Problem Based Learning (Pbl) Model and Mathematics Learning Outcomes Students

by Agnes Goni

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ABSTRACT

This study examines the effect of applying the Problem Based Learning (PBL) model on the learning outcomes of fourth grade students at SD Inpres Tempang. This study uses a quantitative research type of pre-experimental design and one group pretest-posttest research design. The sample in this study were all fourth grade students of SD Inpres Tempang, totaling 26 students. The sampling technique used is the saturated sample technique. Based on the results of data analysis using descriptive statistics, the average value of participants before being taught with the Problem Based Learning (PBL) model was 30.5 and the average value after being taught with the Problem Based Learning (PBL) model was 78.34. The results of the analysis inferential statistics obtained obtained tcount 38.89 < ttable 1.675 and obtained the calculation results of the SPSS sign. $< = 0.05 \, (0,001 < 0.05)$ in the sense that H0 is rejected, with a 95% confidence level it is said that the average value of student learning outcomes before the application of the Problem Based Learning (PBL) model is not the same as the average value of student learning outcomes after the application of the Problem Based Learning model. (PBL). The results showed that there was an effect of applying the Problem Based Learning (PBL) model on students' mathematics learning outcomes after the application of the Problem Based Learning (PBL) model.

Keywords: Problem Based Learning (PBL) learning model, results study.

PRELIMINARY

The nature of education is identical with human life, because since wherever and whenever humans need education. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and state.

Teaching and learning is an activity with educational value, educational value that occurs between educators and students. Interactions have educational value because the teaching and learning activities carried out are directed to achieve certain goals that have been formulated before the learning process is carried out. An educator determines the method that will be used so that the learning objectives that have been formulated can be achieved. Meanwhile, an educator must have four teacher competencies, namely pedagogic competence, personality competence, professional competence and social competence.

In the 2013 curriculum, it is expected to make children learn more contextually with the environment. Therefore, the scientific learning model is implemented using an integrative thematic approach. Integrative thematic approach is a teaching and learning activity that combines the material as a whole on one theme, Ministry of Education and Culture (2013). In the 2013 curriculum objectives, it is hoped that with an integrative thematic approach, learning can be carried out with the principle of contextual learning that is close to the child's environment so that learning can be more meaningful. Through thematic learning the understanding of concepts is always strengthened by the synergy of understanding between concepts packaged with themes.

One of the problems faced by the world of education is the problem of the weakness of the learning process. In the learning process, children are less encouraged to develop their thinking skills. The learning process in the classroom is directed to the child's ability to memorize, the child's brain is forced to remember various information without being required to understand the information it remembers to connect it with everyday life.

This fact applies to all subjects. Likewise in mathematics, the difficulties of mathematics have been known to people for a long time. There are many complaints from students that mathematics lessons are not interesting, boring, scary, so students are not interested in learning, this is because mathematics lessons are felt to be difficult and do not appear to be related in everyday life. As happened in grade IV SD Inpres Tempang.

Based on the facts in the field, it shows that generally students do not give enough

positive response to mathematics, so that in the end it causes difficulties in learning mathematics and the impact on student achievement is also low. Based on the results of observations at SD Inpres Tempang, that the ability of students in mastering mathematics subject matter is not satisfactory, as evidenced by the test scores of students in grade IV SD Inpres Tempang, of 26 students there are still some students who get scores that are still below the KKM score. This is caused by the lack of attention of students in following the learning process, as well as the lack of student motivation to learn and student achievement in mathematics is low.

Researchers feel and see the difficulties of students in terms of mastering the material on mathematics material so that they feel the need to immediately deal with the problem. To overcome the problems mentioned above, in carrying out learning activities, educators must also master the teaching material. Educators also need to make variations in teaching, in this case educators are expected to be able to apply learning models that allow students to grow their passion for learning. Learning models can be used as patterns of choice, meaning that teachers may choose appropriate and efficient learning models to achieve learning objectives.

Teachers are required to choose a learning model that can stimulate students' enthusiasm for learning

actively involved in the learning experience. But in reality what happened at SD Inpres Tempang in grade IV still tended to use the conventional model with educators being the center of learning resources. One alternative model that allows the development of students' thinking

skills is Problem Based Learning (PBL).

In connection with the description above, the authors are interested in conducting research with the title "The Influence of the Application of Problem Based Learning (PBL) Models on Mathematics Learning Outcomes of Fourth Grade Students of SD Inpres Tempang"

THEORITICAL REVIEW

Understanding Problem Based Learning (PBL) Models

According to Gagne (2017) the Problem Based Learning (PBL) model is a learning model that emphasizes the exposure of problems as a trigger for learning, so that learning is no longer fragmented according to the field of science, but is integrated as a whole.

According to Mulyasa (2016) the Problem Based Learning (PBL) model is a learning model that aims to design students to learn through real problems in everyday life, connected with the knowledge they learn.

According to Suarni (2019) the Problem Based Learning (PBL) model is a learning model that involves students in solving real problems.

Based on the opinions of the experts above, it can be concluded that the Problem Based Learning (PBL) model is a learning model that uses contextual problems as learning materials, by fostering students' curiosity to feel motivated and able to find information that is used as a reference for problem solving. So that students are accustomed to solving problems.

Steps of the Problem Based Learning (PBL) model

According to Rusman (2011: 243) the steps of the Problem Based Learning (PBL) model are as follows:

1. Student orientation on problems
2. Organizing students to learn
3. Guiding individual and group investigations
4. Develop and present the work
5. Analyze and evaluate the problem solving process.

RESEARCH METHODS

This research uses the type of research *pre-experimental design*, this design is not yet a real experiment. Because there are still external variables that also influence the formation of the dependent variable. So the experimental results which are variables the dependent is not solely influenced by the independent variable. This can happen, because there is no control variable, and the sample is not chosen at random.

The approach used in this research is a quantitative research approach. According to Sugiyono (2013: 13) quantitative research is one type of research activity whose specifications are

systematic, well-planned and clearly structured from the beginning to the making of research designs.

The research design used is the One-Group Pretest-Posttest design. In this design there is a pretest, before being given treatment. Thus the results of the treatment can be known more accurately, because it can compare with the situation before being treated.

This design can be described as follows:

$$\boxed{\text{O1} \quad \text{X} \quad \text{O}_2}$$
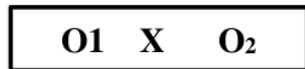
Information:

O1   : Pretest score (before being taught by model*Problem Based Learning*(PBL))

X   : Treatment (applying model*Problem Based Learning*(PBL))

O2   : Posttest scores (after being taught the model*Problem Based Learning*(PBL))

The population in this study were fourth grade students of SD Inpres Tempang. The sample in this study were all fourth grade students of SD Inpres Tempang, totaling 26 students.

The location of this research was in the fourth grade of SD Inpres Tempang. This research was conducted in August 2021.

TData collection techniques are the methods used by researchers to collect research data.In this study, researchers used two data collection techniques, namely documentation and tests.

1.   Documentation
In this study, the documentation meant by the researcher was data about students and photos of the learning process of students at SD Inpres Tempang.
2.   Test
The form of the test used is multiple choice questions.
Data Analysis Techniques In this study, two statistical techniques were used, namely descriptive statistics and inferential statistics.
1.   Descriptive statistics
According to Sugiyono (2017) descriptive statistics are statistics used to analyze data by describing or describing the data that has been collected as it is without intending to make conclusions that apply to the general public or generalizations.
The steps in compiling research data are:
a.   Creating a Frequency Distribution Table
1.   Calculates the range of values (R), which is the largest data minus the smallest data.
2.   Counting the number of class intervals (K)
3.   Calculating the length of the class interval (P)
b.   Mean or average
c.   Standard Deviation
d.   Determining the Percentage

2.   Inferential Statistics [4]

According to Sugiyono (2017) inferential statistics, (often also called inductive statistics or probability statistics), are statistical techniques used to analyze sample data and the results are applied to the [20] population.

a.   Normality test

The normality test aims to determine how much the research data is normally distributed or not. Normality test illustrates that the sample taken comes from a population that is normally distributed.

The normality test in this study was conducted to process the pretest and posttest scores. The method used to test for normality is the Kolmogrov-Smirnov test. If the significance value of the Kolmogrov-Smirnov test result is 0.05, then it is normally distributed and otherwise is not normally distributed.

b.   Hypothesis testing

Hypothesis testing in this study uses a two-party test with:

H0 : There is no effect of the application of the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang.
H1: There is an effect of applying the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang.

To test the hypothesis in this study using the help of SPSS. In addition, this study also uses hypothesis testing using the following formula:

$$\text{thit} = \frac{X_1 - X_2}{S_{gab} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where :

[21]

$$S_{gab} = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_1 - 1)S_2^2}{n_1 + n_2 - 2}}$$

RESEARCH RESULTS AND DISCUSSION

This research was conducted with descriptive analysis used to answer the first and second problem formulations, namely student learning outcomes before and after student learning outcomes after being taught using the Problem Based Learning (PBL) model while inferential analysis was used to answer the third problem formulation, namely whether there are the effect of the application of the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang. Moreover, inferential statistics too used to test hypotheses that have been previously set by the researcher.

Hypothesis testing uses inferential statistics, namely the two-party t-test, before testing the hypothesis, the prerequisites for the normality test are tested, which aims to determine whether [17] the data is normally distributed or not.

a.   Normality test

Normality testing was carried out using the Kolmogorov-Smirnov type of test using SPSS. The level of significance = 0.05 > sig SPSS, it can be said that the data or student learning outcomes are normally distributed, and in different circumstances the data is said to be abnormal. The

following are the results of the SPSS normality test.

Table of Normality Test of Mathematics Learning Outcomes for Fourth Grade Students of SD Inpres Tempang

Variable	Kolmogorov-Smirnov		
	statistics	df	Sig
Pretest	0.162	26	0.076
Posttest	0.165	26	0.066

In the table above, the results of the pretest normality test with a significance of = 0.05 and the SPSS sig value obtained by Kolmogorov Smirnov is 0.076. Because the significance level of = 0.05 is greater than the SPSS sig (0.05 > 0.076), it can be said that the pretest or grade IV mathematics learning outcomes of SD Inpres Tempang are normally distributed. Likewise posttest or result scores   study   after

Problem Based Learning (PBL) model was applied with a significance of = 0.05 and a significance of SPSS 0.066. Because the significance level of is greater than the SPSS sig (0.05 > 0.066), it can be said that the posttest scores for the fourth grade students of SD Inpres Tempang are normally distributed.

The data or value of mathematics learning outcomes for fourth grade students of SD Inpres Tempang before and after being taught using the Problem Based Learning (PBL) model at a significance level of = 0.05 both data (pretest and posttest) sig SPSS obtained is greater or sig > sig SPSS therefore it can be said that the two learning outcomes data are normally distributed.

b.   Hypothesis testing

Testing the hypothesis of this study using a two-party test was carried out to answer presumptions or hypotheses using SPSS.

The following hypotheses have been formulated previously: H0 : $\mu_1 = \mu_2$

H1 : Information : H0 = There is no effect of applying the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang. H1 = There is an effect of applying the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang .$\mu_1 \neq \mu_2$

The results of the descriptive analysis obtained the average student learning outcomes on the theme of always saving energy, the sub-theme of various energy sources before the application of the model

Problem Based Learning(PBL), which is 30.5 with a standard deviation of 14.03, where the maximum score achieved by students is 50 and the minimum score is 10, the distance between the maximum score and the minimum score is 40.

Overall the scores obtained by students, if grouped into three categories, namely low, medium, and high categories. There are 6 students in the low category, 13 students in the medium category, and 7 students in the high category. So it can be said that most of the student learning outcomes on mixed arithmetic operations before the application of the Problem Based Learning (PBL) model were in the medium category.

The results of the descriptive analysis obtained the average student learning outcomes on mixed arithmetic operations after the application of the Problem Based Learning (PBL) model, which was 78.34 with a standard deviation of 10.92, where the maximum score achieved by students was 100 and the minimum score was 60, the distance between the maximum score and the minimum score is 40.

Overall the scores obtained by students, if grouped into three categories, namely low, medium, and high categories. There are 3 students in the low category, 15 students in the medium category, and 8 students in the high category. So it can be said that most of the student learning outcomes on mixed operations material after the application of the Problem Based Learning (PBL) model is in the medium category.

Hypothesis testing uses inferential statistics, namely by using a two-party t-test, which was previously tested for normality with the aim of knowing whether the distribution of the data is normal or not. Normality testing was carried out using SPSS Kolmogorov-Smirnov for a significant level = 0.05 > sig SPSS, it can be said that the data is normally distributed. Based on the results of the analysis of student data before the application of the Problem Based Learning (PBL) model, the above analysis was obtained = 0.076 > 0.05, so the score of student learning outcomes before the application of the Problem Based Learning (PBL) model was normally distributed. Likewise with student learning outcomes after the application of the Problem Based Learning (PBL) model, the results of data analysis were obtained at a significant level at the level = 0.066 > 0,

The results of the pretest and posttest were tested with inferential statistics, the sign value. < = 0.05 (0.001 < 0.05) for 95% confidence H0 is rejected, meaning that the average value of student learning outcomes before the application of the Problem Based Learning (PBL) model is not the same as the average value of student learning outcomes after the application of the Problem model Based Learning (PBL).

From the results of hypothesis testing and supported by relevant studies, then it can be concluded that there is an effect of applying the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang.

CONCLUSION

Based on the value of data analysis, there is an effect of applying the Problem Based Learning (PBL) model on the mathematics learning outcomes of fourth grade students of SD Inpres Tempang.

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