



Development of E-Masl Learning Media Based on Multimodus Representation Oriented to Ethno-Stem

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ABSTRACT

This study aims to describe the results of the development of E-MASL (Electronic Malind Science Learning) Learning Media based on multimodus representation oriented Ethno-STEM which is made in the form of animated videos. E-MASL learning media discusses the concept of science learning in the culture of the Malind tribe in the process of burning stones to make sago sep, which is related to science learning materials, namely heat and its transfer. This type of research is Research and Development (R&D) research and uses a 4D (four-D) development model. The results of this study indicate that the average score of the validators is 83.33% with the category of "Very Eligible". The results of the student response questionnaire were 92.62% with the category of "Very Eligible". Therefore, it can be concluded that the development of E-MASL learning media based on multimodal representation oriented to Ethno-STEM has been tested and is feasible to be tested, so that the products of this study can be used as science learning media.



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INTRODUCTION

Along with the development of the era that utilizes a lot of technology, it can bring education to develop [1]. The development of education can be seen from the learning process activities carried out in the classroom. When carrying out the teaching and learning process, an educator needs a learning resource that is used as a teaching medium to bring a subject [2]. One of the subjects that requires learning media is science learning. Natural Sciences is a lesson that studies natural sciences, which are around or in the environment where students are [3]. Science learning is not only learning by memorizing or passively listening to the teacher explaining and mastering the concept, but also by actively observing, experimenting or experimenting by students [4], [5]. So, the process of acquiring science knowledge can be conveyed.

Students often consider science learning as boring and difficult, so that students tend to avoid learning it. This is because the science learning that is studied is different from the science knowledge in the students' environment [6]. The science learning process should be able to make students feel directly the benefits of learning science through natural events that exist in their environment [7].

Science learning resources can be found and studied by students in the uniqueness and advantages of a region, where the region has a culture and tradition that is inherent in its local wisdom [8]. Each region has local wisdom with its own characteristics. One of the regions that has local wisdom characteristics that contain elements of science learning is Merauke Regency [9].

Merauke Regency is one of the regencies in Papua province. The indigenous tribe that inhabits Merauke Regency is the Malind tribe. With the many cultures of the Malind tribe, researchers believe that there is a culture that contains natural science values [10]. Natural science that cultivates and blends with daily activities is called a combination of natural science based on culture and natural science scientifically. If science learning carried out in schools can combine scientific science learning and science based on culture, it is hoped that students can understand the concept of science learning better [11].

Science learning taught by educators to students must also use various multi-representations of science in their teaching and learning activities. Multi-representation learning is learning that explains the same concept again in a different form [12]. The use of various different representations can make learning concepts easier to understand [13]. The existence of integrated science representations and students can understand the concept of science learning is what is called multimodus representation. Multimodus representation can meet the needs of students in understanding science learning because it can help students in their learning.

Learning that uses various representations of science can be taught with the advancement of technology. Utilizing this technology can motivate students to follow all learning processes, especially in science learning [14]. In addition, based on the results of interviews conducted by researchers with science teachers at one of the schools in the Merauke district, it was explained that currently there are no diverse learning media, especially in science learning media in schools that can be given to students. The science teacher said: "currently the learning process that we do is to deliver science lessons to students and give homework to be done". Students still do not understand the concept of science learning well, because there is a lack of diverse science learning media and the absence of contextual science learning media [15].

Through the results of the interview, science teaching and learning activities are carried out using learning media in the form of books and assignments, there are no other science learning media that are contextual, so that students do not understand the concept of science learning better. Science teaching and learning activities should be carried out with various types of learning media and can take advantage of technological advances in the form of internet networks used on smartphones which can be used as a means of delivering learning [16].

Based on the existing problems, a meaningful science learning media is needed that can be used easily by students. The learning media must attract the attention of students and can make them interested in learning, understanding, and mastering science concepts. The learning media used is adjusted by linking the science concepts studied with events

that are often found in their environment or which are equated with the customs or culture of the area where students live [17].

Science learning using an E-MASL learning media is the solution to the problem. E-MASL (Electronic Malind Science Learning) is a science learning media based on the Malind tribe culture using e-learning. E-learning is learning that is made by utilizing information technology for use in teaching and learning activities. With the use of information technology, the concept of science learning based on the Malind tribe culture can be used as a media that supports the learning process.

The E-MASL learning media is created using various multi-representations of science that are oriented in an Ethno-STEM manner. Ethno-STEM is learning based on Ethno, Science, Technology, Engineering, and Mathematics, where students can learn science concepts through their culture [18]. Ethno-STEM is a culture-based STEM learning that utilizes the environment and culture of the community as a learning resource. This Ethno-STEM-oriented learning is able to help students learn learning concepts appropriately by applying five disciplines that involve local advantages that are connected to the learning materials presented by educators [19]. Thus, learning using this media as a teaching tool is expected to provide an integrated understanding and meaning of the scientific information obtained by students. Thus, educational goals can be achieved through the implementation of an effective teaching and learning process.

The purpose of this research is to develop an E-MASL learning media that is oriented towards ethno-STEM, with the hope that it can become a media that makes it easier for students to understand science material, especially Physics.

METHOD

This study uses the research and development (R&D) method. Research and Development is a study used to produce a product to perfect existing products and can be accounted for. Research and development of E-MASL learning media refers to the 4-D model, there are four stages in the 4-D Model, namely the define, design, develop, and disseminate stages. However, this study only uses 3 stages, namely the define, design, and develop stages.

The first stage is defining. At this stage, the things that are done are from analyzing needs, literature review, Core Competency (CC) and Basic Competency (BC) analysis. Needs analysis is obtained from observation, interviews and literature to obtain information. Furthermore, reviewing materials or theories through literature review, CC and BC analysis then from all that has been obtained is used as a basis for compiling a guide to making E-MASL learning media.

The second stage is design. This stage creates a storyboard for the product developed in the form of an animated video that discusses the material of heat and its transfer, creates an arrangement or presentation of the material in the E-MASL learning media and designs a questionnaire sheet statement that will be validated to test the feasibility of the product developed. The questionnaire statement is made in 2 (two) aspects of product validity assessment, namely the product validity assessment aspect and the product attractiveness assessment aspect. The product validity assessment aspect is used to determine the feasibility of the product being developed. This aspect is assessed by two lecturers and teachers as users. The product attractiveness assessment aspect is used to determine the response of students after using the E-MASL learning media.

The third stage is development. What is done at this stage is to continue from the previous stage, namely the development of E-MASL learning media through a product validation process. After validating the product to determine the quality of the product, the next step is to revise the product and distribute an attractiveness questionnaire to determine the feasibility of the product. The indicators of the success of the feasibility of E-MASL learning media can be seen in Table 1.

Table 1. Success Indicators of E-MASL Learning Media

Percentage Range	Quality Criteria
$81,26 \% \leq Dp \leq 100 \%$	Very Eligible
$62,51 \% \leq Dp \leq 81,25 \%$	Eligible
$43,76 \% \leq Dp \leq 62,50 \%$	Less Eligible
$25 \% \leq Dp \leq 43,75 \%$	Not Eligible
$10 \% \leq Dp \leq 24,99 \%$	Very Uneligible

RESULTS AND DISCUSSIONS

Needs Analysis

Based on the results of interviews with teachers, it was obtained that science learning is still in the form of books and assignments, there is no diverse and contextual science learning media. In addition, it was found that students still do not understand the concept of science learning, due to the lack of science learning media and the absence of contextual science learning media. This is supported by the researcher's observation that the school still does not have various types of learning media, especially science learning media as a source of learning for students.

Development of E-MASL Learning Media

Product development is arranged based on the storyboard structure and uses the help of the Animaker website to create animations, and the Kinemaster application to edit and present learning materials. Product development is carried out according to the design that has been made. The results of the E-MASL Learning Media Product design can be seen in Table 2.

Table 2. Product Section

No	Part	Information
1	Introduction	Opening greetings, delivery of learning objectives, and apperception before starting learning
2	Content	Learning materials, namely heat and its transfer. Discussing examples of heat and its transfer in everyday life and in the local culture of the Malind tribe in the process of burning stones to make sago sep, as well as sample questions.
3	Closing	Summary and closing remarks

Validation Results and Interest Questionnaire

The product was validated by 3 validators consisting of 2 validators by lecturers and 1 teacher validator as a user who was assessed from the material and media aspects. The assessment of product attractiveness was carried out by filling out a questionnaire sheet of student responses to the E-MASL learning media which was assessed from the aspects of media use, usage reactions, and supporting facilities.

Eligibility Test by Validators

The validators examine the E-MASL Learning Media with 2 aspects, namely the material aspect and the media aspect. Furthermore, the validators will provide suggestions and comments on the validation sheet. The results of the validation that has been carried out can be seen in Table 3.







Table 3 Results of the E-MASL Learning Media Feasibility Test

Validator	Mark	Average Score	Category
I	107		
II	122	83,33	Very Worth It
III	146		

Validator Revision

After product validation has been carried out and received suggestions and comments from the validator to revise the product that has been developed. The suggestions and comments given by the validators related to the E-MASL Learning Media product that was developed can be seen in Table 4.

Table 4. Validator Revisions

Validator	Revision	Before Revision	After Revision
Validator I dan II	The Ethno-STEM points are displayed, and the video layout is changed.		
Validator I	Change Font		
Validator II	Change background		

Validator	Add		
I	summary		

Results of the Trial of the Attractiveness of the E-MASL Learning Media Product

The purpose of the trial of the attractiveness of this product is to determine the feasibility of the E-MASL learning media. The questionnaire on the attractiveness of the product or the students' responses to the E-MASL Learning Media was conducted by students in grade VII, with a total of 26 respondents. which was reviewed from the aspects of media use, reaction to use, and supporting facilities. The results of the trial of the attractiveness of the product can be seen in Table 5.

Table 5. Results of the Trial of the Attractiveness of E-MASL Learning Media Products

Learners	Score	Learners	Score
1	55	14	52
2	60	15	54
3	57	16	50
4	60	17	58
5	50	18	60
6	58	19	51
7	52	20	48
8	54	21	56
9	58	22	60
10	57	23	60
11	54	24	56
12	56	25	58
13	54	26	57
Average Score		92,62	
Category		Very Worth It	

Based on the results of the product attractiveness trial analysis, an average score of 92.62 was obtained with the category "Very Eligible". E-MASL learning media based on multimodus representation oriented Ethno-STEM is a media that can help students in their learning activities. This is in line with previous research which states that learning media that have multiple representations in delivering learning materials can help students to learn [20], [21] and learning that links Ethno-STEM can improve students' understanding of learning materials [18].

The E-MASL (Electronic Malind Science Learning) learning media developed is a science learning media that discusses science learning based on Malind tribe culture using e-learning. E-learning is learning that is made by utilizing information technology for use in teaching and learning activities, one of which is the use of smartphones.

The E-MASL (Electronic Malind Science Learning) learning media developed is a science learning media that discusses science learning based on Malind tribe culture using e-learning. E-learning is learning that is made by utilizing information technology for use

in teaching and learning activities, one of which is the use of smartphones.

E-MASL learning media is made in the form of animated videos. This animated video discusses the material of heat and its transfer for grade VII junior high school students. The material of heat and its transfer discusses the concept of scientific science learning and the concept of science learning based on the culture of the Malind tribe, namely in the process of burning stones to make sago sep which can be used as a medium that supports the learning process.

The E-MASL learning media in the form of animated videos is made based on multimodus representations that are oriented towards Ethno-STEM. The existence of multimodus representations which are the right representations to explain each part of the concept of the five disciplines owned, both in ethno, science, technology, engineering, and mathematics (Ethno-STEM). The representations used can be in the form of text, sound, images, videos, animations, which aim to make it easier for students to understand the concept of science learning materials better. So, students can understand that science learning can be found in real life.

Loading Ethno-STEM means consisting of the field of ethnosience (ethno) which is contained in the explanation of making sago sep related to heat material and its transfer. The field of science (science) is contained in the concept of heat and its transfer, both by conduction, convection, and radiation. The field of technology (technology) is contained in the tools used to cook sago sep, as well as the presentation of E-MASL learning media which is accessed using a smartphone. The field of engineering (engineering) is contained in the heat transfer experiment in making sago sep as an example of the application of heat transfer. The field of mathematics (mathematics) is contained in calculations using heat equations and its transfer.

CONCLUSION AND SUGGESTION

The conclusions that can be drawn from the results of the research and development of E-MASL learning media based on multimodus representation oriented to Ethno-STEM are: (1) based on the results of the validation sheet assessment of the E-MASL learning media based on multimodus representation oriented to Ethno-STEM that was developed, it was concluded that the E-MASL learning media that was developed was very feasible. (2) based on the results of the assessment of the product attractiveness questionnaire for the E-MASL learning media based on multimodus representation oriented to Ethno-STEM that was developed, it was concluded that the E-MASL learning media that was developed was very feasible.

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