

Research Article

Efforts to Build Students' Mathematical Problem-solving Ability Through Problem-based Learning Models on Number Operation Materials in Class VII SMPN 25 Malang

Sukoco¹, I Nengah Parta¹, Lila Puspitasari²¹State University of Malang²Junior High School 25 Malang**Abstract.**

The background of this research is students' low mathematical problem-solving ability. The purpose of this study was to determine the efforts to build mathematical problem-solving abilities of junior high school students, especially in the number operations material caused by the lack of attention and involvement of students in the learning process, students' difficulties in understanding story problems related to contextual problems, and students who were less active and creative in constructing problem-solving ideas. Therefore, we need a learning model that can build students' mathematical problem-solving skills, namely the problem-based learning model. This research was conducted at SMPN 25 Malang as classroom action research (CAR) which refers to the MC Taggart learning model which was carried out for two cycles. The study was carried out on 31 students of class VII.C. The results of this study indicate that the test results of students' mathematical problem-solving abilities have changed for the better from cycle I to cycle II, where in cycle II the average score has reached 76 and the criteria for completeness have exceeded the mastery limit, which is 87.10%. In this case, it can be concluded that the application of the problem-based learning model can build the mathematical solving abilities of students in class VII-C of SMPN 25 Malang.

Keywords: problem-based learning, mathematical problem-solving, number operations

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1. INTRODUCTION

Problems are part of human life that originates from within or from the surrounding environment. Almost every day humans are faced with a problem that needs to be found a way out of. These problems, solving problems is a basic human activity for survival. Therefore, everyone is expected to be able to play the role of a reliable problem solver to maintain his life. A skilled problem solver is inseparable from the ability to think systematically, logically, and critically and persistence in solving the problems he faces.

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This ability and persistence are not necessarily owned by someone but can be learned and trained of them through mathematics.

Learning mathematics is one way that can be taken to develop students' thinking, namely: logical, critical, thorough, curious, never give up, and others. This is what was stated by Sundayana (2013: 2) that mathematics is a provision for students to think logically, analytically, systematically, critically, and creatively. This ability is needed in problem solving.

Problem solving is a very important part of the mathematics curriculum. This is because students will gain experience in using their knowledge and skills to solve problems so that students become more analytical in making decisions in their lives. Problem solving skills must be owned by students to solve problem-based questions. As revealed by Wahyudi (2012) explaining that in solving mathematical problems, students are faced with situations that require them to understand the problem, make mathematical models, choose strategies for solving mathematical models, carry out solving mathematical models and conclude.

But in fact, solving problems is one of the most difficult abilities for students to learn. In addition, the achievement of the Program for International Student Assessment (PISA) score in 2015, in Indonesian mathematics competence, earned 386 points while the overall average was 490 points. This shows that Indonesia's mathematical competence is still low or below average.

The following are some of the student answers which show a low ability to solve math problems.

This possibility is caused by the lack of active students in learning and difficulties in understanding problem solving and the process of solving them. In working on the questions, most students only use simple steps and immediately write down the answers to the questions, not writing down in a coherent way what is known, what was asked, and then solved. This is evidence of the lack of ability to explain the mathematical problem-solving process which includes understanding the problem, planning problem solving, solving problems, and finding solutions.

The learning process is one of the factors causing the low ability because the learning system does not involve students actively participating and ignores student activity because it is considered the center of learning. As stated by Soedijarto (in Dewi, 2013, p. 6) that in the process of learning activities does not use a modern approach, only a series of activities taking notes, then memorizing and recalling, it is a characteristic of the learning process carried out in most developing countries, one of which is the only country is Indonesia. This makes students not creative because they only

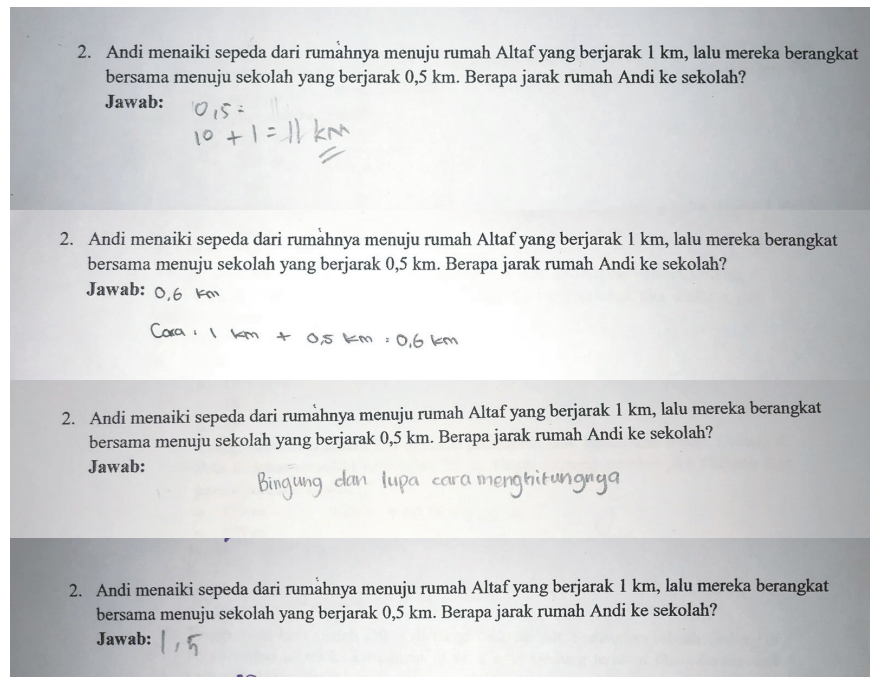


Figure 1: Student Answer Sheet.

receive information from the teacher without any process of expressing their ideas in finding a mathematical concept. Therefore, a learning model is needed that can provide opportunities for students to think creatively.

One of the learning models that encourage students to be able to express their creative ideas and develop mathematical problem-solving skills is active learning, namely problem-based learning (Problem Based Learning or PBL). Problem Based Learning according to Arends Problem Based Learning is a learning model in which students are faced with authentic (real) problems so that they are expected to develop their knowledge, develop inquiry and high-level skills, make students independent, and increase their self-confidence.

Based on the pre-test, shows that the problem-solving ability based on Polya's steps in students is that students have not been able to understand the problem well, students are not precise in modeling mathematical sentences in the questions, students cannot make a plan of completion in advance in solving problems and answers that are given. obtained by students is not right, it is because students make mistakes in modeling mathematical sentences.

Therefore, the researcher will conduct research with the title "Efforts to Build Students' Mathematical Problem-Solving Ability Through Problem Based Learning Model on Number Operation Material in Class VII SMPN 25 Malang"

2. METHOD

This research is qualitative research with the type of classroom action research (CAR) or Classroom Action Research (CAR). The researcher uses the McTaggart model which consists of a series of activities in the form of planning (plan), implementation of action (act), observation (observe), and reflection (reflect).

This classroom action research was conducted at SMPN 25 Malang, which is located at Jl. Bukit Tidar Villa Housing, Merjosari, Lowokwaru District, Malang City, East Java. The subjects in this study were class VII.C for the academic year 2022/2023 with 31 students, consisting of 18 male students and 13 female students.

This research was conducted at the beginning of the new academic year 2022/2023. That is July to August 2022. The timing of the research refers to the school's academic education calendar because CAR requires several cycles that require an effective teaching process. In this odd semester, the first material is Numbers.

The researcher is the main instrument (human instrument) in this study. Researchers as planners, implementers, observers, data managers, data interpreters, and reporting research results. Other instruments used in this research are Learning tools in the form of Teaching Modules, LKPD, textbooks, and test questions, Data Collection Instruments in the form of Teacher Activity Observation Sheets, Student Activity Observation Sheets, Problem Solving Ability Tests in the form of description questions compiled based on indicators- indicators of students' mathematical problem-solving abilities, the test questions made also show aspects of the Problem Based Learning model. This research was carried out in two cycles where each cycle consisted of planning, action, observation, and reflection,

3. RESULTS AND DISCUSSION

In this section, the results of data processing and a discussion of research results will be presented which are the results of the problem-solving ability test from cycle one to cycle two on the Numbers material through the Problem Based Learning model. The results of the data analysis carried out are the percentage of each assessment activity

3.1. Cycle 1

Based on the results of the analysis presented in the first cycle, it was found that the application of the Problem Based Learning model had not been able to build students'

mathematical problem-solving abilities by the planned targets. The percentage of the average score on the indicators of mathematical problem solving in the first cycle only reached 48.39% and was still included in the "very poor" category. This is influenced by several factors, including students who are not accustomed to learning using the Problem Based Learning model, so students cannot maximize when studying in groups, and students are not accustomed to presenting the results of discussions in front of the class. The impact of Covid-19, which made them study online for two years during grades V and VI, caused students to be lazy to read questions that were indeed the model of the questions containing long readings because they were related to story problems in everyday life.

Learning outcomes based on the mathematical problem-solving ability test in this cycle are also still quite lacking. Of as many as 31 students only 48.39% reached the criteria for completeness or the test score reached a value of 75. However, when viewed directly, student activity was different. with the initial observation time taking place without using the Problem Based Learning model. This success is influenced by several factors, including students starting to not get bored with the ongoing learning process, students being more enthusiastic because they are working on problems together with their group friends, students getting experience about learning while discussing groups, and presentations, respecting the opinions of others so that exchange ideas about the problems that are being given.

The results of the tests carried out at the end of the first cycle are also still very lacking because the average only reaches a score of 60.65 which is still in the "enough" category, most of the students' problems are understanding the story questions given and when solving the questions, they immediately answer without writing the process from scratch.

3.2. Cycle 2

The results of observations made during the second cycle concluded that there were developments by the expected targets. It appears that the activeness of students in the first cycle only reached 65.18%, but in the second cycle it reached 87.80%. The factors that influence this development are good group work, listening carefully and paying attention to the teacher's explanation, reading carefully the story problems in the student worksheets, being active in learning, self-confidence and the role of the teacher is also very influential.

As for the test results of students' mathematical problem-solving abilities in the second cycle, they reached an average score of 76, which can be concluded that there was better developed than in the previous cycle and managed to achieve a minimum level of mastery success, namely ≥ 75 with a percentage of 87.10%.

To see more clearly the linkage of research results in each cycle with predetermined success criteria, presented in the following table

TABLE 1: Recapitulation of Research Results.

No	Activity	Cycle 1	Cycle 2
1	Student Activities	65,18	87,80
2	Teacher Activity	89,71	95,83
3	Problem Solving Ability Test	48,39	87,10

Based on the table above, the activities measured have shown progress in each cycle. At the end of the second cycle, all target criteria can be fulfilled, therefore students' mathematical problem-solving abilities experience better changes through learning using the Problem Based Learning model

4. CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that, in general, the use of the Problem Based Learning model in learning mathematics can build students' mathematical problem-solving abilities. This can be seen from the average change in the results of the mathematical problem-solving ability test of 60.65 in cycle I and 76.00 in cycle II. Mathematical problem-solving abilities that are built through learning activities with the Problem Based Learning model include students' abilities to understand problems, students' abilities to plan problem-solving strategies, students' abilities to solve problems, and students' abilities to interpret their solutions or check again.

The developments that occurred during the application of the Problem Based Learning model in mathematics lessons at SMPN 25 Malang, especially class VII.C, can be concluded as follows:

1. Students who use the Problem Based Learning model have good mathematical-solving abilities. This can be seen from the results of the final test of the first cycle and second cycle on the Number Operations material which shows a better development in the percentage in each cycle, which is 48.29% with an average

value of 60.65 in the first cycle and becomes 87.10 % with an average value of 76 in the second cycle.

2. There is a change in the results of observations of teacher activities in the first cycle of 89.71% and the second cycle of 95.83%
3. There is a change in the results of observing student activities in the first cycle which is 65.18% and in the second cycle to 87.80%

The development for the better above is by studies that have been carried out by several previous researchers, where the Problem Based Learning model can affect students' mathematical problem-solving abilities better.

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