



Application of Problem-Based Learning Model to Improve Problem Solving Ability

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Article Info	Abstract
Received September 29, 2022	This study aims to improve the problem solving ability of class VIII junior high school students. This research was conducted after the preliminary study it was found that problem solving abilities were still relatively low. Observational shows that more than 50% of class VIII students of SMP Muhammadiyah 3 Depok have poor problem solving skills. Based on the theory put forward some expert of experts, the researchers decided to apply the problem-based learning model. This study uses classroom action research design with a target of 50% of students having a problem solving ability score above the <i>Kriteria Ketuntasan Minimal</i> (KKM). There are four stage of this research, namely planning, implementation, observation and reflection. The data collection technique using the test and non-test techniques. Data analysis using descriptive analysis of quantitative and qualitative analysis descriptive. From the results of the study, it was found that 77% of students had problem solving scores above the KKM. Besides that, it was found that student were able to work on the questions in a more structured manner and could better understand the questions given.
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INTRODUCTION

To improve the quality of human resources, one of the main means is education. One of the basic education provided in Indonesia is mathematics. The Law of the Republic of Indonesia Year 2003 concerning the National Education System Article 37 confirms that mathematics is one of the compulsory subjects for students at the primary and secondary education levels. This is because mathematics can improve students' reasoning so that it can help students in solving and solving problems (Chotimah et al., 2020).

The ability to solve problems is one of the higher-order thinking skills needed by students in responding to the increasingly complex challenges of life in the future (Fajri, 2017; Irawati, 2018; Hidayati, 2017; Simanjuntak, Meiliasari, & Ambarwati, 2021). Tarhadi and Pujiastuti (2006), defines problem solving as a way of thinking, analyzing, and reasoning using experience and knowledge related to the problem. Roebyanto and Sri (2017) mentions that mathematical problem solving is a process in which a person relates to mathematical concepts,

skills and processes to solve a mathematical problem. However, from the initial pre-survey data at SMP 3 Muhammadiyah Depok by providing problem solving questions, it was found that 50% of students had poor mathematical problem solving abilities. This can be seen that there are still many students who are still often confused in finding, understanding problems and presenting solutions when given problem-based problems.

According to Eggen and Kauchak (2012) problem-based learning is a set of teaching models that use problems as a focus to develop problem solving skills, materials, and self-regulation. This learning model requires students to be active and work collaboratively (Sigia, 2020). Based on this opinion, the problem-based learning model will be able to improve students' ability to improve problem solving skills.

The steps of the problem-based learning model according to Abidin (2014) problem-based learning has the following characteristics. (a) Problems become the starting point of learning, (b) Problems used are contextual and authentic, (c) Problems encourage students to think in multiple perspectives, (d) Oriented to the development of independent learning, (e) Develop knowledge, attitudes, skills, and competence, (f) Utilizing various learning resources, (g) Emphasizing collaborative, communicative, and cooperative activities, (h) Emphasizing the importance of acquiring research skills, problem solving, and mastery of knowledge, (i) Encouraging students to think at a higher level high: analysis, synthesis, and evaluative, and (j) Ended with evaluation, study of learning experience, and study of learning process.

Based on the problems that have been described previously and supported by the theory of experts, the formulation of the problem studied in this study is how to improve mathematical problem solving skills in class VIII students of SMP Muhammadiyah 3 Depok Sleman by using problem-based methods. learning model. The stages of the problem-based learning model in this study include finding problems, building work structures, defining problems, collecting and sharing information, formulating solutions, determining the best solutions, and presenting solutions. This stage is assessed in more detail and can be tracked in improving students' problem solving abilities. In addition, there is no research in the field of mathematics that mentions problem solving abilities in schools. The purpose of this study was to improve the mathematical problem solving ability of eighth grade students of SMP Muhammadiyah 3 Depok Sleman in the 2014/2015 academic year after receiving a problem-based learning model.

RESEARCH METHODS

This type of research is Classroom Action Research (CAR). CAR actually begins with the term "action research" which is generally used to find solutions to problems faced by someone in their daily tasks. CAR consists of 4 stages, namely: (1) planning, (2) acting, (3) observing, and (4) reflection. For the characteristics of students, most of the students have cognitive abilities that are in the lower middle range. In terms of motivation, most students still have low motivation.

The planned action is the teaching and learning process with a problem-based learning model, the steps are as follows, (1) Each subject is delivered for 2 hours and 3 hours of lessons. The teaching and learning process is carried out by

learning with a problem-based model. (2) The implementer of the lesson is a mathematics teacher for class VIII B SMP Muhammadiyah 3 Depok Sleman Yogyakarta. (3) The teaching and learning process is carried out in class VIII B of SMP Muhammadiyah 3 Depok Sleman Yogyakarta. (4) The initial activity begins with conducting a pretest for the material of a two-variable linear equation system. Data collection techniques were carried out through filling out motivational questionnaires, interviews, and observations. The data collection instruments used in this study were motivation questionnaires, interview guidelines, and learning implementation observation sheets.

The results of the problem solving ability scores given before the action, after the first cycle, and after the second cycle and so on reflect how the mathematical problem solving ability is. Indicators of increasing students' mathematical problem solving abilities are seen by comparing test scores before the action at the end of each cycle. The data collected were analyzed in the following way: (1) Giving a score for each question that has been answered by students which is then added up for each student. This research is said to be successful if 50% of all students have reached the minimum category above the KKM that has been set by the school, namely 66. In this study researchers were required to attend because the homeroom teacher only acted as a collaborator. The validity of the data is important in a study. To check the validity of the data, a technique for checking the validity of the data will be used, namely persistence of observation and peer review. Persistence of observation is carried out by making careful, detailed, and continuous observations at each meeting. Peer Examination is done by discussing the process and results of research with experts, mathematics subject teachers, or colleagues.

RESULTS AND DISCUSSION

Pre Research

Before conducting research, pre-research activities were carried out, namely to determine the initial condition of students' problem solving abilities. From pre-study data collection (interviews and observations) it is known that the mathematical problem solving ability of class VIII B students is classically in poor condition, with details of 63.3% in poor condition, 33.3% in poor condition. quite good, and 3.33% in good condition. From the pre-research it was also obtained data that only about 22% of students were able to find problems, 15% build work structures, 17% compile problems, 26% collect and share information, 15% formulate solutions. , 10% determine the best solution, and present the solution.

Cycle Data Exposure I

Some of the research findings in cycle I are the first. Many students are not disciplined during class hours, so it takes time and as a result class hours are interrupted. Second, students have not completed the LKS assignments on time because they are still not familiar with the LKS problem-based learning model. Third, cooperation in each group has not run optimally. Some groups still have members who are not actively working on the worksheets and making noise and disturbing other friends. Fourth, many students ask the teacher to present more

material before being given worksheets, this is because students feel they have not mastered the material if it is not explained by the teacher. Fifth, the level of problem solving ability of students in classical mathematics learning slightly increased when compared to the results obtained before the implementation of the action, less than 50% of students who had problem solving ability scores below the KKM became more than 50% or more precisely 77.3% of students. have a problem solving ability value above the KKM. Based on the findings in cycle I, the desired target of success indicators has been achieved so that the cycle can be stopped.

Discussion

The purpose of this study was to improve the problem solving ability of students at SMP Muhammadiyah 3 Depok by using a problem-based learning model. The steps in the problem-based learning model include finding problems, building work structures, defining problems, collecting and sharing information, formulating solutions, determining the best solutions, and presenting solutions.

At the beginning of the action, the teacher conveys the material and the initial learning objectives to be achieved. Then the teacher tries to grow motivation by giving apperception. Then proceed with group formation. At this stage the group discusses to find problems and build a work structure on the worksheets that have been given. In this case the teacher only acts as a facilitator. After that, students are expected to be able to define the problem, collect and share information so that they actively seek knowledge.

After the discussion time is over, each group is asked to formulate a solution and determine the best solution. Then each group presents the solution that has been agreed upon. In this case, according to the statement of Smith and Cook (2012) teachers are also expected to provide scaffolding to improve academic abilities and achievements. Then the teacher gives the opportunity to other groups to provide feedback. And at the end of the discussion the teacher and students make conclusions about the material that has been discussed. In the final stage, the teacher conducts questions and answers with students.

For problem-solving ability scores have increased, from pre-action less than 50% who have a score above the KKM after going through cycle 1 it increases to 77.3% who have a score above the KKM. In accordance with Abidin (2014) the problem-based learning model does have several characteristics that emphasize the importance of acquiring research skills, problem solving, and mastery of knowledge. In addition, according to Arends and Kilcher (2010) that the purpose of the problem-based learning model is a process that emphasizes the ability to find and solve problems, self-confidence, collaboration skills, and project management skills.

From the CAR conducted, knowledge was obtained regarding the application of problem-based learning models: First, students felt happy when asked to seek and share information. Second, students need strict sanctions in order to be disciplined towards their obligations. Third, students have difficulty understanding the problem. Fourth, students become bored if they are asked to work on LKS continuously.

This study still has several limitations, including: First, the implementation of the action is only carried out within a period of 3 weeks so that the increase in

students' problem solving abilities is not optimal. Second, during group discussions, each student demands a lot of attention from the teacher so that many students ask questions during the discussion and make the class a little noisy. Third, this research focuses attention on improving problem solving skills.

CONCLUSION

Based on the results of research, discussion, and reflection, several conclusions can be drawn: (1) The application of problem-based learning models improves problem-solving abilities in class VIIIB students of SMP Muhammadiyah 3 Depok. (2) The application of the problem-based learning model increases the problem-solving ability score of class VIIIB students of SMP Muhammadiyah 3 Depok. This can be seen from the increase in the percentage of students who have a problem-solving ability score of less than 50% who reach the KKM, then in the first cycle it becomes 77.33% who achieves the KKM.

Based on the final results of this study, the researcher suggests to the teacher that the problem-based learning model can be redeveloped so that problem solving abilities are increasing and the teacher must be more assertive in giving sanctions to students who are less disciplined. In addition, further research suggestions are to add independent variables that are measured so that not only problem solving abilities but also relevant variables related to problem-based learning models and the application of problem-based learning models can also develop or increase. other aspects, such as the ability to ask questions, learning achievement, student motivation, attitudes towards mathematics and thinking skills and student interests.

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