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The Influence of Problem Based Learning on The Mathematical Problem Solving And Connection Ability of Students In SMP Swasta Assisi Siantar Dorezky Saragih¹, Waminton Rajagukguk², Abil Mansyur³ 1(Department of Mathematics, State University of Medan, Indonesia) 2,3(Doctor, Postgraduate Lecturer, State University of Medan, Indonesia) Corresponding Author: Dorezky Saragih¹ Abstract : The purpose of the research is to determine: (1) the effect of problem based learning on the mathematical problem solving ability of students, (2) the effect of problem based learning on the mathematical connection ability of student, (3) the interaction of learning with

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The Influence of Problem Based Learning on The Mathematical Problem Solving And Connection Ability of Students In SMP Swasta Assisi Siantar

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Abstract : The purpose of the research is to determine: (1) the effect of problem based learning on the mathematical problem solving ability of students, (2) the effect of problem based learning on the mathematical connection ability of student, (3) the interaction of learning with mathematics early ability on the mathematical problem solving ability of students, (4) the interaction of learning with mathematics early ability on the mathematical connection ability of students. The kind of this research is quasi experiment. The population of this research is all students of SMP Swasta Assisi Siantar. The sample of research was taken randomly as many as 2 classes amounted to 76 students. The analysis is used by using t test and 2 way anava. The results of this research shows that: (1) there is effect of problem based learning on the mathematical problem solving ability

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The Influence of Problem Based Learning on The Mathematical Problem Solving And Connection Ability of Students In SMP Swasta Assisi Siantar Dorezky Saragih1, Waminton Rajagukguk2, Abil Mansyur3 1(Department of Mathematics, State University of Medan, Indonesia) 2,3(Doctor, Postgraduate Lecturer, State University of Medan, Indonesia) Corresponding Author: Dorezky Saragih1 Abstract : The purpose of the research is to determine: (1) the effect of problem based learning on the mathematical problem solving ability of students, (2) the effect of problem based learning on the mathematical connection ability of student, (3) the interaction of learning with mathematics early ability on the mathematical problem solving ability of students, (4) the interaction of learning with mathematics early ability on the mathematical connection ability of students, The kind of this research is quasi experiment. The population of this research is all students of SMP Swasta Assisi Siantar.

The sample of research was taken randomly as many as 2 classes amounted to 76 students. The analysis is used by using t test and 2 way anava. The results of this research shows that: (1) there is effect of problem based learning on the mathematical problem solving ability of students, (2) there is effect of problem based learning on the mathematical connection ability of student, (3) there is no interaction of learning with mathematics early ability on the mathematical problem solving ability of students, (4) there is no interaction of learning with mathematics early ability on the mathematical connection ability of students Keywords: problem based learning, direct learning, mathematics early ability, problem solving ability, connection ability

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----- I. Introduction Problem solving ability is a basic activity for students as well as a major focus of the mathematics curriculum.

This is consistent with the purposes of mathematics learning formulated by the National Council of Teachers of Mathematics (2000:7), namely: (1) learning to communicate (mathematical communication), (2) learning to reason (mathematical reasoning), (3) learning to solving problems (mathematical problem solving), (4) learning to connect ideas (mathematical connections), and (5) the formation of positive attitudes toward mathematics (positive attitudes toward mathematics).

Suryadi (2003:83) in his survey about the current situation on mathematics and science education in Bandung sponsored by JICA, stated the discovery that: "Mathematical problem solving is one of the mathematics activities that are considered important by teachers and students at all levels ranging from elementary to high school". Therefore, problem solving ability in mathematics need to be trained and familiarized to students as early as possible.

This is as stated by Ruseffendi (1991: 291) that problem solving ability is very important, not only for those who later will go into math but also for those who will apply them in other fields of study as well as in everyday life. The fact that the problem solving ability is poor is evidenced by the results of the Program for International Student Assessment (PISA) test.

Indonesia is one of the participating countries of PISA. The distribution of students' mathematics ability in PISA 2003 is level 1 (49,7%), level 2 (25,9%), level 3 (15,5%), level 4 (6,6%), and level 5 - 6 (2.3%). At level 1 students are only able to solve mathematical problems that require one step.

Proportionally, out of every 100 junior high school students in Indonesia only about 3 students reach level 5-6. Low problem solving ability of students can also be seen from the report of Trend in International Mathematics and Science Study (TIMSS) which states that the ability of Indonesian students in problem solving only 25% compared to countries such as Singapore, Hongkong, Taiwan, and Japan which is already 75% and based on the result of MIPA research reporting mathematics rank of Indonesia with SMP class 2: 1999 rank 34 from 38 participants; in 2003 ranking 34 out of 45 participants; in 2007 ranked 36 out of 48 participants.

just focused on a particular topic being studied. II. Method This type of research is quasi experiment.

The population of this research is all students of SMP Swasta Assisi Siantar. The sample in this research is all students of class VII-b and class VII-c. The students of grade VII-b were selected as experimental class and given problem based learning, while the students of class VII-c as control class were given direct learning. Learning tools developed in this research were Lesson Plan (RPP), Student Activity Sheet (LAS) and research instrument.

The instrument used consist of: (1) test of mathematics early ability (2) test of mathematical problem solving ability and (3) test of mathematical connection ability. After the test of mathematics early ability is done, next, data analysis is done as normality test by using The Influence Of Problem Based Learning On The Mathematical Problem Solving And Connection.. DOI: 10.9790/7388-0802012430 www.iosrjournals.org 26 | Page kolmogorov-smirnov test, the homogeneity test by using levene test and for test of mathematical problem solving and connection ability of the students using t test and two way Anava. III. Result And Discussion 3.1

The Description of the Mathematics Early Ability Before discussing the research data from the results of the test of mathematical problem solving and connection ability of the students, the researcher first discusses the results of the test of mathematics early ability of the students. This test was given to find out the equivalence of experimental and control groups, and to grouping students according to high, medium and low. Table 1.

Sample Research Distribution Group N S Experimental 38 4 20 10.84 4.523 Control 38 4 20 11.08 4.784 1.1.1 Normality Test of The Mathematics Early Ability Table 2. The Result of Normality Test of The Mathematics Early Ability Class Kolmogorov-Smirnova Shapiro-Wilk Statistic Df Sig. Statistic Df Sig. Early Ability Eksperimental .118 38 .200* .954 38 .125 Control .115 38 .200* .952 38 .103 From the table 2 above we can see that the value of significance is greater than the level of significance value $200 > 0.05$, while for control class $0.200 > 0.05$.

This means that score data of the students from both groups of samples comes from normally distributed populations. 1.1.2 Homogeneity Test of The Early Mathematics Ability Table 3. The Result of Homogeneity Test of The Mathematics Early Ability Levene Statistic df1 df2 Sig. .074 1 74 .786 Based on Table 3, giving significance score = 0,786 is iggerthaa 00. herr oosale me from the population that has homogeneity varians. 1.2

The type of Student Mathematical Problem Solving Ability Test is an essay test with quadrilateral material. The results of the problem solving ability of students in the problem based learning class and direct learning class showed that the average of students on the post-test result is 38,64 and 33. Standard deviation of each class is 5,69 and 5,38.

Description of students' problem solving ability by using problem based learning devices can be seen in Fig 1. Figure 1. Average Post-test of Mathematical Problem Solving Ability The Influence Of Problem Based Learning On The Mathematical Problem Solving And Connection.. DOI: 10.9790/7388-0802012430 www.iosrjournals.org 27 | Page Based on Figure 1, can be concluded that post test scores of mathematical problem solving ability for direct learning groups are not very diffuse than post test scores for problem based learning groups. 1.3 The type of Student Mathematical Connection Ability Test is an essay test with quadrilateral material.

The results of the connection ability of student in the problem based learning class and direct learning class showed that the average of students on the post-test result is 9,92 and 8,55. Standard deviation of each class is 1,66 and 1,88. Description of students' connection ability by using problem based learning devices can be seen in Fig 2. Figure 2.

Average Post-test of Mathematical Connection Ability Based on Figure 2, can be concluded that post test scores of mathematical connection ability for direct learning groups are not very diffuse than post test scores for problem based learning groups 3.3 Hypothesis Test a. First Hypothesis The test results showed that the sample came from the normal distributed population with the variance of each pair of homogeneous data groups, then the t test statistical analysis was performed.

The statistic tested are: $H_0 : H_a$: : Average mathematical problem solving ability of students with problem based learning : Average mathematical problem solving ability of students with direct learning Table 5. The result of t test of The Mathematical Problem Solving Ability Levene's Test for Equality of Variances t-test for Equality of Means F Sig. T df Sig.

(2-tailed) Mean Difference Std. Error Difference Problem-Solving Ability Equal variances assumed .469 .496 4.429 74 .000 5.63158 1.27143 Equal variances not assumed 4.429 73.777 .000 5.63158 1.27143 From the above output results can be seen that the value of significance is $0.000 < 0.05$. This means there is effect of problem based learning on the mathematical problem solving ability of students .

The Influence Of Problem Based Learning On The Mathematical Problem Solving And Connection.. DOI: 10.9790/7388-0802012430 www.iosrjournals.org 28 | Page b. Second Hypothesis The test results showed that the sample came from the normal distributed population with the variance of each pair of homogeneous data groups, then the t test statistical analysis was performed.

The statistic tested are: $H_0 : H_a : :$ Average mathematical connection ability of students with problem based learning : Average mathematical connection ability of students with direct learning Table 6. The result of t test of The Mathematical Connection Ability Levene's Test for Equality of Variances t-test for Equality of Means F Sig. t df Sig.

(2-tailed) Mean Difference Std. Error Difference Connection Ability Equal variances assumed .986 .324 3.353 74 .001 1.36842 .40810 Equal variances not assumed 3.353 72.910 .001 1.36842 .40810 From the above output results can be seen that the value of significance is $0.001 < 0.05$. This means there is effect of problem based learning on the mathematical connection ability of students . c.

Third Hypothesis The test results showed that the sample came from the normal distributed population with the variance of each pair of homogeneous data groups, then the two way ANAVA test statistical analysis was performed. The statistic tested are: for $i = 1,2, j = 1,2,3$: the interaction of learning with mathematics early ability on the mathematical problem solving ability Table 7.

The result of ANAVA test of The Mathematical Problem Solving Ability Source Type III Sum of Squares Df Mean Square F Sig. Corrected Model 1047.899a 5 209.580 8.028 .000 Intercept 72298.037 1 72298.037 2769.248 .000 Learning 448.799 1 448.799 17.190 .000 KAM 324.534 2 162.267 6.215 .003 Learning * KAM 133.829 2 66.914 2.563 .084 Error 1827.523 70 26.107 Total 100366.000 76 Corrected Total 2875.421 75 From the above output results can be seen that the value of significance is 0.0

$84 > 0.05$. This means there is no interaction of learning with mathematics early ability (KAM) on the mathematical problem solving ability of students. The Influence Of Problem Based Learning On The Mathematical Problem Solving And Connection.. DOI: 10.9790/7388-0802012430 www.iosrjournals.org 29 | Page Figure 3. There is No Interaction Between Mathematical Problem Solving Ability Based on Learning Model and Early Mathematical Ability d.

Fourth Hypothesis The test results showed that the sample came from the normal distributed population with the variance of each pair of homogeneous data groups, then the two way ANAVA test statistical analysis was performed. The statistic tested are: for i

= 1,2 j = 1,2,3 : the interaction of learning with mathematics early ability on the mathematical connection ability Table 8.

The result of ANAVA test of The Mathematical Connection Ability Source Type III Sum of Squares df Mean Square F Sig. Corrected Model 66.718a 5 13.344 4.601 .001 Intercept 4850.894 1 4850.894 1672.567 .000 Learning 23.629 1 23.629 8.147 .006 KAM 27.264 2 13.632 4.700 .012 Learning * KAM 4.618 2 2.309 .796 .455 Error 203.019 70 2.900 Total 6754.000 76 Corrected Total 269.737 75 From the above output results can be seen that the value of significance is $0.455 > 0.05$.

This means there is no interaction of learning with mathematics early ability (KAM) on the mathematical connection ability of students. The Influence Of Problem Based Learning On The Mathematical Problem Solving And Connection.. DOI: 10.9790/7388-0802012430 www.iosrjournals.org 30 | Page Figure 3. There is No Interaction Between Mathematical Connection Ability Based on Learning Model and Early Mathematical Ability IV.

Conclusion Based on the results of data analysis research on the mathematical problem solving and connection ability of students who were taught with problem based learning then obtained some conclusions as follows: 1. there is effect of problem based learning on the mathematical problem solving ability of students 2. there is effect of problem based learning on the mathematical connection ability of student 3.

there is no interaction of learning with mathematics early ability on the mathematical problem solving ability of students 4. there is no interaction of learning with mathematics early ability on the mathematical connection ability of students References [1]. NCTM. (2000). Principles and Standarts for Mathematics, Reaston , VA: NCTM [2]. Suryadi, D. (2003).

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