

Effect of Problem Based Learning Model on Mathematical Learning Outcomes of 6th Grade Students of Elementary School Accredited B in Kendari City

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ABSTRACT

The purpose of this study was to determine the effect of problem-based learning models towards the mathematics learning outcomes of 6th-grade students of an Elementary School accredited B in Kendari City. This study is quantitative experimental research. The population in this were all 6th-grade students of an Elementary School accredited B in Kendari City. The technique of determining the sample was done by cluster random sampling. Data analysis used is descriptive statistics and inferential statistics where the hypothesis test used is the t-test. The results showed the effect of problem-based learning models better than direct instruction and problem-based learning model positive effect on mathematics learning outcomes of 6th-grade students of an Elementary School Accredited B in Kendari City.

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1. INTRODUCTION

Education is an effort that can improve human dignity and preparedness to face every change towards a better life. Education is very important, given that education is a pillar of national development (Imswatama, 2018; Usmadi, 2018; Amalia, 2018). Education is basically a conscious effort to develop students' potential by encouraging and facilitating learning activities. In an effort to improve the quality of education, the teacher is required to make learning innovations, by using the right learning model as an effort to improve students in mastery subject, especially of mathematics subject matter (Masitoh, 2018; Thahir, 2018; Putriani, 2018). Mathematics is a universal science that underlies the development of modern technology, has an important role in advancing the power of human thought.

Mathematics is one of the subjects that must be taught at every level of education, especially in elementary school. Mastery of mathematics is needed early. Because mathematics subjects can equip students with the ability to think logically, analytically, systematically, critically and creatively and the ability to cooperate. In an effort to improve the quality of education in Indonesia, it continues and never stops, one way is to change the curriculum. In 2014 the government implemented the 2013 curriculum. The implementation of the 2013 curriculum is a way of facing globalization and the demands of the Indonesian people in the future.

Curriculum changes will be maximized if changes are made not only in the classroom but also outside the classroom. The reality in the field from the survey conducted in April 2017 Elementary school accredited B in Kendari City, many schools have implemented the 2013 curriculum but the applied learning does not match reality,

because the concept of learning always returns to the easiest way the teacher teaches, namely direct instruction so that learning makes students passive and less skilled because students only become the object of the listener and the teacher only explains the material, as well as when learning mathematics, as a result, students only memorize formulas and do exercises that are exactly the same as the example given by the teacher, if the level of difficulty is rising the student are confused and cannot even do.

Most of the elementary school accredited B in Kendari is having a problem related to learning mathematics in schools. From the results of observations and interviews in the field for 1 month, the problems obtained in mathematics learning include; Low student mathematics learning outcomes, because students are less active by looking at the learning process, students feel embarrassed and afraid to ask questions, do not dare to express opinions, only some students who dare to go forward to do the questions in front of the class, students are still busy themselves and lack attention to the teacher's explanation so that students cannot provide answers and respond to questions, and students do not work on questions that are different from the previous example given because the problem is considered difficult and only waits for answers from friends who have finished working on it. As a result, after assessing students who meet the minimum completeness criteria do not achieve completeness in a classical manner that is 85%. This can also be seen from the average mathematics score of 2016/2017 academic year students which only reached 62.77.

Based on one of the learning innovations that corresponds to the condition of students in the problem based learning model. Permatasari, Koeswati, & Giarti (2018) explains that there are many gaps in the learning process to close gaps and answer needs, a

learning model that is able to convey open-minded, accurate learning, and is able to train students to construct knowledge and solve problems. One learning model that is able to convey such learning is problem-based learning. According to Duch et al (Amiluddin, & Sugiman, 2016), problem-based learning is a learning model that starts by asking problems, questions, which makes students want to solve them. Ariani (2018) also explained that problem based learning is a directly related learning model characterized by student-centered and able to increase mathematical intelligence, in this case, the ability to learn mathematics. The problem-based learning principles are students who actively seek their own answers to the problems given by the teacher so that the teacher is only a mediator and facilitator to help students construct their knowledge effectively (Lestari, 2012; Fonna, 2018, Mursalin, 2018). In line with those described Kaharuddin (2013) students are expected to be able to construct their own understanding according to themselves Therefore the role of teachers tends to be facilitators rather than information providers.

Implementation of the problem-based learning model very suitable to be applied to mathematics subjects, because this model is able to make students solve several contextual issues related to mathematics subjects so that it can construct students' understanding. The results of the study Nasir (2016) about the effectiveness of problem-based learning models on students' problem-solving ability in mathematics learning, learning by using problem-based learning models in mathematics learning is effective in improving students problem-solving abilities. Similar research was also conducted Paloloang (2014) on the application of problem based learning models to improve student learning outcomes with the results of the study saying the application of problem-based learning models improves student learning outcomes, by following the steps, (1) student orientation to the problem, (2) organizing students to learning, (3) assisting individual or group investigations, (4) developing and presenting work and (5) analyzing and evaluating the problem-solving process.

While the research conducted Farhan & Retnawati (2014) about the effectiveness of problem-based learning with the results of effective problem based learning research from all aspects measured; learning achievement, mathematical representation ability, and learning motivation. From several relevant theoretical and research studies that have been described previously, it can be concluded that the application of problem-based learning models can improve student learning outcomes from the learning process starting from problem clarification, problem-solving techniques, information gathering, information sharing, and discussion to find solutions to problem-solving. presentation of the results of problem-solving. Based on the description above, to improve student learning outcomes, it is necessary to do research to see the effect and comparison of problem based learning and direct instruction towards the mathematics learning outcomes of 6th-grade students of an Elementary School Accredited B in Kendari City.

2. RESEARCH METHODS

Design the study used a randomized pretest-posttest comparison group design. Selection of research design by seeing that in the research plan which was carried out beginning with the pretest before giving treatment can be seen in Table 1.

Table 1. Research Design

Elementary School	Pre-Test	Treatment	Post-Test
10 Mandonga	O ₁	X ₁	O ₃
13 Poasia	O ₂	X ₂	O ₄

The study population was students of a 6th grade Elementary School Accredited B in Kendari City consists of 23 schools according to Kemendikbud (2017). The research sample consisted of two classes from different schools that were given treatment using problem-based learning models and direct instructional.

Methods used in data collection are (1) Documentation method, according to Queirós (2017) Documentation method for collecting data obtained from documents or note. This method is used to obtain the average value of daily repetition of the sixth-grade students of SDN Accreditation B in Kendari City who are the study population. Then the homogeneity test is conducted to find out whether the data is homogeneous. (2) Interview Method, (Siregar, 2017: 40) explains the interview method is the process of obtaining data by means of question and answer, face to face between the interviewer and the respondent using a tool called the interview guide. This method is used to obtain information directly on students about the conditions about mathematics learning in class after treatment. (3) Test Method, a test method to obtain data about students' mathematics learning outcomes. This test was carried out on students of experimental class I and experimental class II.

The descriptive analysis aims to analyze the results of mathematics learning tests. Normality test aims to find out the data is normally distributed or non-parametric statistical tests are not used. Homogeneity test aims to find out the class by learning problem-based learning and direct instructional models through the value of the mathematics learning outcomes test has the same level of variance or no. Hypothesis test aims to see the effect and comparison of problem based learning and direct instructional towards the mathematics learning outcomes of 6th-grade students of an Elementary School accredited B in Kendari City.

3. RESULTS AND DISCUSSION

3.1 Results

The instrument is description of 5 numbers. Before the test is given to students who will be studied, namely 6th grade Elementary School Accredited B in Kendari City where 6th grade Elementary school of 10 Mandonga as the experimental class I taught with problem based learning model and 6th grade Elementary School of 13 Poasia as a class of Experiment II which was taught by direct instructional, it was conducted a trial against the 6th grade of Elementary School accredited A in Kendari City. Franke (2010) explained that the trial of the mathematics learning outcomes test instrument with the criteria of the item is said to be valid if the value of r_{xy} is greater than the table product Moment (r) = 0.381. From the results of the 5 item test results obtained there are 5 items that are in the valid category, namely item number 1, 2, 3, 4, 5.

Table 2. Results of Instrument Validity Test

Number	r_{xy}	r_{table}	Etc
1	0.784	0.381	Valid
2	0.975	0.381	Valid
3	0.959	0.381	Valid
4	0.963	0.381	Valid
5	0.979	0.381	Valid

Table 2. shows that out of five items, there are 5 items that are valid for use as an instrument to measure the ability of the results of students' mathematics learning 6th grade Elementary school accredited B in Kendari City. Based on the data above, it is appropriate to be used as a research instrument.

Table 3. Results of Reliability Test

Question	Test Results Learning	
	r_{xy}	r_{11}
1	0.784 (Valid)	0.560 (Medium reliability)
2	0.975 (Valid)	
3	0.959 (Valid)	
4	0.963 (Valid)	
5	0.979 (Valid)	

Table 3. shows that the items of the test of the mathematics learning outcomes test instrument of students have fulfilled good characteristics to be used as instruments of this study.

In general student learning outcomes between the experimental class, I and experiment II are presented in Figure 1.

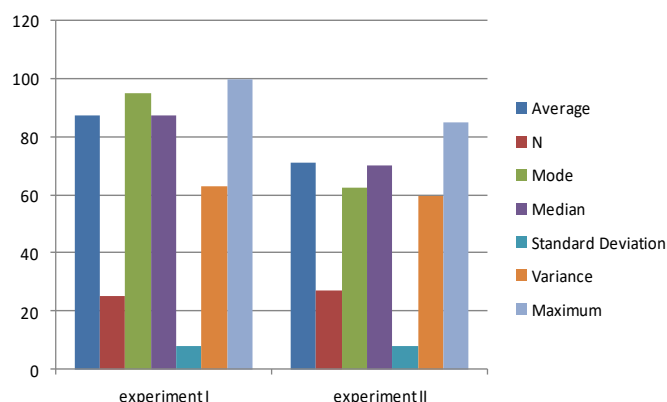


Figure 1. providing an illustration that the quality of mathematics learning outcomes of students taught by problem-based learning models greater than students taught with direct instructional This can be seen from the average students' mathematics learning outcomes from the application of problem-based learning amounting to 87.5. While the average value of students mathematics learning outcomes from the application of direct instructional has an average of 71.3. So it can be concluded that descriptively the application of problem-based learning is better than direct instructional.

The results of the calculation of the normality test of data using Kolmogorov test statistics concluded that the data of students' mathematics learning outcomes using problem-based learning models and direct instructional normal distribution and can be seen in Table 2.3. following.

Table 4. Results of Normality Test

D_{max}	D_{table}	Distribution Information
0.0958	0.187211	Normal

Table 4. providing an overview between experiment I and experiment II with a normal distribution.

The results of the test data homogeneity test from the mathematics learning outcomes of the experimental class I students and experimental class II were obtained $F_{count} = 1.1527 < F_{(0.05); 24, 26} = 1.95$ at a significant level $\alpha = 0.05$, meaning that the results of student learning outcomes of the two classes have homogeneous variance. This means that the ability of students between experimental I and experiment II is assumed to be the same.

The results of the research hypothesis can be seen in Table 5.

Table 5. Results of Hypothesis Test

Class	N	t_{count}	t_{table}	Description
Experiment I	25	7.45	1.678	H_0 was rejected
Experiment II	27			

For $t_{count} = 7.45 > t_{(0.05; 45)} = 1.678$ then H_0 is rejected, it means problem-based learning model is better than direct instructional of students' mathematics learning outcomes.

Based on the description above can be concluded descriptively and inferentially the problem-based learning model is better than direct instructional so that it can be concluded that the problem-based learning model positive effect on mathematics learning outcomes of 6th-grade students of an Elementary School accredited B in Kendari City.

3.2 Discussion

The model has a positive effect on mathematics learning outcomes of 6th-grade students of an Elementary School accredited B in Kendari City. In the learning process using the problem-based learning process each student has a responsibility to solve problems in students worksheet by linking daily life and also ensuring all group members understand what they have done, such as clarification of problems, group problem-solving techniques, information gathering, and data, sharing information and discussing to problem-solving, and presentation of the results of problem-solving. So that each member is able to present the results of group work.

The positive impact of the problem-based learning model application, students look more active, creative in solving problems given in learning both individuals and groups, besides students are better prepared in the learning process because they have understood the problems related to everyday life this is supported by means and infrastructure that makes students understand learning, because the logic of their thinking is explored not only to know but really understand and understand the lesson, and students are more responsive to individuals and groups so as to improve students' mathematics learning outcomes and can be used as an alternative to improve the quality of learning carried out in class.

Based on the results of the study, it is known that student learning outcomes in experimental class II are lower than experimental class I learning outcomes. This is caused by several things such as, students are more silent and pay attention to the teacher who is explaining the subject so interaction student has less sleepy, even chat with their peers.

The results of the descriptive analysis of the learning outcomes of the two classes obtained on average in the experimental class I of 87.5 and in the experimental class II of 71.3. The average value represents the value of all students in each class. This shows that the average value in the experimental class I is higher than the average value in the experimental class II. In terms of data diversity, the experimental class had a variance of 63.02 while in the experimental class II had a variance of 59.79. From the results of the calculation of the variance obtained the value of variance in the experimental class is greater than the value of the variance in the experimental class II. This means that the increase in the value of students in the experimental class I is more evenly distributed than the increase in the value of students in the experimental class II. While the results of inferential analysis using t-test, the value of $t_{count} = 7.45$, $t_{table} = 1.678 > \text{significant level } \alpha = 0.05$. Because $= 7.45 >$

$t_{table} = 1.678$ then H_0 is rejected. This means that problem-based learning models are better than direct instructional.

Based on the description above can be concluded descriptively and inferentially that the application of problem-based learning model has a positive effect on the mathematics learning outcomes of Elementary School accredited B in Kendari City, this is also in accordance with the theory of constructivism (Danoebroto, 2015) wherein the theory of learning starts from a process of assimilating and relating experiences or lessons learned with the understanding they already have, so that their knowledge can be developed. In problem-based learning model, departs from real (authentic) problems so that students can develop their own knowledge, develop their skills to solve the problems at hand.

4. CONCLUSIONS

Based on the results of the t-test used to determine the effects of problem-based learning on mathematics learning outcomes of 6th-grade students of Elementary School accredited B in Kendari City, from the results of research and discussion it can be concluded that problem-based learning models better than direct instructional on mathematics subjects in 6th-grade Elementary School accredited B in Kendari City. So it can be said that the application of problem-based learning model has a positive effect on mathematics learning outcomes of 6th-grade students of an Elementary School accredited B in Kendari City.

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