The influence of problem posing learning on mathematical solution ability of junior high school

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Abstract. This study aims to determine the influence of learning problems posing to the mathematical problem-solving skills of class VIII students. The approaches and methods used in this study are quantitative approaches and experimental methods. The design in this research is pre-experimental with form one group pre-tests post-test design. This study was conducted at Junior high School Al Islam Cikampek by taking one class as a sample of research, class VIII C which amounted to 40 students. Sampling using purposive sampling techniques. The instruments in this study used a 4-question description test related to mathematical problem-solving skills with surface area material, prism volume, and pyramid. There are three phases in this research, the pre-test is done to know the initial ability to solve the student's mathematical problem before given treatment. After being given a pre-test, researchers give treatment by giving teaching using the model problem posing. After treatment, the researchers conducted a post-test to determine the final ability to solve students' mathematical problems. Based on the analysis results of the test-T for two dependent samples showed there is the influence of learning problems posing to the ability to solve the mathematical problem of class VIII students.

1. Introduction

Mathematics has an important role in daily life [1]. When carrying out problem-solving activities, humans have done mathematical activities [2–4]. Mathematical problem solving is one of the important goals in learning mathematics and even the process of solving mathematics is the heart of mathematics [5–8]. Problem-solving is an integral part of learning mathematics so that it should not be separated from mathematics learning [9,10].

The importance of problem-solving skills by students include (1) The ability to solve problems is a general goal of teaching mathematics, (2) Problem solving which includes methods, procedures and strategies is the core and main process in the curriculum mathematics, (3) Problem solving is a basic ability in learning mathematics [10–14]. So that the ability to solve mathematical problems is an important aspect of learning mathematics because the process of solving mathematical is one of the basic mathematical abilities that must be mastered by school students [10].

However, based on the results of observations made by researchers in one of the junior high schools in Karawang Regency, in one class only 5 to 8 people were able to solve mathematical problems correctly. When conducting interviews, it turns out students find it difficult to understand and solve the problems contained in the problem. This is in line with the results of previous studies which state that the skills of high school and junior high school students in West Java in solving mathematical problems are still relatively low [15–17]. One way to overcome problems in mathematical problem-solving ability
is through learning problem posing. That in principle, the problem-posing learning model requires students to submit their problems through independent problem learning [18–21].

Problem posing by forming questions or formulating questions or arranging problems [22,23], problem-posing has several meanings, namely: a) formulation of questions in standard or standard language or re-formulation of existing questions with some changes so that they are simple and can be mastered; b) formulation of questions relating to the conditions of the problem being solved to find alternative solutions or alternative problems that are still relevant; c) formulation of the problem from an available situation either done before, when, or after working on the problem [24,25].

In learning problem-posing, students will be trained to make problems independently and confidently. So this learning can make students develop their knowledge and skills in solving problems. The problem-posing model assumes students are subjects of learning, trains students to develop their potential as people who have the potential for curiosity and try hard in understanding and solving problems. So learning problem posing can affect students' mathematical problem-solving abilities.

2. Method
The approach used in this research is quantitative. The method used in this research is the experimental method. Experimental research can be interpreted as a research method used to find the effect of certain treatments on others under controlled conditions [26–28]. This is by the purpose of this research, namely to know the influence of the model learning problem posing to the ability to solve students' mathematical problems. The treatment tested in this study was a learning posing problem. In this study, the design used was Pre Experimental. The design of this research form The One-Group Pretest-Posttest Design [26].

The population in this study was all students of grade VIII junior high school academic year 2016-2017, with a sample of research consisting of a group of class VIII students selected Purposive sampling in consideration that the class is believed to possess homogeneous characteristics. Purposive sampling is a group retrieval based on the particular consideration [26].

After the data processing is complete, the data obtained is then analyzed to get results and conclusions. The data analyzed is test data. Test data processing using statistical tests against pretests data and post-test data. Test Data is done test normality. If the data is normal distribution, then the next step is done t-test on two dependent samples. Whereas if the data is not normal distribution then do a non-parametric test, Wilcoxon. Data processing is done with the help of a software program SPSS 23.

3. Result and Discussion
This study was conducted in one elected class, i.e. class VIII C using learning problem posing. At the implementation of this research, the material used is the flat side space surface on sub material area, the volume of Prism and Pyramid which includes identifying the properties of Prism and Pyramid, making the net-nets prism and Pyramid, determining the formula of surface area prism and Pyramid, calculating the surface area of the prism and Pyramid. In the learning process, students are given student worksheets.

The student learning process is grouped into 8 groups that each group consists of 5 students. Before the model problem-posing, students first provided a pretest to determine the initial ability to solve mathematical problems. At the beginning of the student response meeting on learning the problem-posing very positive, students look quite enthusiastic. However, there are still a lot of students who do not understand the student worksheet. This is because students are not familiar with group discussions and learning that requires students to jointly discover the concept of mathematics and demand each group to create similar problems that researchers have delivered.

At the next meeting, students begin to become accustomed to learning the problem-posing model applied. Group discussions are becoming more active and each student contributes to the presentation of ideas or ideas and seeks information through the learning resources used to address issues that are in the worksheet and can create problems that would later be given to other groups.

At the last meeting was held posttest to know the ability of problem-solving students mathematically after the model learning problem posing. The values of Pretests and posttests were first processed using normality testing. Data processing is done using the help of SPSS 23 software, with a significance rate
of 5%. To find out the detailed research results, here are the results of the test analysis normality of pretests and posttest data, as table 1.

| Table 1. Pre-test and post-test data normality test results of Normality with Shapiro-Wilk |
|-----------------------------------------------|
| Score       | Statistic | df | Sig.   |
| Pre-test    | 0.950     | 40 | 0.078  |
| Post-test   | 0.976     | 40 | 0.550  |

From table 1 above indicate that the significance value of the pretests and posttest results is greater than the value of $\alpha = 0.05$ so that $H_0$ is accepted, this means that the pretests and posttest data are equally normal distributions. Therefore, the data on this study resumed a t-test for two dependent samples. The results of the t-test analysis for the two dependent samples showed that the coefficient significant as 0.000. Based on this result, we can see that the value of Sig. (2-tailed) is 0.000 < 0.05. Based on the hypothesis testing criteria above, $H_0$ is rejected, meaning that at the level of confidence 95% there is the influence of learning problem-posing to the ability to solve the mathematical problem of class VIII students.

This is in line with previous research which states that after the application of problem-posing learning, students’ mathematical problem-solving abilities are categorized very well [29–33]. This can occur because of the problem of posing learning can affect the way of learning students who were originally passive to tend to be active.

4. Conclusion

Based on the results of data analysis and previous discussions, from the results of research in mathematics learning conducted at Al Islam Cikampek junior high school regarding the effect of learning problem posing on the mathematical problem-solving ability of eighth-grade students of SMP, it is concluded that there is an effect of learning problem posing on students’ mathematical problem-solving abilities junior high school class VIII.

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