Influence of Problem-Based Learning Model of Learning to the Mathematical Communication Ability of Students of Grade XI IPA SMAN 14 Padang

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Influence of Problem-Based Learning Model of Learning to the Mathematical Communication Ability of Students of Grade XI IPA SMAN 14 Padang

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Abstract. The ability of mathematical communication is one of the goals of learning mathematics expected to be mastered by students. However, reality in the field found that the ability of mathematical communication the students of grade XI IPA SMA Negeri 14 Padang have not developed optimally. This is evident from the low test results of communication skills mathematically done. One of the factors that causes this happens is learning that has not been fully able to facilitate students to develop mathematical communication skills well. By therefore, to improve students' mathematical communication skills required a model in the learning activities. One of the models learning that can be used is Problem Based learning model Learning (PBL). The purpose of this study is to see whether the ability the students' mathematical communication using the PBL model better than the students' mathematical communication skills of the learning using conventional learning in Class XI IPA SMAN 14 Padang. This research type is quasi experiment with design Randomized Group Only Design. Population in this research that is student of class XI IPA SMAN 14 Padang with sample class XI IPA 3 and class XI IPA 4. Data retrieval is done by using communication skill test mathematically shaped essay. To test the hypothesis used U-Mann test Whitney. Based on the results of data analysis, it can be concluded that the ability mathematical communication of students whose learning apply more PBL model better than the students' mathematical communication skills of their learning apply conventional learning in class XI IPA SMA 14 Padang at $\alpha = 0.05$. This indicates that the PBL learning model effect on students' mathematical communication ability.

1. Preliminary
Is a compulsory subject at every level of education and need to be given so that learners are able to think logically, analytically, systematically, critical, and creative, and cooperate. Therefore, it is fitting for math teachers preparing lessons that facilitate students to achieve goals learning mathematics with the maximum. The purpose of learning The mathematics is that learners have abilities such as understanding concepts, using patterns, using reasoning, communicate ideas, have the right attitude of respect and behavior with math, doing motor activities as well as using simple props in performing mathematical activities (Permendikbud, 2014). In the process of learning mathematics, the eight abilities are very important and expected to be achieved by students. Ability to understand concept is a basic ability that must be achieved by students. After students understand the mathematical concepts...
so hopefully they can communicating math ideas or ideas well. In fact, many students who have understood the concept well but have not been able expressed his mathematical ideas correctly.

This shows that students' mathematical communication ability is still low. The issues raised are supported by the facts based on observations made in grade XI IPA SMA N 14 Padang on September 7 to 12, 2015. It is seen that within learning mathematics students have difficulty in communicating a clear mathematical idea to a friend or teacher through spoken language and writing. When the teacher asks questions about a concept or process, students have difficulty explaining the method they use. Student have difficulty in modeling a problem into the model mathematics. Many students do not read and use notation right or mathematical symbols when asked by the teacher. In addition, students too difficulties in understanding mathematical problems in the form of stories, so they also can not make a mathematical model of that problem given. Therefore, in the mathematics of teachers are required to choose a strategy, method, or model that involves a lot students in learning. One of the models that can facilitate students to developing the ability of mathematical communication is a Problem model based learning, hereinafter abbreviated as PBL. In learning PBL students are required to actively develop skills think of them. The PBL model is focused on giving the problem to the participants educate and do solve problems with concepts, principles and knowledge appropriate knowledge.

Giving a problem will trigger it good mathematical communication between teacher and student, student with source learning, or students with fellow students. By giving the problem to students, they will practice solving problems in the form of stories. Modeling mathematical problems, and can train students in the use of symbols and notations appropriately. Problem-based learning can also optimize development students' thinking ability. In line with the statement, Tan (Rusman, 2012: 229) suggests that "Problem-based learning is innovation in learning because students' thinking skills are optimized through systematic or group work ".Therefore, PBL is seen to improve students' mathematical communication skills.

Based on the formulation of the above problem, the purpose of this study is to knowing whether the mathematical communication ability of grade XI student of high school Negeri 14 Padang learning with PBL model better than siwa who learn with conventional learning. Research relevant to this research is Rahmi Research (2009) taking sample of junior high school students while research Riza (2013) took a sample of high school students. The results of the study shows that the mathematical communication ability shows developments after the implementation of different strategies with learning conventional.

2. Research Methods
Based on the problems studied and the proposed research objectives, the type of research conducted is quasi experimental (quasi experiments), according to the type of research research design used is Randomized Control Group Only Design. In this design, two random groups, the first group of experimental classes were given treatment, while the second group control class without conventional treatment or learning. in this study, samples were randomly selected as experimental class and control class. population in this study is all students of class XI IPA SMA N 14 Padang. selected class XI IPA 3 as experimental class and class XI IPA 4 as control class.

independent variables in this research is the treatment given to the sample class, which consists of learning mathematics with Problem Based Learning model in the experimental group and conventional learning in the control group. The dependent variable in this research is the mathematical communication ability of the students in the subjects of mathematics class XI IPA SMA N 14 Padang. The instrument used in this research is the ability test students' mathematical communication. This test aims to measure ability students on each indicator of mathematical communication ability.

3. Research Result
Mathematical communication ability data obtained through test with problem shaped essay. The test was conducted at the end of the study on the 21st May 2016 in both sample groups followed by 30
students of the experimental class and 29 control class students. Results of the description of the data obtained by the test which has been done can be seen in Table 1.

Table 1. Results Description Data Test Mathematical Communication Skills

| Group       | The number of students | The lowest score | Highest score | Average | Standard deviation |
|-------------|------------------------|------------------|---------------|---------|--------------------|
| Experiment  | 30                     | 4                | 12            | 9.20    | 1.97               |
| Control     | 29                     | 3                | 12            | 7.66    | 2.33               |

Table 1 shows that the mean of the experimental group test results is higher than the average of control group test results. the average of experimental group test result is 9.20 while control group that is 7.66. standard deviation in the experimental class is lower than the control class. these results indicate that students' mathematical communication ability of the experimental class is more uniform, the data of both classes of samples are normally distributed and have homogeneous variances. then test the hypothesis using Mann-Whitney test.

Based on Mann-Whitney test results obtained P-Value is 0.0062 which means reject H₀ and accept H₁. it means mathematical communication ability of experimental class students. better than the students' mathematical communication skills of the control class. so, it can be concluded that the mathematical communication ability of students whose learning using PBL learning model is better than students' mathematical communication ability with conventional learning. The conclusion of this hypothesis test is the PBL model gives effect to students' mathematical communication abilities, in which ability the mathematical communication of students learning with the PBL model is better than students who study with conventional learning in real level of 0.05.

4. Discussion

Students' mathematical communication ability in this research is seen through five indicators that are (1) present mathematical statement in writing or in the form of drawings; (2) Explaining ideas, situations, and mathematical relations, writing, with real objects, drawings, graphics, and algebra; (3) Declare everyday events in language or mathematical symbols; (4) Provide reason or evidence against the solution; and (5) Checking the validity of an argument.

Result of hypothesis test give result that mathematical communication ability of experiment class student is better than control class student. In the experimental class applied the PBL model, while in the control class using conventional learning. Hypothesis test results are general conclusions.

In indicator 1 students are required to present a mathematical statement into a graphical form as well as interpreting the graph. in indicator 2, the percentage of the experimental class students who achieved the maximum score is much higher than the control class students. percentage of experimental class students who are able to achieve maximum score on this indicator that is equal to 86.67% and control class student equal to 41.38%. the average score obtained by the experimental class students in indicator 2 is also higher compared to control class students that is 2.87 while the average score of the control class student score is 2.00 for the indicator 3 percentage of experimental class students who achieve maximum score is much higher than the control class student percentage of experimental class students who can achieve maximum score on this indicator that is equal to 63.33% and control class student equal to 27.59%. The average score is obtained by experimental class students on indicator 3 is also higher compared to control class students that is 2.37 while the average gain student grade score of 1.24. For this indicator 4, the percentage of control class students who achieve maximum score is higher than the experimental class students. Percentage of students control class that is able to achieve maximum score on this indicator is equal to 65.51% and experiment class student equal to 53.33%. The average score is obtained the control class students in indicator 4 is also higher than the experimental class is 2.31 while the average score of the experimental class student score is 2.00. For this indicator 5, the percentage of the experiment class students who achieved the score maximum higher than control class students. Percentage of class students experiments that can
achieve maximum score on this indicator that is equal to 63.33% and control class students 58.62%. Average score gained the experimental class students on this indicator 5 are also higher than the students control class that is equal to 1.50 while the average score of student control class score is 1.45.

Based on the description of each indicator of communication ability mathematical and result of description and analysis of data that have been done can it is said that the mathematical communication ability of experiment class students more better than the students' mathematical communication skills of the control class. This matter because in the experimental classroom learning is carried out with using PBL models that engage students actively in the process learning through the five stages contained in it. Learning activities using this PBL model start with giving problem to student, where with giving of this problem student given the opportunity to conduct an investigation to solve the problem the. Through this activity students are trained to explain the idea as well strategy in solving the problem. Besides, as it has been it is known beforehand that the problems given in this PBL model is a real-world problem, so it can train students to declaring everyday events into math or language modeling the given problem. At the time of modeling the problem this, of course students are also trained to use notation or symbols mathematics well. Learning activities use this PBL model also train students to define problems and find mathematical ideas in solving the problem. Furthermore students are also trained for summarizes the solution of the problems they find using their own language. This is what makes the PBL model can improve students' mathematical communication skills in experimental class. So students able to explain ideas, situations, and mathematical relationships, in writing, with real objects, images, graphics, and algebra, able to declare the day-to-day in a language or mathematical symbol, and able to check validity an argument

5. Conclusion
The conclusion of this research is PBL model gives influence to students' mathematical communication abilities, in which ability the mathematical communication of students learning with the PBL model is better than mathematical communication skills of students who learn by using conventional learning. This is because in this PBL model learning is based on giving problems to students. As is this problem, certainly in the process of completion of trained students in modeling or declaring daily events in the language of mathematics. With these modeling activities students are also trained in using, symbols or mathematical notation. In addition, in using lessons this PBL model students are trained in explaining ideas or strategies through problem solving activities are given and students are also required to summed up the solution they found from solving that problem given in their own language. This is what makes the ability mathematical communication of experimental class students can be better than students control class.

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