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PROBLEM BASED LEARNING TO IMPROVE THE QUALITY OF MATHEMATICS TEACHING AT ELEMENTARY SCHOOL EDUCATION ACADEMIC YEAR 2018/2019

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ABSTRACT: *Research conducted at the University of Quality Jl Ngumban Surbakti No 18 Medan, North Sumatera Indonesia. This study aims to determine the influence of problem based learning models to improve learning quality. The type of research that researchers use is a draft of the research on quasi exsperimen with research draft using Non-Equivalent Control Group Design experiments. The population in the study is all students of the second generation of PGSD with a total of 7 classes with a student number of 278 people and as a sample of the class 2B21 (X-2) as the experimental class as many as 40 people and class 2B22 (X-1) as control class as many 35 people are acquired in a random way. Research instrument is a form test of the 35 description of the problem that has been validated by the validator with the level of breliability of Cronbach's alphadan of 0.83 very high category. Hypothesis testing conducted with Independent sample T-Test significantly $\propto$ = 5% and test requirement analysis is data normality and variance homogenization.Based on the results of the test Independent Sample Test obtained t = 6.2706 and t at the degree of freedom (DF = 73) and a significant level of α 0.05 is 1.6660. It was therefore null Hypotesis rejected and received an alternate hypothesis. Thus the implementation of a problem-based learning model is influential and can improve the outcomes of low-grade mathematics teaching the primary school teacher Education course of Quality University*
KEYWORDS: problem-based learning, learning outcomes, low-grade mathematics.

INTRODUCTION

The Background of the Study

Education is an effort to develop personal potential, personality, intelligence, noble morality, and skills given to children by adults. Education is the guidance or help given to children by adults intentionally so that children become adult (Purwanto,2011:19). More clearly, according to Law of Republic of Indonesia No. 20 of 2003 Chapter I article 1, stated "Education is a conscious and planned effort to create a learning atmosphere and learning process so that learners actively develop the potential Personality, personalities, intelligence, noble morality, and skills necessary for himself, society, nation and state".The government strives to improve education in Indonesia and produce quality resources. But education in Indonesia is still problematic in terms of the low quality of teachers. This is consistent with the statement Kulsum (2013) states "Educational problems in Indonesia include: (1) education paradigm in Indonesia, (2) poor quality of physical facilities, (3) low quality of teachers, (4) low teacher welfare and (5) the high cost of education ". Mathematics education is part of education in Indonesia. Mathematics is a universal science of form, structure, quantity and concepts that play an important role in problem solving. Mathematics is a universal science that

underlies the development of modern technology which has an important role in various disciplines and advancing human thinking ". James in Hasratuddin (2014: 30) states "Mathematics is the science of logic regarding the form, composition, amount and other related concepts with a large number which is divided into three fields, namely algebra, analysis and geometry".

Mathematics education in Indonesia is still troubled by the lack of understanding of student concept and students ' skills to solve the problems that are still low because of the less effective teacher and student communication where students rarely respond To the statements given by the teacher and the students assume that mathematics is difficult and frightening. Suliana (2012:7), stated:One of the factors causing the difficulty of learning math is the inability to properly mastery the concept, there are some who can use the formula correctly, but do not know the origin of a formula and why it should be used. In learning mathematics A student must be able to connect the concept of one with the other concept so that students easily absorb new material.Mathematics is very important to be taught to improve student intelligence. Cornelius (Suliana, 2013:6) suggests five reasons for learning Mathematics:

(1) The means of thinking that is clear and logical, (2) means to solve the problem of daily life, (3) the means of identifying patterns of relationship and generalization of experience, (4) the means to develop creativity, and (5) means to raise awareness To the development of culture.

Factors causing the low understanding of students' concepts due to the learning model used by teachers in the classroom is still problematic. The inability of teachers in terms of the selection of appropriate learning models. In addition, conventional learning tends to be centered on the teacher. Efforts that can be made to overcome these problems are by applying problem-based learning.

Tan in Rusman (2013:232) States "problem-based learning is the use of all sorts of intelligence needed to confront real-world challenges, the ability to deal with everything new and Complexity ". In Problem Based Learning, students are placed in positions that have an active role in resolving each of the problems they face (Harisson in Wardoyo,2013:72). Problem-based learning models help students develop high-level thinking skills, solve problems, learn to act as adults through their involvement in real-life experiences and simulations of being independent learners (Ibrahim and Nur in the Trianto,2011:96).According to Rusman (2013: 214), problem-based learning has characteristics including:

(1) Problem-based learning is a series of learning activities, meaning in the implementation of problem-based learning there are a number of activities that students should do. Problem-based learning does not expect students to just Listen to record, then memorize the subject matter but through the problem-based learning students actively think, communicate, search and process the data and eventually conclude, (2) learning activities are geared towards Solve the problem. Problem-based learning puts problems as keywords from the learning process. It means that without problems there could not be a learning process, (3) problem solving is done using a scientific thinking

approach. Thinking using scientific methods is the process of deductive and inductive thinking. The process of scientific thinking is done through certain stages; While empirical means the problem solving process is based on clear data and facts.

Problem-based learning has some major steps in the learning process, (David Johnson & Jhonson in Sanjaya, 2013:217):

1. Defining the problem, namely to formulate problems of certain events that contain conflict issues, until students become clear what problems will be studied. In this activity the teacher can ask the students for opinions and explanations on the interesting warm issues to solve.
2. Diagnosing problems, namely determining the causes of problems and analyzing various factors both factors that can inhibit or factors that can support the problem solving. This activity can be done in small group discussions to the end students sort the priority measures that can be performed according to the expected inhibitory type.
3. Formulating alternative strategies, i.e. test every action that has been formulated through class discussions. At this stage each student is encouraged to think about the tips and arguments about the possibility of any action that can be performed.
4. Determining and implementing the preferred strategy is decision making about which strategy to do.
5. Evaluate both process evaluation and result evaluation. Process evaluation is an evaluation of all activity activities; While evaluation of results is an evaluation of the outcome of implemented strategies.
6.

Problem-based learning has some advantages that both are used in learning (Rusman, 2013:220). The advantages of problem-based learning are: a technique that is good enough to better understand the content of the lesson, can challenge students ' ability and provide satisfaction to discover new knowledge for students, can increase activity Students ' learning, help students how to transfer their knowledge to understand problems in real life, help students develop new knowledge and be accountable for the learning they do, encouraging to conducting their own evaluation of both the outcome and the learning process, showing students that each subject is essentially a way of thinking and something that students should understand is not merely learning from the teacher or from Books alone, more enjoyable and liked by students, can develop students ' ability to think critically and develop their ability to adapt to new knowledge, can develop students ' interest to continuously Learning even when studying in formal education has ended.

Various reviews have explained the problem based learning is a model that can develop the students ' rational thinking skills. Problem-based learning provides an opportunity for students to explore collecting and analyzing data in a complete manner to solve the problems faced, the goal is for students to think critically, analytically, systematically, and logically s to find alternative troubleshooting through data exploration. By applying a problem-based learning model, students ' learning interest will increase. Because problem solving can challenge students ' abilities and provide satisfaction to discover new knowledge for students. With the learning process being run based on a problem-based learning scenario, student learning outcomes will increase.

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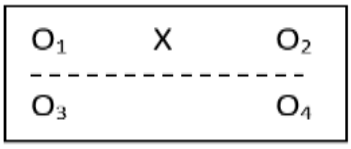
RESEARCH METHODS

The study was conducted at Quality University Jl Ngumban Surbakti No. 18 medan, North Sumatra Indonesia. This study aims to determine the effect of problem based learning learning models to improve the quality of learning. The quality of learning referred to is based on the process of implementing learning (lecturer and student activities) and student learning outcomes in the Mathematics courses of the Low Class Primary School Teacher Education Study Program (PGSD) Faculty of Teacher Training and Education Quality University. This type of research that researchers use is quasi-experimental research designs (quasi experiments) with research designs using the Non-Equivalent Control Group Design experiment. This design uses 2 groups, namely the experimental class and the control class. In this design, the experimental class group is treated while the control class group is the control group, ie the class that is not treated perlakuan.
The paradigm in Nonequivalent Control Group Design can be described as follows (Sugiyono, 2013:116):



Where:
O_1 = pretests value of group given treatment (experimental)
O_2 = posttest value of the group given the treatment (experimental)
O_3 = The Prestest value of the group not given the treatment (control)
O_4 = value of unassigned Group Posttest (Control)
X = Treatment

This research was conducted in March Academic Year 2018/2019. The study population was all students of the second batch of PGSD study programs, then two classes were randomly selected as samples. One class as an experimental class is a class that is taught using a learning scenario with problem based learning and a control class that is a class taught using conventional learning as usual.

The instruments used to obtain data on learning outcomes include tests and observation sheets. The test is a multiple-choice study. Further data on the test of learning results analyzed and the results of analysis as the basis for the improvement of the test itself as part of the learning device with the validity of the formula using the Product Moment and found 37 valid items from 40 items tested on the reliability level of the test (reliability test) were measured by using Cronbach's Alphadan by 0.83 (very high category).

After conducting the treatment of experimental classes and control classes, data obtained in the form of pretest result, posttest and observation data on the implementation of learning. This Data is analyzed to prove hypotheses. In hypothesized testing there are several prerequisite tests i.e. sample data data derived from a

population that is normally distributed and homogeneous. Analysis of data normality using Liliefors technique while analysis of data homogenization using variance similarity test (data normality analysis use) at a significant level of α = 0.05. Hypothesis testing conducted with Independent sample T-Test with formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$ (Source: Siregar, 2013:238)

RESEARCH RESULTS

To find out if there is a statistically significant difference in the level of trust (α = 0.05) for the implementation of problem-based learning models in order to improve the outcomes of low-grade mathematics courses starting with Describing the results of each group's analyses, averaging the pretes and postes scores, standard deviation test test normality and homogenity as a test of the prerequisite hypothesis testing.
This research was conducted from 3 March to 15 April 2019. Student Learning Data is obtained through post-test with the following results:

Table 1. Description of Post-Test Data on both samples

Summari statistic post-test		
	Exp-class	***Control-class***
Count	*40*	*35*
Minimum	62	58
Maximum	90	81
Sum	3159	2433
Mean	78,975	69,51428571
Median	79	70
Mode	78	69
Range	28	23
Std Dev (Sample)	7,043773391	6,021390442
Variance (Sample)	49,61474359	36,25714286

Based on the data in table 1.1 shows the post-test results in the experiment class after being learned through problem-based learning in the value range of 62-90. The average post-test value in the experimental class was 78.97; Median 79 and a mode of 78 with a student number of 40 people. As for the control class, conventionally located in the range of 58-81 values. The average post-test value of the control class is 69.51; Median of 70 and 69 mode from a total of 35 students.

Prior to the hypothesis testing, data on the results of the low-grade mathematics course obtained first was tested to determine the normality and homogeneity of the data. Based on the normality test by Kolmogorov-Smirnov class 2B21 as the experiment class acquired the Test Statistic value of 0.15 with a critical value of 0.21 and a class of 2B22 as the control class acquired Test value Statistic of 0.09 with value Critical 0.22. Both classes have a significance (SIG) value of > 0.05, so it can be said that the distribution of student learning values of each class is normal distribution.

Table 2. The normality of Post-Test data for both samples

Normality Test: Kolmogorov-Smirnov		
	Exp-class	***Control-class***
Null Hypothesis:	X-2 is normally distributed	X-1 is normally distributed
Alternative Hypothesis:	X-2 is not normally distributed	X-1 is not normally distributed
Number of Obs:	40	35
Hypothesised Mean:	78	69,51
Hypothesised Std Dev:	7	6,02
Test Statistic:	0,1500	0,0948
Alpha:	0,05	0,05
Critical Value:	0,2100	0,2240
Decision Rule:	Reject the Null Hypothesis if Test Statistic > 0,2100	Reject the Null Hypothesis if Test Statistic > 0,2240
Conclusion:	Do Not Reject the Null Hypothesis	Do Not Reject the Null Hypothesis

The results of testing homogeneity of both samples using analysis of variance seen that both samples were homogeneous. This is evidenced by the value of Fcount 1.3684 > F = 0.5204 on Degrees of Freedom (39.34) and a significant level of $\alpha = 0.05$. It can be concluded that the data comes from populations that have the same or homogeneous variance. Therefore, the hypothesis testing can be resumed.

Table 3. Test the Data homogenity Post-Test

Variance Test: Two Sampel		
Null Hypothesis:	Var(X-2) = Var(X-1)	
Alternative Hypothesis:	Var(X-2) ≠ Var(X-1)	
	Exp-class	***Control-class***
	X-2	**X-1**
Count :	40	35
Mean:	78,98	69,51
Std Dev:	7,04	6,02
Variance:	49,61	36,26
F(39,34) Test Statistic:	1,3684	
Lower Critical Value:	0,5204	
Upper Critical Value:	1,9508	
Alpha:	0,05	
p-Value:	0,3545	
Decision Rule:	Reject the Null Hypothesis if Test Statistic < 0,5204 or Test Statistic > 1,9508 or p-Value < 0,05	
Conclusion:	Do Not Reject the Null Hypothesis	

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The hypothesis testing was conducted using the Independent sample T-Test as seen in the table below.

Table 4. Test the difference two on average

Hypothesis Test Difference in Population Means :

Null Hypothesis:	(Mean of X-2) - (Mean of X-1) = 0	
Alternative Hypothesis:	(Mean of X-2) - (Mean of X-1) > 0	
	X-2	**X-1**
Sample Size:	40	35
Sample Mean:	78,98	69,51
Sample Std Dev:	7,04	6,02
Difference in Sample Means:	9	
t-Statistic (d.f. = 73):	6,2706	
Critical Value(s):	16.660	
Alpha:	0,0500	
p-Value:	0,0000	
Decision Rule:	Reject the Null Hypothesis if t-Statistic > 1,6660 or p-Value < 00.05	
Conclusion:	Reject the Null Hypothesis	
95% CI for the Difference in Means:	9,46 ± 2,51 [6,95 to 11,97]	

Based on the results of the test Independent Sample Test obtained T = 6.2706 and this = 1.6660 at the degree of freedom (DF = 73) and a significant level of α = 0.05. It was therefore null Hypotesis rejected and received an alternate hypothesis. Thus the implementation of a problem-based learning model is influential and can improve the outcome of learning courses Mathematics low class education study Program Teacher Elementary School FKIP Quality University

DISCUSSION

Problem-based learning is a learning model centered on learners with a study of issues in daily life and working in teams or groups, thereby training learners to take Their own learning and turn the role of educators into facilitators. While the study is conventionally oriented to educators activities centrally. Learning like this cendenrung resulted in boredom, less attractive and lack of interaction between educators with participants in the students so that will result in the lack of maximum learning outcomes.

The results of data analysis and hypothesis testing proved that learning outcomes in experimental classes were taught using problem-based learning better than the control

groups taught using learning models Conventional. In experimental classes, each group member cooperates with fellow group members to find solutions to the problems that educators offer. Modification of learning scenarios through problem-based learning has created the principle of cooperation and familiarizing students in thinking and seeking truth based on systematic and factual logic. Predefined scenarios have created critical, analytical, systematic, and logical thinking capabilities to find troubleshooting alternatives through data exploration as well as the creation of individual leadership characters. This allows students to achieve better learning achievements, have thinking skills, and the ability to solve problems in their lives based on empirical data.

The results gained in line with the opinions of Armigate, PIHL, & Ryberg (2015, 1) that "problem-based learning is a pedagogical approach that encourages people who take part in the process to act both change agents as Support working closely with peers, and also as individuals to use their creativity in finding solutions to practical problems ". Lestari, Ni Nyoman Sri (2012) found that the PBL in learning, in real creativity students can be raised and the students ' attention to problems and learning provided is very good, students more freely in the delivery of ideas and opinions And student cooperation look very good in group work. The concept of constructivism in learning is explained if the students are able to develop and build their own knowledge through the learning process then the knowledge that students have will be more remembered in a longer period of time. Wuryandani (2017) argues that through the problem-based learning activities of students are invited to form groups to conduct investigations in the problem solving in a group, while the role of educators is as Facilitator to assist with the discussion and help to direct the search for a variety of information or resources as a student material to find a solution until it can draw conclusions on the problems that have been discussed. Thus the learning activities are more meaningful and the material delivered by educators is more readily acceptable.

Through problem-based learning, it creates meaningful learning. Students who learn to solve a problem will apply the knowledge it possesses. Learning can be more meaningful and expandable when students are faced with situations where concepts are applied.

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