www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

The Effect of Macromedia Flash Interactive Learning Media on Mathematical Critical Thinking Skills of Students IV SD Negeri 101788 Marindal I

Ainul Marhamah Hasibuan[1], Fatmawati[2]
[1,2]*Sekolah Tinggi Keguruan dan Ilmu Pendidikan Amal Bakti, Indonesia*
ainulmarhamahhsb@gmail.com

Abstract

This study aims to determine the comparison between students' mathematical critical thinking skills taught with macromedia flash interactive learning media compared to powerpoint media. This type of research is an experimental research. This research was conducted at SD Negeri 101788 Marindal I. The population in this study were students of SD Negeri 101788 Marindal I. While the samples in this study were 27 students in class IV/a and 27 students in class IV/b. The data collection in this study used a mathematical critical thinking ability test. The research hypotheses were tested using independent sample t-test data analysis techniques. The results showed that: (1) There was a significant difference between students' mathematical critical thinking skills taught with interactive learning media macromedia flash compared to powerpoint media (Fcount = 4.005; sig. = 0.004); and (2) The average mathematical critical thinking ability of students who are taught with interactive learning media macromedia flash is higher than the powerpoint media with a Mean Difference value of 7.40. In other words, it can be said that there is a significant effect of the application of interactive learning media macromedia flash on students' mathematical critical thinking skills.

Keywords
interactive media; macromedia flash; mathematical critical thinking ability

I. Introduction

Education is recognized as an industry that is strongly influenced by the speed of technological development. Education plays an important role in efforts to improve the quality of future talent, especially with the aim of developing good values for each individual in a planned manner. Today, the world of education is shaken by the emergence of a dangerous corona virus disease that has stopped the world of education. School holidays lead to poor student quality and poor academic achievement.

Education is considered to have a very important role in promoting the civilization of a nation. Good quality education can encourage the creation of a quality society, creative and productive until finally able to achieve welfare. Through this national education system, the government should be able to ensure equal distribution of educational opportunities, as well as the relevance and efficiency of education management to face challenges in line with the changing demands of local, national and global life. The budget allocation system for education in Indonesia is heavily influenced by government policies. Education financing

DOI: *https://doi.org/10.33258/birci.v4i4.2705*

depends on the management of educational institutions, but budget allocations used must conform to national financing standards. (Saputra, A. 2018)

According to Alan (2017) said that of several subjects taught mathematics is one that is difficult to understand. In learning mathematics, there is one important factor in teaching mathematics, namely students' mathematical thinking skills. In fact mathematics is also a very boring subject, the low ability of teachers in designing learning affects students' thinking skills. Mathematics learning that is not creative and monotonous sometimes makes students bored and bored, this results in a loss of concentration in learning, especially in the pandemic era where learning is only limited to guide books which results in no knowledge gained by students. The solution to develop students' thinking skills is to use learning media in the teaching and learning process.

Learning media is a tool to process the transfer of knowledge from teachers to students. Siqueira, et al (2016) assume that media is an instrument for learning in the world of education. Basically, learning support is a way to learn what aims to improve the quality of education. Masykur (2017) also explained that the media also functioned as a mediator to improve the efficiency and efficiency of the learning process education. Learning media is a way or tool to transmit knowledge that can improve student learning skills. The media also works as a way to achieve educational goals that effectively challenge the quality of students and effectively improve the quality of students, the media also provide teachers and students with learning.

Dagli (2020) assumes that the media is an important tool to understand students' perceptions of learning, the media plays a role in the management of learning and the context that is able to produce quality learning. In line with that, Iswanto (2018) says that learning media is essentially one of the components used to communicate in learning that does not take place optimally depending on the individual's ability to receive the media. The use of media can help and learn student by student, easy to understand learning. Support support is very useful for a teacher to provide statements for learning, summaries and good congresses. However, the use of media requires the skills and creativity of teachers in using the media, especially on the facilities and infrastructure used in the learning process.

However, at this time learning media is difficult to do if it is only in the form of pictures or posters, but adjust the media to the times. Macromedia Flash is an application that is currently developing which is able to provide a new learning experience for students. Kania (2020) said that macromedia Flash is defined as software that gives an animated appearance to learning, macromedia flash is used as a tool to visualize abstract learning into concrete, and is able to attract students' attention to learning that allows for an increase in student learning outcomes.

Macromedia Flash is a learning animation that functions as a tool to visualize abstract learning into concrete, and is able to attract students' attention to learning that allows an increase in student learning outcomes. Macromedia Flash is a multimedia platform and software tool used to create animations, games and internet enrichment applications that can be viewed, played, and run on Adobe Flash Player. Wardani (2020) explained that this media can also provoke student stimuli so that they can manipulate concepts and can recognize the real form of abstract mathematical concepts.

Macromedia flash in mathematics learning is expected to be able to improve students' mathematical critical thinking skills and improve the quality of education that acts as an alternative in learning that allows students to be able to overcome the boredom that exists in students when learning in the pandemic era. Mathematical critical thinking skills as a series of non-percedural thinking skills in the form of the ability to find analogies, analyzes, evaluates, solves non-routine problems and proves. So that the ability to think critically

mathematically is a cognitive activity to solve mathematical problems by using the ability to generalize, analyze, evaluate and prove a problem. In line with that, Layyina (2018) argues that the ability to think mathematically is a process that expands understanding and involves the use of mathematical skills, such as estimation, induction, deduction, specification, generalization, analogy, reasoning, and verification. Based on the above opinion, it can be concluded that the ability to think critically mathematically is a process that can change the mindset of humans through the use of good skills in writing, counting, induction and others.

Based on the statement above, it is concluded that the learning media based on Macromedia Flash is a determining factor in improving students' mathematical thinking skills. In the pandemic era, the use of media or ideas in learning in such a way is needed to overcome the low mathematical thinking ability of students. using media and interesting learning methods can have a positive impact on learning. The use of learning media is believed to be able to provide an increase in students' mathematical critical thinking skills that are adapted to current technological developments so that they are able to provide motivation for students in learning activities both online and offline.

II. Research Methods

The type of research used is experimental research. This research was conducted at SD Negeri 101788 Marindal I. The population in this study were all students of SD Negeri 101788 Marindal I. The research sample was class V students, totaling 54 students consisting of 27 students in class A and 27 students in class B. Collecting tools The data used in this study is a mathematical critical thinking ability test. Testing the research hypothesis using an independent sample t-test with a significance level of 0.05.

III. Result and Discussion

3.1. Research Results

Based on the analysis design, the frequency distribution of the data presented is as follows: (1) Pre-test of students' mathematical critical thinking abilities in the experimental class; (2) Pre-test of students' mathematical critical thinking skills in the control class; (3) Post-test of students' mathematical critical thinking skills taught with Macromedia Flash-Assisted Interactive Learning Media; (4) Post-test of students' mathematical critical thinking skills taught by visual learning media.

a. Data Description

1. Pre-Test Mathematical Critical Thinking Ability of Experimental Class Students

Based on statistical calculations, it was obtained that the lowest score obtained by students was 45 and the highest score was 75 with an average of 61.11; median 60.00; and mode 60; standard deviation 7.38; and variant 54.49. Furthermore, the frequency distribution data above can be described in the form of a histogram as shown in the following figure.

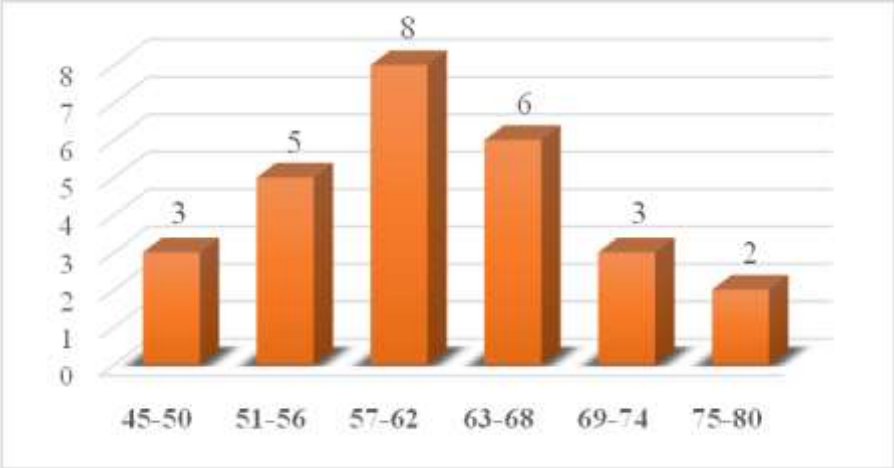

***Figure 1**. Histogram Pre Test Mathematical Critical Thinking Ability of Experiment Class Students*

b. **Pre-Test Mathematical Critical Thinking Ability of Control Class Students**

Based on statistical calculations, it was obtained that the lowest score obtained by students was 40 and the highest score was 80 with an average of 59.81; median 60.00; and mode 65; standard deviation 9.85; and a variance of 97.08. Furthermore, the frequency distribution data above can be described in the form of a histogram as shown in the following figure:

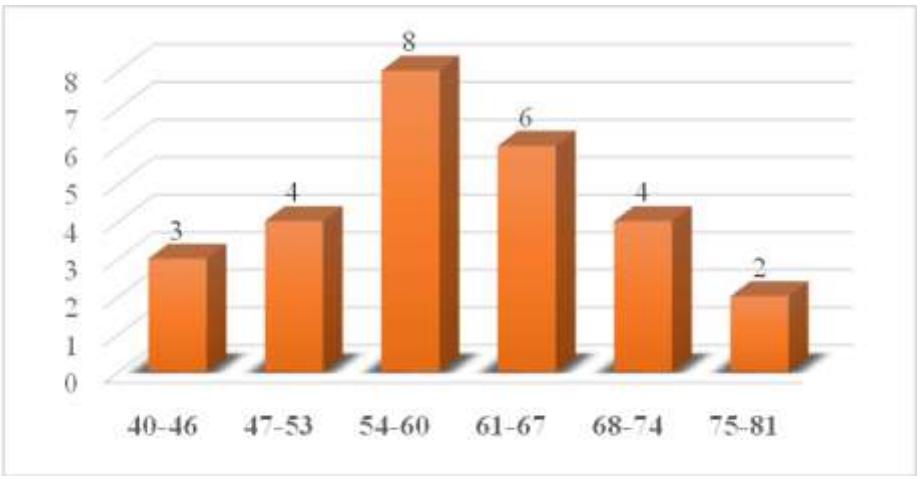

***Figure 2.** Histogram Pre Test Mathematical Critical Thinking Ability of Control Class Students*

c. Post-test of Students' Mathematical Critical Thinking Ability Taught with Macromedia Flash-Assisted Interactive Learning Media

Based on the data obtained and the results of statistical calculations, it is known that the mathematical critical thinking skills of students who are taught with Macromedia Flash Assisted Interactive Learning Media get the lowest score of 75, and the highest score of 95, with an average of 86.85; variance of 40.67 and standard deviation of 6.38. The frequency distribution of students' mathematical critical thinking ability scores taught using Macromedia Flash-Assisted Interactive Learning Media is visually shown in the following histogram image:

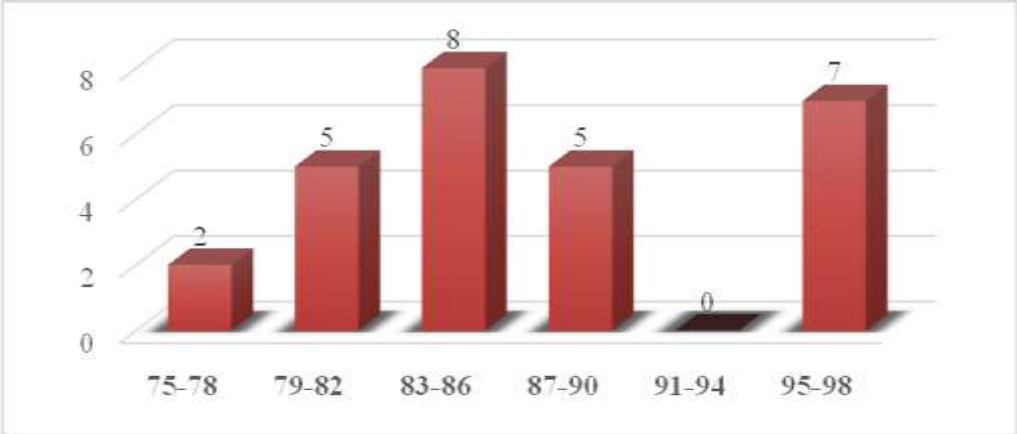

Figure 3.*Histogram of Post-Test Mathematical Critical Thinking Ability of Experiment Class Students*

d. Post-test of Students' Mathematical Critical Thinking Ability Taught with Visual Learning Media

From the data obtained and the results of statistical calculations, it is known that the mathematical critical thinking ability of students who are taught with visual learning media gets the lowest score, namely 55, and the highest score is 95, with an average of 78.52; variance of 82.34 and standard deviation of 9.07. The frequency distribution of students' mathematical critical thinking ability scores taught by visual learning media is shown in the following histogram image:

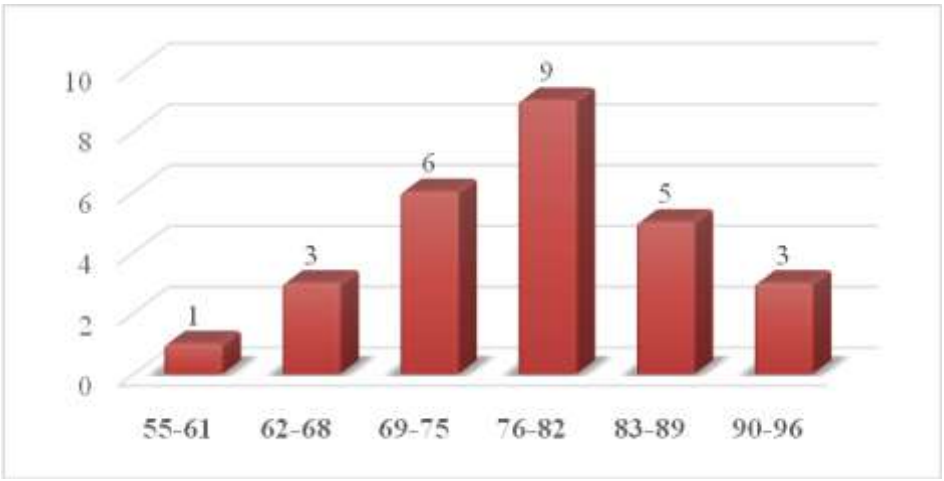

Figure 4. *Histogram of Post-Test Mathematical Critical Thinking Ability of Control Class Students*

4.2. Prerequisite Test

a. Normalitas Test

Table 1. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Group A	,930	27	,108	,204	27	,014
Group B	,965	27	,566	,127	27	,200*

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the table above, it is found that the significant value of the experimental class is 0.108 > 0.05 and the significant value of the control class is 0.566 > 0.05. Thus, it can be concluded that the data of the two classes is normally distributed.

b. Homogenitas Test

Table 2. Test of Homogeneity of Variances

Dependent Variable: Students' Mathematical Critical Thinking Ability

Levene Statistic	df1	df2	Sig.
4,009	1	52	,084

Based on the table above shows that the data homogeneity test obtained a significant value of 0.084 > 0.05, thus it can be concluded that the research data group is relatively the same or homogeneous.

4.3. Hypothesis Test

Hypothesis testing using independent sample t-test testing. The results of SPSS output can be seen in the table below:

Table 3. Output SPSS Uji Independen Sampel t-test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
kemampuan berpikir kritis matematis siswa	Equal variances assumed	4,005	,052	3,025	44	,004	7,391	2,444	2,466	12,316
	Equal variances not assumed			3,025	38,852	,004	7,391	2,444	2,448	12,335

Table 4. Comparison of the Average Mathematical Critical Thinking Ability of Experimental Class Students with Control Class

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Students' Mathematical Critical Thinking Ability	Group A	27	83,70	6,609	1,378
	Group B	27	76,30	9,679	2,018

4.4. Research Hypothesis:

$H_0 : \mu_1 \leq \mu_2$

$H_a : \mu_1 > \mu_2$

Based on the calculation of the SPSS output in table 1, the Fcount value is 4.005 and a significant value is 0.004 <0.05. It can be interpreted that there is a significant difference between students' mathematical critical thinking skills taught with macromedia flash interactive learning media compared to cardboard learning media. Based on table 2, it is found that the average mathematical critical thinking ability of students who are taught with interactive learning media macromedia flash is 83.70. While the average mathematical critical thinking ability of students who are taught with PowerPoint media is 76.30. So the assessment hypothesis rejects H_0 to accept Ha. Thus, it can be concluded that the mathematical critical thinking ability of students who are taught with macromedia flash interactive learning media is significantly higher than cardboard learning media with a Mean Difference value of 7.40.

Mathematics is considered a compulsory subject of formal education and occupies a very important place and role in the world of education. Mathematics is a science that plays an important role in supporting a better human life (Suratno, 2016). Students with good mathematical knowledge can compete in the world economy. Without mathematics, economics, industry and information and communication technology, all economic infrastructure becomes a problem (Akanmu and Fajemidagba, 2013). Observing this, serious attention should be paid to the position of the school mathematics department.

Permendiknas No. 22 of 2006, starting from elementary school, equip students with the ability to think logically, analytically, systematically, critically, creatively, and collaboratively on content standards. It is stated that students must be able to use mathematics (Hasana & Surya, 2017). However, according to Marpaung and Syahputa (2016), the reality in this area is that students are often hesitant to solve mathematical problems, especially historical ones. This shows that students' ability to solve mathematics is still quite low, which certainly affects students' mathematical thinking skills.

Mathematics lessons have a lot of material that must be done by relying on high thinking so that math is difficult for students, and causes boredom in learning. For this reason, the teacher uses an interesting learning model to provide a good response to students. The use of interactive learning media macromedia flashes to improve children's critical thinking towards the learning process.

In visual learning media the teacher's responsibility in teaching students is quite large and the teacher's role in planning learning activities is very large, because in visual learning media the learning process is teacher-centered while in interactive learning media macromedia flash students are stimulated to be able to solve problems, think high-level , explore information, work together and improve communication skills through the teacher's role as a mentor. In this case, learning activities are not entirely dependent on the teacher who is expected to make the classroom conditions interesting and fun.

Based on the results of the research conducted, it was found that the average critical thinking ability of mathematics taught with interactive learning media macromedia flash was 87.42. Meanwhile, the average mathematical thinking ability of students who are taught using visual learning media is 78.52. Therefore, it can be said that mathematics is more appropriate to be taught using interactive learning media macromedia flash considering that the average thinking ability obtained by students is higher than the average thinking ability of students who are taught using visual learning media or media that have been used by teachers in mathematics.

Based on the results of the analysis during the research process, the researcher observed that each student had different abilities in understanding the lesson. The continuity of this research makes the researcher closer to the object of the problem. The core problem found is the low level of students' thinking skills, students need to be stimulated by using a learning process that is in accordance with student needs. Therefore, with interactive learning media, macromedia flash is allegedly able to help students easily understand concepts in mathematics. Based on these thoughts, it can be said that students' mathematical critical thinking skills will be better and improved if the teacher provides a good stimulus such as interactive learning media macromedia flash in helping the daily learning process.

V. Conclusion

Based on the discussion that has been described previously, several conclusions can be drawn including the following:

1. There is a significant difference between students' mathematical critical thinking skills taught with macromedia flash interactive learning media compared to powerpoint media (Fcount = 4,005; sig. = 0,004); and
2. The average mathematical critical thinking ability of students who are taught with interactive learning media macromedia flash is higher than the powerpoint media with a Mean Difference value of 7.40.

References

Alan U. Fauzan. (2017). "Kemampuan Pemahaman Matematis Siswa Melalui Model Pembelajaran Auditory Intellectualy Repetition Dan Problem Based Learning (Studi Penelitian di SMP Negeri 1 CisurupanKelas VII)," J. Pendidik. Mat., vol. 11, no. 1, p. 68.

A. B. de Siqueira, A. Berardi, J. Mistry, and D. Rothberg. (2016). "Experimenting with Media Education, Civic Engagement, and Sustainability in Brazilian Schools," pp. 41–61.

E. Iswanto, R. Suharmono, and S. Hidayat. (2018). "Pengaruh Penggunaan Media Pembelajaran Berbasis Powerpoint Dan Buku Teks Terhadap Hasil Belajar Ilmu Pengetahuan Alam (Ipa) Materi Tata Surya Siswa Kelas Vi Semester Ganjil Tahun Pelajaran," J. Educ. Technol. Innov., vol. 1, no. 2, pp. 7–20.

G. Dagli, F. Altinay, Z. Altinay, and M. Altinay. (2020). "Evaluation of higher education services: social media learning," Int. J. Inf. Learn. Technol, doi: 10.1108/IJILT-03-2020-0032.

K. W. Wardani and D. Setyadi. (2020). "Pengembangan Media Pembelajaran Matematika Berbasis Macromedia Flash Materi Luas dan Keliling untuk Meningkatkan Motivasi Belajar Siswa," Sch. J. Pendidik. dan Kebud., vol. 10, no. 1, pp. 73–84.

N. Kania. (2020). "Aplikasi Macromedia Flash untuk Meningkatkan Pemahaman Konsep Matematika Siswa," JNPM (Jurnal Nas. Pendidik. Mat., vol. 4, no. 1, p. 96, doi: 10.33603/jnpm.v4i1.2872.

P. R. Nasution. (2017). "Perbedaan Peningkatan Kemampuan Berpikir Kreatif Matematis Dan Kemandirian Belajar Siswa Pada Pembelajaran Berbasis Masalah Dan Pembelajaran Konvensional Di Smpn 4 Padangsidimpuan Puspa," Peidagogeo, vol. 2, no. 1, pp. 46–62.

R. Masykur, Nofrizal, and M. Syazali. (2017). “Pengembangan Media Pembelajaran Matematika dengan Macromedia Flash Rubhan,” Al-Jabar J. Pendidik. Mat., vol. 8, no. 2, pp. 177–186.

Saputra, A. (2018). Allocation of Education Budget in Indonesia. Budapest International Research and Critics Institute-Journal (BIRCI-Journal). P. 142-148.

S. Fahmi and I. Email. (2014). “Pengembangan Multimedia Macromedia Flash dengan Pendekatan Kontekstual dan Keefektifannya terhadap Sikap Siswa pada Matematika Developing Multimedia Macromedia Flash with Contextual Approach and Its Effect on Students ’ Attitude toward Mathematics,” vol. 9, pp. 90–98.

S. Wulandar, M. Azis, and H. Hamzah. (2018). “Pengaruh Media Berbasis Lingkungan terhadap Hasil Belajar Murid Kelas V SD Inpres Karunrung,” JKPD (Jurnal Kaji. Pendidik. Dasar),vol. 1, no. 2, p. 106.

R. Amalia. (2017). “Kemampuan Berpikir Matematis Mahasiswa dalam Menyelesaikan Masalah Geometri,” EDU-MAT J. Pendidik. Mat., vol. 4, no. 2.

U. Layyina. (2018). “Analisis Kemampuan Berpikir Matematis Berdasarkan Tipe Kepribadian pada Model 4K dengan Asesmen Proyek Bagi Siswa Kelas VII,” Prisma, vol. 1, pp. 704–713.