

DIFFERENCES OF SOLID STUDENTS MATHEMATICAL PROBLEMS THROUGH RESOURCE BASED LEARNING APPROACH AND REALISTIC MATHEMATICS APPROACH ON MATERIAL SYSTEM EQUAL LINEAR TWO VARIABLES IN CLASS VIII SMP PRIVATE MUHAMMADIYAH 2 MEDAN

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Abstract--This study aims to determine whether there are differences in problem solving skills of mathematics students through a resource-based learning approach with a realistic approach mathematics on the material system of linear equations two variables in class VIII SMP Swasta Muhammadiyah. The population in this study is all students of class VIII SMP Swasta Muhammadiyah 2 Medan consists of 3 classes. From 3 class, two classes were chosen in class VIII-B as experiment class I with RBL approach and class VIII-C as experiment class II with RM approach which amounted to 30 students. This research includes the kind of quasi-experimental research. The instrument used to determine students' mathematical problem solving abilities is a validated problem-solving test in the form of a description. The results showed that from the results of the research given different treatment, the average of the experimental class I with the RBL approach and the experimental class II with RM approach obtained pretest average value of 52.7 and post-test of 78.75 experimental class I while the average value of pretest experiment class II of 47.08 and post-test of 72.17. From the normality test results obtained that the two data derived from the normal distributed population with Lhitung in the experimental class I (RBL) in pretest is 0.1253 and post-test of 0.1268 and in the experimental class II (RM) on pretest is 0, 1204 and the post-test is 0.1315 because L_{count} is smaller than L_{table} (0.161) then both data are normally distributed. In addition, from homogeneity test results in pretest obtained F_{count} is 1.3818 and at post-test obtained 1.2041 smaller than F_{table} (1.858) which means that both data have the same variance. After it is known that the data of both classes are normal and homogeneous distribution, then hypothesis testing is done. From result of hypothesis test obtained t_{count} at pretest is 2,164 and at post-test is 2,099 bigger than t_{table} (1,671) which mean that H_0 is rejected and H_a accepted. Thus it can be concluded that the problem-solving ability of mathematics students taught by approach of learning-based learning differs from the problem solving ability of mathematics students taught with realistic mathematics approach on SPLDV material in class VIII SMP Private Muhammadiyah 2 Medan.

Keywords: Mathematical Problem Solving Abilities, Resource Based Learning Approach (RBL) and Realistic Mathematics (RM).

PREFACE

Mathematics as one of the subjects in school is considered to play an important role in shaping the students into quality, because mathematics is a means of thinking logically and systematically. there are many other reasons that make important mathematics lessons learned by students. As Fahrardina [1] puts it:

- (1) Means of clear and logical thinking,
- (2) Means to solve the problems of everyday life,
- (3) Means recognize relationship patterns and generalize experiences,
- (4) Means to develop creativity, and
- (5) Means to raise awareness of cultural development.

In line with the above statement, mathematics learning is not only aimed at improving students 'ability in numeracy, but also directed to increasing students' ability in problem solving, As The National Council of Teachers of Mathematics [2], states that: Problem solving should be the main focus of the mathematics curriculum. Thus, problem solving is the ultimate goal of all mathematical instruction and is a necessary part of all mathematical activity. Problem solving is not a different topic but a process that must penetrate the entire program and provide a context where concepts and skills can be learned.

In fact mathematics is a subject that is difficult to understand by students. This is in line with the statement of Abdurrahman [3] which states: "From the various fields of study taught in schools, mathematics is a field of study that is considered most difficult by students, both non-learning disabilities and moreover for students with learning disabilities".

Therefore, one of them is because the students' mathematical problem solving ability is still low. Problem-solving skills need to be the focus of attention in mathematics learning, as trying to solve problems independently will provide a concrete experience so that experience can be used to solve similar problems. In terms of problem solving abilities Trianto [4] says that In learning teachers always demand students to learn and rarely provide lessons on how students to learn, teachers also demand students to solve problems, but rarely teach how students should solve problems.

From the above problems indicate that the learning of mathematics needs to be improved in order to improve the problem solving ability of student math. Repair and development is done one on the learning of mathematics because it is considered there are many problems of non-successful teaching and learning process on mathematics subjects found as can be seen that students are still less able to solve problems related to mathematical problems.

In solving the problem there is certainly a problem to be solved. Problems can be interpreted as a situation, where a person is asked to solve problems that have not been done, and have not understood the solution. Hasratuddin [5] argues that "the problem is a situation where the individual wants to do something but does not know the way or action needed to get what he wants." Therefore, if a problem is given to a student, knowing the correct answer to the given problem, then the problem is not said a problem.

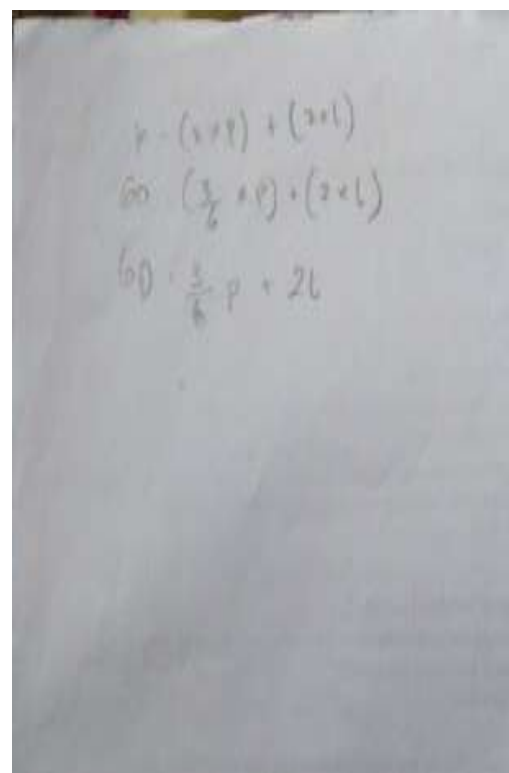
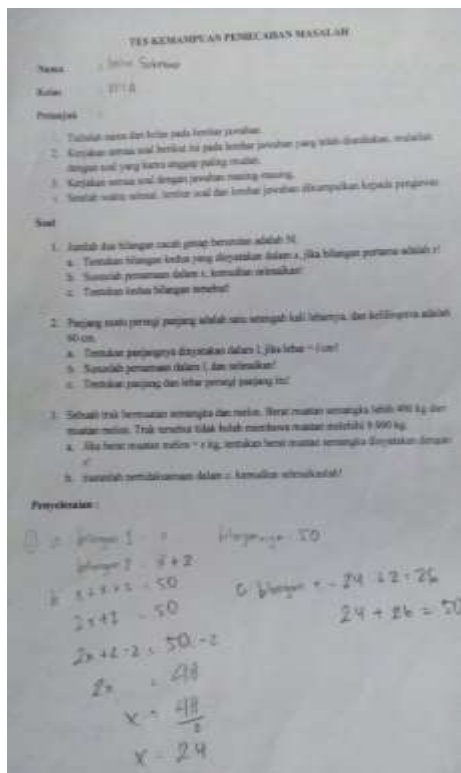
Problem solving is a process used to solve a problem. Students are said to have good mathematical problem solving skills if they have been able to: (1) identify known elements, and be

asked; (2) to formulate a mathematical problem or to construct a mathematical model; and (3) selecting and implementing strategies to resolve problems.

But in fact, many students have difficulty in solving math problems. This is supported by the result of the researcher's initial observation (dated 1 August 2017) in the form of giving test to the students of class VIII-A in SMP Swasta Muhammadiyah 2 Medan. From the results of tests that have been implemented shows the students have not been able to solve the problem solving problem. Students are less able to identify problems. From 3 pieces of questions given to 30 students obtained description

of students ability in solving problems, that is 20 people can understand the problem, 5 people can plan problem solving, and 3 people can carry out problem solving and 2 people can draw conclusion.

From the above facts we can see that the problem solving ability of students is still very less or need to be improved especially when doing the following initial test of one of the problems, namely: The length of a rectangle is one and a half times the width, and the circumference is 60 cm. Determine the length expressed in l , if the width = 1 cm and specify the length and width of the rectangle!



Picture 1. The work of students

In the picture above, there is a student error analysis that is: (a) Students do not understand the problem by not writing down what is known and asked; (b) Students do not understand the

concept, so don't write the plan of completion; (c) Not able to solve the problem where the implementation is done there is still something wrong; (d) Unable to re-examine the results

of completion and not give final conclusion.

From the picture shown still seen that the ability of students to solve the problem of math problem is still low and the students still difficult to translate the problem. And that is why most students avoid mathematics because of the difficulty of solving mathematics because it is difficult to understand and understanding. Also supported by the factors of teaching in many schools still use teaching practices that tend to be teacher-centered learning (teacher oriented). This teaching is regarded as a process of delivering facts (material) directly to the students without giving feedback or providing student activeness. So as to bring a less interesting impression to follow and cause students not actively participate in developing ideas in the fraction of problems related to mathematics.

The results of Novriani and Surya [6] also showed that students' mathematical problem solving ability of MTs Private Private IRA Medan students in general is not satisfactory and still far from ideal score. The students' difficulties in solving the problem are (1) the students have difficulty in solving mathematical problems in reading the text or questions, (2) the students always misinterpret the problem, (3) if the students do not understand the problem then they will guess the answer from the problem, (4)) students do not want to look for problem solving given, (5) students have difficulty in understanding the problem so can not interpret into symbol form.

In line with the results of research Paranginangin and Surya [7], which shows that the ability problem solving mathematics students SMP Negeri 4 Pancurbatu workmanship in

each indicator is still not complete or not meet the complete polya rules.

Problem solving skills are one of the basic mathematical skills students need to have. Weak mastery of concepts and principles by students, can lead to the ability of students in solving problems will be weak as well. In fact, problem-solving skills are important in mathematics learning because the problem-solving abilities gained in a mathematical teaching can generally be transferred for use in solving other problems in everyday life. Therefore, one of the efforts and steps taken is to renovate the teaching-learning approach and strategy.

In essence, the approach of learning is done by the teacher to explain the learning materials from the parts of one with the other oriented to the experiences of the students to learn new theories about a field of science. Sanjaya [8] (2011: 127) suggests that " Learning approach is defined as the starting point or point of view of the learning process, which refers to the view of the occurrence of a process that is still very common. Roy Killen (in [8]) he says that there are two approaches in learning, which are teacher-centered and student-centered approaches ".

From the opinion, it can be concluded that the learning approach is the way used by teachers in presenting a material that allows students to learn to achieve learning objectives. The several methods and approaches that can show students' math problem solving skills. In this case the researcher chose two approach model that is Resource Based Learning Approach and Realistic Mathematics Approach.

Resource Based Learning is a learning model designed by instructors who actively involve learners with a

variety of learning resources, both print and non-print. Learners are given the freedom to choose the right source of learning for themselves. Through this approach the teacher can provide material in more detail through practice or experience directly acquired. In addition students can search, collect, discover facts, concepts and principles on their own or experience their own [9]. Meanwhile, According to De Lange (in [10]) Realistic Mathematics was developed with the intention of linking the activity of learning mathematics with reality or real in everyday life. So that it can apply and develop the knowledge it has previously owned.

RESEARCH METHODS

The population in this study is all students of class VIII SMP Private

Muhammadiyah 2 Medan consisting of 3 classes of each class of 30 students. Samples taken in the research are 2 classes with random sampling. Selected 2 classes as sample for the experimental class in this study. In class VIII-B as many as 30 students as experimental class I that was taught by using resource-based learning approach, and in class VIII-C as many as 30 students as experimental class II that was taught by using realistic mathematics approach.

The type of research used in this research is quasi experiment, that is research which is meant to know the existence of effect of something imposed on the subject (in this case student), and it said quasi eksperimen because student condition can not be controlled as a whole. The research design used is Two Group (Pre-test and Post-test) that is experiment conducted in two groups.

Table 1. Two Group Research Design (*Pre-test and Post-test*)

Class	Pre-test	Treatment	Post-test
Experiment I	$T_{1(I)}$	$X_{1(I)}$	$T_{2(I)}$
Experiment II	$T_{1(II)}$	$X_{2(II)}$	$T_{2(II)}$

Informatin:

T_1 : Provision of preliminary tests (*pre-test*)

T_2 : Final test (*post-test*)

X_1 : Learning with Resource Based Learning Approach (RBL)

X_2 : Learning with Realistic Mathematics Approach (RM)

Instrument of data collection through TKPM pre-test and post-test. The data obtained are used to measure the mathematical problem solving ability of two-variable linear equation system in odd semesters according to the Education Unit Level Curriculum (KTSP). The test used is t-test. Before the t-test, normality and homogeneity of the data were tested.

RESEARCH RESULT

Based on the research that has been done in experiment class I using the learning model of Resource Based Learning approach, it is found that the highest posttest-pretest difference is 30, whereas the lowest posttest-pretest difference is 30 with the mean posttest-pretest difference of problem solving ability student is 26.08 with difference of deviation raw 1. While experimental class II using Realistic Mathematics learning model obtained data result of research that difference of highest posttest-pretest value is 25, while difference of posttest-pretest value is lowest 22,5 with mean value of posttest-pretest difference student problem

solving ability is 25.08 with a standard deviation difference of 3.5.

Normality testing was conducted to see if the pretest and posttest data of students' mathematical problem solving abilities were normally distributed in

experimental group I and experiment II. To test normal or not the data is done by using Liliefors test, with normal condition if $L_{hitung} \leq L_{tabel}$ at level $\alpha = 0,05$. In summary, the results of the calculation of research data are shown in Table 4.3 below.

Table 2. Normality Test Result of Pre-Test of Experiment Class I and Experiment Class II

Class	L_{count}	L_{table}	Information
Experiment I	0,1253	0,161	Normal Distribution
Experiment II	0,1204	0,161	Normal Distribution

From the table above shows that the results of normality test at significance level $\alpha = 0.05$ indicates pretest data from both samples have distribution of normal distributed data. This is obtained by comparing the value of L_0 with L_{table} . The pretest data in the experimental class I obtained the value of L_0 is $0.1253 < L_{table} (0,161)$ which means normal distributed data and in

experimental class II obtained value L_0 is $0,1204 < L_{table} (0,161)$ which also mean normal distributed data. This shows that the value of pretest significance in both classes is lower than the critical value for Liliefors test that is $L_{table} = 0,161$ with $\alpha = 0,05$ and $n = 30$. So it can be concluded that the pretest data of both classes is normally distributed

Table 3. Post-Test Normality Test Result of Experiment Class I and Experiment Class II

Class	L_{count}	L_{table}	Information
Experiment I	0,1268	0,161	Normal Distribution
Experiment II	0,1315	0,161	Normal Distribution

From the table above can be seen that the normality test results at the significance level $\alpha = 0.05$ shows the post-test data from both samples have distribution of normal distributed data. This is obtained by comparing the value of L_0 with L_{table} . The post-test data in the experimental class I obtained the value of L_0 is $0.1268 < L_{table} (0.161)$ which means the data is normally distributed and in the experimental class II obtained the value of L_0 is $0.1315 < L_{table} (0.161)$ which also means the data is normally distributed. This indicates that the value of post-test significance in both classes is lower than the critical value for Liliefors test ie $L_{table} = 0,161$ with $\alpha = 0,05$ and $n = 30$. So it can be concluded that the pretest data of both classes are normally distributed.

The data homogeneity test is used to determine whether the sample used in the study comes from a homogeneous population or not, meaning whether the selected sample can represent the entire population. For homogeneity test used the equality test of both variance is test F. If $F_{count} < F_{table}$ then H_0 accepted and if $F_{count} \geq F_{table}$ then H_0 is rejected. With the degrees of freedom of the numerator = $(n_1 - 1)$ and degrees of freedom denominator = $(n_2 - 1)$ with the real level $\alpha = 0.05$.

Table 4. Homogeneity Test Result of Pre-test and Post-Test of Experiment Class I and Experiment Class II

Data	F_{count}	F_{table}	Conclusion
<i>Pretest</i>	1,3818	1,858	Homogen
<i>Post-test</i>	1,2041	1,858	Homogen

From the table above shows that the results of homogeneity test data indicate that the pretest and post-test data of both classes have the same variance or in other words the two classes are homogeneous. This is obtained by comparing the value of F_{count} with F_{table} (1.858) at the significant level $\alpha = 0.05$ and $n = 30$. From the calculation of pretest data obtained F_{count} is 1.3818 $< F_{table}$ (1.858) which means H_0 accepted. And in the post-test obtained F_{count} is 1.2041 $< F_{table}$ (1,858) which means H_0 accepted. H_0 is accepted which means that both populations have the same variance. So it can be concluded that both classes are homogeneous.

After it is known that the data of both classes are normal and homogeneous distribution, then hypothesis testing is done. Then the difference test of students' pretest and post-test average (1st party test) is used to see the difference of students' mathematical problem solving ability between experiment class I and experiment class II.

In summary the results of the hypothesis test can be seen in the following table:

Table 5. Hypothesis Test Result Data Initial Ability Test (Pretest)

Median		t_{count}	t_{table}	Conclusion
<i>Resource Based Learning (RBL)</i>	<i>Realistic Mathematics (RM)</i>			
52,07	47,08	2,164	1,671	Reject H_0

From the pretest data above we get $t_{count} = 2,164$ and $t_{table} = 1,671$ with $\alpha = 0,05$ and $dk = n_1 + n_2 - 2 = 58$, it shows that

$t_{count} > t_{table}$ is $2,164 > 1,671$. Based on hypothesis testing criteria then H_0 rejected and H_a accepted.

Table 6. Hypothesis Test Result Data End-Test (Post-test)

Median		t_{count}	t_{table}	Conclusion
<i>Resource Based Learning (RBL)</i>	<i>Realistic Mathematics (RM)</i>			
78,75	72,17	2,099	1,671	Reject H_0

From the table above it can be seen that for the post-test hypothesis test using t test is obtained at $\alpha = 0,05$ and $dk = n_1 + n_2 - 2 = 58$ with $t_{count} = 2.099$ this indicates that $t_{count} > t_{table}$ is $2.099 > 1.671$. Based on hypothesis testing criteria then H_0 rejected and H_a accepted.

Thus it can be concluded that there are differences in problem solving skills of mathematics between students taught by a resource based learning (RBL) approach with students taught by realistic mathematics (RM) approach in Class VIII SMP Negeri 2 Medan.

DISCUSSION

Research conducted in SMP Swasta Muhammadiyah 2 Medan uses two different approaches of learning approach that is Resource Based Learning (RBL) and Realistic Mathematics (RM). The RBL approach is applied in class VIII-B (Experiment I) consisting of 30 students and RM Approach applied in class VIII-C (Experiment II) consisting of 30 students.

Before being treated differently, the researcher performs a pretest or preliminary test to see students' mathematical problem-solving abilities before being treated. From the pretest given, the average value of pretest of experiment class I was 52.07 and the average of pretest grade of experiment II was 47,08. This means that both research samples experience different conditions on students' mathematical problem solving abilities.

This is evidenced by the testing of hypotheses by using t-test one party. After testing the data obtained is $2.164 > 1.671$ which means that H_0 rejected and H_a accepted.

Furthermore, after being given different treatment, the researcher

performs a post-test or final test to see students' mathematical problem solving abilities after being treated. From the post-test conducted, the average value of posttest experimental class I is 78.75 and the average of post experiment class II is 72,17. This means that both research samples experience different conditions for students' mathematical problem solving abilities. In this case it can be seen that there is a difference of problem solving ability of mathematics of experiment class I students with experiment class II.

This is also evidenced by the testing of hypotheses using a one-party t test. After testing the data obtained that is $2.099 > 1.671$ which means that H_0 rejected and H_a accepted.

Overall from the existing pretest and post-test results, it was found that there was a difference of students' mathematical problem solving abilities through a resource based learning (RBL) approach in experimental class I with realistic mathematics (RM) approach in experiment II class on linear equations in class VIII SMP Private Muhammadiyah 2 Medan.

In the experimental class I students were formed in groups where the number of students in one group was 4-5 people divided heterogeneously. Then each group is asked to discuss the LAS and the problem, the students are not left alone. But given direction where the nature is like a question but with so researchers do not teach how to solve the problem solving problem, but guide students to find their own way. Researchers only provide basic stages in solving problem-solving problems. The researcher always emphasizes to the students what information can be obtained from the problem (understand the questions about what is known and asked), which way might be used to solve

the problem (make problem solving strategy), do the calculation after getting the strategy to be used (executing the completion plan), and monitoring the students to re-examine and conclude the results of the calculation whether it is in accordance with the questions asked or not (looking back). This is a step in solving the problem-solving problem known as the Polya strategy. After the students do the LAS by discussion, the teacher asks the students to re-examine the results of their work. Next the teacher calls one of the groups to present it to the front of the class then asks the other group to respond to the results of his friend's discussion.

In the second experiment class, students were also asked to work on the LAS in groups. The group formed consisted of 4-5 people divided heterogeneously. In the discussion the students are not left alone, but given directives in the form of questions that can lead students to be able to understand the problem and then formulate the hypothesis by changing into the mathematical model then discussed to a group of friends to test the problem and then draw conclusions from the results obtained.

During the learning process in both classes, researchers observed how the characteristics of students when discussing with his team. In the experimental class I using the RBL approach which emphasizes the students to self-study and find their own answers teams / groups on the source of learning as information materials so that students must translate information and learn the information and use it on the problem. In accordance with the findings of the field in the implementation of learning resource-based learning, students more easily in collecting information and translating information in the form of mathematical formulas make students

become aware of the information obtained in solving problems. While the realistic mathematics approach emphasizes the students to use their own experiences or new experiences into learning materials so that more freely think to appreciate the thoughts that have in solving the problem. According to the findings of the field, found little difficulty students in groups using realistic mathematics approach. This happens because the students do not really understand using their own experience or idea (thought) in solving the problem. This can be seen from the variety of students' answers to each group in the process of learning during the learning process.

Thus it can be said that there is a significant difference to the problem solving ability of math students of experimental class I that is taught by using a resource based learning approach with problem solving problems of students' math class II experiments are taught with realistic mathematics approach. This is in accordance with research by Renhard [11] which states that there are differences in problem-solving abilities that apply learning model of resource based learning approach with realistic mathematics approach in class VIII SMP Negeri 2 Doloksanggul. Based on the results of research and supported by relevant research can be concluded that the difference to the problem solving skills of mathematics students who taught using a resource-based learning approach with students who taught using realistic mathematics approach in class VIII SMP Swasta Muhammadiyah 2 Medan.

CONCLUSIONS

Based on data analysis and discussion then there are conclusions in this study as follows:

Through hypothesis test it is found that there are differences in problem solving ability of students mathematics taught by approach Resource Based Learning (RBL) and Realistic Mathematics (RM) approach on material system of two linear equations in class VIII SMP Swasta Muhammadiyah 2 Medan.

Based on the results of this study, the suggestions that researchers can provide include:

1. To the teachers of mathematics should apply the approach of resource based learning as one of the alternative learning in an effort to develop problem solving ability of mathematical student especially in linear equation system two variable. Therefore, this learning approach should continue to be developed in the field that makes students trained in solving problems.
2. To the teacher of mathematics should be more train student in two problem solving indicator that is executing problem solving and check back result obtained or make conclusion because from result of post-test mathematical problem solving ability done in class experiment I and experiment class II obtained that students are still having difficulties while at both stages. It is expected that with the teacher's problem-solving exercises, students' mathematical problem solving skills are better in the future on all indicators.
3. To teachers / prospective math teachers to give appreciation for students who have advantages in finding answers using different methods for the development of student knowledge.
4. To other researchers who will conduct similar research should better maximize the use of time and facilities

- so that students are better prepared when the learning process takes place.
5. To other researchers who want to conduct similar research with the same approach in order to further develop the learning process in this approach as well as learning materials used to get better results.

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