

THE EFFECT OF MULTI-REPRESENTATION MATHEMATICS LEARNING MODEL ON STUDENTS' MATHEMATICAL CREATIVE THINKING ABILITY

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Abstract

The purpose of this study, was to determine the effect of the multi-representational mathematics learning model on students' mathematical creative thinking abilities. This research uses Quasi Experiment quantitative method. The population in this study were class VII students of SMP Dharma Siswa Kota Tangerang in semester 2 of the 2022/2023 academic year, a total of 360 students. The sample in this study were students of class VII.A, totaling 30 students as the experimental class and class VII.C, totaling 30 students as the control class. The learning model used in the experimental class is the Multi Representational Learning Model. The data collection technique is using a test instrument that has been adjusted based on indicators of creative thinking. The Abstract should be informative and completely self-explanatory, provide a clear statement of the problem, the proposed approach or solution, and point out major findings and conclusions. The Abstract should be 200 to 250 words in length. The Abstract should be written in the past tense. Standard nomenclature should be used, and abbreviations should be avoided. No literature should be cited. The keyword list provides the opportunity to add keywords used by the indexing and abstracting services, in addition to those already present in the title. Judicious use of keywords may increase the ease with which interested parties can locate our article.

Keywords: Multi Representational Learning Model, Creative Thinking Ability

INTRODUCTION

Education has an important role in life. Education can produce students who are able to develop their potential or talents and the ability to solve problems that occur. Education must have ways or stages that must be carried out to improve the quality of education. The quality of education can be seen from the potential achieved by students while participating in teaching and learning activities at school. However, obstacles often occur in the world of education. This makes the teaching and learning process less effective, especially in mathematics.

Mathematics is a scientific discipline that is useful in everyday life, by studying mathematics one is trained to understand, think creatively, critically and apply it in solving everyday life and in other subjects. Based on Johnson and Rising (Rahma, 2013, p. 3), reveals that mathematics is a pattern of thinking, organizing pattern, logical proof. Mathematics is that which uses carefully defined, clear, and accurate terms. This gives the meaning that learning mathematics will certainly be able to direct students to think creatively. (Judge, et al 2023)

Thinking creatively in mathematics and in other fields is a part of life skills that needs to be developed, especially in the face of the information age and increasingly fierce

competition. Individuals who are given the opportunity to think creatively will grow healthy and be able to face challenges. Conversely, individuals who are not introduced to creative thinking will become frustrated and dissatisfied.

However, the importance of the ability to think creatively is not in accordance with the facts in SMP Dharma Siswa. It can be seen that the level of creative thinking in learning mathematics is still low. This can be seen when learning mathematics, many students do not discuss with each other to work on the questions given by the teacher. In this case the motivation to learn to make groups in doing the task is low. Besides that, when the teacher left the class, many students did not do the assignments given by the teacher, many students played and chatted with their friends. It can be seen that the awareness in doing the task is only when the teacher approaches.

Another problem is that when the teacher finishes delivering the material, the teacher asks students to come forward to work on the questions, none of the students want to come forward for fear of being wrong in working on the questions. Students must be called first when they come forward to work on the questions. Some of the students even pointed to their friends to advance. When moving forward students only use the formulas contained in the LKS. In this case, it can be seen that the cohesiveness of student learning and the ability of students to think creatively is still lacking.

This was reinforced by observation tests on 30 grade VII students for preliminary studies. An example of the results of students' answers to the observation test of creative thinking skills can be seen in the following figure:



Figure 1. The results of the students' answers to the observation test

The results of the observation test for class VII indicate that the students' creative thinking ability on the observation test given is included in the low category. Allegedly the factors that cause low creative thinking ability are students who only tend to memorize formulas and do not understand geometric concepts correctly. Another factor is the teacher's

inaccuracy in applying the learning model, so that it does not attract attention which results in low student mathematics learning outcomes. Learning models that construct students' abilities such as Multi Representation can solve this problem so that students can explore problems creatively.

Therefore, in learning in the classroom the teacher can apply a suitable learning model and is expected to improve mathematical creative thinking abilities such as Multi Representational Learning Model that triggers the emergence of creative thinking by students. This is in line with research (Fitriana, 2020) which explains that the multi-representational learning model can improve mathematical creative thinking skills in the experimental class and be better than the control class.

Based on the description that has been described above, the researcher is interested in trying to conduct research entitled "The Effect of Multi-Representational Learning Models on Students' Mathematical Creative Thinking Ability"

METHODS

The research method is a scientific procedure for a series of research activities used by researchers related to the research they carry out with measurable and systematic steps of proof. According to (Sugiyono, 2019) understanding research methodology is a research method is a scientific way to obtain data with specific purposes and uses.

The use of methods and procedures for making observations in a structured study is similar to an experiment, but the conditions and experiences of the participants lack control because the research is limited to random assignment, including comparisons or control groups (Willian, 2019)

The data is processed by means of statistical analysis in the form of numbers. Because of that, researchers are trying to collect and find data that is objective and in accordance with the real situation at the research location regarding the effect of the Multi Representation learning model on students' creative thinking abilities.

Research plan (Sugiono, 2015):



The population is the entire research subject to determine the population in the study are all students of class VII SMP Dharma Siswa. The sample is part of the amount owned by the population. The sampling technique used in this study namely simple random sampling. According to (Sugiono, 2015) simple random sampling is a technique for determining a sample of data sources with certain considerations. Reasons for using techniques simple random sampling this is because it is suitable for use in quantitative research, or studies that do not generalize (Sugiono, 2015). The sample in this study was class VII which was randomly selected.

Data collection techniques in this study used observation and written tests. Where Observations in this study were carried out to make observations regarding students' creative thinking skills during mathematics learning while the written tests given to students in this study were intended to determine the extent of students' abilities in learning mathematics. The results of this written test can be used as a reference that with the learning model multiple representation applied it will affect students' creative thinking abilities.

The data analysis technique used is descriptive statistics where according to (Yenni, 2018) Descriptive statistics are statistics that summarize the problem, describe and analyze a given group of data without drawing conclusions. The purpose of descriptive statistics is to describe the problem accurately and clearly. In this research, the calculation of descriptive statistics uses SPSS 25.

Furthermore, the data is tested using the Prerequisite Test, namely the Normality Test. The Normality Test is carried out to find out whether the data from the research obtained is normally distributed or not. In the Normality Test, the researchers used the SPSS program, then the homogeneity test aimed to find out whether the two groups studied had the same variance or not. If the two groups have the same variance, the group is said to be homogeneous. Continuing to test the hypothesis used in this study using the Independent T-Test test.

RESULTS AND DISCUSSION

This study aims to determine the effect of the multi-representational learning model on the ability to think creatively mathematically. The use of a multi-representational learning model was carried out in the experimental class (7A), which consisted of 30 students, while the control class (7C) consisted of 30 students using conventional learning.

Following are the results of the calculation of the normality test, homogeneity test and hypothesis testing on the pretest and posttest data in the experimental class and control class

Table 2. Normality Test

Data	Class	N	Sig.	Information
Pretest	Experiment	30	0.200	Normal Distribution
	Control	30	0.200	Normal Distribution
Posttest	Experiment	30	0.161	Normal Distribution
	Control	30	0.200	Normal Distribution

Table 4. Homogeneity Test

Data	Significance	Conclusion
Pretest Experiment and Control Class	0.759	Homogeneous
Posttest Experiment and Control Class	0.790	Homogeneous

Based on Table 4.4 it is known that the data has a significance > 0.05 so that the two data have a homogeneous variance.

Table 4. Pretest data t test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences	std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Results of Creative Thinking Ability	Equal variances assumed	0.095	0.759	0.075	58	0.941	0.333	4,465	-8,604	9,270
	Equal variances not assumed			0.075	57,983	0.941	0.333	4,465	-8,604	9,270

Based on Table 4.5 above, the results of the Independent Sample t-test > 0.05 (0.941 > 0.05) which shows H_0 is accepted and rejected. So based on the testing criteria, it can be concluded that there is no difference in the initial ability of students' mathematical creative thinking abilities between the experimental class and the control class. ₁

Table 4. Posttest Data t test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences	std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Results of Creative Thinking Ability	Equal variances assumed	0.071	0.790	3,827	58	0.000	14,000	3,658	6,677	21,323
	Equal variances not assumed			3,827	57,820	0.000	14,000	3,658	6,677	21,323

Based on Table 4.6 above, the results of the Independent Sample t-test > 0.05 (0.000 < 0.05) which shows that H_0 is rejected is accepted. So based on the testing criteria, it can be concluded that there are differences in the final mathematical creative thinking ability of students who are given multi-representational learning and students who are given conventional learning. ₁

CONCLUSION

Conclusion

Based on the results of data analysis and discussion, there are differences in the ability to think creatively between students who are given learning with multi-representational models and conventional with multi-representational learning models than conventional learning. The results of this study can be concluded that the effect of the multi-representational mathematics learning model on students' mathematical creative thinking abilities.

Suggestions

Based on the research results obtained, the following suggestions are put forward:

1. It is recommended that teachers/teachers in the field of mathematics study make the multi-representational learning model an alternative in developing learning

tools and applying them in class to improve the quality of learning mathematics in schools.

2. To carry out mathematics learning with a multi-representational learning model, teachers should make careful preparations, especially in preparing learning tools such as lesson plans, worksheets, and student books.

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