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Jurnal Literasi Digital Vol 3 No 1, Maret 2023

Utilization of Macromedia Flash in Mathematics Learning

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Abstract

This research is to find out whether there is an increase in mathematics learning outcomes in flat shape material after being taught using learning media using macromedia flash and how to find out the effectiveness of learning using learning media using macromedia flash. This research was carried out at the Palopo Model State MTs for the 2021/2022 Academic Year. This research uses The One Group Pretest-Posttes Design. The experimental units in this study were determined randomly from all class VII. The data collection technique in this study was to use tests, namely pretest and posttest, student activity observation sheets and student response questionnaires. The results of students' mathematics learning before being taught using learning media by utilizing macromedia flash on flat shape materials have an average value of 50.50. The results of students' mathematics learning after being taught using learning media by utilizing macromedia flash on flat shape material have an average value of 72.65. Student activity when learning media was applied using macromedia flash on flat shape material was active, namely 2.68. Student response when learning media was applied using macromedia flash on flat shape material was in the good category, namely 3.1. There is an increase in mathematics learning outcomes in students' flat shape material after being taught using learning media using macromedia flash with an average acquisition of 72.65. The results of inferential statistical analysis using the t-test concluded that learning media using macromedia flash on student data structure material is said to be effective because it meets the criteria for learning effectiveness. The novelty in this study can be seen in the average achievement of each good aspect of learning media using Macromedia Flash which is in the active category, as well as the responses of students who are taught with learning media using Macromedia Flash which are in the good category.

Keywords: *Learning Media, Macromedia Flash, Effectiveness*

Introduction

Education has one important goal as a conscious effort to humanize humans. Someone is not only required to understand his self-concept, but someone is also required to understand the reality around him (Saputra et al, 2018). Education is a transfer of knowledge (the process of transferring knowledge) that is able to change a person's mindset. Education for human life is an absolute necessity that must be fulfilled throughout life. There are various branches of knowledge in education, one of which is the branch of mathematics.

Mathematics is a science that discusses arithmetic, and is needed in everyday life because human activities use mathematics (Lihu et al, 2019). By studying mathematics, students are expected to be able to reason and think logically, analytically, critically, and creatively (Ilyas et al, 2014). These conditions make mathematics have an important role in

https://doi.org/10.54065/jld.3.1.2023.258

life, which causes individuals to be moved to master the learning of mathematics. Mathematics studies and defines objects or symbols in mathematics that do not exist in real life, so they are said to be abstract (Wardhana et al, 2021). Discussing something abstract requires the right means to convey its purpose.

Learning media is one of the right ways to discuss the abstract in mathematics. Nopiyani et al (2016) stated that learning time would be much more effective if learning strategies used computers. Munadi (2013) defines learning media as anything that can convey and channel messages from sources in a planned manner so as to create a conducive learning environment where recipients can carry out the learning process efficiently and effectively. Learning media have different characteristics and functions to support the success of the learning process (Darari, 2017; Muhammad et al, 2022).

Learning media is a tool in the learning process in the framework of communication between educators and students to convey information in the form of teaching materials so that students become more interested in participating in learning activities (Maskur et al, 2017; Yunarti, 2022). Learning media also has a contribution in improving the quality and quality of learning (Khairani et al, 2016; Adi et al, 2020). A good learning process can be produced by a teacher by utilizing learning media as a means/intermediary for delivering students to achieve a knowledge. The use of learning media makes the learning atmosphere different and varied (Mayana et al, 2021).

Along with the rapid development of technology, there are several applications that can be utilized in making learning media, one of which is Macromedia Flash (Kania et al. 2020). One way to use technology in learning is the use of technological resources as a medium in the learning process (Akhmadan, 2017). Macromedia Flash is a multimedia platform and software used for animation, games and internet enrichment applications that can be viewed, played and run in Adobe Flash Player (Kusumadewi, 2013; Septian et al, 2021). This macromedia flash 8 software can be used at all levels of education, especially at the junior high school (SMP) level with a discussion of the geometry of cubes and blocks (Meilinda et al, 2019). Thus the teacher can do the learning process of mathematics using a computer with the Macromedia Flash program which is projected with an LCD (Liquid Crystal Display). This software is expected to provide more focused and fun motivation for students in improving their learning outcomes according to Umam et al, (2016).

The use of macromedia flash as a learning medium is useful for teachers as an aid in preparing teaching materials and organizing learning (Alyusfitri et al, 2020; Pertami et al, 2021). This media can also provoke student stimulus so that they can manipulate concepts and can know the real form of abstract mathematical concepts (Nizaruddin et al, 2017). By using the Macromedia Flash software, 8 students can easily describe the shapes of the third dimension (Nilawati, 2013; Franselaa et al, 2021). In describing geometric shapes, it is usually started by making points and lines (Wardani et al, 2020). In Macromedia Flash, the 8 components of dots and lines are made to look real (Wulandari et al, 2019).

Method

In this study, researchers took the research location at MTs Negeri Model Palopo which is located on Jalan Andi Kambo, Wara Timur District, Palopo City. The research object chosen is class VII. The research design used was the One-Group Pretest-Posttest Design, namely an experiment conducted in one group without a comparison group. According to Sugiyono (2012) revealed that the One-Group Pretest-Posttest Design was that this research was carried out twice, namely before the experiment (pretest) and after the experiment (posttest) with one group of subjects.

Table 1 One-Group Pretest-Posttest Research Design

Pretest	Perlakuan	Posttest
O1	X	O2

Information:

O1 : Student learning outcomes before being given treatment with learning media utilizing macromedia flash (Pretest)

X : Treatment in the experimental class

O2 : Student learning outcomes after being given treatment with learning media utilizing macromedia flash (Posttest)

The research instrument consisted of validation sheets, observation sheets (observations), student response questionnaires, and learning achievement tests. The following is a description of the instrument.

(1) Student Activity Observation Sheet; Student activity observation sheet is a research instrument used to assess and monitor student activity during the ongoing learning process,
(2) Student Response Questionnaire; Student response questionnaires are used to collect data about student responses to learning activities using the Example Non-Example learning method. The questionnaire was filled out by students after the end of the learning implementation,
(3) Student Response Questionnaire; Questionnaires are used to collect data on student responses to learning activities using learning media by utilizing macromedia flash. Questionnaires were distributed to students after the learning process,
(4) Learning Outcomes Test; The learning outcomes test is a description test that is used to measure the level of mastery of student teaching materials, this test consists of: a. Pretest is to measure students' initial mastery of the subject matter before the implementation of learning, b. Posttest is to measure students' mastery of teaching materials after implementing the learning process.

Results

Results of Student Activity Data Analysis

Acquisition of scores from the second meeting to the seventh meeting of student activity increased in each meeting. The average score for all student activities from the 2nd meeting to the 7th meeting was 2.68, which according to the criteria of student activity was included in the Active category. So it can be concluded that the learning activities of class VII.B MTs Negeri Model Palopo during learning using learning media using macromedia flash are included in the active category, namely 2.68. In detail can be seen in table 2.

Table 2 Description of the average value of student activity in learning mathematics when learning media is applied using macromedia flash

Indikator	The average score of each indicator in each meeting						Average of each indicator
	P2	P3	P4	P5	P6	P7	
1	2,00	2,67	3	3,33	3,67	3,67	3,06
2	1	2	2	3,33	3,67	3,67	2,61
3	1,33	1,67	2,33	2,67	3,33	3,67	2,49
4	1,67	2,00	2,67	3	3	3	2,92
5	1,33	1,33	2,33	2,67	3	4	2,44
6	1,00	2	2	2,67	3	3,67	2,39
7	2,00	2,67	3	3	3,67	3,67	3
8	2,33	2,33	2,67	3	3,67	4	3
9	1,33	1,33	1,67	1,67	2,33	3,67	2
10	1	2,33	2	3,33	3,67	4	2,72
11	1	1.33	2,33	1,67	3,33	3,67	2,22
12	2,33	2,67	2,67	3	3,33	3,67	2,95
13	2	2,33	3	3,33	3,33	3,67	2,94
14	2	2,33	2,67	3,67	3,67	4	3,06
15	1,33	1,67	2	3	3,33	3,33	2,44
Overall Student Activity Average							2,68
Category							Aktif

Results of Student Response Data Analysis

From the results of the analysis it was concluded that the average score for the overall response of class VII.B students of MTs Negeri Palopo during learning using learning media using macromedia flash was 3.1 which according to the category of student responses was included in the Good category.

Learning Outcomes of Mathematics Before Being Taught before Utilizing Macromedia Flash

Table 3 Descriptive statistics on students' mathematics learning outcomes before being taught using learning media using macromedia flash.

Statistik	Nilai Statistik
Ukuran Sampel	40
Skor Maksimum	78
Skor Minimum	34
Rentang Skor	44
Skor Rata-rata	50,50
Standar Deviasi	12,39
Variansi	153,69
Skewness	0,57
Kurtosis	-0,25
Jumlah Data	2020

Based on table 3, the descriptive statistics obtained from the ability to learn mathematics in class VII.B MTs Negeri Model Palopo who were taught before using learning media by utilizing macromedia flash were the maximum score of 78 and the minimum score of 34, while the average score was 50.50 from the ideal score. possible to achieve, namely 100 with a standard deviation of 12.39 and a variance of 153.69. If the scores of students' mathematics learning outcomes that are taught using learning media using macromedia flash are grouped on a scale of five categories compiled by Nurkanca, then the frequency and percentage distributions are obtained as shown in table 4 below:

Table 4 Frequency distribution and percentage of students' mathematics learning outcomes before being taught using learning media using macromedia flash.

Skor	Kategori	Frekuensi	Persentase (%)
0 – 54	Very low	25	62,5
55 – 64	Low	9	22,5
65 – 79	Currently	6	15
80 – 89	Tall	0	0
90 – 100	Very high	0	0
Jumlah		40	100

From table 4 it was obtained information that the mathematics learning outcomes of class VII.B MTs Negeri Model Palopo were taught before using learning media by utilizing macromedia flash, namely there were 25 students (62.5%) whose grades were in the very low category, 9 students (22.5%) scored in the low category and students who scored in the medium category were 6 students (15%). This means that in general the ability to learn mathematics results of class VII.B MTs Negeri Model Palopo who were taught before using learning media by utilizing macromedia flash was categorized as very low. The same thing if the average is included in the above category, then the average (50.50) is also in the very low category.

Mathematics Learning Outcomes After Being Taught before Utilizing Macromedia Flash

Table 5 Descriptive statistics on students' mathematics learning outcomes after being taught using learning media using macromedia flash

Statistik	Nilai Statistik
Ukuran Sampel	40
Skor Maksimum	97
Skor Minimum	58
Rentang Skor	39
Skor Rata-rata	72,65
Standar Deviasi	10,43
Variansi	108,95
Skewness	0,57
Kurtosis	-0,22
Jumlah Data	2906

Based on table 5, it is obtained descriptive statistics on mathematics learning outcomes for class VII.B MTs Negeri Model Palopo who are taught after using learning media by utilizing macromedia flash with a maximum score of 97 and a minimum score of 58, while an average score of 72.65 from the ideal possible score achieved, namely 100 with a standard deviation of 10.43 and a variance of 108.95. If the scores of students' mathematics learning outcomes after being taught using learning media using macromedia flash are grouped on a scale of five categories compiled by Nurkancan, then the distribution of frequencies and percentages is obtained as shown in table 6 below:

Table 6 Frequency distribution and percentage of students' mathematics learning outcomes after being taught using learning media using macromedia flash.

Skor	Kategori	Frekuensi	Persentase (%)
0 – 54	Very low	0	0
55 – 64	Low	10	25
65 – 79	Currently	21	52,5
80 – 89	Tall	5	12,5
90 – 100	Very high	4	10
Jumlah		40	100

From table 6, it was obtained information that the mathematics learning outcomes of class VII.B MTs Negeri Model Palopo were taught after using learning media using macromedia flash, that is, there were no students whose grades were in the very low category. There were 10 students (25%) who scored in the low category, students who scored in the medium category were 21 students (52.5%), students who scored in the high category were 5 students (12.5%) and students who received score in the very high category is 4 students (10%). This means that in general the results of learning mathematics for class VII.B MTs Negeri Model Palopo who were taught after using learning media using macromedia flash were categorized as moderate. The same thing if the average is included in the above categorization, then the average (72.65) is also in the moderate category.

Ketuntasan Hasil Belajar Siswa

Based on the minimum completeness criteria (KKM) that apply in the Palopo Model State MTs used to determine the level of achievement of student learning outcomes, the number of students who have completed and not completed can be seen in Table 4.7 below.

Table 7 Distribution of Completeness of Student Learning Outcomes

Interval	Category Completeness	Pretest		Posttest	
		Frekuensi	Persentase	Frekuensi	Persentase
< 74	not finished	37	92,5	19	47,5
≥ 74	complete	3	7,5	21	52,5

In Table 7 it can be seen that the learning outcomes of students after being taught using learning media using macromedia flash have increased. This can be seen from the increase in the lowest score from 34 to 78, the highest score from 58 to 97, the average from 50.50 to 72.65 and the median increase from 49.50 to 73.00. The variance of the pretest is greater than the variance of the posttest, indicating that the posttest results are spread out from the pretest values. The increase in student learning outcomes can also be seen from the increase in the percentage of students who achieved completeness, in Table 4.7 it can be seen from the three students who completed that 52.5% of students achieved mastery after being taught using learning media by utilizing macromedia flash, while the mastery of students' mathematics teaching materials was complete. classically achieved when at least 50% of students in the class have completed. Therefore, learning using learning media using macromedia flash can be said to be effective.

Uji Normalitas

The decisions taken from the SPSS 20.0 output are the significant values from the Tests of Normality table in the Kolmogorov-Smirnova column and the decision-making guidelines are: 1. Probability value < 0.05 (p < 0.05), this means that the two groups are not distributed normal. 2. Probability value ≥ 0.05 (p ≥ 0.05), this means that both groups are normally distributed.

1. Data Normality Test Variable Scores of Students' Mathematics Learning Outcomes Before Being Taught by Using Learning Media by utilizing Macromedia Flash. From the Tests of Normality table, the significance level in the Kolmogorov-Smirnova column turns out to be a probability value = 0.141. This means p 0.05, so it can be concluded that the distribution of score data on students' mathematics learning outcomes before being taught using learning media using macromedia flash is normal.
2. Data Normality Test Variable Scores of Students' Mathematics Learning Outcomes After Being Taught Using Learning Media by utilizing Macromedia Flash. From the Tests of Normality table, the significance level in the Kolmogorov-Smirnova column turns out to be a probability value = 0.200. This means p 0.05, so it can be concluded that the distribution of score data on students' mathematics learning outcomes after being taught using learning media using macromedia flash is normal.

Uji Homogenitas Varians

To test the homogeneity of variance, the hypothesis is formulated: 1. If the p value <0.05, then the research data comes from a population that has unequal variance (not homogeneous). 2. If the p-value > 0.05, then the research data comes from populations that have the same (homogeneous) variance. The basis for making a homogeneity test decision is if the p value> 0.05, then H0 is accepted and if the p value <0.05, then H0 is rejected. Based on the results of data analysis in the "Test of Homogeinity of Variance" table, it can be seen in the Based on Mean line, it can be seen that the significant value is 0.330 which is greater than 0.05 (0.330 > 0.05). Likewise, if the measurement basis is the p-value for the median, it can be seen that the p-value (based on the median) is 0.371 which is also greater than 0.05 (0.371 > 0.05), so it can be concluded that the data comes from a population that has the variance is the same (homogeneous).

Uji Hipotesis

Based on the Paired Samples Correlations table, it can be seen that the probability value is <0.000, this means that (p <0.05). Where the consequences taken are rejecting H0 and accepting H1. So it can be concluded that the average student mathematics learning outcomes after being taught with learning media using macromedia flash is higher than the average student mathematics learning outcomes before being taught with learning media using macromedia flash. To find out how much difference or increase in the average student learning outcomes that occurred before and after the application of learning media using macromedia flash, it can be seen from the Mean Difference value (the average difference that occurs between the average student mathematics learning outcomes after the media is implemented learning by utilizing macromedia flash prior to the application of learning media using macromedia flash) in the Paired Samples Test table, namely 22.150.

Discussion

Achievement of Learning Effectiveness

Table 8 Achievement of Learning Media Effectiveness by utilizing Macromedia Flash

No.	Category Aspect	Achievement	Information
1.	Classical mastery of learning	52.5%	complete
2.	Student response to learning	Every aspect is well received	Good
3.	Student activity in learning	Each aspect shows liveliness	Active
4.	Average pretest and posttest	The posttest average is higher than the pretest average	Increase

Based on the criteria for learning effectiveness, it can be concluded that learning media using macromedia flash is effective for application to the discussion of Flat Shapes in class VII.B MTs Negeri Model Palopo. The results of the analysis of student activity data on learning media using Macromedia Flash show that the learning media using Macromedia Flash is in the

aspect of the group which is in the very effective category. In learning media using macromedia flash, aspects of behavior that are not in accordance with teaching and learning are in the very ineffective category. The average student behavior that is not in accordance with the teaching and learning process in learning media using macromedia flash is 0.17 and the average student behavior that is not in accordance with the teaching and learning process in learning media using macromedia flash is 1.33. In general, good student activity in the experimental class is in the effective limit criteria. This can be seen in the average achievement of each aspect of learning media using Macromedia Flash which is in the active category.

The results of the student response questionnaire, in general students gave a positive response to the learning media by utilizing macromedia flash. Many students respond positively to the learning components implemented by the teacher in class, worksheets and the learning atmosphere in class. Based on the results of student responses, it was found that the average value of student responses to learning media using macromedia flash was 3.1. Student responses to learning media using macromedia flash are in the good category, this means that they meet the effectiveness criteria.

The average score of the mathematics learning outcomes test as measured through the initial test before the start of learning and the final test after the application of learning media using macromedia flash in the experimental class has increased. This is because, in learning media by utilizing macromedia flash students can learn while socializing with their friends, so students can be more open to asking their group mates what they don't understand. The use of image media is structured and designed so that children can analyze material such as flat shapes into a brief description of what is in the picture. Based on the results of the research, the achievement of classical learning mastery has been achieved, namely at least 50% of students in the class have completed.

The results of the analysis of the effectiveness of learning, learning media using macromedia flash are effective for applying to the subject of flat shapes for class VII.B MTs Negeri Model Palopo. In detail presented in the following table:

Table 9 Achievement of Learning Effectiveness

Learning methods	Example Non Example
Achievement of Mastery Learning Outcomes	52,5% (Tuntas)
Average Student Activity During Learning	2,68 (Aktif)
Average Student Response to Learning	3,1 (Baik)
The difference between Pretest and Posttest	22,15

Based on the results of the analysis, by comparing the average pretest and posttest differences, the average learning outcomes of students who were taught with learning media using macromedia flash were complete, the activities of students who were taught with learning media using macromedia flash were in the active limit criteria. The use of macromedia flash as a learning medium is useful for teachers as an aid in preparing teaching materials and organizing learning (Trisnawati et al, 2018; Handayani et al, 2018).

This media can also provoke student stimulus so that they can manipulate concepts and can know the real form of abstract mathematical concepts (Sari et al, 2018). By using macromedia flash software, 8 students can easily describe the shapes of the third dimension (Raharjo, 2017; Sanusi et al, 2015). In describing geometric shapes, it is usually started by making points and lines (Septian et al, 2021). In Macromedia Flash, the 8 components of dots and lines are made to look real (Saputra et al, 2020; Silaban et al, 2020). The novelty in this study can be seen in the average achievement of each good aspect of learning media using Macromedia Flash which is in the active category, as well as the responses of students who are taught with learning media using Macromedia Flash which are in the good category.

Conclusion

Based on the results of the analysis of research data, it can be concluded that: (1) The results of learning mathematics for class VII.B MTs Negeri Model Palopo who were taught before using the learning media using macromedia flash on flat shape material had an average value of 50.50 from the ideal score possible to achieve, namely 100 with a standard deviation of 12.79. (2) The results of learning mathematics for class VII.B MTs Negeri Model Palopo after being taught using learning media using macromedia flash on flat shape materials have an average value of 72.65 from the ideal score that might be achieved, namely 100 with a standard deviation of 10.43. (3) The activity of class VII.B MTs Negeri Model Palopo when learning media was implemented using macromedia flash on flat shape material was active with a good category, namely 2.68. (4) The response of class VII.B students of the Palopo Model State MTs when learning media was implemented using macromedia flash on flat shape material was a good response category, namely 3.1. (5) There was an increase in student learning outcomes for class VII.B students of the Palopo Model State MTs taught using learning media using macromedia flash on flat shape material with an average score of 72.65. (6) The results of inferential statistical analysis using the t-test concluded that the learning media using macromedia flash on the flat material for class VII.B MTs Negeri Model Palopo was said to be effective because it met the criteria for learning effectiveness.

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