



# JOURNAL

## for Lesson and Learning Studies

Vol. 5 No. 2 (2022) : July

Universitas Pendidikan Ganesha  
<https://ejournal.undiksha.ac.id/index.php/JLLS>

## About the Journal

Journal title	<b>Journal for Lesson and Learning Studies</b>
Initials	<b>JLLS</b>
Abbreviation	<b>J. leasson learning std.</b>
Frequency	<b>Three issues per year</b>
DOI	<b>prefix 10.23887/jlls</b>
Print ISSN	<b><a href="#">2615-6148</a></b>
Online ISSN	<b><a href="#">2615-7330</a></b>
Editor-in-chief	<b><a href="#">I Made Citra Wibawa</a></b>
Publisher	<b><a href="#">Universitas Pendidikan Ganesha</a></b>
Organizer	<b>FIP - Undiksha</b>



\*) Jurnal for Lesson and Learning Studies (JLLS)  
Accredited Sinta 2 by The Ministry for Research, Technology  
and Higher Education (RISTEKDIKTI)



# The Effect of Realistic Mathematics Approach on Creative Thinking Ability of Fourth Grade Elementary School Students

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## ARTICLE INFO

### Article history:

Received April 07, 2022

Accepted July 09, 2022

Available online July 25, 2022

### Kata Kunci:

Berpikir Kreatif, Pendekatan Matematika Realistik (PMR), Pembelajaran Matematika

### Keywords:

Creative Thinking, Realistic Mathematics Approach, Mathematics Learning



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## ABSTRAK

Kemampuan berpikir kreatif merupakan salah satu kemampuan yang penting dimiliki oleh peserta didik. Namun, fakta dilapangan menunjukkan bahwa kemampuan berpikir kreatif peserta didik masih rendah. Salah satu penyebab terjadinya permasalahan tersebut adalah penggunaan pendekatan pembelajaran yang kurang inovatif. Penelitian ini bertujuan untuk menganalisis pengaruh pendekatan matematika realistik terhadap kemampuan berpikir kreatif siswa kelas IV sekolah dasar. Jenis penelitian ini adalah quasy experiment dengan menggunakan desain Randomize Control Group Post Test Only. Populasi penelitian ini berjumlah 74 orang. Sampel penelitian ini yaitu 52 orang yang ditentukan dengan menggunakan teknik Random Sampling. Pengumpulan data dilakukan dengan menggunakan instrumen berupa tes kemampuan berpikir kreatif. Data dianalisis secara kuantitatif dengan menggunakan uji-t. Hasil penelitian menunjukkan adanya perbedaan yang signifikan antara kemampuan berpikir kreatif siswa pada kelas eksperimen dan kelas kontrol. Hal ini ditunjukkan dengan nilai  $t$  sebesar 2,537 dan  $p$ -values sebesar 0,014 ( $<0,05$ ). Berdasarkan hasil tersebut dapat disimpulkan bahwa pendekatan matematika realistik mempunyai pengaruh terhadap kemampuan berpikir kreatif peserta didik kelas IV sekolah dasar.

## ABSTRACT

Creative thinking ability is one of the important abilities possessed by students. However, the facts on the ground show that students' creative thinking skills are still low. One of the causes of these problems is the use of less innovative learning approaches. This study aims to analyze the effect of realistic mathematics approach on the creative thinking ability of fourth grade elementary school students. This type of research is a quasi experiment using the Randomize Control Group Post Test Only design. The population of this study amounted to 74 people. The sample of this study was 52 people who were determined using the Random Sampling technique. Data was collected using an instrument in the form of a creative thinking ability test. Data were analyzed quantitatively by using  $t$ -test. The results showed that there was a significant difference between students' creative thinking abilities in the experimental class and the control class. This is indicated by the  $t$ -value of 2.537 and  $p$ -values of 0.014 ( $<0.05$ ). Based on these results, it can be concluded that the realistic mathematics approach has an influence on the creative thinking skills of fourth grade elementary school students.

## 1. INTRODUCTION

Education is one of the most discussed topics in the world. Several methods, models, approaches, and strategies must be developed to become one of the factors supporting success in the world of education in the current era of globalization (Sutrisno & Retnawati, 2018). Education is an issue that is very important to do to create a better learning process than before (Fitriani & Permana, 2019). Education at this time requires various learning innovations to motivate all students to be creative, innovative, and active in the classroom (Fitriani & Permana, 2019; Pradevi et al., 2021). Students in the field of education, especially at the elementary school level, still really need some models or approaches to make the learning process more focused and systematic than in previous years, especially in mathematics which is now still used as an unpleasant lesson for some students in the past. elementary, middle, high school, and college levels (Hernawati & Pradipta, 2021; Prasasti et al., 2019; Triwahyuningtyas et al., 2020).

Mathematics is a universal science that has an important factor in several disciplines and develops

the human mindset and is also the basis for the development of modern technology (Misla & Mawardi, 2020; Prananda et al, 2021; Swara et al, 2020). Due to this, mathematics learning must be taught to all students at every level from elementary school to high school to provide learning for students to be able to have real, original, critical, and creative thinking skills and also be able to solve problems in daily life. Mathematics is a subject that studies abstract studies through various relationships (Bayuni, 2021; Kusumaningrum & Nuriadin, 2022). Learning mathematics is the most important factor in encouraging students' thinking skills to have critical, real, creative, and systematic thinking (Setyawan, 2020; Surya, 2017). The ability to think creatively is the ability to observe something that comes from existing data or information but also creates something new and much more perfect. And get several ideas to solve a problem (Amelia et al, 2018; Yasiro et al, 2021). The existence of students' creative thinking skills is needed in the ongoing mathematics learning process because mathematics learning activities have a nature of learning that is said to be abstract. Students should be able to think creatively to produce and find the right answers (Abidin et al, 2018; Ernaeni & Gunawan, 2019; Siregar et al, 2020). In addition, the ability to think creatively is an ability to think by requiring all students to have the ability to build/form a material, thought, etc., that is different from before and can be used as a rare innovation.

However, many students today are still experiencing some difficulties in mathematics. These problems can be seen through the learning process that occurs in the classroom, such as the student's lack of focus on the teaching materials presented by the teacher, the student looking bored in class, and the student being less active during the learning process (Wahyuni & Jailani, 2017). Based on observations at SDN Sunter Agung 03 Pagi North Jakarta, students in fourth grade at the school still have students who have low mathematical creative thinking skills when learning mathematics takes place. Therefore, the researcher wants to provide some interesting experiences in the learning process by applying an approach that has never been done by students at SDN Sunter Agung 03 Pagi North Jakarta, namely the Realistic Mathematics Approach. The existence of several difficulties encountered in the classroom during the learning process will result in some students experiencing low creative thinking skills. With the above difficulties, teachers must have special strategies to encourage each student's mathematical creative thinking ability to develop when learning mathematics activities are running.

The solution to overcome these problems is to use a learning approach. A realistic mathematics approach is an approach to making the teaching and learning process of mathematics an activity carried out by humans (Jeheman et al, 2019; Wibowo, 2017). Learning mathematics is an integral part of the nature of mathematics to solve problems, explore problems, and organize subject matter (Hariyono, 2019; Siregar et al, 2020). Realistic Mathematics Learning has principles as activities, building, real, understanding the material, intertwining (interconnection relationships between concepts), guidance (guiding students to encounter a mathematical concept), and interaction (learning as a daily activity) (Dwipayana et al, 2018; Peni Febriani et al, 2019; Setyaningsih et al, 2017). The Realistic Mathematics approach has the advantage that realistic mathematics learning conveys explanations to students that can be related to the daily activities undertaken by students (Fitriani & Permana, 2019; Suryaningtyas, 2017). Realistic mathematics explains to students that mathematics is centered not only on the teacher but also makes students develop their products and thoughts (P Febriani et al, 2019; Ismartoyo et al, 2016). Realistic mathematics learning explains mathematics learning to students because mathematics learning prioritizes the learning process and finds mathematical concepts with the teacher (Harahap, 2018).

Previous research findings stated that the results of students' mathematical representation abilities that were applied to the realistic mathematics approach assisted by concrete media were higher than the classes that were applied to conventional learning (Kusumaningrum & Nuriadin, 2022). The realistic mathematics learning approach improves elementary school students' cognitive mathematics learning outcomes (Puspitasari & Airlanda, 2021). Realistic mathematics education can improve students' conceptual understanding skills (Peni Febriani et al, 2019; Jeheman et al, 2019). The difference in this study is that no research related realistic mathematics education to improving creative thinking skills. Based on previous research, the ability to think creatively has characteristics so that teachers can see students with higher or lower creative thinking skills when teaching mathematics on walking angle measurement material in fourth grade. Angle measurement is a fourth-grade learning material branch within the mathematics education sector that studies geometry. Angles have many uses in everyday life to measure objects' length, height, and angles (Putri & Basir, 2020). Thus, this study aimed to analyze the effect of a realistic mathematical approach on the creative thinking ability of fourth-grade elementary school students.

## 2. METHOD

This study applies a quantitative research method which is a quasi-experimental type. This experimental research aims to explain what happens to certain variables controlled in a certain way. This

research was conducted at SDN Sunter Agung 03 Pagi, located at Jl. Agung Jaya 15 Blok D7, RT. 017/RW. 010, Sunter Agung, Kec. Tanjung Priok, Kota. Jakarta Utara, DKI Jakarta, 14350.. From the three classes, the researchers randomly chose a class, which relied on the three classes, and then divided them into classes, namely class A and class C, thus creating two groups. The first class will be selected as the control group, while the second class will be selected as the experimental group. The experimental class is the group that is given treatment by applying the Realistic Mathematics Education learning approach, and the control class is the group that is not given the treatment by applying the Realistic Mathematics Education learning approach. From the two classes, the researchers determined class IV-A to be the control group with no treatment and class IV-C to be the experimental group by giving treatment. The design in the research used is Randomize Control Group Post Test Only. They chose the group with treatment ( $X^2$ ) and the group without treatment  $X^2$  (control variable). The class the researcher gave treatment to was the experimental group, and the class with no treatment was said to be the control group. Then, the researcher gave a post-test (O) to both groups.

Before the research was conducted at SDN Sunter Agung 03 Pagi, the researchers gave essay questions to other schools that have similar accreditation to SDN Sunter Agung 03 Pagi Jakarta, namely SDN Sunter Agung 07 Pagi Jakarta, as many as 15 questions to test the validity with Microsoft Excel and apply the Pearson Product Moment as a formula to test the validity and reliability test using Cronbach's Alpha as a formula to calculate the reliability of a data. After being tested for validity and reliability, there are 12 valid and reliable essay questions. The researchers gave these questions to the experimental and control classes at SDN Sunter Agung 03 Pagi as post-test questions. Furthermore, the population selected in this study were all class IV SDN Sunter Agung 03 Pagi North Jakarta, totaling 74 students consisting of three classes, namely class IV-A with 26 students, class IV-B as many as 22 students, and class IV -C with many as 26 students. And the samples taken by the researchers were from class A and class C, with 26 students each. The sampling technique of this research applies Random Sampling. The random Sampling technique is a sampling that gives each population member a balanced opportunity/opportunity to be selected as a research sample. The research sample was selected by not randomizing each student but by randomizing each class. The class used as the research sample has been formed individually, and the researcher has no intervention to create a new class. The sample in this study in class IV-A as a control group was 26 students. The researcher did not give treatment by applying the Realistic Mathematics Approach. The students in class IV-C, the experimental group, were 26 students, and the researchers treated them with a Realistic Mathematics Approach.

Data was collected through a test of students' thinking skills or post-test from both classes, namely the ability of creative mathematical thinking from class IV-A as the control group and the ability of creative mathematical thinking from class IV-C, which is the experimental group. The sample given is in the form of a subjective test, the same as essay questions on angle measurement. The test that the researcher gave consisted of 12 questions. This study takes data from classes that are composed of 1 group. It can be said to be an experimental group with treatment, and 1 group is said to be a control group with no treatment. They are collecting data in the form of total scores from the results of students' mathematical creative thinking abilities from fourth grade at SDN Sunter Agung 03 Pagi North Jakarta on angle measurement material. The instrument used in this research is the syllabus, lesson plan, and written test on the Angle Measurement material in the form of 12 essay questions. This test measured students' creative thinking ability in the experimental group by applying the Realistic Mathematics Approach and in the control group by not applying the Realistic Mathematics Approach. The form of the test given is an essay question that has been adjusted to the achievement index of the ability to think creatively in the angle measurement material. Because this study only uses the post-test to test the mathematical creative thinking skills of all students in grades IV-A and IV-C, the researchers only gave post-test questions to the control and experimental groups. After that, the normality test was carried out, in this case, using the Shapiro-Wilk test on the SPSS software. The researchers carried out a homogeneity test using One Way ANOVA in the SPSS software and tested the hypothesis using the Independent Samples T-Test test on the SPSS device.

### 3. RESULT AND DISCUSSION

#### Result

Based on research data, grouping the frequency distribution for mathematical creative thinking skills in the experimental group obtained an average result = of 77.65. But in the control group, the average result = 74.42. The results obtained through the data analysis test of the ability of creative mathematical thinking had an average result of the experimental group's creative thinking ability test =  $77.65 > 74.42$  for the control group. They were testing the analysis of the results of the test scores on



students by looking at the creative thinking skills of class IV-C mathematics by providing treatment in the form of a Realistic Mathematics Approach to the experimental group and class IVA who were not given treatment in the control group presented in Table 1.

**Table 1. Statistics Description**

	N	Minimum	Maximum	Mean	Std. Deviation
Post-test Experiment	26	69.00	90.00	77.6538	5.44751
Post-test Control	26	66.00	79.00	74.4231	3.53466
Valid N (listwise)					

Table 1 shows different descriptive statistical calculations between the two classes. It can be seen that the score that has the highest score from the experimental class treated with the Realistic Mathematics Approach is 90, while the highest score from the control class that is not treated is 79. From the value seen, the mathematical creative thinking ability with the highest score is in the experimental class and the ability to think creatively. Mathematical creative thinking with the lowest score is in the control class. The result value of the mean (mean) of the two classes has differences that require testing by using the Independent Sample T-Test analysis in the SPSS software. Before testing the average similarity of these groups through data testing using the Independent Sample T-Test, a prerequisite test is needed to analyze the calculations carried out previously. The prerequisite tests of the analysis are homogeneity testing and normality testing. It tested the normality of this study using the Shapiro-Wilk formula contained in the SPSS software. The results of the Shapiro-Wilk test obtained through the calculation of the normality test are in Table 2.

**Table 2. Results of the Shapiro Wilk test**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Conventional Realistic Mathematics Approach	0.141	26	0.197	0.955	26	0.301
Conventional Realistic Mathematics Approach	0.172	26	0.046	0.934	26	0.095

Based on Table 2, the results were obtained through the normality test by applying the test with the Shapiro Wilk formula using the SPSS device with a significance level of  $\alpha = 0.05$ . The results of the significance level in the Realistic Mathematics Approach class are 0.301, and the conventional class is 0.095. Due to this, through a comparison between the significance value of the calculation results that the researcher has set, by relying on the significant value of the experimental group by being treated with the Realistic Mathematics Approach and the control class by not being treated with Realistic Mathematics Approach exceeding the value of  $\alpha = 0.05$ , i.e., can be formulated into a conclusion that the data score results from each student treatment class and conventional class based on the ability to think creatively mathematics spelled out that the data is said to be a normal distribution. Furthermore, if the data is normally distributed, then the next prerequisite test is the homogeneity of variance test. In the homogeneity test of variance, this study applies the One-Way ANOVA test in the SPSS device.

The results obtained on the homogeneity test using SPSS software at a significance level of  $= 0.05$ , it was found that the Levene Statistic test was 2.789 with  $db1 = 1$ ,  $db2 = 50$ , where the results of the p-value were  $0.101 > 0, 05$  or accepted  $H_0$  which is formulated into a conclusion that the score data from the results of the treatment class and conventional class is seen from the ability to think creatively in mathematics, which is homogeneous. The existence of previous tests showed that testing for normality and homogeneity in the class with treatment (experimental) and class with no treatment (control) had a total score of the mathematical creative thinking ability test where the distribution occurred normally, and the variance in the experimental class was given the Mathematical Approach treatment. Realistic and in the control class with no treatment given Realistic Mathematics Approach is said to be the same or homogeneous. Due to this, the average similarity test can be carried out by applying test analysis using the Independent Samples T-Test in the SPSS application.

The results obtained through the average (mean) similarity test in the treatment class and the conventional class by looking at the total score of the mathematical creative thinking ability in the SPSS application with a 95% confidence level shows that rejecting  $H_0$  which means there is a significant difference between the ability of the student's mathematical creative thinking in the treatment group and the conventional group. This problem can be seen through the value of  $t = 2.537$  with  $db = 50$ , which is obtained p-values with  $= 0.014/2 = 0.014 < 0.05$ , which states that rejecting  $H_0$  which is formulated into a conclusion that the result of the ability of group creative thinking experiment with realistic mathematics approach exceeds the creative thinking ability of the control group which does not use realistic mathematics approach. So it can be said that there is a different difference between the creative thinking ability of mathematics in the conventional class and the treatment class when using the Realistic Mathematics Approach, so it can be said that there is an influence of the realistic mathematical approach on the creative thinking ability of students in mathematics in the fourth-grade angle measurement lesson at SDN Sunter Agung 03 Pagi Jakarta Utara.

## Discussion

Based on the study's results, a realistic mathematical approach affects students' mathematical creative thinking skills in the fourth-grade angle measurement lesson at SDN Sunter Agung 03 Pagi, North Jakarta. Students given learning treatment using a realistic mathematical approach tend to be more active in learning because the media attracts students' attention. A realistic mathematical approach can make it easier for students to learn mathematical representation skills because students can see and learn directly the mathematics subject matter being studied. A realistic mathematics learning approach can make students active, creative, and innovative. The teacher is only a facilitator in the classroom and must manage the class so that the class structure is maintained. Learning activities through a realistic mathematical approach must relate to real life and make the student experience a starting point for learning (Dwipayana et al., 2018; Setyaningsih et al., 2017) so that it can stimulate students to think creatively. The existence of students' creative thinking skills is needed in the ongoing mathematics learning process because mathematics learning activities have the nature of learning is said to be abstract (Acesta, 2020; Siregar et al., 2020).

Learning by applying a realistic mathematical approach can make it easier for students to find ways and describe working on mathematical ideas according to the real problems that have been previously given. Students are very interested in learning mathematics when it comes to things that are real to students. The result of mathematical representation ability using a realistic mathematical approach is proven effective when used in mathematics learning. Thus, students no longer consider mathematics to be a difficult and troublesome subject. Happy students who study mathematics subjects will easily represent mathematics lessons in other forms of representation (Kusumaningrum & Nuriadin, 2022; Mendrofa, 2021; Putri & Basir, 2020). The realistic mathematical approach has steps appropriate to the steps to solve the problem proposed by Polya and described by Treffers and Goffree as several steps to the Realistic Mathematics Approach, namely understanding real contextual problems. Describe real contextual problems. Solve real context problems. Comparing and discussing real contextual answers and forming a conclusion (Hariyono, 2019). In addition, a realistic mathematical approach uses contextual problems and various learning models that are in harmony with learning—enabling students to contribute. Interacting with students can integrate with other topics (Peni Febriani et al., 2019), so applying a realistic mathematical approach influences the ability to think creatively in mathematics.

This finding is strengthened by previous research, which states that a realistic mathematical approach is effectively applied to the learning process with the help of concrete objects (Kusumaningrum & Nuriadin, 2022). The realistic mathematics learning approach improves elementary school students' cognitive mathematics learning outcomes (Puspitasari & Airlanda, 2021). Realistic mathematics education can improve students' conceptual understanding skills (Peni Febriani et al., 2019; Jeheman et al., 2019). The implications of this research are expected to help students improve their creative thinking skills by applying a realistic mathematical approach. However, applying a realistic mathematical approach has a drawback, namely the difficulty of changing the perspective that forms the basis for several issues related to change, for example, teachers, students, and social roles or contextual problems. The difficulty of encouraging students to find solutions to solving problems. The difficulty of assisting students in finding mathematical concepts or principles that have been studied. Tracing several problems that meet the requirements of realistic mathematics learning is difficult. It is recommended for teachers and other researchers to be able to review the shortcomings of the application of realistic mathematics to get the expected results.

#### 4. CONCLUSION

The ability to think creatively in mathematics in every fourth-grade student at SDN Sunter Agung 03 Pagi has an average increase due to treatment through applying a Realistic Mathematics Approach. The Realistic Mathematics approach shows a significant difference in the creative thinking abilities of fourth graders at SDN Sunter Agung 03 Pagi. So, from the conclusions described earlier, it can be said that the Realistic Mathematics Approach influences the mathematical creative thinking ability of fourth graders at SDN Sunter Agung 03 Pagi, North Jakarta.

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