Mathematic Problem Ability of Algebra Operation With Problem Based Learning Class VIII.1 SMP Bhayangkari Pekanbaru

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ABSTRACT

Mathematic problem solving ability is an important goal in mathematics learning. Problem solving involves a high-level thinking process, including visualization, association, abstraction, manipulation, reasoning, analysis, synthesis, and generalizations.This study aims to determine the mathematic problem solving abilityof students class VIII.1 SMP Bhayangkari such understanding problem, planning the problem solving, making the calculation, and checking the results. This study uses a problembased learning model, involving activity, collaborative, and centered on the students, so it will able to develop the ability independently. The test is an essay. Data was analyzed quantitatively to determine the level of ability. Thestages are: giving scores on item, writing total scores, then determining them. It is in a classical assesment, which is based on the classical quantitative analysis. The average score of the students is 91.30. This means that the mathematic problem solving ability of students is very good.

***Keywords**: mathematic problem solving ability*

Introduction

Mathematics has learning objectives, including: (1) understanding the relation between concepts in problem solving; (2) use the scheme as a allegation in problem solving and make generalizations based on existing phenomena or data; (3) using reasoning in trait, performing mathematical manipulations both in simplification, as well as analyzing existing components in problem solving within mathematical and beyond mathematical contexts; (4) communicating ideas, reasoning and the ability of mathematical proof by using sentences, symbols, tables, diagrams, or other media to explain the situation or problem; (5) having appreciation of the utility of mathematics in life, which has pry, attention, and interest to learn mathematics, as well as a firm attitude and conviction in problem solving; (6) having attitudes and behaviors consistent with values in mathematics and learning; (7) doing motoric activities using mathematical knowledge; (8) using simple props and technology results to perform mathematical activities. This part shows the background, identification and objective of the study.

From the learning objectives, especially the first and fifth points, mathematics problem solving ability is one of the important goals in learning mathematics. Problem solving involves high-level thinking processes, such as visualization, associations, abstractions, manipulations, reasoning, analysis, synthesis, and generalizations that each of them need to

be managed in a coordinated. (Didi Suryadi and Tatang Herman, 2008).

Based on the rationale, it is necessary to apply problem based learning model,which can increase students' activity and can improve mathematics problem solving ability of thestudents'.

Problem solving is not merely a form of the ability to apply rules that have been mastered through learning activities, but it is the process of getting a set of rules at a higher level (Made Wena, 2012). Problem-solving looks as a process of finding a combination of a number of rules that can be applied in dealing with new situations.

According to Polya (Sumarmo, 2013) there are four stages in mathematics problem solving: (1) understand the problem; (2) plan or design problem solving strategies, (3) make the calculations; (4) re-examine the solution.

Methodology

This research was conducted in class VIII.1 SMP Bhayangkari Pekanbaru. This form is a classroom research. Classroom research is carried out by applying the problem based learning model with two main lessons, the Algebra Operations and Function Relation. Each subject consists of 10 hours of lessons divided into three meetings, and there are a test after each lesson to measure mathematic problem solving ability of the students. The subjects of this research are students of class VIII.1 SMP Bhayangkari Pekanbaru consisted of 5 male and 15 female students with heterogeneous ability level.

The learning devices used are as follows:

1. Syllabus
   According to Permendikbud number 22 in 2016, syllabus is a reference for the preparation of learning for each subject that contains at least subject identity, school identity, core competency, basic competency, subject matter, learning activities, assessment, time allocation, and learning resources.
2. Lesson Plan
   According to Permendikbud number 22 in 2016, lesson plan is a program of face-to-face learning activities for one or more meetings. Lesson plan is developed from the syllabus to the learning activities of students in an effort to achieve the goal of basic competence. The components contained in the lesson plan include school identity, subject identity, class/semester, subject of learning, time allocation, learning objectives, basic competency and indicators of achievement of each competency, learning materials, learning methods, instructional media, learning resources, and learning steps .
3. Student Activity Sheets
   Student activity sheets contains steps in constructing the concept with procedures that are made in such a way so that students are able to solve a problem individually or in groups. It aims to enable students to collect the information about the material learned through learning activities in a systematic way, so that students can develop and build understanding of the material by themselves.

The data of the test were obtained based on the score in final test. Evaluation of the final test refers to the scoring guidelines adapted from Hamzah (2014). The scoring criteria for each indicator of students' mathematical problem solving ability in table 1 below.

Table 1 Mathematical Problem Solving Scoring Guide Students

Aspect	Score	Explanation
Understanding the problem	0	Not mention what is known and what is asked
	1	Mention what is

		known without mentioning what is asked or vice versa.
	2	Mention what is known and what is asked but not quite right.
	3	Mention what is known and what is asked precisely.
Plan for completion	0	Not planning any problem solving at all.
	1	Plan the completion by making a mathematical model based on the problem but the mathematical model is less precise.
	2	Plan the solution by creating a mathematical model based on the problem appropriately.
Execute the plan	0	Not answer
	1	Implement the plan by writing the answer but answer one or only a few correct answers.
	2	Implement the plan by writing answers half or most of the correct answers.
	3	Implement the plan by writing the answers completely and correctly.
Analyze the results	0	Not write the conclusion
	1	Interpret results by making conclusions but not exactly.
	2	Interpret the results by making the conclusions appropriately.

Source: Hamzah (2014)

Data obtained through observation and test of mathematics problem solving ability of students analyzed by using descriptive analysis technique of narrative and descriptive statistic analysis. Data obtained from the observation sheet is qualitative by narrative descriptive analysis technique, which aims to describe data about teacher activity and students during the learning process and expose it in narrative form. Data obtained from mathematics problem solving ability test of students were analyzed by descriptive statistic analysis technique. According Sugiyono (2008), descriptive statistic is used to analyze data by describing the data that has been collected without intending to make general conclusions or generalizations.

Data analysis of mathematics problem solving abilityis analyzed quantitatively to determine the mathematics problem solving ability level of students. The are: (1) provide scores of students' answers in a converted into mathematics problem solving ability score of students with a range from 0-100; (2) make table average of mathematics problem solving ability score of students; (3) determine the score of mathematics problem solving ability in classical students.Conversion of mathematics problem solving ability score of students using the formula:

Mathematics problem solving ability scores of students = (Gain Score) / (Max Score) × 100

The value of the mathematic problem solving ability from the calculation is then qualified in accordance with the following table.

Table 2 Qualification of Mathematic Problem Solving Ability ofStudents

Score	Qualification
85,00-100	Very Good
70,00-84,99	Good
55,00-69,99	Good Enough
40,00-54,99	Less
0-39,99	Deficient

Sumber: Japa, 2008

The way that can be used to see the improvement of mathematics problem solving abilitystudents is see the average increase and the percentage (Suharsimi Arikunto, 2006).

Result and Discussion

Based on the observation sheet of students, during the learning process in class VIII.1 SMP Bhayangkari Pekanbaru, the studentsare more active. Implementation of problem based learning modelhas provided the opportunity of students to be active in the learning process such as respond to motivation and apperception, discuss in groups, train in solving problems in the form of problem solving, and courage in asking opinions and questions to teachers.

Based on the implementation of the learning process that researchers have done, the learning has been in accordance with Permendikbud mandate No. 22 in 2016, that learning takes place interactively, inspiration, fun, challenging, efficient, motivate students to participate actively, and provide sufficient space for initiative, creativity, and independence in accordance with the talents, interests, physical and psychological development of students.

Here is an analysis of mathematics problem solving ability in a classical way with the application of problem based learning model on Algebra Operation and Function Relation.

Table 3Classical score of mathematic problem solving ability class VIII.1 SMP Bhayangkari Pekanbaru on the subject on Operation Algebra and Function Relation

	Score
Average Score of Mathematics Problem Solving Ability	45,65
Average Score	91,30

Source : Research

The mistakes made by students based on the analysis of the achievement of the mathematics problem solving ability are students write down the wrong planning to solve the problem so that the students have an error in solving the problem. In addition, students are less thorough in completing the count operation, and do not carry out all the steps in solving the problem solving.

The following is the analysis of mathematic problem solving abilitt values of students on each aspect of problem solving model Algebra Operation and Functional Relation.

Table 4 Average of mathematic problem solving ability of students class VIII.1 SMP Bhayangkari Pekanbaru on every aspect of Algebra Operation and Function Relation

No	Aspect	Score Average
1	Understanding the problem	2.94
2	Planning the problem solving	1,81
3	Making the calculation	2,63
4	Checking the results	1,75

Source: Researcher

In this study, students' mathematical problem solving ability showed that there is a good score of mathematic problem solving ability of students after researcher applied problem based learning model.

Table 5 Mathematic problem solving ability class VIII.1 SMP Bhayangkari Pekanbaru on the subject matter Algebra Operations and the subject matter Function

	Classical score
Average of mathematic problem solving ability	45,65
Average	91,30

Source : Researcher

Based on the classical quantitative analysis, the average score of students in class VIII.1 SMP Bhayangkari Pekanbaru is 91.30. This

means that the ability to solve mathematical problems of students is very good.

Conclusion

The good value of mathematic problem solving ability ofstudents is because in problem based learning model,students together with the group are given the opportunity to actively participate in finding their knowledge and solve the problem of the material learned by finding their own learning becomes meaningful and the knowledge obtained lasts long and the students are accustomed to be logic thinking problem solving. In line with the statement that the problem based learning model is a model of learning with student learning approaches on authentic issues, so that students can develop their own knowledge, develop higher skills and inquiri, establish students, and increase self-confidence (Nurhayati Abbas, 2000).

Based on that, the implementation of problem based learning model cause the score of the students are very good.

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