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IMPLEMENTATION OF THE PROBLEM-POSING LEARNING METHOD TO INCREASE STUDENT'S ACTIVE PARTICIPATION IN MATHEMATICS

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Abstract

Purpose: This study aims to analyse the impact of the implementation of Problem-Posing Learning method to the student's active participation and study results in Mathematics subject.

Research Methodology: This study uses Classroom Action Research and Paired t-test by using the pre-test and post-test score.

Results: The application of problem-posing learning method can increase students' active participation and grade in Mathematics subject.

Limitations: This study analyses the impact of Problem-Posing Learning method in Mathematics subject.

Contribution: The results contribute to the education field in terms of effective learning model to increase students' active participation and study results.

Keywords: *Problem-Posing Method, Classroom Action Research*

1. INTRODUCTION

Critical thinking is the ability to make rational decisions about what to do and believe. One of the goals of education is to improve critical thinking skills to gain knowledge. However, only a few schools teach their students to think critically, so critical thinking skills still need to be improved (Shanti et al., 2017).

Education needs to improve teachers' robust learning process implementation. The learning process that has occurred so far has yet to be able to develop students' thinking skills (Martiani & Rachmiati, 2016). Teachers still like to teach with conventional learning patterns and see few opportunities for more innovative activities (Shanti et al., 2017). Teachers use the lecture method and only choose books as student learning resources. So that the ability of students to achieve competency in both knowledge and skills is less than optimal, creative and productive learning models can refer to learning processes and outcomes. The freedom given to students to be able to develop intellectually is a way that can give profound results. This will be achieved if the learning model is applied correctly and adequately (Parindra et al., 2021).

Based on the results of field observations, it is known that the Mathematics scores of class VII students at SMPN 6 Kuningan primarily need to meet the passing grade of 70. This is known because many students do not master Mathematics and feel bored learning it. Mathematics is considered one of the most challenging subjects. Many students are not

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motivated to participate in mathematics learning because students' ability to understand mathematics still needs to improve, and students' understanding cannot last long (Martiani & Rachmiati, 2016).

In general, the teacher becomes the centre of learning in almost all learning activities by treating students as empty boxes needing filling. Such circumstances are not conducive to teaching mathematics or the learning process. This situation suggests that selecting learning methods is a crucial thing that needs attention to foster critical thinking skills (Shanti et al., 2017).

These problems can be solved by applying the Problem Posing learning model (posing questions). In the learning process, students are assigned to make questions that have yet to be understood and then responded to by other students (Parindra et al., 2021). Problem posing is of central importance in the discipline of mathematics and the nature of mathematical thinking. Problem posing is an approach that requires students to ask questions and make solutions that are expected to develop thinking skills, especially critical thinking skills. The Problem posing approach has stages in learning, namely (1) creating mathematics problems (making mathematical situations); (2) posing mathematics problems (making math questions); (3) solving mathematics problems (solving math problems); (4) applying mathematics. These stages can foster students' critical thinking skills in learning mathematics. This study stated the relationship between Problem posing, which is applied in learning activities and the development of students' critical thinking skills (Shanti et al., 2017).

This study will analyze the use of Problem posing learning methods in increasing students' understanding of mathematical concepts. This research is expected to contribute to developing more innovative and effective learning methods.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Problem Posing Learning Model

The Problem posing learning model is learning that assigns students to make questions or questions based on information that still needs to be understood to form students' conceptual understanding of the material (Parindra et al., 2021). So that it can enrich information and insight for other students to be more comprehensive because the questions asked are different. Giving group assignments can establish cooperative relationships between students to develop various opinions or input related to posing existing problems (Herawati et al., 2010). As a learning strategy, Problem Posing Learning involves three basic skills, namely listening, dialogue, and action (Siswono, 2008).

The application of the Problem posing learning model can positively influence students, where students become more actively involved in finding the necessary information themselves. At the same time, the teacher in the teaching process only serves as a mediator and facilitator (Guntara et al., 2014). The advantage of the Problem Posing learning model is that it encourages students to think actively and creatively to pose problems through questions and analysis to find solutions. So that this learning model is not just listening, but students can develop their potential and insight. The weakness is that it takes much time, so it requires teachers to optimize their time as best they can (Parindra et al., 2021).

The Problem Posing method is applied to three different forms of mathematical cognitive activity (Siswono, 2008), namely:

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1. Submission of pre-solutions (pre-solution posing), namely, a student makes a question from the situation held.
2. Submission in the solution (within-solution posing), namely, a student reformulating the Problem as it has been solved.
3. Submission of problem solutions (post-solution posing), in which a student modifies the objectives or conditions of questions that have been solved to create new questions.

Previous research

The Problem Posing Learning approach in research conducted by (Parindra et al., 2021) is carried out through the following stages: (1) creating a mathematical situation; (2) making math questions; (3) solving math problems; (4) applying mathematics. The stages passed have relevance to indicators of critical thinking skills, which include interpretation, analysis, evaluation, and decisions. The results showed that the use of problem-posing learning models affected student learning outcomes and could improve student learning outcomes.

Another research was conducted by (Suntianah, 2019) in mathematics. The results of this study indicate that the Problem Posing learning method influences mathematical reasoning abilities and learning motivation. In addition, student learning outcomes increased after implementing the Problem Posing learning model (Kristina et al., 2019; Wulandari et al., 2018). Overall, it was concluded that students' critical thinking skills could be improved by applying the Problem posing approach in the learning process (Shanti et al., 2017).

Based on previous research, the hypothesis in this study is:
H0: there is no change in value after applying the Problem Posing learning method
H1: there is a change in value after applying the Problem Posing learning method

3. RESEARCH METHODOLOGY

This study used a quantitative approach with an experimental method carried out in class VII A SMP Negeri 6 Kuningan, a total of 26 students. This research was conducted in the subject of Mathematics on the subject of Algebraic Forms. The research design used the One-Group Pretest-Posttest Design (Parindra et al., 2021). The first stage is giving a pretest, applying the Problem Posing learning model, and the final stage is giving a posttest (Sugiyono, 2018).

The steps in applying the Problem posing model as in research (Martiani & Rachmiati, 2016), include the following:

1. The teacher explains the subject matter to the students
2. The teacher gives good practice questions.
3. Students are asked to submit 1 or 2 challenging questions, and the student concerned must be able to solve them. This task can also be done in groups.
4. At the next meeting, randomly, the teacher asked the students to present their findings in front of the class.
5. The teacher gives homework individually.

Data analysis

The hypothesis testing uses Paired Sample t-test (Parindra et al., 2021). A paired-sample t-test compares the mean of two matched groups of people or cases or the mean of a single group examined at two different points in time. If the same group is tested again on the same measure, the t-test is called a repeated measures t-test (Ross & Wilson, 2017). Paired sample t-test is formulated as follows:

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$$t_{test} = \frac{\sum D}{\sqrt{\frac{n.\sum D^2 - (\sum D)^2}{n-1}}}$$

D is the difference per paired value, and n is the number of samples. Before being tested using the Paired Sample T-test, statistical tests were carried out using the normal distribution test.

4. RESULTS AND DISCUSSIONS

Results

The normality test aims to determine whether the research data is normally distributed. The normality test uses the Shapiro-Wilk Test of Normality because there are fewer samples than 50 students (Solekhah, 2018, p. 1399). The data is normally distributed if the sig. >0.05. Conversely, if the sig. < 0.05, the research data is not normally distributed. The output test results are obtained as follows based on the normality test.

Table 1 Normality Test

Test of Normality							
	Class	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	Df	Say.	Statistic	Df	Say.
Student learning outcomes	Pretest	.215	28	.200	,917	28	.082
	Posttest	.248	28	.082	,934	28	.074

Based on the Shapiro-Wilk Test of Normality output, the value (Sig.) is 0.082 > 0.05. While the posttest (Sig.) value is 0.074 > 0.05. So the research data is normally distributed because the value (Sig.) of both is > 0.05.

Hypothesis Testing Based on the results of the prerequisite test, it is known that the data is normally distributed and homogeneous (same). Then the hypothesis test can be continued using the parametric test, namely the Paired Sample Test. Test paired sample t-test is used to determine whether applying the Problem posing learning model affects student learning outcomes. Decision-making Ha is accepted if the value is sig. (2-tailed) < 0.05, whereas if the sig. (2-tailed) > 0.05, then Ha is rejected, and H0 is accepted.

Table 2 Hypothesis Testing

Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Say. (2-tailed)
					Lower	Upper			
Pair 1	Pretest - Posttest	-6.22581	3.25279	.58422	-7.41894	-5.03267	-10.657	30	.000

Based on the results of the paired sample t-test output, the sig value was obtained. (2-tailed) of 0.000 <0.05. So Ha is accepted, and H0 is rejected. This means there is a value change after applying the Problem Posing learning method.

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Discussion

Based on the results of research conducted in class VII A students of SMP Negeri 6 Kuningan, 26 students in the Mathematics subject of Algebraic Forms were found to have an effect. Based on the results of field observations, it is known that the Mathematics scores of class VII students at SMPN 6 Kuningan mostly do not meet the passing grade of 70. This is known because many students do not master Mathematics and feel bored learning it. Mathematics is considered one of the most challenging subjects. Many students are not motivated to participate in mathematics learning because students' ability to understand mathematics is still low, and students' understanding cannot last long (Martiani & Rachmiati, 2016).

The Problem posing learning model is learning that assigns students to make questions or questions based on information that still needs to be understood to form students' conceptual understanding of the material (Parindra et al., 2021). So that it can enrich information and insight for other students to be more comprehensive because the questions asked are different. Giving group assignments can establish cooperative relationships between students to develop various opinions or input related to posing existing problems (Herawati et al., 2010). As a learning strategy, Problem Posing Learning involves three basic skills, namely listening, dialogue, and action (Siswono, 2008).

The Problem Posing Learning approach in research conducted by (Parindra et al., 2021) is carried out through the following stages: (1) creating a mathematical situation; (2) making math questions; (3) solving math problems; (4) applying mathematics. The stages passed have relevance to indicators of critical thinking skills, which include interpretation, analysis, evaluation, and decisions. The results showed that the use of problem-posing learning models had an effect on student learning outcomes and could improve student learning outcomes.

The results of this study were in line with the results of previous research where the Problem posing learning model can improve student learning outcomes. It was also found that the Problem posing learning model can be applied to high grades because it trains students to formulate and create questions based on material that is not yet understood so that it can provide a challenge to think critically to find solutions to solving problems. Each learning model certainly has advantages and disadvantages, as well as Problem posing learning models. The advantage of the Problem Posing learning model is that it encourages students to think actively and creatively to pose problems through questions and analyze to find solutions. So that this learning model is not just listening, but students can develop their potential and insight. The weakness is that it takes much time, so it requires teachers to optimize their time as well as possible.

5. CONCLUSION

Based on the research results, it can be concluded that the Problem posing learning model affects student learning outcomes in class VII A SMP Negeri 6 Kuningan, totalling 26 students in Mathematics subject on the subject of Algebraic Forms. Applying the Problem posing learning model can involve students actively learning and practising problem-solving skills.

LIMITATION AND STUDY FORWARD

The results contribute to the education field in terms of effective learning model to increase students' active participation and study results. Based on the results of classroom action research research using the Problem-Posing Learning model, the researchers provide suggestions for teachers to be able to apply this Problem-Posing Learning method to other subjects. Furthermore, teachers can increase their proactive attitude and always create

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harmonious relationships with students. This will help students grow self-confidence and actively participate in learning..

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