Realistic Mathematics Education (RME) approach to increase student’s problem solving skill in elementary school

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Abstract. The purpose of this study is to describe the steps of implementing the Realistic Mathematics Education (RME) approach to increase students’ problem solving skill. The method used in this research is action research method, with 5th grade students’ elementary school as a subject. Data collection techniques used is observation sheet and test. The results showed that the realistic mathematics education (RME) can increase students’ problem solving skill with average students’ score up to 68.8 as good criteria in cycle I. Then in cycle II the average score of students’ increase up to 84 as very good criteria. So, it can be concluded that RME can increase students’ problem solving skill in elementary school.

1. Introduction

1.1. Background

Mathematics is one of the compulsory subjects from elementary to tertiary levels. According to Frengky [1] and also Johar [2] argue that Mathematics is firstly learned formally by teachers when they are in the first grade of elementary school. In daily life, students encounter various problems pertained to the application of Mathematics. The proper mastery of Mathematics can support the solvency of those problems.

Despite its benefit and function, Mathematics is generally considered challenging and tedious since this subject relates to numbers, formulas, and calculations. Nevertheless, according to Ruseffendi [3] Mathematics can help students to solve problems, communicate daily, improve logical, critical, exact, and improve spatial thinking ability. One of the benefits of learning mathematics is the development of systematic, logical, and critical thinking as well as analytical skill [4]. Hence, Mathematics is considered as one of the essential subjects in formal and informal education. However, one of the issues in Mathematics learning in elementary school is students' low problem-solving skills. Mathematics teaching at school has not emphasized the importance of problem-solving skills as it focuses more on procedural aspects. Most students are trained to memorize formulas, however, they have been not encouraged to master the problem-solving application of Mathematics.

Mathematical problem solving has become the main focus in mathematics learning; thus, facilitation needs to be provided in the teaching to improve students’ problem-solving skills. This point is also emphasized by The National Council of Teachers of Mathematics (NCTM). NCTM further suggests that problem-solving should be not only the learning objective of learning mathematics but also the medium to achieve the stated goal. Based on the observation conducted at one elementary school in...
Cisurupan District, the problems encountered by students during the mathematics class are (1) difficulties in answering mathematics problems, especially story problems; (2) difficulties in understanding existing information and question statement in mathematics problems; (3) difficulties in deciding which operation and formulas to solve problems; (4) incorrect final answers despite the use of correct formulas and operation; and (5) inability to review answers based on the problems provided.

To address the issue, Realistic Mathematics Education (RME), a method that orients toward mathematization of everyday experience and applies mathematics in daily life, can be employed. Soedjadi [5] states that realistic mathematics learning mainly uses reality and environment familiar to students to boost the mathematics learning process and achievement of the objective. Soedjadi [5] further explains that the reality used in the learning should be real or concrete for students to understand and imagine. In a similar vein, Wijaya [6] views mathematics as a discipline that is closely related to reality. The learning model should be determined and designed to encourage student activities, which provide various chances to build knowledge and solve problems personally. The learning model is expected to result in better learning. To address the issue mentioned above, this study aims at investigating the application of Realistic Mathematics Education (RME) in mathematics learning to improve students' problem-solving skills.

1.2. Research questions
The research question of this study is as follows:

Does Realistic Mathematics Education (RME) approach improve students' problem-solving skills?

2. Research methods
The research method employed in this study is a qualitative method with the classroom action research model. Classroom action research combines research procedure with substantive action conducted in inquiry discipline or action aimed at understanding a current phenomenon while actively involved in the change and improvement process (Hopkins in Gunawan [7]). Classroom action research can be defined as a problem analysis process through self-reflection to solve a problem. Carefully planned actions in real situation and analysis of the effect of the intervention are conducted in classroom action research (Sanjaya in Gunawan [7]). When the model is applied, reflection is undertaken to analyze the factor and impact of the problems.

The sample of this study is the fifth-grade students in one of school in Kecamatan Cisurupan, Kabupaten Garut. The participants of this study are 41 students consisting 27 female students and 14 male students.

3. Findings and discussion
Activity improvement of mathematics learning through RME approach from cycle I to cycle II is presented in the following table 1:

| No | Score    | Cycle I | Cycle II |
|----|----------|---------|----------|
| 1  | Total score | 673     | 970      |
| 2  | Average  | 16.8    | 24.3     |
| 3  | Criterion | Fair    | Very good |

The table above shows that there was an improvement in students learning activity from cycles I and II. was is an increase from Cycle I with 673 of the total score, 16.8 of average score, and fair criterion to cycle II with 970 of the total score, 25.3 of average score, and very good criterion. Several unmaximized observation indicators in Cycle I were refined in Cycle II.

RME approach encourages students to be actively involved in learning and created fun learning activities, which improves students' activity from Cycle I to Cycle II. One of the possible factors affecting the improvement in students' motivation and convenient learning situation. According to Uno
motivation is one of the essential factors that determines the success of learning. Furthermore, a convenient learning situation can also affect the improvement of the student's activity.

The improvement of students learning outcome in pre-cycle, cycle I, and cycle II is shown as follows:

| No  | Category               | Pre-cycle | Cycle I  | Cycle II |
|-----|------------------------|-----------|----------|----------|
| 1   | The highest score      | 81        | 100      | 100      |
| 2   | The lowest score       | 37        | 35       | 70       |
| 3   | Student pass           | 16        | 27       | 40       |
| 4   | Student fail           | 24        | 13       | 0        |
| 5   | Student pass percentage| 40%       | 67.5%    | 100%     |
| 6   | Student fail percentage| 60%       | 32.5%    | 0%       |
| 7   | Learning outcome average| 61       | 68.8     | 84       |
| 8   | Category               | Poor      | Fair     | Good     |

Based on the table 2 above, the learning outcome of the classical pre-cycle was 40%. In Cycle I, there was an increase in classical learning outcomes to 67.5%. In Cycle II, the classical learning outcome was increased to 100%. The findings above demonstrate that students could master the lesson, and the application of RME approach could encourage the improvement in learning. The finding indicates that RME could play an essential role in improving students' mathematical problem-solving. Applying RME approach in learning tends to create a positive, safe, supportive, relaxing, and fun classroom environment. DePorter and Hinacki [9] also add that a safe classroom with proper lighting and arrangement is essential.

According to Bunga [10] RME approach is in line with constructivism theory, which emphasizes the provision of activities where students can practice lessons and build a concept based on the materials learned. The learning process in this theory is concrete and closely related to nature and surroundings. In a similar vein, Realistic Mathematics Education (RME) emphasizes the solvency of concrete problems encountered by students.

Teachers' classroom action research generates several improvements, namely (1) improvement of teachers' skill from good to very good; (2) improvement of students' activity from fair to good and very good, (3) improvement of students' reading skill from fair to good and very good; and (4) improvement of students' learning outcome from ≤ 80% to ≥ 80%. Hence, classroom action research should be an integral part of teachers' duty as it provides added values and suggestions for improving the learning process, curriculum, and evaluation approach [11].

When teacher skills improve, the learning process will be more effective as students are more actively involved in the process. Fun learning increases students' motivation, which in turn helps students to understand mathematic lesson and improve their learning outcome.

4. Conclusion

Based on data analysis and discussion, the improvement of students' mathematical problem-solving skill through the implementation of the Realistic Mathematics Education (RME) approach can be concluded that Teachers' skills in the Cycle I got a score of 24 in a good category, and in the Cycle II got a score of 38 in a very good category. Students' activity in the Cycle I obtained a total score of 673 with an average of 16.8 in a fair category, while the score in the Cycle II increased by 970 with an average of 24.3 in a very good category. In terms of learning outcomes in the form of students' understanding of mathematics through the implementation of the Realistic Mathematics Education (RME) approach, the learning completion in Cycle 1 reached 67.5% with an average score of 68.8 in a good category. Meanwhile, learning completion in Cycle II reached 100%, with an average score of 84 in a very good category.
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