The Effect Of Application Of Problem Based Learning On Student Learning Motivation In Mathematics

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Problem based learning is one method of learning that encourages students to be active. This research was conducted to see the effect of the application of this learning model on student motivation. Participants involved were 4th grade students in one elementary school in the city of Yogyakarta, Indonesia. The study was conducted using the pretest-posttest control group design and the instruments used consisted of test and non-test instruments. Data were then analyzed using T-Test. Data from the analysis showed the Sig. (2 Tailed) of 0.001. This value is below the α value, which is 0.05. This shows that there is a significant positive effect of the application of problem based learning on student motivation.

Keywords : Problem Based Learning; Motivasi Belajar.

Introduction

Learning is a system consisting of various components that are closely related to each other. Various components including objectives, materials, methods, and evaluations (Rusman, 2010). In determining the methods to be used in the learning process, the teacher must pay attention to four components. Permendikbud No. 21 of 2016 concerning the standard content of Mathematics in elementary schools explains that the purpose of mathematics subjects is to develop positive attitudes in mathematics that are logical, critical, careful and thorough, honest, responsible, and the ability to work together, and not easily give up and despair in solving problems encountered. This is a form of applying habits in mathematical investigation and exploration. The purpose of learning mathematics is to produce students so that they have the skills and knowledge to solve problems faced later in the community. To produce students who

have competence that can be relied on in problem solving, learning strategies in problem solving are needed (Wena, 2013). The learning process is an activity that can be done by the teacher to students in providing subject matter. A teacher must also guide and educate students in teaching and learning in schools, so that they can truly understand what has been explained by the teacher (Pertiwi and Suchyadi, 2019; Beck and McKeown, 2007). Students also not only sit still and listen, but students must be active when the learning process takes place.

Student learning motivation will determine the success that will be achieved by students. High student learning motivation will be able to achieve high learning outcomes (Boerger, 2011). And conversely, students who have low learning motivation will tend to get low learning outcomes so that they experience higher learning difficulties. According to Uno (2013), motivation is a basic impetus that moves a person to behave. This impetus is in a person who moves to do something that is in accordance with the motivation within him in the form of the desires and needs of students to come to school, take lessons, do assignments, repeat lessons and read reference books without the encouragement of others or from outside (Yamin, 2013). Students who do not have motivation in learning may not do learning activities. Students are said to be successful in learning if there is motivation from themselves to learn so they know something that is learned and understand the reasons it needs to be learned (Sardiman, 2012). Sudjana (2013) states that the high and low of learning motivation can be seen from the attitude of students when participating in the learning process among other things are interest, enthusiasm, responsibility, pleasure in doing the tasks given by the teacher and student responses shown to the stimulus given by the teacher.

Low student motivation can inhibit the achievement of learning goals so it must be handled appropriately. Students who have sufficiently high intelligence may also fail if they are not well motivated (Sardiman, 2012). Motivation will grow because of the desire of students to be able to know and understand something that can drive in directing the interest in learning so that it will be truly for learning and motivated to achieve achievement. Motivation really determines whether or not in achieving goals. The greater the motivation of students, the greater the success of learning. Students who have great motivation will be active in trying, seem persistent not willing to give up actively reading books to improve their achievement to solve the problem (Rohmah, 2012). Conversely students who have low motivation seem indifferent, easily discouraged, attention is not focused on learning, likes to disturb the class, often leaving the lesson as a result many experience learning difficulties (Ahmadi and Supriyono, 2013).

Learning needs to empower all potential students to master the expected competencies. This empowerment is directed so that it can encourage students to achieve competencies that will be developed throughout life. Understanding of the concepts and skills of the science process can increase after students experience the learning process (Suchyadi and Karmila, 2019). This must also be done, especially in learning mathematics. According to Daryanto (2012), mathematics is learning that places more emphasis on students to think logically, systematically, critically, creatively and collaboratively so that students will be able to develop abilities in terms of solving various everyday problems. Mathematics is a discipline that can improve the ability to think, contribute, and argue so that it can solve problems in life, as well as develop science and technology (Susanto, 2013; Downer and Pianta, 2006). There are several things which state that learning mathematics is very necessary, namely 1) a person's way of thinking logically and clearly; 2) the means to solve life problems; 3) recognize patterns of relationships between generalizations of experience; 4) a means of developing creativity; and 5) means to increase awareness of cultural development.

Based on preliminary observations and interviews, fourth grade students in one of the elementary schools in the city of Yogyakarta showed that students' motivation in participating in

learning mathematics was very low. The low motivation to learn from these students can be seen their lack of enthusiasm in the learning process. This is because in mathematics there are many variations of formulas that must be memorized and understood. Students find it difficult to understand this material and result in not being able to work on problems related to the material being studied. Furthermore, the results of interviews with teachers also obtained information that students' learning motivation looks very low when participating in learning, many students have difficulty in solving problems solving problems on flat material, and data obtained that the average value of students is still below the minimum graduation criteria . In addition, it was strengthened by the data of random interviews with several students, apparently there are still many students who have difficulty with the material to get up flat with evaluation questions characterized by problem solving and creative thinking. Students find it difficult to work on problems that require high-level thinking. The teacher only explains the subject matter by providing formulas in problem solving then students are asked to pay attention and take notes. Next the teacher gives examples of how to do the questions on the board This causes the enthusiasm of students to participate in learning in the classroom is very low, students become sleepy, do not pay attention, and like to talk alone with friends when the teacher is explaining the lesson.

Indicators of motivation in learning are internal and external encouragement to students who are in the process of learning to make changes in behavior, generally with several indicators or supporting elements (Christian, Morrison, Frazier, and Massetti, 2000). Sardiman (2012) states that there are eight motivational indicators, namely 1) persevering in facing tasks. Students are said to be diligent if they can work continuously continuously and will not stop before what is done is done; 2) Tough in the face of difficulties. Students who show tenacity when each is faced with difficulties so that it does not become easy to despair and it is not easy to be satisfied with the results that have been achieved; 3) Showing interest in various things. Students can show a willingness to solve various problems that are not always liked by others; 4) Prefer to work independently in facing problems, so students prefer to work independently with their abilities; 5) Get bored quickly with routine tasks. Students feel bored with various things that are just repeated so that they cannot bring up the creativity needed by students; 6) Can defend his opinion. When students feel confident about what they want, they will maintain that belief; 7) It is not easy to let go of what is believed. After feeling confident about something and defending it, students also will not easily let go of things that are believed; 8) Happy to find and solve problems. students are said to be motivated in learning if he can always find and solve problems that not all students do.

Low learning motivation can occur because of the way to teach teachers who are boring and can even with monotonous teaching. This can lead to the assumption that mathematics is a boring subject by teaching the same teachers (Suchyadi and Nurjanah, 2018; Taraban, Rynearson, and Kerr, 2000). With such conditions an effort should be made to increase motivation and develop student potential. In the learning process, teachers must use effective and varied learning models so that students show more interest in learning actively in the learning process. One method that can be used is Problem Based Learning (PBL).

PBL is a learning model that is able to encourage students to have expertise in solving problems and can encourage students to develop more critical thinking skills (Slameto, 2011; Ziori and Dienes, 2008). Kurniasih (2014) also states that PBL is learning that presents various real problems in students' daily life (contextual) so that it can stimulate students to learn. Yamin (2013) also states that PBL is learning that emphasizes authentic problem solving such as problems that occur in everyday life. Rusmono (2012) explains that the PBL model steps are as follows: a) organizes students on the problem, the teacher informs the learning objectives then

the teacher explains the important logistical needs and stimulates students to be involved in solving problems; b) condition students in the learning process, the teacher also helps students to manage and direct assignments related to problems; c) help independent inquiry in groups, the teacher directs students to gather information that is appropriate in conducting the experiment then seeks explanations and solutions; d) developing and presenting work and dividing work, the teacher helps students to design appropriate work, such as reports, video footage and models; e) analyzing and evaluating the process of solving problems, the teacher helps direct students to reflect on the investigation and the process carried out.

Research Method

This research is an experimental research using Quasi Experimental research design. Pseudo-experimental research is a form of development of pure experiments that is difficult to do. Pseudo-research is carried out because of the fact that it is difficult to get a control group that is used for research (Sugiyono, 2016). The design of this study is the development of Nonequivalent Control Group Design, this design is almost the same as Pretest-posttest Control Group Design, only in this design experiment 1 and experiment 2 were not randomly selected (Sugiyono, 2016). This research was conducted in one elementary school in the city of Yogyakarta and involved 4th grade students. There were two variables in this study, namely the independent variable (the application of problem based learning models) and the dependent variable (student learning motivation) (Sugiyono, 2016).

The instrument used in this study was a questionnaire. Regarding the validity test of questionnaire statement items, statement items are considered valid if they reach the correlation coefficient value of each score with a total score greater than 0.30. Meanwhile, if the correlation coefficient is less than 0.30, then the item is said to be invalid or must be removed (Azwar, 2011). In the questionnaire there were 40 statements related to learning motivation. Based on the results of the validity test, it can be obtained that 21 items of motivation questionnaire items have a correlation coefficient with the total score in the valid category ($\geq$ 0.30). Reliable instruments are instruments that are used several times to measure the same object, and will produce the same data (Sugiyono, 2016). It can be concluded that the reliability test can be done to find out whether or not an instrument is appropriate and consistent or not in generating data even though it is used repeatedly to measure the same object. Data analysis techniques and hypothesis testing using the Independent Sample T-Test with prerequisites for normality and homogeneity tests. Normality test is used to determine whether the data obtained is normally distributed or not. While the homogeneity test is used to find out the state of variance of the two groups of the same or different.

Results and Discussion

The level of student motivation in the experimental group was explained through descriptive statistics from the results of the pretest and posttest consisting of the mean (mean), highest score (max), lowest score (min), standard deviation, frequency distribution and graphical data presentation. The complete descriptive data can be seen in Table 1.

Table 1. Descriptive Statistics of Pretest and Postest Scores of Experiment and Control Groups

	N	Min	Max	Mean
Pretest - Experiment	21	25	51	37.33

Post Test - Experiment	21	46	69	57.00
Valid N	21			
Pretest – Control	27	24	49	37.37
Post Test – Control	27	37	61	50.59
Valid N	27			

Based on the data in Table 1, the results of the experimental group learning motivation scale from 37.33 to 57.00 with a difference of 19.67. While the results of the learning motivation scale of the control group from 37.33 to 50.59 with a difference of 13.26. This shows that the PBL in mathematics has a good effect on student motivation in grade 4 elementary school. This data needs to be further analyzed using statistical analysis using the T test. T Test results can be seen in Table 2.

Descriptive analysis results for the value of student motivation on the application of PBL models have increased. This we can look at the average research results above. In the application of the PBL model an increase of 19.67. This value is seen from the difference between the pretest value of 37.33 and the posttest value of 57.00. For conventional learning models also increased by 13.26. This value can be seen from the difference between the pretest value of 37.33 and the posttest value of 50.59. The average student motivation between the application of the PBL model and the conventional learning model has a different increase.

Table 2. Results of Data Analysis Using T Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Student's motivation to study	Equal vaariances assumed	.686	.412	3.620	46	.001
	Equal variances not assumed			3.652	44.44	.001

The basis for decision making in the Independent Samples T-Test is if the significance value > 0.05, then PBL does not affect. If the significance value or Sig. (2-tailed) <0.05 then PBL can affect. Based on the Independent Samples T-Test test table (see Table 2) it can be seen that Sig. (2-tailed) shows the number 0.001, where 0.001 <0.05. Then, according to the basis of decision making, it can be concluded that Ho was rejected. This can be interpreted that there is a mean influence between the experimental and the control group. Based on these values, it can be interpreted that the results of student motivation to learn about the measurement of angles in mathematics learning using PBL models are significantly higher than the results of student motivation to use conventional learning models. This proves that the PBL model has a different and higher impact than the conventional learning model. The results of this study are in line with research conducted by Istanti (2015) about the effect of problem-based learning models on the learning motivation of science which shows that the average experimental group, 81.82, is in the category of very high learning motivation. And the control group mean of 71.42, is in the category of high learning motivation. In addition, the experimental group's evaluation results were higher than the control group.

The effectiveness of the PBL model is possible due to the implementation of the PBL model steps. The contents of the syntax are students asked to listen to the learning objectives then students receive problems from the teacher continued students will carry out an investigation after that students to analyze the data continued students make reports, then the last student to reflect on the investigation. Before learning is needed a plan that is related to the implementation of using a particular model. Based on the syntax, the advantages of PBL, namely 1) problem solving is one good way to better understand the contents of the material; 2) problem solving gives challenges to students so that it gives flexibility to determine students' new knowledge; 3) problem solving can improve student learning activities; 4) problem solving helps students to transfer what they know to understand problems in real life; 5) problem solving can help students develop knowledge, and account for what has been done; 6) students are able to solve problems with an active and pleasant learning atmosphere; 7) problem solving can train students in critical thinking and adapt to new knowledge; 8) problem solving can be an opportunity for students to apply the knowledge gained in the real world (Hamdani, 2011). Through learning using the PBL model in mathematics, students can identify angular measuring devices in standard units in the form of protractors, write angular symbols in standard units, determine angular sizes of two lines with protractors, determine the magnitude of small angles formed by two hands, measure angles of flat shape with a protractor, measure angles on a flat figure in standard units in everyday life and solve problems related to measurement of angles in everyday life.

Conclusion

The results showed that students' learning motivation in mathematics using PBL learning models was significantly higher compared to learning using conventional learning models. This is evidenced by the average posttest results of the experimental group that is 57.00 higher than the average posttest results of the control group that is 50.59. In addition, this data was strengthened by the results of the analysis using the T Test which produced a Sig (2 tailed) value of 0.001 or <0.05. That is, the application of PBL has a significantly positive effect on student motivation.

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