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The Influence of The Problem Possing Learning Model on Cognitive Mathematics Learning Outcomes of Class Vi Students of SD 7 Kandangmas

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Abstract: Elementary school education provides initial knowledge to students by implementing various learning models. Mathematics is a subject that students need to master to develop students thinking in solving problems studied in everyday life. In mathematics lessons regarding integer counting operations, students find it difficult to identify solutions to problems in story form. To overcome this problem, the application of the Problem Posing learning model was chosen. This research uses a quantitative approach with experimental methods. Data collection techniques use written tests. Based on the normality test using SPSS, the normality test results were obtained, namely a pretest value of 0,192 > 0,05 and a posttest value of 0,129 > 0,05. This data shows a significance value of α > 0,05, which means that both data have a normal distribution. The paired sample t-test shows a significance value of α 0,000 < 0,05, which means H_o is rejected and H_a is accepted. The conclusion is that the application of the Problem Possing learning model influences the cognitive mathematics learning outcomes of class VI students at SD 7 Kandangmas.

Keywords: Education, Learning Model, Problem Posing, Learning Outcomes.

1. Introduction

Education is a method used to improve the ability to use logic in solving problems and creating a bright future (Meika et al., 2022). Education at the elementary school level provides initial knowledge education to students in the form of self-confidence, independence and skills with an approach in the form of learning models and interactions in the classroom carried out by teachers with students to achieve learning goals that have been prepared through an active, innovative, learning process. and creative (Parindra et al., 2021). In mathematics learning, when students solve a problem, students are expected to be able to solve it through critical, creative and innovative steps. At the elementary school level, mathematics subjects not only develop the ability to calculate and use formulas but also equip students to have problem solving skills (Meika et al., 2022).

Mathematics is one of the subjects that students need to master to develop students' thinking in solving problems and can be integrated into solving problems in everyday life, through the learning process in class (Ngaeni & Saefudin, 2017). A mathematics learning process that can attract enthusiasm and be fun for students in achieving learning goals optimally can be done by applying various learning models for students. Apart from that, using learning methods that can foster student activity and creativity in learning by holding interesting learning, namely by using innovative learning methods so that students are more enthusiastic and active in the learning process (Amalia et al., 2022). Approaches, strategies, methods and learning techniques combined into one complete unit will create a learning model. The learning model is a form of learning that is depicted from beginning to end carried out by the teacher (Windasari & Sofyan, 2019).

The application of diverse and innovative learning models is based on student conditions, the condition of students who get bored easily and are not interested in learning (Arsiyanto et al., 2021). In mathematics learning, students are trained to be critical, creative and innovative in solving problems. These learning problems can be overcome by choosing a learning model that can train students' cognitive abilities through critical thinking in solving mathematical problems,

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namely using the Problem Posing learning model. The Problem Possing learning model is a problem solving learning model through posing problems to students with the aim of training students' skills, independence and activeness during learning. The Problem Possing learning model involves students being active and involved in the learning process, students will arrange or create questions based on the explanations given by the teacher including solutions to the questions created (Astuti, 2020; Parindra et al., 2021; Yulifa et al., 2022).

Choosing the right learning model will also influence students cognitive learning outcomes. Student learning outcomes are the achievements achieved by students academically through exams, assignments and student activity in participating in learning activities in class (Khomsah et al., 2023). Learning outcomes are skills that students obtain after studying in the form of certain skills or abilities that students obtain after participating in the teaching and learning process. Learning outcomes are one of the indicators used as a measuring tool for achieving learning objectives. Learning outcomes are a process of behavioral change that occurs at the student's cognitive, affective and psychomotor levels, which refers to changes in knowledge, understanding, attitudes and behavior. The changes that occur are achieved after a learning or treatment process is carried out based on an ongoing problem or an agreed goal (Ananda, 2017; Ngaeni & Saefudin, 2017; Sujarwo et al., 2023). Learning outcomes are an indicator that the learning model applied has an influence on students' mathematical cognitive understanding as well as critical, logical, creative and innovative thinking. The success and effectiveness of the learning process using the Problem Posing model can be seen from student learning outcomes which have increased compared to before using the learning model.

The results of observations carried out at SD 7 Kandangmas in class VI showed that in mathematics learning the teacher applied a conventional learning model using the lecture method. The application of the mathematics learning model using the lecture method makes students feel that the learning is monotonous and boring. In the integer material, students have difficulty completing integer arithmetic operations because they cannot identify what solution process should be used to complete the problem. If the problem is changed into a story form, for example in everyday problems students can understand it, but if the problem is changed into a mathematical sentence with the same problem students have difficulty solving the problem. With the characteristics of students who like to ask questions and have high curiosity, the lecture model cannot accommodate and facilitate students to express their curiosity. This will affect student learning outcomes. So, choosing an appropriate learning model can be a place for students to learn happily. This is a challenge for teachers to find learning models that can restore students' interest in learning (Yahya & Bakri, 2019).

The application of the conventional learning process using the lecture method is not effective for learning mathematics on integer material for class VI students at SD 7 Kandangmas. This also shows that learning objectives cannot be achieved optimally. Answering the lack of activeness of the lecture method in mathematics lessons, therefore innovative learning is needed. The Problem Posing learning model was chosen by adapting the learning characteristics of students who are highly curious. Based on the explanation of the problem above, this research aims to find out whether after implementing the problem posing learning model it can influence students' cognitive mathematics learning outcomes with the title "The Influence of the Problem Posing Learning Model on Mathematics Cognitive Learning Outcomes in Class IV Students at SD 7 Kandangmas".

Several related studies have been carried out by previous researchers. First, research conducted by Suntianah (2019) shows that problem posing learning has an influence on mathematical reasoning abilities and learning motivation. Second, research conducted by Parindra et al (2021), shows that the use of the problem posing learning model has an effect on student learning outcomes and can improve student learning outcomes. Third, Silalahi et al (2022) in their research showed that the use of the problem posing model in learning had a positive influence on students' mathematics learning outcomes. Fourth, research conducted by Widayanti et al (2019), shows that the cooperative learning model of the problem posing type has an effect on the learning outcomes of writing fable stories. Fifth, Iswara dan Sundayana (2021) in their research results show that the increase in mathematical problem solving abilities of students who learn with the problem posing learning model is better than the Direct Instruction learning model.

2. Methodology

This research uses a quantitative approach using experimental methods. The use of experimental methods in this research is to determine in a controlled manner the changes that occur in research subjects due to the treatment that has been given. The experimental method is a method used to reveal the causal relationship between two variables (Yuliana et al., 2013).

The experimental design in this research is a Pre-Experimental Design in the form of One Group Pretest-Posttest. One Group Pretest-Posttest carries out treatment in the same group, to find out the effects that occur after the research. In the first stage, a pretest is carried out before treatment is carried out on the subject group, the second stage is to carry out treatment on the same group of subjects as the first stage, the last stage is to carry out a posttest on the same group of subjects as the first stage. After the treatment is carried out, different values or results will be obtained to determine the effect of the treatment that has been carried out on that group (Astuti, 2020; Parindra et al., 2021; Yulifa et al., 2022).

The sample used in the research was 13 class IV students at SD 7 Kandangmas. The sampling technique used is Non Probability Sampling. The sampling technique chosen was saturated sampling. Saturated sampling is a sampling technique if all members of the population are used as samples (Yulifa et al., 2022). The instrument used in the research was a written test in the form of essay questions. The data collection technique in this experimental research uses tests in

the form of written tests. Students are asked to fill in pretest and posttest questions to find out the value of cognitive mathematics learning outcomes before and after treatment with the Problem Based Learning learning model.

Data analysis was carried out based on inferential statistics using parametric statistics. The parametric statistics used are the T-test in the form of a paired sample t-test. The paired sample t-test is a testing step to evaluate the effectiveness of treatment which is characterized by the difference in averages before and after treatment carried out using SPSS (Syafitri et al., 2023).

3. Findings

The research was conducted to obtain pretest and posttest scores by applying the Problem Posing learning model. From the application of this learning model, students cognitive learning outcomes are obtained as follows.

Table 1: Student Learning Results

Min pretest score	40
Max pretest score	80
Pretest average	58,4
Min posttest score	50
Max posttest score	100
Posttest average	75,3

The table above shows the learning results of class IV students at SD 7 Kandangmas, that the class average experienced an increase in scores from before the treatment, namely 58,4 (pre-test) to 75,3 (post-test) after the treatment. The value data will then be used to carry out a normality test. The normality test was carried out to determine the normality of the data and the paired sample t-test as a hypothesis test.

3.1 Normality Test

Table 2. Pretest and posttest normality test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Pretest	.221	13	.081	.911	13	.192
Posttest	.242	13	.036	.899	13	.129

a. Lilliefors Significance Correction

The normality test is carried out from the results of the pre-test and post-test scores that have been carried out to determine whether the research data is normally distributed or not. Using the Shapiro-Wilk Test of Normality normality test because the number of student samples is less than 50 (Windasari & Sofyan, 2019). Data is said to be normally distributed if the significance value α is > 0,05. On the other hand, data is said to be not normally distributed if the significance value α < 0,05. Based on the normality test which was carried out using SPSS, the normality test results were obtained as follows. The pretest value has a significance value of α 0,192 > 0,05 and the posttest value has a significance value of 0,129 > 0,05. Both data show a significant value of α > 0,05, which means that the data is normally distributed.

3.2 Paired Samples T-Test

The paired sample t-test was carried out to determine the hypothesis of a treatment (Nuryadi et al., 2017). The hypothesis used is, H_o means there is no influence on the application of the Problem Possing learning model on the cognitive learning outcomes of class VI students at SD 7 Kandangmas and H_a means there is an influence of the application of the Problem Possing learning model on the cognitive learning outcomes of class VI students at SD 7 Kandangmas. With a significance value (α) of 0,05. The hypothesis is said to be successful if H_o is rejected with a significance value of α < 0,05.

Table 3: Paired sample t-test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-16.92308	11.82132	3.27864	-24.06663	-9.77953	-5.162	12	.000

The table above shows the results of the paired sample t-test that the significance value α is 0,000 < 0,05. This shows that H_o is rejected and H_a is accepted. It can be interpreted that giving influence by implementing the Problem Possing learning model has an influence on the cognitive learning outcomes of class VI students at SD 7 Kandangmas.

4. Discussion

Learning mathematics through the Problem Possing learning model or posing problems (asking questions) is an appropriate learning tool because problem possing activities are in accordance with the mathematical thinking model, this was stated by Siswono in Mahmudi, (2008). Teachers understand that problem possing has a strategic role in improving students' abilities in solving mathematical problems. In implementing the problem possing learning model, you can follow the following steps: (1) The teacher explains the lesson material using visual aids that are easy to understand concretely, (2) Students ask challenging questions and their solutions which can be done in groups, (3) The teacher asks students present findings questions in front of the class, (4) The teacher provides reinforcement and in-depth questions to students. These problem possing steps can create effective learning by achieving learning objectives (Ngaeni & Saefudin, 2017).

The application of the Problem Posing learning model is carried out by following the steps above. Before delivering the material, the teacher gives questions as a pretest before treating the students. After that, the teacher delivered material on the chapter on integers with material on integer counting operations using the Problem Possing learning model. The teacher explains the material then the students are grouped heterogeneously to write two questions about the material they understand along with the answers and write two questions they don't understand and then the questions are collected. To find out students' understanding, the teacher asks students to take questions that have been collected randomly to check whether the answers have been understood correctly or not and to answer questions that have not been understood from the questions obtained. After that, each group presents the results of the discussion and other groups pay attention and respond to the results of the discussion from the group that is presenting. After that, the teacher provides material reinforcement and explains material that has not been completed during the group discussion. After this explanation, students were given post-test questions to determine students understanding after being treated with the Problem Posing learning model. The students' pretest and post-test scores became data which resulted in the conclusion that there was an influence after treatment in learning through the Problem Possing learning model on students' cognitive mathematics learning outcomes. This is demonstrated by the increase in students' average scores after treatment of cognitive learning outcomes.

One of the learning outcomes includes cognitive abilities. Cognitive abilities include knowledge, understanding, applying, describing, planning, and evaluating. Mathematics learning outcomes are the results obtained by students after a learning process that includes cognitive abilities (Jainuddin et al., 2020). From the results of implementing the Problem Posing learning model, students' cognitive learning outcomes have increased. Students already know, understand, and explain how to identify questions, namely by knowing what whole number operations are in the question and knowing which numbers in the question include positive or negative integers. In the applied domain, students know the circumstances and how to use integers in everyday life. In the domain of planning and evaluation, when students are asked to write down difficulties in the material for calculating integer operations, students compose questions that are not yet understood and write down questions and solutions to problems that are understood. This domain has been implemented in the learning process using the Problem Posing learning model.

The problem posing learning model focuses on students being able to discover new knowledge and experiences through activities that students experience directly. The problem posing learning model also fosters student interest and hones students' skills in critical, logical, creative and interactive thinking (Mahmudi, 2008). This learning model aims to enable students to find out the difficulties they are experiencing which are resolved through posing problems in learning which are expressed in the form of questions. It is hoped that these questions will encourage students to solve them in creative and innovative ways. Increased student interest, skills and activeness in participating in the learning process can be seen from increased learning outcomes (Widayanti & Sutama, 2019).

Problem posing is defined as creating a problem, whether in the form of a new problem or an old problem, by changing the information in the existing problem. Lin (2004) describes that Problem Posing is defined as the formulation of questions or problems using basic stories, content, information or images that students already know. Ellerton (Christou et al., 2005) explains that Problem Posing is a question-making activity carried out by students without conditions or limitations in the question-making process. Parindra et al (2021), in their research, stated that learning using the Problem Posing model involves students asking questions and then responding to them by the teacher or other students. So that it fosters curiosity and can find out that students are interested in the ongoing learning process (Syafitri et al., 2023).

According to Silalahi et al (2022), Problem Possing (asking questions) is almost the same as intrinsic problem solving. The difference between the two is that problem solving focuses on students' skills in solving problems where students are not aware of using their skills to solve problems, while problem posing focuses on students' deliberate efforts to discover new, unknown knowledge and experiences. The application of problem posing becomes more effective and enjoyable, because students are not only fed and listened to the teacher's explanations in understanding the subject matter, but students are trained to find and realize the difficulties they have and how to resolve or overcome the difficulties experienced either independently or through teacher guidance in understanding learning materials. In addition, students are trained to think critically in communicating difficulties experienced in mathematics subjects so that students can understand mathematical concepts correctly because they correspond to the difficulties experienced (Silalahi et al., 2022).

4. Conclusion

The process of knowing the effect of implementing the Problem Posing learning model is carried out by giving a pretest before treatment to find out the students' initial scores. After implementing the Problem Posing learning model, students are given a posttest to find out the final results after treatment. The results of the value data from the pretest and posttest show that there is an influence of the Problem Posing learning model on students' cognitive mathematics learning outcomes after the treatment.

The research was carried out with the aim of obtaining pretest and posttest score results by implementing the Problem Possing learning model. Based on the normality test which was carried out using SPSS, the following results were obtained. The pretest value has a significance of 0,155 > 0,05 and the posttest value has a significance of 0,07 > 0,05. Both data show a significance value of $\alpha > 0,05$, which means the data is normally distributed.

The paired sample t-test was carried out to determine the hypothesis of a treatment applied. The hypothesis is as follows, H_o there is no influence of the application of the Problem Possing learning model on the cognitive learning outcomes of class VI students at SD 7 Kandangmas and H_a there is an influence of the application of the Problem Possing learning model on the cognitive learning outcomes of class VI students of SD 7 Kandangmas. In Table 3. Paired Sample T-Test, the results show that the significance value α is 0,000 < 0,05. It can be concluded that H_o is rejected and Ha is accepted, which means that the application of the Problem Possing learning model has an influence on the cognitive learning outcomes of class VI students at SD 7 Kandangmas.

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