The Effectiveness of Macromedia Flash Digital Media in Improving Students' Mathematics Reasoning

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Abstract. This study aims to describe the effectiveness of students' reasoning abilities through Macromedia flash digital media. Learning media is an educational product that can bridge students' interest in learning mathematics so that with this interest, they can increase their mathematical thinking skills at a higher level. The population of this study was students of SMPN Rokun Hulu. The research sample was one of the junior high schools in Rokan Hulu Regency, which was selected purposively according to the problems found in the field, namely SMPN 1 Ujungbatu. The research instrument is an essay test. Research data analysis using quantitative descriptive data analysis, correlational, and paired t-test. The results showed a significant difference between ordinary learning used by teachers and learning using Macromedia flash digital media. These results can be seen from the results of the descriptive test and paired t-test with a sig of 0.00. These results indicate that Macromedia flash-based digital learning media effectively improves the reasoning of SMPN 1 Ujungbatu students.
Keywords: Digital Media, Macromedia Flash, Mathematical Reasoning

1. INTRODUCTION

Mathematical reasoning is a crucial issue in teaching mathematics because with reasoning abilities students can follow more complex mathematics lessons [1]. Mathematical reasoning ability is the foundation for mastering science related to mathematics [2]. Mathematical reasoning ability can affect students' mathematical ability at a higher level [3], [4]. Students will be more productive in solving problems at a high level when students are able to have good mathematical reasoning [5]. Students' reasoning abilities are abilities that make it easier for students to interact with various other mathematical abilities [6]. Mathematical reasoning needs special attention so that strategies, methods, developments of learning products need to be created to bridge students in mastering these reasoning abilities [7]. Learning products such as media are needed as a communication tool between teachers and students to clarify abstract mathematical concepts [8]. Attractive learning media will improve students' ability to master mathematics learning [9].

Mathematics is defined as the science of logic, numbers and space so that mathematical reasoning is needed because mathematical reasoning abilities can

accommodate difficulties in learning mathematics related to logic, numbers and space [10]. So, the position of mathematics is very important because this knowledge is needed in everyday life [11]. Reasoning ability can produce critical, logical and mathematical thinking skills so that complex mathematical material can be understood easily. Mathematical reasoning is reasoning about mathematical objects. Mathematical objects in this case are basic objects that are often studied in mathematics which include facts, concepts, operations or relations and principles [12]. Mathematical reasoning is a habit of the brain like any other habit that must be developed consistently using a variety of contexts [13]. The facts in the field show that the habit of stimulating students to be able to reason has not been carried out optimally by the teacher [2]. This is a factor in the low mathematical reasoning ability of students in junior high school [14]. Maximum learning with the support of various learning facilities is a solution in improving students' reasoning abilities [15].

Based on the description above, it can be concluded that the reasoning in teaching mathematics is an important aspect in mathematics education that needs to be improved through various relevant media, strategies, methods or approaches. The media, strategies, methods and learning approaches are expected to stimulate students to be persistent in learning so that learning outcomes are high. Treatment for treatment is important for a teacher to think about because with treatment through strategies it can increase interest in learning so that students' desire to learn is high and learning outcomes increase. Therefore, the research entitled "The effectiveness of macromedia flash learning media in improving the reasoning abilities of students at Rokan Hulu Junior High School. Macromedia Flash media that is designed to the maximum, is expected to stimulate students to improve their reasoning and understanding of the material described in the media.

2. RESEARCH METHOD

Method was used in this research is a quasi-experimental approach. The population of this study were all junior high school students in Rokan Hulu district. The sample of this study was some students who were taken purposively according to the problems found in the field. Data collection techniques using test techniques. The data collection instrument was in the form of an essay test designed and validated by experts to improve the reasoning of junior high school students. Data analysis in this study used descriptive analysis and Paired T-Test. The research procedure is to give treatment to 31 students in one class for 3 meetings with the material build up flat. After treatment, students were given a test to see the effect of treatment on students' reasoning abilities. The test results were compared with math scores in other classes, which were also given students' reasoning tests.

3. RESULTS AND DISCUSSION

RESULTS

Before the paired t-test statistical test is carried out, it is necessary to test for normality as a condition for inferential statistical tests so that the tests to be carried out do not violate the rules in the use of statistics in research. The results can be seen in Table 1.

Table 1. Data Normality

		Media	Non_Media
N		31	31
Normal Parameters[a]	Mean	90.6452	80.4516
	Std. Deviation	8.92020	8.61332
Kolmogorov-Smirnov Z		1.516	.871
Sig of Kolmogorov-Smirnov		.051	.433

Based on the table above, it is obtained sig of Kolmogorov-Smirnov is 0.51 for media and 0.43 for non-media, because the significant value is greater than 0.05, it can be concluded that the data is normally distributed. The distributed data shows that inferential statistical tests can be used in this study. The results of the Pared T-Test can be seen in Table 2 and Table 3.

Table 2. Descriptif of media and non-media

		Mean	N	Std. Deviation	Std. Error
Pair 1	Media	90.6452	31	8.92020	1.60211
	Non_Media	80.4516	31	8.61332	1.54700

Based on the table of paired samples statistics, the mean value of media is 90.6452 and non-media is 80.4516. From these results there are differences between media and non-media (conventional learning commonly used by teachers in the classroom). To find out whether there is a significant difference between the reasoning abilities of the media and non-media classes, paired samples test can be used as follows:

Table 3. T-Test Result

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig
Pair 1	Media - Non_Media	1.02E+01	7.91799	1.42211	7.168	30	0.00

Table 3 explains that there are differences in learning outcomes using digital macromedia flash media with non-media (conventional learning commonly used by teachers in class). This difference can be seen from the significant value obtained at 0.000 where the result is smaller than the standard set, namely 0.05. These results also show that macromedia flash

digital learning media can improve students' mathematical reasoning abilities on flat-shaped materials.

DISCUSSION

Based on the paired samples test table, a value with a significance of 0.000 is obtained from a small significance of 0.05, then h_0 is rejected and h_a is accepted, meaning that there is a significant difference between learning using macromedia flash-based learning media on student learning outcomes at SMPN 1 Ujungbatu. The product of developing learning media in Mathematics is a Mathematics learning material that has been developed by taking into account aspects of learning and media as a strategy for improving learning outcomes [16]. Learning using interactive media, both Macromedia Flash and Adobe Flash, can make students more interested in using it as a learning medium [17]. Learning media has an effect on learning in the classroom, thus making the learning atmosphere more fun and students do not feel bored [18]. Utilization of media and technology can help teachers and students make communication easier, especially in increasing student skill and increase students' interest in the learning process [19].

In learning, Mathematical understanding is often claimed based on students' reasoning abilities [4]. So teachers need variations when learning, one of which is by using learning media. The media plays a role in helping students understand the concepts given, motivating students to learn, and making the classroom atmosphere not monotonous [20]. Media is a container of messages whose source is to be forwarded to the target or recipient of the message, the material delivered is instructional, and the goal achieved is the achievement of the learning process. [21]. The use of Macromedia Flash as a learning medium, useful for teachers as a tool in preparing teaching materials and making students more active in following lessons [9]. Macromedia Flash-based learning media that was developed not only provides material and practice questions to students, but also allows students to be actively involved in using the media. Students are given the opportunity to input answers directly so that students really learn about the material or questions given [20].

The effectiveness of learning in this study can be seen that the use of macromedia flash learning media is better than students who are taught through conventional learning, so it can be said that the learning is effective. Learning using macromedia flash media can be used as a source of learning mathematics on curved side space materials, such as cones, tubes, and balls with a contextual approach for junior high school students Fahmi (2014). Multimedia created by considering the principles of learning will be able to teach better Yuliarni, Marzal, dan Kuntarto (2019). Therefore, the subject matter that has been abstract so far can now be visualized so that it is easier to understand with animated media [24]. The use of learning media developed using Macromedia flash can improve students' conceptual understanding and self-regulated learning [25]. By using multimedia, students are more interested in participating in learning, the interest of these students is because

multimedia is a means of learning that is more lively and presentative, so that multimedia helps teachers and students a lot in the learning process Andinny dan Lestari (2016).

4. CONCLUSION

There is a significant difference between macromedia flash digital learning media and non-media (the way the teacher teaches with the lecture method). Macromedia flash digital learning media can increase interest so that with this interest students are persistent in learning to understand the material provided. Macromedia flash learning media with interesting animations makes it easier for students to understand questions with high-level reasoning so that student learning outcomes are also high.

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