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Comparison of Student’s Learning Achievement through Realistic Mathematics Education (RME) Approach and Problem Solving Approach on Grade VII

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Abstract. The type of this research was experiment. The purpose of this study was to determine the difference and the quality of student’s learning achievement between students who obtained learning through Realistic Mathematics Education (RME) approach and students who obtained learning through problem solving approach. This study was a quasi-experimental research with non-equivalent experiment group design. The population of this study was all students of grade VII in one of junior high school in Palopo, in the second semester of academic year 2015/2016. Two classes were selected purposively as sample of research that was: year VII-5 as many as 28 students were selected as experiment group I and VII-6 as many as 23 students were selected as experiment group II. Treatment that used in the experiment group I was learning by RME Approach, whereas in the experiment group II by problem solving approach. Technique of data collection in this study gave pretest and posttest to students. The analysis used in this research was an analysis of descriptive statistics and analysis of inferential statistics using t-test. Based on the analysis of descriptive statistics, it can be concluded that the average score of students' mathematics learning after taught using problem solving approach was similar to the average results of students' mathematics learning after taught using realistic mathematics education (RME) approach, which are both at the high category. In addition, It can also be concluded that; (1) there was no difference in the results of students' mathematics learning taught using realistic mathematics education (RME) approach and students who taught using problem solving approach, (2) quality of learning achievement of students who received RME approach and problem solving approach learning was same, which was at the high category.

INTRODUCTION

Education in the era of globalization today has a very important role to serve as a benchmark for man to face numerous challenges. Education is an effort in order to be able to make real men, formed character to become human dignity, faithful, devoted, creative, independent, become citizens of a democratic and responsible, creativity, and be able to improve the Human Resources (HR).

Educational process is implemented in schools is basically a learning activity, which aims to enable students to have the best results they can. One benchmark which illustrates the level of student success in learning is the result of learning. Learning achievement can be viewed from three aspects, namely cognitive, affective, psychomotor aspects.

Education and knowledge are closely related to student learning achievement, where knowledge is in control of education in student learning achievement. One of the disciplines of science plays an important role in education, especially against student learning achievement is mathematics. Mathematics is one of the most useful knowledge in life.

Education in Indonesia needs to be improved, in term of the quality of mathematics education. One thing to note is the increase in students' mathematics learning outcomes in schools. Fadilah [1], said, "Mathematics is important as forming attitudes, therefore, one of the teacher's task is to encourage students to learn well". Reality on the
ground, the process of teaching and learning activities in the classroom, especially mathematics’ response was unfavorable. Fadilah [1] suggested that, mathematics (science) for children in general is a subject that is unpopular if not is lessons in hate.

Overcoming it is necessary to find a learning approach that is expected to improve student learning achievement. One of learning approach that can improve student learning achievement is realistic mathematics education (RME) approach. This is consistent with results of previous research conducted by Septianawati et al [2] found that learning Realistic Mathematics Education (PMR) is effective for improving mathematics achievement Eighth Grade school students in terms of the personality of students. Similarly, the research results of Sarismah [3] found that the application of RME can improve student achievement in the triangle material. According to Lestari [4], implementation of RME can enhance students learning achievement on grade VII.

Similarly, the problem solving approach, the approach is one alternative that can be used to improve student learning outcomes. This is supported by the results of previous studies which found that problem solving approach makes students more active in the learning process, and students responded positively to the learning tools that are used, and even the level of ability of teachers to manage the learning process is using the problem-solving approach in the high category [5].

Based on the explanation above, the purpose of this study was to determine: (a) The difference in results of learning mathematics students get learning through approaches realistic mathematics education (RME) and students who had learning with problem solving approach, (b) the quality of mathematics learning who get learning through RME approach and students get learning through problem solving approach.

**LITERATURE REVIEW**

**Student’s Learning Achievement**

Learning problem is an issue for every human being, with human learning acquired skills, the ability to form attitudes and increase knowledge. According to Salwah [6], learning achievement appears as the change in student behavior that can be observed and measured in changes in knowledge attitudes and skills.

According to Salwah [6], learning achievement measured using the test, the results contained in the report cards or diplomas. By learning students will experience a change that is from not knowing to knowing, of not understand being understood. The final result of the decision makers of high and low grades of a student during the learning intended learning achievement. The results of students’ mathematics learning is the ability gained after the student through the learning activities.

So the learning achievement is a real result achieved by students in an effort to master the physical and spiritual prowess at school which are realized in the form of report cards in each semester.

**Realistic Mathematics Education (RME) Approach**

Mathematics is very important. Therefore, in the whole country must learn mathematics. Countries that ignore mathematics education will definitely be the underdeveloped countries. Mathematics is a product of the fruit of human intellectual thought [7]. Intellectual thinking can be the brainchild of the issue of fictitious or is the fruit of thinking of the problems of everyday life. Wijaya, [8] argued that "mathematics as a human activity”. It is a cornerstone development of Realistic Mathematics Education (RME).

Hasratuddin [9] stated that mathematics is not given to students in the form of a product, but students must construct their own content knowledge through the solution of problems contextual interactively, both informally and formally, so they find themselves or with the help of people adult / teacher (guided reinvention), whether they are right or wrong answers. Somakim [10] suggested that the approach is Realistic Mathematics (PMR) view that mathematics as a human activity that is developed with three basic principles, namely (a) Guided Reinvention and Progressive mathematization; (b) didactical Phenomenology (phenomena Learning); and (c) Self-developed Models (Model Development itself).

**Problem Solving Approach**

Problem solving approach is often called the "scientific method" because the measures used is a step scientific starting from formulating the problem, formulate a response while the (hypothetical), collect and search for data /
facts, draw conclusions or make generalizations, and applying the findings into a new situation. As for the view of the problem solving approach by experts that according to Fadli [11], problem solving approach is a way of presenting a lesson to encourage learners to seek or solve a problem in the achievement of learning goals.

According to Abdurrahman [12], problem solving approach emphasizes on teaching to think about how to solve mathematics problems and information processing. The syntax of Problem Solving Learning are clues, game plan, solve, and reflect.

Phase 1: Clues
1. Read the problem carefully.
2. Underline the cues are the problem.
3. Ask students to find problems in the signals underlined.
4. Invite students to plan what to do on the issue.
5. Ask students to find the facts underlying the problem.
6. Invite students to express what they need to find.

Phase 2: Game Plan
1. Make a game plan to solve the problem.
2. Ask students to customize the game with the problem just presented.
3. Ask students to identify what they have done.
4. Ask students to explain the strategies they will use to solve the problem.
5. Ask students to try out his strategies (for example, by simplification, sketch, guess and check, search patterns, and so on).
   If the strategies they use does not work, ask them to rethink the strategy.

Phase 3: Solve
Ask students to use the strategy in solving the problem.

Phase 4: Reflect
1. Ask students to look back solutions they use.
2. Ask students to discuss the possibility of using this strategy in the future.
3. Check whether their strategy can really answer the problem posed.
4. Make sure that the strategy is really applicable for the same problem.

So the problem solving approach emphasizes to the discovery and problem solving in a sustainable manner.

METHOD

This research is experimental research involving two groups (experiment I and experiment II) to measure students' mathematics learning achievement. The population of this study was all students of class VII in one of the SMPN, the academic year 2015/2016. 2 class purposely selected as the study sample. This research used a quasi-experimental design with non-equivalent [9]. Students on the first experimental class numbered 28 pupils and students in the second experimental class were 23 students. Experimental class was given treatment in the form of RME approach and experimental class II given treatment in the form of problem solving approach.

The type of research instrument that used to collect data in this study were: (a) the achievement test, and (b) worksheet. Worksheet in the experimental class I contains realistic problems, whereas in the experimental class II contains the real problem. Data analysis techniques that used in this research was using t-test.

Terms of learning was said to be done well if the majority of students achieve a higher category on the categorization of the value of learning achievement are presented in the following TABLE 1.

### TABLE 1. Categorization of Student Learning Achievement

<table>
<thead>
<tr>
<th>Score</th>
<th>Categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65</td>
<td>Low</td>
</tr>
<tr>
<td>65–74</td>
<td>Middle</td>
</tr>
<tr>
<td>75–100</td>
<td>High</td>
</tr>
</tbody>
</table>

Modification from Arikunto [13]
RESULTS

Analysis Result of Preliminary Capability

Pretest data of mathematics learning achievement in both classes were same. It was inferred from the equality test ranking before being given treatment. Based on the Mann-Whitney test was obtained sig. (2-tailed) was 0.761 greater than $\alpha = 0.05$, meaning that the null hypothesis that there was no difference between classroom learning achievement that got RME approach learning and classes that got learning with problem solving approach, acceptable.

Analysis Result of students’ Mathematics Achievement

Based on T-test results (two tails) that obtained t value = -0.090 with significance of 0.929. Because sig. > $\alpha = 0.05$, then H0 was accepted, or H1 was rejected. This means that, there was no difference between mathematics learning achievement taught by RME approach and students taught by problem solving approach.

Achieving Quality of Student Mathematics Learning Achievement

The RME and problem solving approach have been presented by analyzed statistically. Furthermore, the study was presented by the categorization of the value of mathematics learning achievement. In TABLE 2 are presented a list of frequency distribution of students who achieve high, medium and low categorization when the review of their learning achievement.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Criteria</th>
<th>Experiment I</th>
<th>Experiment II</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65</td>
<td>Low</td>
<td>25 Pretest</td>
<td>23 Posttest</td>
<td>1 Pretest</td>
</tr>
<tr>
<td>65-74</td>
<td>Middle</td>
<td>2 Pretest</td>
<td>11 Posttest</td>
<td>8 Pretest</td>
</tr>
<tr>
<td>75-100</td>
<td>High</td>
<td>0 Pretest</td>
<td>14 Posttest</td>
<td>14 Pretest</td>
</tr>
</tbody>
</table>

Based on the above results, the students’ value in the experimental I and experiment II has increased quite significantly from pretest to posttest. When we see an increase in the ratio of these two classes, seemed no different. This means that the quality of student learning achievement are taught through RME approach is same with the quality of student learning achievement are taught through problem solving approach.

DISCUSSION

Discussion of the results of this study was based on research data that have been obtained during the conduct of research and analysis of the results of data processing that has been shown before. This study used two types of learning approaches that RME approach given the experimental class I and problem solving approach given the experimental class II. Based on the research that has been described previously obtained results that there is no difference between the learning achievement of learning by using RME approach and learning by using a problem solving approach. This can be caused by both approaches are equally train the students' mathematical thinking skills (there are no differences in learning achievement).

Worksheet that given the experimental class I contain realistic problems that can train students' thinking skills through guided-reinvention principle as has been described before. Results of previous studies have also found that the students' thinking skills can be enhanced by RME approach. At worksheets, students focus on realistic problems. The given problem is a problem that can be reached by the students. Students will think how to find a realistic solution of the problem. Through the issue, the students will use their problem-solving strategies to find the answer.
According to Fachrurazi [14], in a situation like this, students will utilize cognitive ability in efforts to seek the truth and confirmation of the knowledge in his mind. This stage is called the stage Guided-reinvention and progressive mathematization.

Worksheet that was given the experimental class II contained real problems, instead of the usual mathematics problems. The purpose of the usual mathematics problem is a problem that easy so that the child can immediately find the answer, then the problem is not the real problem [15]. Problem solving approach can also enhance students' thinking skills that can improve their learning achievement, as only the RME approach. This is consistent with results of previous studies which found that problem solving approach is more emphasis on teaching to think about how to solve math problems and information processing [12]. Students are also required to be able to understand the content and the type of problems to solve these problems, this approach involves not only the dynamics interaction between teachers and students but also involves dynamic interaction between the one students and the other students in the learning process and give a positive response, so as to interest and motivation students in learning [11].

If we see the quality of student learning achievement, can be concluded that, class that taught with RME approach and problem solving approach together enhance learning achievement. The quality of learning achievement of both classes was average at the high category.

**CONCLUSION**

Based on research data that has been analyzed and discussed above, it is concluded that; (1) There was no difference in the results of students' mathematics learning taught using realistic mathematics education (RME) approach and students who taught using problem solving approach, (2) The quality of learning achievement of students who received RME approach and problem solving approach learning was same, which was at the high category.

**REFERENCES**