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The Influence of the Problem Posing Approach on the Creative Thinking Ability of Class V Students on Geometry Material at Elementary School

Pengaruh Pendekatan *Problem Posing* Terhadap Kemampuan *Creative Thinking* Siswa Kelas V Materi Geometri Sekolah Dasar

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Abstract

The 21st century require students to have the ability to think creatively, i.e. come up with original ideas and innovative solutions in various situations. However, the creative thinking skills of Indonesian students are still low, shown through the lack of variety of ideas and the tendency to think linearly in solving problems. This study aims to determine the influence of the problem posing method on the mathematical creative thinking ability of fifth grade elementary school students regarding fifth grade geometry. The research method used in this study is a quasi-experimental method with a Randomized Control Group Post Test Only. This research was conducted at SDN Tanah Baru 02. Sampling was carried out using the Simple Random Sampling technique which amounted to 30 people. The research instrument used in this study is a test instrument that measures students' mathematical creative thinking skills on spatial building materials. The test consisted of 9 questions in the form of descriptions. Each question represents an indicator of creative thinking according to Munandar, which is taught using the problem posing method. The average result of the creative thinking ability obtained using the problem posing method of the experimental class was 72.70, and the mathematical creative thinking ability of the control class students was 51.73. The results of the calculation of the T-test using the Independent Sample T-test method in the post-test results of the second class obtained a significance value of 0.000 < 0.05, so that H0 was rejected and H1 was accepted, which means that the Problem Posing approach affects students' mathematical creative thinking skills. This research shows that the problem posing method can be used as an alternative learning strategy to foster students creative thinking skills, thereby supporting the achievement of 21st century competencies in the elementary school curriculum.
Keywords: Problem Posing Approach, Creative Thinking, Mathematics

Abstrak

Keterampilan abad 21 menuntut siswa memiliki kemampuan berpikir kreatif, yakni menghasilkan ide orisinal dan solusi inovatif dalam berbagai situasi. Namun, kemampuan berpikir kreatif siswa Indonesia masih rendah, ditunjukkan oleh minimnya variasi ide dan kecenderungan berpikir linear dalam menyelesaikan masalah. Penelitian ini bertujuan untuk mengetahui pengaruh metode problem posing terhadap kemampuan berpikir kreatif matematis siswa kelas V SD, pada materi bangun ruang. Metode penelitian yang digunakan dalam penelitian ini yaitu metode quasi eksperimen dengan Randomized Control Group Post Test Only. Penelitian ini dilakukan di SDN Tanah Baru 02. Pengambilan sampel dilakukan dengan menggunakan teknik Simple Random Sampling yang berjumlah 30 orang. Instrumen penelitian yang digunakan dalam penelitian ini adalah instrumen tes yang mengukur kemampuan berpikir kreatif matematis siswa pada materi bangun ruang. Tes yang diberikan terdiri dari 9 soal berbentuk uraian. Masing-masing soal mewakili indikator berpikir kreatif menurut Munandar, yang diajarkan dengan menggunakan metode problem Posing. Hasil rata-rata kemampuan berpikir kreatif yang diperoleh, dengan menggunakan metode problem posing kelas eksperimen sebesar 72,70, dan kemampuan berpikir kreatif matematis siswa kelas kontrol sebesar 51,73. Hasil perhitungan uji T-test dengan metode uji Independent Sample T-tes pada hasil posttest kedua kelas diperoleh nilai signifikansi 0,000 < 0,05, sehingga H0 ditolak dan H1 diterima, yang berarti bahwa pendekatan Problem Posing berpengaruh terhadap kemampuan creative thinking matematis siswa. Penelitian ini menunjukkan bahwa metode problem posing dapat dijadikan alternatif strategi pembelajaran untuk menumbuhkan kemampuan creative thinking siswa, sehingga mendukung pencapaian kompetensi abad 21 dalam kurikulum sekolah dasar.
Kata Kunci: Pendekatan *Problem Posing*, *Creative Thinking*, *Matematika*

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INTRODUCTION

The ability to think creatively is one of the important skills that must be mastered in the 21st century, given its significant role in responding to global challenges, supporting technological advancements, and improving people's well-being (Suryaningsih & Astuti, 2021). Juridically, the urgency of creative thinking has a strong foothold in both international and national regulations. At the international level, the Universal Declaration of Human Rights (UDHR) Article 26 Paragraph 2 underlines that education aims to develop human potential as a whole (Assembly, 1949). In addition, the Sustainable Development Goals (SDGs), especially the fourth point, highlight the importance of education that facilitates 21st century skills, including creative thinking skills (Alisjahbana & Murniningtyas, 2018). At the national level, Law number 20 in 2003 concerning the National Education System, especially Article 3, lists creativity as one of the main goals of national education (Republik Indonesia, 2003). Furthermore, policies such as Permendikbud, (2016) aims and directs the development of high-level thinking skills (HOTS), while the Independent Learning Curriculum (Kurikulum Merdeka) emphasizes strengthening creativity as part of the development of Pancasila student profiles. Thus, creative thinking is not only a practical demand, but also required in various legal frameworks as an effort to support innovation and adaptation in the modern era.

Mathematics subjects have a significant role in improving the quality of knowledge, skills, and attitudes of students in improving their mastery over science and technology. This subject aims students to be able to hone the ability to calculate, measure, and create mathematical formulas that can be applied in their daily lives. Therefore, it is expected that students will be able to master mathematics to a certain level to support their abilities in the future (Suryaningsih, 2019).

The development of mathematics from year to year continues to show an increase in line with the needs of the times. This need encourages individuals to be more innovative in developing or applying mathematics as a basic discipline. Students will later contribute to further development or the application of mathematics in daily lives (Simanjuntak et al., 2021).

According to NCTM (2009), there are five standards of mathematical content, namely: (1) numbers and their operations; (2) algebra; (3) geometry; (4) measurement; (5) data and probability analysis. Mathematics learning activities tend to lean towards thinking exercises, therefore the use of brain activities or *mind on activity* is needed to develop students' creativity in mathematics. Mathematics shapes students to become creative and independent human beings (Syahroni & Nurfitriyanti, 2018). The development of creative thinking skills is one of the important aspects of mathematics learning. Through the mathematics, it is hoped that students can master logical, analytical, systematic, critical, and creative ways of thinking, as well as being able to solve various problems (Khalid et al., 2020). The purpose of this is none other than to encourage students to be able to develop their own ideas without being tied to the methods already taught by the teacher. To actualize children's creativity, motivation that comes from within the individual (intrinsic motivation) and motivation that comes from the surrounding environment (extrinsic motivation) is needed (Kim, 2020).

Based on interviews with fifth grade homeroom teachers at SDN Tanah Baru 02 that was conducted on December 5th, 2023, researchers found that children in the fifth grade still had difficulty in conveying their mathematical ideas. Students are not actively involved enough in the learning process because the material they received was only through memorization by way of lectures. What they have learned does not last long and is easily lost from memory.

In addition, it can be seen that the students' creativity skills are still relatively low, with many of them having difficulty answering some of the questions given. Most students only follow the example that the teacher has taught, so when faced with slightly different problems, they find it difficult to convey thoughts or alternative methods of solving problems. Another problem is the lack of implementation of teaching methods that can improve and develop students' ability to think creatively. Therefore, another approach is needed to motivate students to optimize their creative thinking.

Low ability in creative thinking causes students to have difficulties in overcoming the challenges they encounter in the learning process (Abdurrozak et al., 2016). The ability to think creatively can be realized through individual ability to solve problems. According to Munandar, the creative thinking skills developed in learning include aspects of fluency (the ability to think fluently), flexibility (the ability to think flexibly), originality (the ability to think originally), and elaboration (the ability to think in detail) (Rozi & Afriansyah, 2022).

The learning methods applied by teachers are greatly influenced by the approach chosen, as the approach determines how students interact with the material and build understanding. Based on the analysis that has been carried out, one of the approaches that is considered suitable for the aformentioned problems is the Problem Positioning approach. This approach encourages students to actively form, pose, and solve problems based on the information they learn (Elgrably & Leikin, 2021). Thus, the learning process becomes more meaningful because students not only passively receive information, but also build understanding through exploration and problem creation independently (Liljedahl & Cai, 2021).

Problem Posing is considered appropriate in application in how it can stimulate active student involvement in learning and provide space for divergent thinking, namely developing various alternative solutions and looking at a concept from various perspectives (Leikin & Elgrably, 2022). The main advantages of this approach are its ability to foster flexibility in thinking, fluency in generating ideas, originality, and elaboration of ideas which are all important indicators in creative thinking (Cai, 2022). In addition, Problem Posing also helps students relate previous knowledge to new contexts, thus encouraging deeper and applicable learning (Papadopoulos et al., 2022). In this approach, students are trained to turn problems into simpler, easy-to-understand forms (Lee, 2021), which ultimately reinforces the understanding of the concept creatively.

Several previous studies have demonstrated that the Problem Posing approach is effective in enhancing students' creative thinking skills across various educational levels and learning materials (Cai, 2022; Leikin & Elgrably, 2022). Specifically, these studies highlight improvements in fluency and originality when solving mathematical problems using this approach. For example, Schoenherr (2024a) emphasizes that implementing Problem Posing contributes to students' ability to generate more creative and innovative

solutions to mathematical problems. Though despite the various previous studies on the Problem Posing approach, there remain notable limitations in this research, specifically in addressing its application in geometry learning for fifth-grade elementary students. Most prior research has not thoroughly explored how Problem Posing can overcome the low creativity caused by conventional, memorization-based, and lecture-oriented teaching methods. This gap is especially important considering that elementary students urgently need learning approaches that actively engage their intrinsic motivation and involvement. The novelty of this study lies in its focused application of the Problem Posing approach within fifth grade geometry topics; an area that has only received limited attention and its detailed examination of how this approach optimizes creative thinking aspects such as fluency, flexibility and originality at this level. Therefore, this study aims to investigate the influence of the Problem Posing approach on the creative thinking skills of fifth-grade students in geometry learning, addressing how it impacts specific creativity dimensions to provide clearer insights and practical implications.

RESEARCH METHODS

This study used quasi-experimental research which is a research design that does not allow the researcher to fully control the research sample (Sugiyono, 2016). Two classes were used as a comparison, the experimental class, which used the *Problem Posing* approach, and the control class, which used a scientific approach.

The population in this study is the entirety of the fifth grade students of SDN Tanah Baru 02, totaling to 120 people registered in the 2023/2024 school year. The sampling technique used in this study is the Simple Random Sampling Technique. This technique takes 2 classes out of the 4 existing classes. From the 2 classes, it was drawn which class was used as the experimental class and which was tje control class. Class 5A was chosen as the experimental class while Class 5B as the control class with 30 students in each class.

The experimental design used in this study was Randomized Control Group Post Test Only, meaning randomized control with tests only at the end of treatment. The researcher chose this design with the intention to only find out the differences in the creative thinking ability of the two groups, thus not using any pretest scores. The design of the research is as follows:

Table 1. Research Design

Group	Treatment	Post Test
E	X_E	Y
C	X_C	Y

Information:

E : Experimental Class

C : Control Class

XE : The treatment in the experimental class is with *the Problem Posing approach*

XC : The treatment in the *control* class is with a scientific approach.

Y : Creative thinking ability test given to both groups

Data collection in this study was carried out through observation and mathematical creative thinking ability tests. Observations were made to find out the initial condition of students. The observation sheet is compiled based on indicators of creative thinking ability. The following indicators are presented in the following table:

Table 2. Observation Indicators

Observed Aspects	**Observation Indicators**
Fluent	1. Students can recall lessons that have been taught before. 2. Students immediately answer questions from the teacher. 3. Students answer questions in several possible ways. 4. Students can answer questions from teachers that have not been taught before.
Flexible	1. Students do various ways to get answers to the questions given by the teacher.
Original	1. Students explain how to get an idea or solution. 2. Students convey ideas clearly and systematically.

Before the implementation of the test, the learning process was first carried out in both experimental class and control class. Special treatment was given to the experimental class in the form of the application of free variables– the Problem Positioning approach – to examine its influence on the bound variable – the students' creative thinking skills.

The test instrument used consisted of 10 descriptive questions designed to measure students' creative thinking skills. Based on the results of the validity test using a table of 0.361, out of the 10 questions developed, 9 questions were declared valid; questions number 1, 2, 3, 4, 6, 7, 8, 9, and 10. The data analysis techniques used in this study include descriptive analysis and inferential analysis. Descriptive analysis was used

to describe the average score, standard deviation, minimum and maximum scores of the results of the students' creative thinking ability test in each group. Furthermore, to find out the significant differences between the experimental class and the control class, inferential analysis with the Independent Sample t-test was used. This test aims to test the hypothesis of whether there was a difference in the average mathematical creative thinking ability between students who follow learning with the Problem Posing approach and students who follow learning with a scientific approach. If the test results show a significance value (p-value) of less than 0.05, then it can be concluded that there is a significant difference, which indicates that the treatment given in the experimental class has a significant effect on improving students' creative thinking skills.

RESULTS AND DISCUSSION

Based on the results of the data analysis, it shows that *creative thinking* skills have increased after using the problem posing approach compared to using the scientific approach. This can be seen from the student statistics based on the table below.

Table 3. Clashing Mathematical Creative Thinking Abilities of Students in the Experimental Class and Control Class

	Post Test Experiment	Post Test Control
Mean	72.70	51.73
Std. Error of Mean	3.189	3.805
Median	72.00	53.50
Mode	94	50[a]
Std. Deviation	17.466	20.841
Variance	305.045	434.340
Range	58	72
Minimum	36	11
Maximum	94	83
Sum	2181	1552

The results of the analysis presented in Table 3 show that the average value of the experimental group is higher than the average value of the control group, as well as the median value and the mode value, with the experimental group getting a higher score than the control group. The highest individual *creative thinking* ability was found in the experimental group while the lowest individual *mathematical creative thinking* ability was found in the control group.

A normality test must be conducted before a hypothesis test. This test is to find out whether all data is distributed normally or not. The data is said to be normal if the sig value > 0.05, while the data is abnormal if the sig value < 0.05 (Kholifah, 2020).

Table 4. Normality Test

Tests of Normality							
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
CreativeThinking	PostTest Eksperiment	.107	30	.200*	.974	30	.660
	PostTest Control	.143	30	.117	.934	30	.064

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

Based on Table 4, it can be seen that the results of the post-test of the experimental class and the control class have a significance value of more than 0.05. The significance value of the experimental class was obtained at a value of 0.660 > 0.05 and the control class obtained a value of 0.064 > 0.05. This concludes that the distribution of post-test data in both classes is normally distributed. The homogeneity test in this study uses the IBM SPSS version 26 application with test criteria of the sig value. Based on Mean > 0.05, the data can be said to have a homogeneous variance.

Table 5. Homogeneity Test Results

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Creative Thinking	Based on Mean	.261	1	58	.611
	Based on Median	.211	1	58	.647
	Based on Median and with adjusted df	.211	1	52.118	.648
	Based on trimmed mean	.225	1	58	.637

Based on Table 5, the results of the homogeneity test for the experimental class and the control class were obtained with a GIS value. The value based on Mean is 0.611 > 0.05, meaning that the two samples are homogeneous. Normality and homogeneity testing has shown that the test scores of mathematical creative ability in both groups are normally distributed and the variants of both groups are homogeneous. Hypothesis testing is then carried out to find out whether the hypothesis that has been submitted is rejected or accepted. The Hypothesis testing in this study uses *the independent sample t-test.* This t-test was chosen because it consists two free samples that were not paired with each other. The decision making benchmark in the t-test was ontaining a significance level of 5% ($\alpha = 0.05$). If the significance result shows < 0.05 then H0 is rejected and H1 is accepted, and if the significance result shows > 0.05 then H0 is accepted and H1 is rejected. The results of the calculation of the t-test can be seen in the following table:

Table 6. Independent Sample T-Test Test Calculation Results

Independent Samples Test										
		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2tailed)	Mean Difference	Std. Error Difference	Interval of the Lower	Upper
Posttest	Equal variances assumed	,261	,611	4,223	58	,000	20,967	4,964	1,029	30,904
	Equal variances not assumed			4,223	6,279	,000	20,967	4,964	1,023	30,911

Table 6 shows the value of sig. (2-tailed) in the post-test of the experimental class and the control class is 0.000. The significance value is less than 0.05 or 0.000 < 0.05, therefore H0 is rejected and H1 is accepted. It can be concluded that the Problem Posing approach has an effect on the ability to create mathematical creative thinking in learning fifth grade geometry.

Problem Posing approach is proven to make students more involved in conveying creative ideas when they are faced with a problem or problem (Brown & Walter, 2005). Students also become more accustomed to asking various questions related to existing information or questions (Singer et al., 2015). Problem submission provides an opportunity for students to learn independently by formulating and solving their own problems (Liljedahl & Cai, 2021). Students who are involved in open-ended problem-based learning have the ability to think creatively. The application of the Problem Posing approach in the learning process has been proven to increase students' involvement in developing creative ideas, especially when they are faced with mathematical problems. This is in accordance with the findings of Elgrably dan Leikin (2021), having stated that Problem-Posing-based learning, especially the pre-posing type, can strengthen the aspects of fluency, flexibility, and originality in students' mathematical creative thinking. In this study, students who participated in learning with a problem posing approach showed higher creative thinking skills than students who learned through a scientific approach. These findings are in line with the research by Ayvaz & Durmuş, (2021) which reveals that students who engage in open-ended problem-based learning have higher creativity scores.

Theoretically, the effectiveness of the Problem Posing approach in increasing creativity can be explained through the active role of students in building meaning

through submission and problem-solving. This approach facilitates a constructivist process, in which students not only consume information but also create questions based on specific situations, which demand a high level of cognitive processing (Schoenherr, 2024b). Through Problem Posing activities, students are trained to identify important information, reformulate problems with their own language and understanding, and create new questions from the same context (Liu et al., 2025). These activities stimulate thinking flexibility, encourage the exploration of alternative solutions, and demand that students come up with unique ideas that are all fundamental elements of creative thinking (Hernández-Torrano & Ibrayeva, 2020).

At the accepting stage, students are guided to understand the context of the issues provided in the LKPD (Worksheet) and identify important information. At this stage, students begin to familiarize themselves with a systematic and contextual mindset towards the material. Meanwhile, in the challenging stage, students are challenged to formulate new questions from previously understood information. This process encourages them to think divergently, resulting in a wider variety of ideas (Liu et al., 2025). Through group discussions, students are also encouraged to elaborate and evaluate ideas collaboratively, thereby increasing the depth of understanding and the quality of the questions and solutions produced (Cai, 2022).

Although in the initial meeting students have difficulty in creating questions and finding solutions, this is a natural process in problem-based learning, especially since students are not used to actively creating questions from the given situation. However, at the next meeting, the students' ability to ask questions and solve problems made by their peers showed a significant improvement. These findings reinforce the research by Rahayuningsih et al., (2021) which states that problem posing trains students' skills in understanding, rearranging, and creating problem structures, so that it has an impact on their creative thinking skills.

From the results of the group discussions conducted by the students, it can be seen that the peer collaboration process also contributes to expanding students' thinking horizons. When students are asked to solve other groups' puzzles, they learn to analyze the structure of the problem differently than usual, thus increasing their thinking flexibility. Some groups still have problems in solving questions from other groups, but this is an opportunity for teachers to provide guidance and reinforcement of the material.

Teachers as facilitators must be able to map students' difficulties and provide the right stimulus to encourage broader exploration of ideas (Rahayuningsih et al., 2021).

The materials and test questions used in the experimental class and the control class remained the same, with the differences lying in the applied learning approach. In the final test which amounted to 9 descriptive questions containing indicators of creative thinking (fluency, flexibility, and originality), the results of the analysis showed that the average ability of students in the experimental class was significantly higher than in the control class. This shows that the Problem Posing approach not only has an impact on understanding concepts, but also on the development of students' creative thinking capacity (Kontorovich, 2023).

The implications of this research for the world of education are the importance of considering learning approaches that are oriented towards the development of higher-level thinking skills, such as creative thinking. The application of Problem Posing education be a relevant alternative strategy in the 21st century curriculum in equipping students with the ability to overcome complex challenges through innovative solutions. The contribution of this research lies in the emphasis that the active involvement of students in formulating questions and solutions is the key in forming the character of critical and creative learners from the elementary education level.

CONCLUSION

Based on the conclusions that have been presented, the results in this study show that the Problem Posing approach affects students' creative thinking abilities as evidenced by the improvement of students' abilities. So that the results of this study have positive implications for various parties involved in this study. The implication of the results of the research is that this *problem posing* approach strengthens the statement that students can be actively involved and easily understand learning to the approach that has just been given to them, so that the learning process becomes more effective, fun, and meaningful. The difference in students' average scores in the experimental class and in the control class has positive implications that need to be observed further. In creative thinking, students' ability to create ideas is needed. Therefore, the school needs to look at all possibilities that occur in using a learning approach

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