Application of Problem Solving Learning Model on Row and Series Material at SMK Panca Budi

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Abstract. Effective teaching-learning activities are also supported by several aspects such as teaching methods, teaching strategies, learning models , and so on. In this study, we know the extent of the effectiveness of problem-solving learning compared to ordinary learning. Based on the research conducted, the results obtained that concluded the Problem-Solving learning mode proved effective in improving students' mathematical problem-solving abilities. Data analysis for this study used a t-test in this case obtained an average difference from the experimental class group given treatment using Problem-Solving learning and non-problem Solving class groups. The calculation results obtained a t count value (th) of 2.824 for the experimental class and 2.819 for the control class, with the table t value for db 68 sig 5% If consulted in the t table obtained 1.990 then based on the t-test criteria it can be concluded that the t value Count more than t table with GIS greater than SIG alpha by 5%, it can be concluded that count t > t table can be decided to test the hypothesis I that null hypothesis is rejected and alternative hypothethics are accepted, in this case, there is a significant difference between students' mathematical problem-solving ability between the group of students taught using the Problem-Solving method and the group of students taught without using the Problem-Solving model.

Keywords: Teaching Methods, Problem-Solving Learning, SMK Panca Budi.

INTRODUCTION

Education is one of the important components to improve the quality of life, the nation's next generation that is prepared can be started by providing quality education for the nation's next generation. Parents and teachers as educators have a big role in the educational process from children starting from pre-school to adult level or college level. Interaction in learning is very necessary to improve the quality of human resources. From the results of observations and observations in the field, data on student learning outcomes for mathematics subjects are

very standard with only a few students achieving KKM scores. For this reason, improvements are needed in the learning process carried out. The problems encountered in the research place certainly illustrate the real conditions of the learning carried out for it by identifying problems that exist in the research place. The problems encountered in the research place certainly illustrate the real conditions of the learning carried out for it by identifying problems that exist in the research place so that the problems that arise do not become protracted. For this reason, the consideration obtained by conducting this research helps teachers, in this case, teachers to provide maximum learning so that the delivery of information or material, especially material related to mathematics learning, can be maximized. Motivation to awaken children's learning management will certainly increase children's enthusiasm to learn (Ayu & Anggraini, 2024)

LITERATURE REVIEW

Problem-Solving learning model is a learning model designed to maximize learning outcomes. In line with the opinion that teachers must be able to have the ability to vary learning so that students can follow the learning process comfortably and enjoyably. This learning model is used to produce students who can solve problems independently so that they can be used maximally. This is in line with education being one aspect of life that must be considered because it plays an important role in human life, this is in line with the opinion of (Siregar, 2022) Education is an important thing in human life because every human being deserves and hopes to always develop in education and technological advances. Education was first obtained in the family environment, school environment, and community environment. The Problem Solving Method (W.Gulo, 2002)(Opportunity, 2012) is one method that teaches to solve problems by emphasizing problems that must be solved by reasoning. The Problem-Solving method has been researched by previous research to provide potential value for students to become human beings who can face problems and solve problems that exist in everyday life. For this reason, in real or real life, it would be very good if a human resource person has a Problem-Solving mentality that will have a positive and significant influence on the independence possessed, this is what is expected to be owned or forged by students who have followed the learning process using the Problem-Solving learning model.

RESEARCH METHOD(S)

This research uses quantitative descriptive research methods where the elaboration of data taken in the research process uses quantitative data that will be narrated descriptively. This is in line with the opinion of Sugiyono (2016) who explained that the qualitative research method is a method based on the philosophy of positivism that can be used in examining samples and populations from a predetermined research. According to (Mardalis, 2006) the presentation of data in quantitative research in the form of numbers can made in the form of diagrams, graphs, or frequency distribution tables where this method is usually also a method in researching the status of human groups, an object, a condition or a view of the current condition Descriptive research is a research method that aims to describe phenomena or events that exist in the place of research so that the obstacles or phenomena that occur in the place of research can be described for people who read the research so that solutions are found to the research. This is in line with (Fadilah et al., 2020) the data analysis method used in this study is quantitative descriptive data analysis. This study uses quantitative data analysis that is clarified and detailed with descriptive narratives to clarify the results of research obtained at the research site. The research place was conducted at SMK Swasta Pancabudi located in Medan City, Sei Sikambing District, Jl. Jend. Gatot Subroto Km 4.5 Medan. Research activities are carried out schedule or procedural that has been designed before the research activities are carried out, namely, the observation phase begins in December and the implementation of activities starts in January until April. This research is included in the type of quasi-experimental research where this research mixes quantitative and qualitative types. This research is more directed to experimental research, although in its description it still uses a qualitative approach. This experimental research requires the following steps:

1. **Pre-Experiment Stage**

This stage is used to design or design everything needed in the application of problem-solving learning models including the following: instrument making, drawing between two classes that will be used as experimental classes, control classes, and determining classes as trial classes. The research sample used used random sampling techniques or random selection.

2. **Stages of Experimentation**

a) Pre-test

A Pre-test is a provision of initial or preliminary tests to find out how much ability to understand basic mathematics that is hierarchical with the material to be studied, which is

related to row and series material where the content of the pre-test questions covers the scope of basic mathematics in the form of number patterns, addition operas, subtraction, multiplication, calculation, division, and square. The underlying material for the advanced material stages, namely rows and pretest series, will be given to both classes, namely the control class and the experimental class. To see the initial abilities of each group.

b) Treatment by applying conventional learning models and problem-solving

At this stage, the researcher will carry out learning in two classes, namely the control class and the experimental class, where in the control class the researcher will conduct learning using conventional learning models such as lectures and assignments while in the experimental, class there will be an exposure of the Problem-Solving learning model, where the learning of the two will be compared whether in the control and experimental classes there are differences in students' mathematical problem-solving abilities After being given learning with different learning modes.

c) Post Test

At the post-test stage, researchers will give questions in the form of descriptions that will be given after treatment by applying different learning models in both classes, both control classes and experimental classes. In this way, it will be able to see a more effective learning model to improve mathematical problem-solving skills after the data obtained in the post test is recapitulated and collected then analyzed by conducting static testing stages.

3. Post-Experiment Stage

At this stage, data collection will be carried out which will be presented in the presentation of quantitative data obtained using statistical testing that applies certain uj criteria to answer the research hypothesis that has been formulated. The answer to this hypothesis will provide significant conclusions related to the most effective learning model to improve students' mathematical problem-solving ability in row and row material. A hypothesis is a provisional conjecture that can be formulated in a statistical hypothesis or a descriptive hypothesis. This understanding is in accordance with the opinion of Suharsimi Arikunto (in a study that tends to lead to experimental research), more often researchers formulate statistical hypotheses. $H_a : \mu_1 = \mu_2$. There is no significant difference in the mathematical problem-solving ability of grade X students of SMK Pancabudi Medan between groups of students taught using the Problem-Solving learning model and students who are taught without using the Problem-Solving learning model. $H_a : \mu_1 \neq \mu_2$. There is a significant difference in the mathematical problem-solving ability of grade X students of SMK Pancabudi Medan between groups of students taught using the Problem-Solving learning model and students who are

taught without using the Problem-Solving learning model. $H_a : \mu_1 = \mu_2$. The use of the Problem-Solving learning model in teaching mathematical problem-solving skills of SMK Pancabudi is as effective as teaching mathematical problem-solving skills without using the Problem-Solving learning model. $H_a : \mu_1 > \mu_2$ The application of the Problem-Solving model in teaching mathematical problem-solving skills to grade X students of SMK Pancabudi Medan is more effective.

FINDINGS AND DUSCUSSION

Research data is all information that can be used as respondents and data in the type of quantitative research data and qualitative research data. Data that is used as a reference to obtain research results are sourced from primary data and secondary data where the data can be quantitative or derived from documents, either in statistical form or in other forms for the benefit or requirements of conducting a study. The normality test is a test carried out for the distribution of data to determine whether or not the distribution of research data is normal. the formula used (Sukardi, 2003) to test the normality of data with Shapiro Wilk's formula because of the number of samples < out of 50. The normality test carried out after the data was obtained using the software application version 20 to see if the data was normally distributed or not was also a homogeneity test carried out to test for similarity, namely the variance of samples taken from the same population. For pretest and post-test data obtained from the results of research at SMK Pancabudi, it is also necessary to conduct a homogeneity test to see whether the variances taken from the population of SMK Pancabudi students have similarities or are homogeneous.

Table 1. Test Output Results Homogeneity Score Postes Scores Experimental Class and Control Class

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai Posttest	Equal variances assumed	.012	.915	1.603	68	.114	4.672	2.914	-1.144	10.487
	Equal variances not assumed			1.602	67.592	.114	4.672	2.916	-1.148	10.491

From Table 1. above the results of the homogeneity test output obtained the value of F calculate < F table, which is 0.012 < 3.985, it can be concluded for the homogeneity test of postes data experimental class and control class including having the same variant or homogeneous data.

Table 2. Test Results of Homogeneity of Postes Data of Experimental Class and Control Class

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SKOR PRETES	Equal variances assumed	.007	.934	-1.960	69	.054	-5.560	2.836	-11.217	.098
	Equal variances not assumed			-1.960	68.757	.054	-5.560	2.837	-11.220	.101

From table 4.4. above the results of the homogeneity test output obtained the value of F calculate < F table, which is 0.007 < 3.985, it can be concluded for the homogeneity test of postes data, experimental class, and control class including having the same variance or homogeneous data. The data tested are pretest data and posttest data in experimental classes and control classes. With this calculation, the index value will be

compared with the value (p) > 0.05 (α: 5%) then the data in this study is normally distributed (Nurgiyantoro et al. 2020: 118). Data analysis uses the SPSS 20 software application to generate a numerical index that can show whether the data is normally distributed or not. The complete calculation can be seen on the appendix page. A summary of the results of the data spread normality test can be seen in the table below The data used in research can be in the form of quantitative research data or qualitative research data or if possible can combine the two types of research data. The research conducted is in the form of quasi-experimental research where the research is semi-experimental research by using or taking qualitative. Hypothesis testing carried out in this study aims to re-examine the correctness of the previously formulated research hypothesis. The alternative hypothesis (Ha) addressed in this study reads that there is a significant difference between students' mathematical problem-solving abilities between the group of students taught using the Problem-Solving method and the group of students taught without using the Problem-Solving model. For testing alternative hypotheses, the initial hypothesis or initial hypothesis Ho will also be formulated: that is, there is no difference in mathematical problem-solving ability between students taught using the Problem-Solving method and students taught without using the Problem-Solving method. To test this hypothesis, researchers use a t-test with test criteria if the calculated t price is greater than the t table and with an error rate of 5% and db-related 68 then Ho will be rejected and Ha will be accepted.

Table 3. Test Output Results t Postes Scores of Experimental Class and Control Class

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai Posttest	Equal variances assumed	.036	.850	2.824	68	.006	8.088	2.864	2.373	13.804
	Equal variances not assumed			2.819	67.149	.006	8.088	2.869	2.362	13.814

From the calculation results obtained a count value (th) of 2.824 for the experimental class and 2.819 for the control class, with table t value for db 68 sig 5%, if consulted in the t

table obtained 1.990 then based on the t-test criteria it can be concluded that the t value of the count is more than t table with a sig greater than the alpha sig of 5%, it can be concluded that count > t table can be decided to test hypothesis I that the null hypothesis rejected and alternative the hypothesis accepted in this case there is a significant difference between students' mathematical problem-solving ability between the group of students taught using the Problem-Solving method and the group of students taught without using the Problem Solving model. Hypothesis II is a hypothesis formulated in the form of an alternative hypothesis (Ha) with the sound of applying the Problem-Solving learning model to improve mathematical problem-solving skills more effectively than learning without using Problem-Solving. The opposite of alternative hypnosis is formulated as the null hypothesis which reads: the application of the Problem-Solving learning model is as effective as learning that does not apply Problem-Solving learning. From the results of experimental class scores and control classes, it can be seen that student scores are more effective whether they use the Problem-Solving learning model or those without using the Problem-Solving learning model.

Table 4. Results of Improved Scores of Experimental and Control Classes

Jenis Test	Mean	Peningkatan Skor
Pretest Kelas Eksperimen	72,50	13.29
Postest Kelas Eksperimen	85,79	
Pretest Kelas Kontrol	70,29	6.62
Postest Kelas Kontrol	76,91	

From Table 4.18, the calculation results can be obtained with an increase in the experimental class score of 13.29 and an increase in the control class of 6.62. From the results of the increase in scores obtained by students, it can be concluded that the value of increasing the score of the experimental class is greater than that of the control class. So it can be concluded that the increase in student scores obtained in the experimental class is greater when compared to the score obtained by the control class. If the mean posttest value of the experimental group is compared with the mean postes of the control compared, the mean posttest of the control class will be greater at 85.79 > 76.91. So it can be concluded that the application of Problem-Solving learning is effective for mathematical problem-solving abilities. Ho formulated the application of Problem Solving learning to improve mathematical problem-solving skills as effectively as learning without Problem Solving was rejected While the counterhypothesis Ha the application of effective Problem- Solving learning for

mathematical problem-solving ability is more effective than learning without Problem-Solving accepted.

CONCLUSION AND RECOMMENDATION

Conclusions that can be drawn from the results of research and discussion are as follows: There is a difference in achievement of mathematical problem-solving ability between the group of students taught using Problem-Solving and the group of students who are taught without using Problem-Solving learning. The ability to solve mathematical problems using Problem-Solving learning is more effective than without using Problem-Solving learning. Advice For Schools he results of this study can be used to motivate teachers as teaching staff to want to motivate children's learning prestige by modifying or varying everything that is included in the teaching aspect, not excluding teaching models and strategies so that boredom or monotonous learning systems occur in the classroom. For Educators and Students For students, it provides motivation and opportunities to interact by repeating lessons that have been learned at school to further strengthen the knowledge and understanding that has been obtained at school. Parents are more in control of the scores obtained by students so that in the future the grades obtained can be better or show significant improvement

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