IMPROVED ABILITY DIFFERENCE RESOLUTION MATH STUDENTS USING PBL LEARNING MODEL WITH INKUIRI ON MATERIALS CUBE AND BEAM IN SMP 6 MEDAN

Arifin Azhari Harahap[1], Sahat Saragih[2]
[1] Faculty of Mathematics and Natural Sciences, University of Medan (UNIMED)
[2] Faculty of Mathematics and Natural Sciences, University of Medan (UNIMED)
E-mail : arifinah@gmail.com

ABSTRACT

This study attempts to find out if the ability of problem solving math students who had learning problem based on the model of PBL higher than on the ability of the solution that will teach with inkuiri learning model to the matter of the cube and beams in class VIII 6'Junior High School medan and to know the resolutions of the related problem solving ability students who had learning pbl and inkuiri with cube and beams in VIII 6'Junior High School Medan. This research is experiment. Population in this research were all students 6'JuniorHigh School Medan. The data were analyzed using the SPSS.Studies show that there are differences increased capacity problem solving math students who had learning model with pbl with inkuiri solving and math skills students who had learn with PBL learning model is better than Inkuiri.

***Keywords**: Problem Solving Ability, Cube and Beams, Problem Based Learning (PBL), Inkuiri*

ABSTRACT

This study attempts to find out if the ability of problem solving math students who had learning problem based on the model of PBL higher than on the ability of the solution that will teach with inkuiri learning model to the matter of the cube and beams in class VIII 6'Junior High School medan and to know the resolutions of the related problem solving ability students who had learning pbl and inkuiri with cube and beams in VIII 6'Junior High School Medan. This research is experiment. Population in this research were all students 6'JuniorHigh School Medan. The data were analyzed using the SPSS.Studies show that there are differences increased capacity problem solving math students who had learning model with pbl with inkuiri solving and math skills students who had learn with PBL learning model is better than Inkuiri.

***Keywords**: Problem Solving Ability, Cube and Beams, Problem Based Learning (PBL), Inkuiri*

PRELIMINARY

National Education serves to develop the ability and character development and civilization of the nation's dignity in the context of the intellectual life of the nation. Education aims to develop students' potentials to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable.

Mathematics is one element in education. Studied mathematics at each school level both at the primary, secondary and higher education. Math is taught in school is not just for the purposes of calculating it, but more than that mathematics is already being used to help the development of a wide range of science and technology. Therefore, mathematics has an important role in everyday life.

In line with the above opinion, learning mathematics is expected to improve the ability to think, reason, communicate ideas and to improve the creative and problem-solving activities. It shows that mathematics has merit in developing the ability of students that need to be studied. Cornelius (in Abdurahman, 2012: 204) also said that there are five reasons for studying mathematics for mathematics are:
(1) means a clear and logical thinking; (2) a means to solve problems in everyday life; (3) the means to know the relationship patterns and generalization of experience; (4) a means of fostering creativity; and (5) a means to increase awareness of cultural development.

One focus of the study of mathematics today is to increase students' mathematical problem solving abilities through learning that originated from an experience of students that occur in everyday life. With the students' learning through experiences that occur in everyday life it will make students better understand and keeping in concepts they learned. In addition Sumiati and Asra (2013: 89) argues that: "The ability to support the creativity of solving many a person, namely the ability to create new ideas, whether they are native himself on, as well as a modification (change) of various ideas Yag been thereprevious".

Thus, the problem-solving ability to be one of the important activities for dilaksananakan in teaching and learning activities in schools. The problem is how to problem-solving ability was carried out efficiently in mathematics teaching and learning activities. Problem-solving skills to be possessed by students and these skills will be owned by the students when teachers teach and stimulate the students' ability to be able to solve problems in mathematics.

But in fact, many students of SMP N 6 Medan who have difficulty in solving mathematical problems. Students always have difficulty in solving problems related to solving problems, especially problems relating to word problems.

This is supported by the results of preliminary observations of researchers (09 January 2017) for the provision of a diagnostic test for eighth grade students of SMP Negeri 6 Medan, tests are given in the form of two questions in the form of essay test. This test is done to see the students' ability in solving mathematical problems on the material and Beam Cube. From the results of observations conducted by researchers at SMP Negeri 6 Medan, showed that students' difficulties in solving the problem-solving ability. For example, when students are given the following problem:Dodi has a square-shaped garden with side lengths of 4m. then Dodi expand plantation area by adding 20 from the previous garden area, how wide the new garden?m^2

Of the 30 students, only six students (20%) who have problem solving capabilities with category because it has been able to understand the problem properly, is able to represent the problem in the form of the basic concepts of right, and be able to implement the strategies and solve problems though still wrong in the calculation , Meanwhile, there were 24 students (80%) who have problem solving skills with a lower category because students have not been able to understand the problem correctly. This is evident from

the answers of students who do not understand properly the concerns expressed in the wrong questions so that students use strategy to answer that question.

Then the researchers also interviewed one of the teachers and said that PBL learning model and the inquiry has not been applied in the teaching of mathematics because of several factors, including not all the material can be applied to models of PBL learning and inquiry, unobstructed and media time learners as well as lack of socialization on the model.

Seeing the above conditions, we need a model of learning that can facilitate the process of learning that trains students' mathematical problem solving ability, for example by using learning model Problem Based Learning (PBL) and inquiry learning model. Inquiry and PBL learning model is a model of learning that are aiming to increase the attractiveness of the students in problem solving.

Model Problem Based Learning (PBL) by Ward in Ngalimun (2014: 89) is one of the innovative learning model that can provide an active learning conditions for students. Meanwhile, according Padmavathy and Maaresh (2013: 47) "PBL describe learning activities where there is a problem encourages learning. That is, learning begins with a problem to be solved, and the problem presented is such that students need to acquire new knowledge before they can solve the problem. Correspondingly Abdullah, et al in (Smith, 1998; Erickson, 1999; Lubienski, 1999) said that "students participating in PBL environsments have greater opportunity to learn mathematical processes associated with communication, representation, modeling and reasoning" which means that students who participate as well as in PBL environments have a greater chance of knowing the mathematics associated with the communication, statements, modeling, and reasoning.

PBL is an instructional model that involves students to solve a problem through the stages of the scientific method so that students can learn the knowledge related to these issues and also have the skills to solve problems.

In addition, according to the quoted Ibrahim as Hosnan (2014: 295), PBL includes the submission of questions or problems, focusing on interdisciplinary linkages, authentic investigation, cooperation and produce work and demonstrations. Therefore, by applying the PBL learning model, students actually invited to play an active role in the learning process and hone student skills in solving mathematical issue.

While the inquiry learning model emphasizes the student's maximal activity to seek and find, means of inquiry put the student as a subject of study. In the learning process, students not only acts as a receiver lesson through the teacher's explanation verbally, but their role is to find their own core of the subject matter itself. As disclosedGulo (in Trianto, 2011: 166) that:

> Inquiry is a series of learning activities that involve maximally throughout the student's ability to search and investigate in a systematic, critical, logical and analytical so that they can formulate their own findings with aplomb.

While Renesse and Ecke (2015: 3) defines the inquiry learning in education has the following characteristics: (1) The main activity of learning, both inside and outside the classroom, is solving the problem. (2) Student-centered learning process. (3) The teacher acts as a facilitator rather than a conduit of information knowledge. (4) Students use the reflection and active communication, both verbally and in writing, to augment existing knowledge to new knowledge.

By applying the inquiry model is expected to be active and creative students find themselves. Students are able to reconstruct the knowledge of mathematics based on his own experience. Besides, giving students the chance to implement his ideas and learn according to their own learning style to solve mathematical problems faced by these students.

Meanwhile Material and Beam Cube is a material very much used in everyday

situations and is very supportive of the material to do the learning model Problem Based Learning and Inquiry. This is due to both learning models using the existing circumstances in everyday life. By applying the learning model Problem Based Leaning (PBL) and inquiry which uses real state as an object of study, students will be more closely Pengeteahuan within the students themselves.

From the description above, the writer wanted to know how different learning models Problem Based Learning and inquiry learning model to the problem solving ability of students on the material cubes and blocks, the researchers are interested in conducting research under the title: "The difference Upgrades Troubleshooting Math Students Who Taught using Learning Model PBL By inquiry to Content Cube And Beams At SMPN 6.

Identification of problems

Based on the above description, it can be identified with the following issues:

1. Pemecaahan ability math students of SMP Negeri 6 Medan is still low.
2. Learning is still conventional.
3. Students think math is a subject that brings a sense of boredom.
4. Students of SMP Negeri 6 Terrain difficulty in completing math problems on the material cubes and blocks.
5. Teachers in Secondary Schools 6 Terrain yet using a particularly innovative learning model learning model problem based learning (PBL) and inquiry learning model.

Research hypothesis

The hypothesis in this study are:

1. Mathematical problem solving ability of students taught by PBL learning model is higher than students taught by inquiry on material cubes and blocks in SMPN 6 Terrain TA 2017/2018.
2. The process of students' answers in solving related problem solving skills taught by PBL learning model is better than the inquiry on the matter cubes and blocks in SMPN 6 Medan FY 2017/2018,

RESEARCH METHODS

1. **Types of research**
   This type of research is quasi-experimental research.
2. **Location and Time Research**
   This research was conducted in SMP 6 is located at Jalan Medan District of Medan city happy. The research was conducted in the first semester of FY 2017/2018.
3. **Population and Sample Research**
   The population studied were all students of class VII SMP 6 Terrain TA 2017 / 2018. In this study, researchers took a sample of 60 students consisting of 2 classes. Selected class VIII 1 of 30 people as the first experimental group taught by PBL learning model and VIII 2 of 30 people as an experimental group 2 inquiry learning model.
4. **Research design**
   This study design is the posttest only control group design.

Table 1 Research Design

Class	*pretest*	Treatment	*posttest*
experiment 1	T1	X1	T2
experiment 2	T1	X2	T2

Information :
T1: Delivery of the initial test (pretest)
T2: Giving a final test (posttest)
X1: Treatment with PBL
X2: Treatment with Inkuiri

5. **Research Instruments**
   Data collection tool used in collecting data in this research is to test the form of pretest and posttest.
6. **Data analysis**
   This study data analysis with SPSS to test for normality using the Kolmogorov-Smirnov test and homogeneity test of hypothesis using ANOVA test.

RESEARCH RESULTS AND DISCUSSION

Description of Research Results

To answer the question researchers are already advanced in the first formulation of the problem is necessary to analyze the research data. The analysis in question is descriptive analysis and statistical analysis. Description analysis was used to analyze the results of the students' answers in the learning model Problem Based Learning (PBL) for the experimental class 1 and inquiry learning model for the experimental class 2 to see the process and the error responses of the students in doing the final test (post-test) that require problem solving ability of students on material cubes and blocks. Statistical analysis was used to test this hypothesis by analyzing data from students' mathematical problem solving abilities before applied learning model (pretest) and after (posttest).

Test Data Analysis Requirements

Validity test

Has tested the validity matter in question pretest and posttest. for N = 30 and α = 0.05, obtained rtabel = 0.361. By comparing and turns to items 1,2,3,4 and 5 in the pretest and posttest obtained so that a valid question. More clearly seen in the following results:$r_{tabel}\ r_{hitung} r_{hitung} > r_{tabel}$

Table 2 Pretest Result

Grain Problem to	*rhitung*	Information
1	0.713448	valid
2	0.8548651	valid
3	0.7967681	valid
4	0.6082478	valid
5	0.7741796	valid

Table 3 Posttest Result

Grain Problem to	*rhitung*	Information
1	0.70103949	valid
2	0.6124968	valid
3	0.6882369	valid
4	0.7587187	valid
5	0.7739587	valid

test Reliability

Reliability testing has been done on the matter of pretest and posttest in this study with the provision that if $r_{hitung} > r_{tabel}$, Then the matter is reliable. with N = 30 and α = 0.05 in the can = 0.361. After calculation obtained to pretest$r_{tabel} r_{hitung}$0793 and post 0740. Evidently $r_{hitung} > r_{tabel}$for about pretest and posttest based on criteria of measurement reliability of the test, then the problem has a very high level of reliability.

Normality test

Normality test performed on the data pretest and posttest to see whether the distribution data can normal.Di significant value for the experimental class 1 (PBL) of 0096 and for the experimental class 2 (inquiry) of 0.124. So based on the criteria of the experimental class 1 (PBL) 0.096> 0.05 and the experimental class 2 (inquiry) 0.124> 0.05 then the normal distribution of data.

Homogeneity test

Furthermore, the homogeneity of data pretest and posttest to see if the data has the same variance. Learned that the significance of the data pretest value that is equal to 0.85. Based on the criteria 0.85> 0.05 then the data pretest homogeneous.

Averages test

pretest

To see the difference in the average classroom experiment 1 (PBL) and the experimental class 2 (inquiry) used One Way Anova with the hypothesis:

H0: There is no difference between the average pretest experimental class 1 (PBL) and the experimental class 2 (Inquiry)

Ha: There is a difference between the average pretest experimental class 1 (PBL) and ekspeimen class 2 (Inquiry)

With the testing criteria if the significance value> 0.05 then accept H0. Average test results with One Way Anova significance of the data obtained that the pretest value of

0.625. With the testing criteria if the significance value of 0.625> 0.05 then accept H0. It can be concluded that no difference between the average pretest experimental class 1 (PBL) and the experimental class 2 (inquiry).

posttest

At posttest data used hypothesis testing experimental class 1 (PBL) and the experimental class 2 (inquiry) used One Way Anova with the hypothesis:
Where,

H0: $\mu_1 \leq \mu_2$ Problem solving ability of students taught using learning model*Problem Based Learning* no higher or equal to the problem solving ability of students taught using learning model inquiry on material cubes and blocks in class VIII SMP Negeri 6 Medan,

Ha: $\mu_1 > \mu_2$ Problem solving ability of students taught by learning models *Problem Based Learning* higher than problem-solving ability of students taught using learning model inquiry on material cubes and blocks in class VIII SMP Negeri 6 Medan.

With the testing criteria if the significance value> 0.05 then accept H0. Average test results with One Way Anova 0.0.03 found that the significant value of <0.05, then reject H0 thank Ha. It can be concluded that there is a difference between the average pretest experimental class 1 (PBL) and the experimental class 2 (inquiry).

Gain test

Gain N-test calculation is done to determine how much the increase in students' mathematical problem solving ability. After calculation result increase student mathematics problem solving abilities first experimental class taught using PBL learning model for 0.5296 is the medium category, while the experimental class II taught using inquiry learning model for 0.7756 was the high category.

Hypothesis testing

Hypothesis testing is done to answer is whether the research hypothesis mathematical problem solving ability of students to use learning Problem Based Learning (PBL) is higher than the learning Inquiry on material cubes and blocks in class VIII.

Based on the hypothesis testing criteria t> thank Ha with dk = (n1 + n2-2). In the calculations obtained t ($t_{1-\alpha}$4740) > ($t_{1-\alpha}$1667). Then H0 is rejected and Ha accepted. This shows that there are differences in the ability of problem solving ability of students taught by PBL learning model and inquiry and problem solving skills of students who are taught by PBL learning model is higher than the inquiry.

Thus we can conclude mathematics problem solving ability of students to use learning Problem Based Learning (PBL) is higher than the learning Inquiry on material cubes and blocks in class VIII.

CONCLUSION

Based on the results of research and data processing it can be concluded as follows:

1. The results of mathematical problem solving ability of students taught by Problem Based Learning model study gained an average score of pretest-posttest differences in problem-solving abilities of 31 867 while the results of mathematical problem solving ability of students taught by inquiry learning model obtained an average score of pretest-posttest differences in problem-solving abilities of 25.87, Hypothesis test results provide value t =2.058663 and table = 1.6673333 with df = 58 and the significant levelα = 0.05 so it looks that $t_{hitung} > t_{tabel}$2.058663> 1.667333which means that Ho is rejected and Ha accepted. Thus concluded thatmathematical problem solving ability of students to use learning Problem Based Learning (PBL) is higher than the learning Inquiryon material cubes and blocks in class VIII.
2. Analysis of the students' answers seen from the average percentage of students who earn a maximum score of the experimental class 1 (PBL) and

the experimental class 2 (inquiry). The percentage of students who responded with a maximum score of the experimental class 1 (PBL) in a row of about 1 to 5 was 36.7%, 6.7%, 13.3%, 3.3%, 23.3%, while the percentage of students who responded with a maximum score of the experimental class 2 (inquiry) respectively from about 1 to 5 were 40%, 20%, 10%, 0%, 0%. The average percentage of the maximum score graders experiment 1 (PBL) is 16.66%, while the average percentage of the maximum score graders experiment 2 (inquiry) was 14%.

SUGGESTION

1. To further research in order to provide guidance before learning begins each group for mutual discussion, expression, exchange and unite the thoughts or ideas of each member of the group to complete the assignment of teachers.
2. Next to the teacher or researcher should first lead students to read the steps on the student activity sheet so that the learning can run as expected.

REFERENCE

Saragih, S. 2015. Aplikasi SPSS Dalam Penelitian Pendidikan. Medan : Perdana Publising.

Sudjana.2005.*Metoda Statistika*. Bandung : TARSITO

Sumiati, dan Asra. 2013. *Metode Pembelajaran*. Bandung : CV Wacana Prima.

Trianto. 2011. *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta : Kencana Predana Media Group

White, A.L. 2005. *Active Mathematics in Classrooms : Finding Out Why Children Make Mistakes – And Then Doing Something To Help Them*. Sydney : University of Western Sydney. Square One Journal, Vol. 15, No.4, December 2005 .2010. *Numeracy,Literacy, and Newmans Error Analysis*. Journal of Science and Mathematics Education in Southeast Asia 2010, Vol. 33, No.2, 129-148.