DEVELOPING OF INTERACTIVE MATHEMATICS LEARNING MEDIA BASED MACROMEDIA FLASH 8 ON THE SUBJECT OF POLYHEDRON OF CLASS VIII SMP

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ABSTRACT

Mathematics is a basic science that is very important and beneficial to the development of science and technology. The use of learning media based on technology becomes a tool alternative for teachers in presenting the subject of mathematics. The polyhedron subjects still considered difficult for some students. Learning media based on Macromedia Flash Profesional 8 is expected to be facilities that support learning. This research is a development that aims to produce instructional media using Macromedia Flash Profesional 8 in learning mathematics on the subject of polyhedron of class VIII SMP. This development study using the ADDIE development model that is Analysis, Design, Development, Implementation, Evaluation. Subjects were matter experts, media experts, and junior high school students of Muhammadiyah 2 Godean and Muhammadiyah 1 Gamping. The instrument used in this study is a questionnaire. The data analysis technique conducted qualitatively and quantitatively to calculate the results of the feasibility test score developed in instructional media. Based on the quality of every aspect of learning media, results of research-based math learning media development of mathematics learning media based on Macromedia Flash 8 is from materials experts with excellent category, an average score is 96,67 from media experts with excellent category, an average score is 90, and the response of students with excellent category with an average score of 87,09. Based on the assessments, then the media-based mathematics learning Macromedia Flash 8 is very feasible to use in learning.

Keywords: Polyhedron, Learning Media, ADDIE

INTRODUCTION

Learning media is a tool or intermediary used to facilitate the teaching and learning process and make communication effective between teachers and students (Simamorang, R.H: 65). The use of instructional media should be part of the attention of the teacher in learning activities. Learning media consists of various types. Learning media needed now are media that can display particular objects such as sound, moving images, and three-dimensional objects. According to Arsyad (in Suseno, P. et al., 2013: 9), The more sensory devices are used to receive and process information, the more likely the information is understood and retained in memory. One learning that requires visualization of three-dimensional objects is material to polyhedron in class VIII. One of the media that can be used by teachers in learning to increase student attractiveness is interactive learning media using Macromedia Flash Professional 8.

However, these schools are still lacking in organizing mathematics learning using media. That is due to the incomplete learning media, especially on the material of polyhedronwhich can help the learning process. Mathematics is a basic science that is very important and beneficial for the development of science and technology. The use of technology-based learning media makes one alternative as a tool for teachers in delivering mathematics material. According to Hainich (in Rudi, and Riyana, 2009: 6), The media is a means of communication channels. The media comes from Latin and is a plural form of the word medium, which means intermediary that is the intermediary of the source of the message (a source) with the recipient of the message (a receiver).

Mathematics itself is debauchery, According to Joseph and Rising (in Offirstson, T, 2014: 22) says that: Mathematics is a pattern of thinking, organizing patterns, and logical proof, mathematics is a language that uses terms that are defined carefully, clearly, and accurate, its representation is symbolic

and concise, rather than symbolic language about ideas rather than sounds. Learning media that can be used in mathematics learning has various types: interactive multimedia, interactive multimedia learning (interactive multimedia-based learning), game applications, and others. Widaksono, D and Hakim, S (2011: 48).

METHODS

The model of this research is development research. This study's research development is the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). This study aims to produce learning media based on Macromedia Flash 8 on polyhedron material for junior high school students, which is packaged in Compact Disk (CD). This research was conducted at Muhammadiyah 2 Godean Middle School and Gamping 1 Muhammadiyah Middle School from August to September 2017. The subjects in this study were 29 Grade VIII students of SMP Muhammadiyah 2 Godean and 30 students of SMP Muhammadiyah 1 Gamping. The ADDIE development model listed in Benny A. Persons (2011: 176) has the plot illustrated in the following figure, (1) Analysis, (2) Design, (3) Development, (4) Implementation ((5) Evaluation (Evaluation). In this study, there are three types of data used, namely:

a. Observation. In this study, the observation was carried out by observing directly about the state of the school as well as the state of the students who were going to do a trial.
b. Questionnaire. The questionnaire in the research and development of instructional media is given to the validator to assess product development.
c. Interview. Interviews were conducted to obtain data directly related to the responses and facts in the field.
d. Data analysis technique. The data analysis technique used in this study is a qualitative descriptive analysis technique, which describes the results of product development in the form of a mathematics learning media based on Macromedia Flash 8.

1) Descriptive Analysis Process. In this step, there are several more steps, namely: collecting data, displaying data, data reduction, Verification, and interpretation of data.
2) Questionnaire Analysis Process. Data obtained through a questionnaire by media experts, material experts, and students will be converted into qualitative values.

Table 1. Rules for Scoring

Information	Score
Strongly agree	5
Agree	4
Not agree	3
Disagree Disagree	2
Strongly Disagree	1

Fahmi, Syariful (2016: 38)

From the data that has been collected, the average will be calculated using the formula:

$$M = \frac{\sum_{i=1}^{n} X}{N}$$

Information:

M: Average score

$\sum_{i=1}^{n} X$: Total score

N : Number of researchers

Furthermore, the data obtained from both media experts, material experts, and students are converted into qualitative values based on ideal evaluation criteria.

Table 2. Criteria for Ideal Rating Categories

No.	Quantity score range	Qualitative category
1	$M > M_i + 1{,}8\ SB_i$	Very good
2	$M_i + 0{,}6\ SB_i < M \leq M_i + 1{,}8\ SB_i$	Good
3	$M_i - 0{,}6\ SB_i < M \leq M_i + 0{,}6\ SB_i$	Enough
4	$M_i - 1{,}8\ SB_i < M \leq M_i - 0{,}6\ SB_i$	Less
5	$M \leq M_i - 1{,}8\ SB_i$	Very less

Fahmi, Syariful (2016: 38)

Information:

$M_i = \frac{1}{2}$ x (ideal maximum score + ideal minimum score)

$SB_i = \left(\frac{1}{2} \ x \ \frac{1}{3}\right)$ x (Ideal maximum Score - Ideal minimum Score)

M_i = ideal average

SB_i = ideal standard deviation

Ideal maximum score = number of items criteria x highest score.

Ideal minimum score = number of items criteria x lowest score.

In this analysis, the highest score is five, and the lowest score is 1.

The feasibility of instructional media is determined by calculating the average score obtained from the validation of media experts, material experts, and student responses. The average score of the validator is then matched with the following learning media eligibility table criteria:

Table 3. Learning Media Eligibility Criteria

No.	Quantity score range	Qualitative category	Category
1	M > 84	Very good	Very decent
2	68 < M ≤ 84	Good	Worthy
3	52< M ≤ 68	Enough	Very decent
4	36 < M ≤ 52	Less	Very decent
5	M ≤ 36	Very less	Very decent

Table 4. Eligibility Criteria for Learning Materials

No.	Quantity score range	Qualitative category	Category
1	M > 88,2	Very good	Very decent
2	71,4< M ≤ 88,2	Good	Worthy
3	54,6< M ≤ 71,4	Enough	Very decent
4	37,8< M ≤ 54,6	Less	Very decent
5	M ≤ 37,8	Very less	Very decent

Table 5. Criteria for Media Feasibility by Student Responses

No.	Quantity score range	Qualitative category	Category
1	M > 84	Very good	Very decent
2	68 < M ≤ 84	Good	Worthy
3	52 < M ≤ 68	Enough	Very decent
4	36 < M ≤ 52	Less	Very decent
5	M ≤ 36	Very less	Very decent

After the data is analyzed, it will be known how the feasibility of learning media is made.

3) Feasibility Indicator. This research is said to be successful if the eligibility criteria by media experts reach a minimum score higher than 68 (feasible), by material experts achieving a score higher than

71.4 (feasible), and by a minimum student response reaching a score higher than 68 (feasible). Then the interactive mathematics learning media product is declared worthy of being a learning bucket.

RESULTS AND DISCUSSION

This learning media development research is carried out through the following steps: (a) Analysis, (b) Design, (c) Development, (d) Implementation, (e) Evaluation (Evaluation). From the analysis of the situation, materials, and technology in Muhammadiyah 2 Godean Middle School and Muhammadiyah 1 Gamping Middle School, the learning media that will be developed are media material to polyhedronfor VIII grade students of SMP. The initial design results are a description of the learning media that will be made and how the flow in the learning media will function. Media development is the process of translating the design of instructional media into actual appearance. In the development process, validation and limited trials are also carried out on the product. The trial was conducted on 29 students of Muhammadiyah 2 Godean Middle School and 30 students of Gamping 1 Muhammadiyah Middle School. The researcher presented this learning media in the learning process. After completing using the learning media, researchers distributed student response questionnaires to determine students' responses to the learning process using learning media. The assessment gives several parts, namely the quality of instructional media based on material aspects, the quality of instructional media based on aspects of media appearance, and students' responses to learning media.

The results of the product trial resulted in the feasibility of instructional media carried out by three material experts, three media experts, and students of Muhammadiyah 2 Godean Middle School and students of Gamping Muhammadiyah 1 Gamping, who assessed the learning media as a polyhedron. The following are the results of the media assessment.

Table 6. Results of the Questionnaire Calculation of Material Expertise

No	Assessment	Total score	Qualitative Category
1	Expert Material 1	97	Very Good
2	Expert Material 2	95	Very Good
3	Expert Material 3	98	Very Good
	Average score	96,67	Very Good

Based on Table 6, it can be seen that the average score of the material expert assessment is 96.67. These results indicate that the learning media developed were seen in terms of the material included in the excellent category.

Table 7. Results of the Questioning Questionnaire for Feasibility of Media Experts

No	Assessment	Total score	Qualitative Category
1	Expert Material 1	90	Very Good
2	Expert Material 2	87	Good
3	Expert Material 3	93	Very Good
	Average score	90	Very Good

Based on Table 7, it can be seen that the average score of the results of the assessment of media experts is 90. The results indicate that the developed learning media in terms of media are included in the excellent category.

Table 8. Results of Calculation of Questionnaire Student Response in Limited Trials

No	Assessment	Total score	Qualitative Category
1	SMP Muhammadiyah 2 Godean	88,20	Very Good
2	SMP Muhammadiyah 1 Gamping	87,80	Very Good
	Mean	88,00	Very Good

After a limited trial, a large class trial is conducted.

Table 9. Results of Calculation of Student Response Questionnaire in Large Class Trials

No	Assessment	Total score	Qualitative Category
1	SMP Muhammadiyah 2 Godean	86,17	Very Good
2	SMP Muhammadiyah 1 Gamping	88,00	Very Good
	Mean	87,09	Very Good

Based on Table 9, it can be seen that the results of the calculation of the average response of students in a limited trial of the two schools are 88.00, so that the learning media developed are included in the criteria very well. While in table 9, it can be seen that the results of the calculation of the average student response to the large class test of the two schools are 87.09. So the learning media developed are included in the criteria very well. Thus the learning media developed to have very good quality, meaning that the learning media produced are suitable for use in the learning process.

CONCLUSION

Based on the results of research and discussion, it was gathered that the learning media fulfilled three aspects of the assessment of the quality of the feasibility of the media that had been developed with an assessment based on (a) Material worthiness in the learning media by material experts with an average score of 96.67 and a percentage of 87.88% which shows very good category. (b) In the aspect of the appearance of instructional media assessed by media, experts obtained an average score of 90 and a percentage of 90% with a very good category. (c) The technical aspects assessed based on student responses obtained an average score of learning media 87.09 and a percentage of 87.09% with a very good category. Thus the learning media in the form of Compact Disc learning developed is feasible to be used in mathematics learning.

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