$\sum x_i$	38	38
		n	10	10
		$\bar{x}$	3,8	3,8
		Average	3,8	
		Percentage	95%	
		Information	**Very Valid**	
2	Serving Technique	$\sum x_i$	18	19
		n	5	5
		$\bar{x}$	3,6	3,8
		Average	3,7	
		Percentage	92.5%	
		Information	**Very Valid**	
3	Language Eligibility	$\sum x_i$	18	18
		n	5	5
		$\bar{x}$	3,6	3,6
		Average	3,6	

No	Aspect	Analysis	Validators	
			I	II
		Percentage	90%	
		Information	**Very Valid**	

The results of the average assessment of 2 media experts on the content feasibility aspect got a score of 3.9 with a percentage of 97.5% and very valid information, then for the presentation technique aspect got an average score of 3.7 with a percentage of 92.5% and description very valid, as well as on the language feasibility aspect, it gets an average score of 3.6 with a percentage of 90% and the description is very valid.

Table 6. Media Expert Validation Results

No	Aspect	Analysis	Validators
1	Application Usage	$\sum x_i$	20
		n	5
		$\bar{x}$	4
		Percentage	100%
		Information	**Very Valid**
2	Media View	$\sum x_i$	38
		n	10
		$\bar{x}$	3,8
		Percentage	95%
		Information	**Very Valid**
3	Visual Communication	$\sum x_i$	20
		n	5
		$\bar{x}$	4
		Percentage	100%
		Information	**Very Valid**

The results of the assessment from the media expert validator on the three aspects get very valid results with details on the aspect of application usage is 4 with a percentage of 100%, the media

display aspect gets a score of 3.8 with a percentage of 95% and the visual communication aspect gets a score of 4 with a percentage of 100%. .

Small Group Trial

Small group trials were conducted to test the feasibility and effectiveness of the product being developed by taking a sample of 10 students at the school where the research was conducted, SMP Negeri 1 Siau Timur. Small group trials were conducted on May 3, 2023. The results of the product effectiveness and feasibility questionnaire by students can be seen in the table below:

Table 7. Small Group Trial Questionnaire Assessment Results

No	Statement	SS (4)	S (3)	KS (2)	S 1)	Average score	%	Ket.
1	Statement 1	10	0	0		4	100%	Very worth it
2	Statement 2	1	9	0		3,1	77.5%	Very worth it
3	Statement 3	5	5	0		3,5	87.5%	Very worth it
4	Statement 4	9	1	0		3,9	97.5%	Very worth it
5	Statement 5	9	1	0		3,9	97.5%	Very worth it
6	Statement 6	8	2	0		3,8	95%	Very worth it
7	Statement 7	10	0	0		4	100%	Very worth it
8	Statement 8	8	2	0		3,8	95%	Very worth it
9	Statement 9	6	4	0		3,6	90%	Very worth it
10	Statement 10	9	1	0		3,9	97.5%	Very worth it
Average						3.	9	Very

					75	3.75%	worth it

Based on small group trials of the product being developed, it was found that the average of each statement was >75% and the overall average of the 10 statements was 3.75 with a percentage of 93.75% so that this product was declared very feasible to use.

Large Group Trial

Large group trials were conducted to test the feasibility and effectiveness on a large scale of the developed product. The trial was carried out at SMP Negeri 1 Siau Timur class IX.1 with a total of 32 students on May 9 2023. At this stage, apart from showing the developed media, students were also given an assessment questionnaire andpretest and posttest.

Table 8. Results of the Large Group Trial Questionnaire Assessment

No	Statement	SS (4)	S (3)	KS (2)	S 1)	Average score	%	Ket.
1	Statement 1	28	4	0		3.87	96.7%	Very worth it
2	Statement 2	20	12	0		3,62	90.5%	Very worth it
3	Statement 3	29	3	0		3,9	97.5%	Very worth it
4	Statement 4	32	0	0		4.0	100%	Very worth it
5	Statement 5	27	5	0		3.84	96%	Very worth it
6	Statement 6	27	5	0		3.84	96%	Very worth it
7	Statement 7	26	6	0		3.81	95.2%	Very worth it
8	Statement 8	28	4	0		3.87	96.7%	Very worth it
9	Statement 9	25	7	0		3.78	94.5%	Very worth it
10	Statement 10	30	2	0		3.93	98.2%	Very worth it
Average						3.	9	Very

	84	6%	worth it

Based on the results of trials conducted on large groups in class IX at SMP Negeri 1 Siau Timur consisting of 32 students, the average value obtained from each statement was above 85% and the average value of the entire statement was 3, 84 with a percentage of 96% so that this product is very feasible to use in the learning process. Thus it can be concluded that the video learning media product based on Renderforest - Kinemaster is very good and effective to use in the science learning process for class IX on magnetism at the first meeting.

Hypothesis testing

The results of the analysis of hypothesis testing using SPSS, show that the sig (2-tailed) value is 0.000. This indicates that 0.000 <0.05 so that the results of the pretest and posttest have a significant change. Based on the results of the T test analysis, it can be concluded that learning media based on Renderforest-KineMaster using the Problem Based Learning model is effective for use in learning in class IX at SMP Negeri 1 Siau Timur.

Deployment Stage

In the dissemination or dissemination stage, the researcher disseminates the product in the form of a science video learning media that has been developed by publishing it in a journal, then the product is burned on a disc and then stored in the school as one of the learning media at SMP Negeri 1 Siau Timur so that teachers -Science teachers can use it when needed and add learning resource assets at school. Then the product has also been uploaded on the YouTube channel of the researcher by embedding the researcher's name in the video, so that the copyright of the researcher is still listed in the video. The YouTube video link will also be shared with fellow teachers as learning material.

DISCUSSION

This learning media was developed by using an online application called Renderforest and an offline application called KineMaster. The researcher designs the media using renderforest, then refines it, namely adjusting slide to slide moves, adding a video of the researcher's face and adding audio and background music using the KineMaster application. After finishing editing, the video media is exported to the smartphone gallery in mp4 format. This learning media was developed using the PBL learning model so that in the video there are trigger questions that are relevant to everyday life which can create students' curiosity and invite students to think. The activities carried out in the video are included in the LKPD where students will think critically, collaborate with other students in working on the LKPD. In the learning process carried out, the researcher asked fellow teachers to make observations of attitudes towards students through attitude observation instruments, while the researchers made observations of skills on students through skills assessment instruments. Based on observations of attitudes made by fellow teachers, on the aspect of showing curiosity and enthusiasm with the learning media used, an average score of 3 was obtained, on the aspect of showing diligence and responsibility in learning and working both individually and in groups, an average score was obtained an average of 2.78, in the aspect of showing honest and critical nature in discussions, an average score of 2 is obtained,

The Renderforest-KineMaster-based science learning media is very valid based on an assessment by two material experts and one media expert with the percentage of validity in the aspect

of application use being 100%, the aspect of media display getting the percentage of 95% and the aspect of visual communication reaching the percentage of 100%. This is the result of the second stage of validation after the revision was carried out based on the first stage of validation. Furthermore, the media was tried out in small groups with a total of 10 students and received responses from students via a questionnaire with a result of 93.75%, which is very feasible for use in learning. In the large group trial with 32 students, the researcher presented the developed media and received student responses via a questionnaire, namely 96% with very appropriate information.

Effective video learning media is characterized by an increase in students' posttest scores from the pretest. Posttest and pretest consist of 5 multiple choice questions given to students after the learning process. The results showed an increase in students' completeness from the pretest and posttest. The pretest showed that the students' learning completeness was 18.75% and the posttest showed that the students' learning completeness was 87.5%. This shows an increase in student learning completeness of 68.75%.

CONCLUSION

Based on the results of research and development of Renderforest-KinMmaster-based science learning media using the PBL model on magnetism in class IX at SMP Negeri 1 Siau Timur, it can be concluded that:

1. Renderforest-KineMaster-based science learning media using the PBL model on magnetism material in class IX at SMP Negeri 1 Siau Timur was developed using a 4D development model which went through 4 stages, namely Define (definition), Design (design), Development (development) and Disseminate (dissemination) stages.
2. Science learning media based on Renderforest-KineMaster using the PBL model on magnetism material in class IX at SMP Negeri 1 East Siau is suitable for use in the learning process with the criteria obtained from the validation results of material experts and media experts is very valid
3. Science learning media based on Renderforest-KineMaster using the PBL model on magnetism material in class IX at SMP Negeri 1 Siau Timur is effective for use in the learning process based on the results of student responses to small group tests via questionnaires which show an average score of 3.75 with the percentage is 93.75% and in the large group test it shows an average score of 3.84 with a percentage of 96% and the learning outcomes of students through the posttest produce learning completeness with a percentage of 87.5%

SUGGESTION

Based on the development research conducted and the conclusions obtained, there are several suggestions as follows:

1. For students

It is recommended to use Renderforest-KineMaster-based science learning media on magnetism material in class IX to facilitate and assist in the learning process inside the classroom or outside the classroom.

2. For teachers

It is recommended to continue to develop oneself by learning to make learning media on other materials that still don't have media to use so as to increase teacher competence and add learning media in schools

3. For agencies

Recommendedagencies or schools support teachers in self-development so that they can improve the quality of schools because they have creative teachers, interesting learning media and students who are active in learning.

4. For further researchers

It is recommended to conduct similar development research but with different material but must match the learning media to be developed so that there will be many references in further learning media developments.

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