Implementation of Problem-Based Learning Assisted with Recreation of Second Mathematics to Improve Numeracy and Problem Solving Skills

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Abstract---Innovative elementary school education demands students to be active, one of the effort to develop students numeracy skill is mathematics learning. The purpose of this research is to know the effectivity of Problem Based Learning assisted with recreation of second mathematics to improve numeracy and problem solving skill. The type of this research is mix method, the quantitative analysis technique using *Independent sample t test, Paired t test*, proportion test, *N-gain*, whereas the qualitative data validity uses data triangulation. The result of this study shows that: (1) Problem Based Learning assisted with second of mathematics is effective to numeracy elements; (2) Problem Based Learning assisted with second mathematics is effective to problem solving skill elements; (3) result of TOSM sheet analysis, there is an improvement on the use of Mathematics numeracy elements. Suggestion for the next researcher is to underline more attractive stimulation and contextual learning.

Keywords: numeracy, Problem Based Learning, problem solving, second of mathematics

I. INTRODUCTION

Globalization makes Indonesia undertook to develop in various fields, Indonesia as part of the world presents to feel the impact of globalization. This demanding Indonesia society to adapt to increasing development and progress especially in the field of science and technology. One of the formal educational level, basic education which covers elementary school. The fact that elementary school students occur, often have difficulty in learning the subjects especially math. The number of formulas that must be understood by the learners are not comparable to the learner's ability to understand it, so there is rarely the learners consider mathematics as a heavy burden which must dipikulnya yourself. The numbers are studied in mathematics are also causing

learners experiencing fear before studying it. This resulted in a low level of numeracy ability learners.

Recreational Mathematics Seconds is operating TKKB exercise methods (Add, subtract, divide, times) in an easy and quick as a recreational fun for the learners. Methods of Mathematical Recreation Minutes in practice, like warming (warming up) before doing a football game. According to the Faz (an 2017a: 478) Math Minutes need to be done before entering the main material. Warming up is a way to prepare your body before doing the exercise to reduce the potential for injury and reduce pain after exercise. In this case, warm up before learning of mathematics is in the form of Recreational Mathematics: performed by providing easy questions that must be resolved by the learners quickly.

Research on Recreational Mathematics in the form of Mathmagic ever done by previous researchers, among others, namely research experiments conducted by Irawan, dkk (2016) with the title the effectiveness of Mathmagic in increasing the ability of counting Math. The results showed that 47 of the 90 students who were the object of the study scored higher than the value of postes pretes. From the results of this research are seen an increase in the average value before and after the given treatment Mathmagic. If seen from a comparison of the average value before and after the treatment given the value its effectiveness of 90.42%. Based on that data, Mathmagic has proven to be effective.

Problem Based Learning based on the results of the research conducted by Ngatiatun (2012) shows that the ability of the finish reserved the story using Problem Based Learning is better than using conventional learning. According to Hosnan (2014: 295) problem-based learning is learning that uses real problems (authentic) unstructured (ill-structured) which is open as a context for students to develop the

ability solve problems and think critically and build new knowledge.

Problem solving is part of the curriculum of mathematics is very important because in the process of learning as well as the resolution of possible, learners gain experience using knowledge already owned to apply problem solving is not routine. In fact, the study of mathematics is rarely associated with the problems of everyday life. This makes the learners are able to remember only as definitions, theorems and mathematical formula so that the other capabilities of the learners did not develop problem solving ability.

The above description being the cornerstone of researchers to apply the model of Problem Based Learning assisted Recreation of the Second Mathematics in overcoming the problems of Learning Mathematics class V primary school. Researchers want to know whether there is any difference in arithmetic and problem-solving abilities among learners who do and do not do Recreational Mathematics seconds. Therefore, the author would like to examine about "implementation Problem Based Learning assisted Recreation of second Mathematics to improve thinking numeracy and problem solving".

The general objective of the annual research is to know the effectiveness of imolementasi Problem Based Learning assisted Recreation of Second Mathematics to improve numeracy and problem solving math multiplication and material especially Division of fractions in grade V SD. Research is expected to benefit both for among others; the increasing interest in learners to improve math learning material specifically on multiplication and Division of fractions provide motivation to teachers to use Recreational Mathematics learning methods Seconds as alternatives in increasing the ability of problem-solving ability and numeracy learners on Mathematical subjects.

II. METHODS

This is a peneitian type Mix Method. Data collection instrument in the form of tests, now, pieces of interviews, and documentation. Quantitative analysis techniques with Independent samples t test, paired t test, test of proportions, and N-gain. Data analsis qualitative techniques in the study of applying interactive model with steps of analysis, namely data reduction, the presentation of data, and the withdrawal of the conclusion. While the validity of qualitative data in this enelitian use the triangulation of the data. The independent variable in this study i.e. application of Problem Based Learning methods of Mathematical Recreation dibantu Minutes, while the dependent variable in this study i.e., arithmetic and problem solving. Before the instrument is used for research, the instrument must first be tested for reliability and validity of the instrument now arithmetic.

The number of members of a population of 62 students consisting of 30 students a class VA as class experiments and 32 students of class VB as a control class. Therefore, the sample used in this study is the whole grade V Tegal Regency SDN 01 Pesayangan. Instruments in test cobakan to respondents who are not actual respondents. This step can be called with test instruments. This test will be administered to the respondent class V SDN Pesayangan 02 Tegal Regency. Test precondition analysis consists of a test of its homogeneity and normality test. In this study, a test of normality using SPSS program version lilliefors 23 by seeing significance in the Shapiro-wilk. The data revealed a normal, if the value of significance is greater than or equal to 0.05, whereas data stated is not normal if the value of less than 0.05 significance. After a test of normality, then conducted a test of its homogeneity. Its homogeneity test in this study using independent samples t test by looking at the value in the levene's column of the test. If the value is more than 0.05 significance, then the data homogeneous.

III. RESULTS AND DISCUSSION

Table 1. The results of Test Effectiveness Problem Based Learnig assisted Recreation of the Second Mathematics Toward Arithmetic.

Based on the above table it can be seen that the results of the post test thoroughly test students on classroom experiments as much as 24 students achieve mastery rating and 6 students have not reached ketuntasan at a minimum, this means that 80% of students achieving experiment class minimum thoroughly. The results of the calculation of the proportion of test thoroughly classroom experiments stated with $Z_{\text{calculate}}$ = 0.635 and Z_{tabel} = 0.0250. Calculation based on $Z_{\text{calculate}}$ then it can be stated that H_0 repelled because $Z_{\text{calculate}} > Z_{tabel}$ so that the arithmetic mastery of classical experimental classes in more than 75%.

The results of the calculation of the test average difference between experimental and control classes are classes obtained $t_{calculate}$ of 7.416 and t_{tabel} of 1.670. Because $t_{calculate} > t_{tabel}$ then

H_0 repelled, meaning the experiment class of arithmetic better than the class of the control. The results of the calculation of average difference test in pairs between the experimental and the control class obtained $t_{calculate}$ of 22.651 and t_{tabel} of 1.669. Because $t_{calculate} > t_{tabel}$ then H_0 repelled, so the conclusion is the treatment by Problem Based Learning assisted Recreation of the Second Mathematics can improve the counting of students.

The results of the calculation of the test improved N-gain beerdasarkan and pretest values postest class experiments obtained average N-gain sebesa 0.496167 this mean arithmetic class experiment on the criteria are based on the criteria you set. While the results of the average gain in the N-class kotrol of 0.295041, shows an improvement in low criteria.

Table 2. The results of Test Effectiveness Problem Based Learnig assisted Recreation of the Second Mathematics Against the ability of problem solving.

Ketuntasan		Test of Proportion	The Average Differene Test	The Different Averae Couples	Test Improved N-Gain	
Control Class	Experiment Class				Control Class	Experiment Class
27%	80%	0,635	5.902	14.419	0.108	0.301

Based on the above table it can be seen that the results of the post test thoroughly test students on classroom experiments as much as 24 students achieve mastery rating and 6 students have not reached thoroughly at a minimum, this means that 80% of students achieving experiment class minimum thoroughly. The results of the calculation of the proportion of test thoroughly classroom experiments stated with $Z_{calculate}$ = 0.635 and Z_{tabel} = 0.0250. Calculation based on $Z_{calculate}$ then it can be stated that H_0 repelled because $Z_{calculate} > Z_{tabel}$ so that the arithmetic mastery of classical experimental classes in more than 75%.

The results of the calculation of the test average difference between experimental and control classes are classes obtained $t_{calculate}$ of 5.902 and t_{tabel} of 1.670. Because $t_{calculate} > t_{tabel}$ then H_0 repelled, meaning the ability fractions experimental class problems better than the class of the control. The results of the calculation of average difference test in pairs between the experimental and the control class obtained $t_{calculate}$ of 14.4190 and t_{tabel} t_tabel in the amount 1.6691. Because $t_{calculate} > t_{tabel}$ then H_0 repelled, so the conclusion is the treatment by Problem Based Learning assisted Recreation of

Second Mathematics can improve problem-solving abilities.

The results of the calculation of the test improved N-gain beerdasarkan and pretest values postest class experiments obtained average N-gain amounting to 0.301748 this meant problem-solving ability class ekspeimen on the criteria are based on the riteria set. While the results of the average gain in the N-class kotrol of 0.108264, shows an improvement in low criteria.

Characteristic analysis of Problem Based Learning assisted Recreation of Second Mathematics against arithmetic students

Indicators of arithmetic, among others: (1) Capable of Completing about; (2) Being Able to See the Problem and the Solution. Based on the analysis of the test results it is known that there are relationships between arithmetic against the application of the characteristics of Problem based learning assisted Recreation of the second mathematics. The results of the score sheet on the soa TOSM method using Problem Based Learning asisted Recreation of the Second Mathematics shows that keampuan counting students in a class higher than the class of experiment control, ha disebaban meode new

user where students are able to refresh the poa counting them.

Characteristic analysis of Problem Based Learning assisted Recreation of second Mathematics problem-solving ability against a student

Indicator of the ability of problem solving has: (1) Understanding the problem; (2) Plan Completion; (3) Completing; (4) and Rechecking. Based on the analysis of the test results of students noted that the application of Problem Based Learning assisted Mathematical Recreation recreational mathematics assisted Seconds seconds to problem-solving ability of the students. Be aware that the application of the karaktristik realized the problem and formulate problems have an effect on the process of understanding the problem. Application of hypothesis test and characteristics of the collected data to the process of planning a settlement. Whereas the application of the test the hypothesis has the influence on the prsoses problem resolution as well as the implementation of the settlement characteristics can affect the process of rechecking problem-solving abilities of students.

IV. CONCLUSION

Based on the results and discussion, which previously elaborated tlah then summary in this study include: (1) the Problem based learning assisted recreational mathematics second effective against indicators of arithmetic; (2) the Problem based learning assisted mathematics second effective against indicators of problem-solving ability; (3) the application of the characteristics of problem-based learning assisted mathematics seconds less influential action on indiktor check back in less category, application characteristics of learning problems based on aided mathematics seconds to realize problems and merumuskaan problems with good berpegaruh beradda understand the problem on the indicator on the category either; (4) analysis results increase sheet TOSM penggunaann elements of arithmetic mathematics; (5) the results of the final semester exam analysis shows an increase in the indicator in the arithmetic.

Suggestions for further research that is need to emphasize more exciting stimulation from contextual learning. This research is expected to benefit both i.e. the increasing ability of problem solving math learners class V primary school in mathematical subjects especially on the multiplication and Division of fractions materials as well as providing motivate

teachers to use instructional methods of Problem Based Learning Mathematics Recreation berbantu Minutes Minutes as an alternative in enhancing arithmetic and problem-solving abilities of the learners on subjects Math.

REFERENCES

[1] Faz, Ahmad Thoha. 2017a. *Matematika Detik: Inspirasi, Fondasi, dan Garis Besar.* Yogyakarta: PT. Aksarra Sinergi Media.

[2] Irawan, Ari and Chatarina Febriyanti. Efektivitas Mathmagic dalam Peningkatan Kemampuan berhitung Matematika. ISSN: 2088-351X. 91. 2016.

[3] Ngatiatun, Safitri. 2012. Pengaruh Model Problem Based Learning Terhadap Kemampuan Menyelesaikan Soal Cerita. Surakarta: Universits Sebelas Maret.

[4] Hosnan. 20014. Pendekatan Saintifik dan Kontekstul dalam Pembelajaran Abad 21. Bogor: Ghalia Indonesia.

[5] Alexander K.L. Effect Instruction in Creative Problem Solving on Cognition, Creativity, and Satisfactio among Ninth Grade Students in an Intrductin t World Agriculture Science and Tehnoology Course. Disertasi. Texas Tech University. 2007.

[6] Anjai J.T. Comparison of The Learning Effectiveness of Problem Based Learning an Conventional Method ofTeaching Algebra Taraba State University: InternationaL Journal of Education and Pratice, 4 (1): 131-134. 2013.

[7] Anwar M. N., Aness, M. Khiza, A. Naseer, M. & Muhammad, G. Relation of Creative Thinking with the Academic Achievement of Secondary Schooll Student. University of Sargodha: International Interdisciplinary Journal of Education, 3 (22): 47. 2012.

[8] Dian, Rosita. & Rochmad. Error Analysis of Students in Problem Solving in Terms of Adversityquotient The Study Of Creative Problem Solving. Unnes Journal of Mathematics Education Research UMMER, 5 (2): 106-113. 2016.

[9] Anis, Eka Fatchurrochmah., Sarwi., & Utsman. The influence of the Problem Based Learning Through Demonstration and Discussion against the Verbal Ability. Unnes Journal of Primary Education JPE 6 (2): 140-146. 2013

[10] Hwang, Wu-Yuin. Multiple Representaio Skills and Creativity Effects on Mathematical Problem Solving using a Multimeda WhiteboardSystem. International Forum of Educational Technologyy & Society Journals, 14 (3): 45-49. 2007.

[11] Hamza, M. K. & Graffith, K. G. Foresting Probem Solving & Creative Thiking in the Classroom: Cutivating a Creative Mind. National Forum of Applied Educational Research Journal Electronic, 29 (3) : 12-34. 2006.

[12] Herlin, Nurlianasari., Rochmad., & Harrtono. Math Literacy ability based on Cognitive Style. Unnes Journal of Mathematics Education Resarch UJMER, 4 (2)76-83. 2014.

[13] Pehkonen, E. Problem Solving in Mathematics Education in Finland. Pedagogcal Knowledge Journal, 7 (4) : 1-5. 2011.

[14] Nagappan, R. The Teahing of Higher Order Thinking Skill in Malaysia. Sultan Idris Educion University: Journal of Southeast Asian Education , 2 (1): 1-21. 2001.