

# The development of Mathematics Learning Media Using Macromedia Flash Software

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## The Development of Mathematics Learning Media Using Macromedia Flash Software

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### Abstract

This study aims to develop mathematics learning media using Macromedia flash software at Junior High School 5 Palopo. The research aimed to assess validity and practicality standards on the mathematical learning media development through the Macromedia flash. The study implemented ADDIE (Analysis, Design, Development, Implementation, dan Evaluation) development model throughout Research and Development (R&D). The research subject is Junior High School VII Palopo's students, who used Macromedia flash for mathematics learning. The research data is collected through 2 questionnaires: validity and practicality. Thus, the research data is elaborated using qualitative and quantitative descriptive analysis. The research outcomes then feature Macromedia flash utilization on the mathematical learning process at students of Junior High School is genuine and likely to succeed in real learning circumstances which are occurred by validator's outcomes with an average score of 88.91%, and student's response with an average score of 83.74%. All of the information above concludes the product category is highly beneficial.

**Keywords:** Learning Media; Macromedia Flash.

## INTRODUCTION

Education is very influential on technological progress, and the results of technological developments have long been used, especially in education. Through education, humans can find out what is not yet known. Technology can improve the quality of student learning; besides, advances in science and technology have affected the use of teaching aids in schools (Agung Alghifaari et al., 2021). Rapid technological developments can be used to overcome mathematics problems that require media to visualize abstract objects in the learning process (Meilinda et al., 2019). One of the uses of technology in education is mathematics learning media. Mathematics is one element in education. Mathematics, as a field of science is a tool for thinking, communicating, and solving various practical problems, the elements of which are logic and intuition, analysis and construction, generality and individuality. Thus, the role of mathematics is significant as logic or reasoning and quantitative solutions that can be used for other lessons (Anwar & Anis, 2020). Learning media is a tool that serves to convey information. Various forms of information can be conveyed through learning media, both in the form of text, images, graphics, photos, audio, and animation. The important role of using learning media in developing and improving learning is that the delivery of learning messages can be more standardized, learning can be more interesting and interactive, learning implementation time can be efficient, learning quality can be improved, and the learning process can take place whenever and wherever needed, positive attitude of students towards the material and the learning process can be improved, and the teacher's role is changing in a positive direction (Septian et al., 2021).

In the field of education, especially in the learning process, various problems are often found, including in learning mathematics. One of the problems that students often face is the material of flat shapes, where students cannot answer questions about shapes or images, properties, and formulas of

flat shapes. This is in line with the results of interviews conducted with mathematics teachers at SMPN 5 Palopo on March 8, 2021, which stated that students' understanding of flat-shaped materials tends to be low because students cannot quickly understand the explanations given by the educators that are broadly related. Circumference, corner points, sides, edges on flat shapes, and the unavailability of learning media that emphasizes information technology. Besides that, the teaching materials used by educators still use printed teaching materials. Besides that, the incompatibility of using learning media on the material causes the learning process not to run well. This is because educators still rarely use learning media/software, one software that can be used to develop and improve mathematics learning using *Macromedia flash*. *Macromedia flash* is a software developed by Adobe, and this software is designed to create vector-based animations. *Macromedia flash* can create applications equipped with various kinds of animation, sound, interactive animation, and others. Through *Macromedia flash*, the learning process can be carried out well. Learning with this multimedia will allow students to explore new things they have encountered. Experts declared Flash-based interactive multimedia valid and supported by a percentage of mathematical communication ability test completeness of 85.59% so that the learning multimedia developed was feasible to use and met the valid, practical, and effective criteria (Hotimah et al., 2021). Therefore, using *Macromedia flash* is very helpful for educators in explaining the expected learning material. Students find it easier to understand and remember the material being taught, strengthen the material to answer practice questions, and can help students be motivated by new experiences. Macromedia Flash-based mathematics learning media has several advantages, including assisting teachers in preparing teaching materials and conducting learning, improving students' mathematical communication skills, visualizing abstract learning materials to be more real, and increasing students' conceptual understanding (Masykur et al., 2017).

Based on the problems that occur, the formulation of the problem raised in this study is whether the development of mathematics learning media using *Macromedia flash* meets the valid and practical criteria.

## METHOD

**2**  
This research is a research and development. The development model used is the ADDIE development model (*Analysis, Design, Development, Implementation, and Evaluation*) (Sugiyono, 2019). The subjects in this study were seventh-grade students of Junior High School 5 Palopo. The object of this research was a *Macromedia flash*. The research location was Junior High School 5 Palopo, Jalan Domba, Temmalebba Village, Bara District, Palopo City, South Sulawesi Province. This study used a limited trial of 10 students.

**3**  
The steps that must be taken in researching the ADDIE development model are as follows:

### Analysis

The analysis phase aims to analyze the need for developing mathematics learning media using Macromedia flash. This stage includes two main steps: the first needs analysis and the second curriculum analysis.

### Design

At this stage, the researcher creates or designs learning media, starting from designing learning media to make it look attractive, which can make students interested in learning media.

### Development

At this stage, make a product, namely learning media based on Macromedia flash, based on the results of product designs that have been made in the previous stage. Then tested, the validity of the learning media by experts.



### Implementation

Field trials at schools were used as research subjects to test the quality of mathematics learning media using Macromedia flash.

### Evaluation

At this stage, there were two kinds of evaluation: formative and summative. Formative evaluation is carried out to collect data at each stage for refinement, and summative evaluation is carried out at the end of product observation to determine the development quality.

The data collection technique used was in the form of a questionnaire consisting of a validation questionnaire and a practicality questionnaire. The validity data analysis technique is from tabulation by media experts and learning media material experts, and the formula seeks the percentage:

$$\text{persentase} = \frac{\sum \text{skor per item}}{\text{skor maksimum}} \times 100\%$$

Based on the percentage results then categorized according to the following table:

**Table 1.** Categorization of Validation (Munir, 2018)

%	Category
0-20	Invalid
21-40	Less Valid
41-60	Sufficiently Valid
61-80	Valid
81 -100	Very Valid

Practical data analysis technique, namely from the tabulation results by students, the presentation is sought by the formula:

$$\text{persentase} = \frac{\sum \text{skor per item}}{\text{skor maksimum}} \times 100\%$$

Based on the percentage results then categorized according to the following table:

**Table 2.** Categorization of Practicality (Munir, 2018)

%	Category
0-20	No Practical
21-40	Less Practical
41-60	Quite Practical
61-80	Practical
81-100	Very Practical



## RESULT AND DISCUSSION

### Result

#### Analysis Phase

Based on the results of interviews with researchers at SMPN 5 Palopo, there are several problems faced by most students in the mathematics learning process, namely not understanding the explanations given by educators, especially in the flat-shaped material and the unavailability of learning media that emphasizes IT, besides the teaching materials used are still using printed teaching materials. In addition, educators rarely use multimedia/software learning media and have never used media in the form of *Macromedia flash* in the learning process. The incomplete use of teaching tools owned by educators is an obstacle for educators to implement learning. The researchers developed mathematics learning media using *Macromedia flash* based on these problems.

Curriculum analysis found that the curriculum used at SMPN 5 Palopo is the 2013 curriculum.

#### Planning Phase

Designing media, at this stage, is done to make designs related to interactive learning media using *Macromedia flash*. In creating a design to be developed into a mathematics learning media, several components need to be included in the learning media so that the arrangement is neat and systematic and the learning objectives are achieved.

Instrument Design the instruments designed are in the form of validation sheets and practicality questionnaires. Validation sheet and practicality questionnaire containing statements related to learning media using *Macromedia flash* in the form of a checklist

#### Development Phase

The initial design includes the design of the media used to obtain data used in the development process. The initial design of learning media refers to the results carried out at the analysis stage and other stages before. In this initial design, the learning media that will be developed contains several contents, including an opening page, navigation page, basic competency and indicator pages, material type pages, square material pages, rectangular material pages, triangle material pages, rhombus pages, parallelogram pages, trapezoidal yard, and kite yard.

The validity of the learning media, this validation was carried out to know the level of validity of the learning media using *Macromedia flash*. Validators validate material and media validity aspects; the results of expert validation in the form of suggestions and input are used as the basis for revising this learning media. The names of validators who validate the mathematics learning media that have been developed include Rosdiana, ST, M. Kom., Isradil Mustamine, S. Pd., M. Pd., Hj. Dwi Pujihastuti, S. Pd., MM.

Based on the test results of Experiments carried out on experts, the results of the assessment of the *Macromedia flash* are as follows.

**Table 3.** Data Validation

Aspects Assessed		Score		
		Media Experts 1	Media Experts 2	Media Experts 3
Material validity	The truth of concepts and materials	3	3	3
	The material sequence procedure is clear	4	4	4
	Following the 2013 curriculum	4	3	4
	The division of material is clear	4	3	3
	The material presented follows essential competencies	3	4	4
	The material presented follows the indicators	4	3	4

	Names, materials, and images can be clearly understood	4	3	4
	The suitability between the images and the material	4	4	4
	The explanations presented do not cause multiple interpretations	4	3	4
	The order of the material is clear	4	4	4
Validity of media	Ease of operating learning media	3	4	4
	Navigation buttons on instructional media work correctly	4	4	4
	The color display on the <i>background</i> of the learning media is appropriate so that it looks attractive	3	3	3
	The layout of the images on display is appropriate to facilitate an understanding of the material	3	3	3
	The layout of the directions on display is correct, making it easier to operate	4	3	3
	The drawn image Show clear and easy to understand	4	3	3
Total score		59	54	58
Average score		3.68	3.37	3.62
Percentage score		92	84.25	90.5
Category		Very valid	Very valid	Very valid

Based on the results of the validation, it can be seen that-based mathematics learning media, *Macromedia flash* obtained a percentage of the first validator of 92% with a very valid category, the second validator with a percentage of 84.25% with a valid category, and the third validator with a percentage of 90.5% with a very valid category. Based on the results of the three validators obtained an average of 88.91% with a very valid category. Based on the assessment results of each validator, it was found that the product could be used with minor revisions.

#### Implementation Phase

After the learning media using *Macromedia flash* is declared valid and feasible to be tested by the validator, then a practical test is carried out. Meanwhile, to see the practicality of the mathematics learning media using *Macromedia flash*, a limited trial was conducted on 10 seventh-grade students of SMP Negeri 5 Palopo in the 2021/2022 academic year through a practicality sheet that includes aspects of appearance, aspects of content presentation and aspects of benefits. Student responses related to the practicality of the media can be seen in the following table.

**Table 4.** Practical Data Results

No	Student Name	Aspect		
		1	2	3
1	X1	20	15	16
2	X2	23	16	16
3	X3	26	15	15
4	X4	27	16	20
5	X5	25	16	16
6	X6	21	17	16
7	X7	25	20	16
8	X8	22	17	17
9	X9	21	17	17



10	X10	25	18	17
	Total	235	167	166
	Max score	280	200	200
	Percentage	83.92	83.5	83
	Category	Very practical	Very practical	Very practical
	Average	83.47	Very practical	

Based on Table 4, the data obtained-based mathematics learning media *Macromedia flash* averages 83.47%. Therefore, if viewed from the media practicality categorization table, the practicality questionnaire data is included in the very practical category to use.

#### Evaluation stage

There are two types of evaluation in the ADDIE model: formative and summative. Formative evaluation in this development is carried out at the end of each stage. While the summative evaluation is carried out at the end of development after validity and practicality tests are carried out. Based on the results of the formative assessment, it was found that the product developed was a mathematics learning media. Furthermore, validity and practicality tests were carried out. The developed media was declared valid by competent and practical validators by class VII students of SMPN 5 Palopo. After the validity and practicality tests are carried out, a summative evaluation is carried out to revise the learning media per the suggestions and inputs of a competent validator.

#### Discussion

The product produced in this research is learning media using *Macromedia flash* at SMPN 5 Palopo. This study assumes that this product will help students understand the material and can also make it easier for educators to teach. So that the creation of effective and efficient learning. Based on the results of the development of *Macromedia flash*, the percentage of validation of the developed learning media is 88.92% with a very valid category, and the results of the practicality test of the developed learning media are 83.47% with a very practical category. So, in conclusion, the learning media using *Macromedia flash* that was developed is in the very valid and practical category. This is in line with the results of research by (Putri et al., 2022) entitled "Development of interactive multimedia-based mathematics learning media *Macromedia flash 8*," which shows the average validity of learning media with a percentage of 86.57% is in the very valid category. The results of the practicality test of learning media are 89.53% very practical category. Thus, this learning medium is feasible and practical to use in the teaching and learning process.

#### CONCLUSION AND SUGGESTION

The conclusion of the development of mathematics learning media using *Macromedia flash* for junior high school students when viewed from the results of the validity by three validators, namely the first validation percentage of 92% in the very valid category, the second validation percentage of 84.25% in the very valid category, three namely 90.5%, with a very valid category. Based on the results of the three validators, the average percentage of the three validators is 88.91%, which is in the very valid category; as for the practicality test of the use of media, which includes aspects of appearance, aspects of content presentation and aspects of benefits with an average percentage of 83.47%.

Further research can be done by adding populations and samples so that the distribution can reach a wider range of schools and students. Likewise, with the material contained in *Macromedia flash-based learning media*, the resulting product only discusses flat-shaped material; further research can develop it with other materials.



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