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QUALITY OF STUDENTS PROBLEM SOLVING WORKSHEET DESIGNED BY JUNIOR HIGH SCHOOL MATHEMATICS TEACHERS IN GUNUNG MEGANG

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Abstract

One way to improve the quality of the teaching and learning activity that can be done by teachers is by designing their own worksheet that is used in the classroom. The aim of the present study are to see the quality of worksheet designed by teachers with indicators (a) students' activity when learning with the help of worksheet and (b) students' ability in solving mathematics problem. The method that was used in this present study is asking teachers to design their own worksheet, observation, and test. The result shows that the quality of the mathematics problem solving worksheet designed by teachers is quite well. It can be seen that students' activity in the instruction is in the high level, and their ability in solving problem is good. This vignette shows that mathematics problem solving worksheet designed by teachers is an alternative for teachers to improve the quality of their instruction.

Keywords*: worksheet, mathematics problem solving*

INTRODUCTION

One of the goals of mathematics instruction in Kurikulum Tingkat Satuan Pendidikan (KTSP) is improving creative activity that involves imagination, intuition, and discovery by developing divergent, original thinking, the eagerness, the ability to predict something, hypothesis and trial-and-error. Students have to learn mathematics through understanding and developing new knowledge actively from their experience and prior knowledge. Rule of National Education Ministry No. 22 (Depdiknas, 2006) about the standard of content states that the goal of junior high school mathematics is the students are able to:

"Solving problems about the ability of understanding problems, designing mathematics model, solving models, and interpreting the solution of the problems."

Problem solving itself is a process of applying prior knowledge to a new and unknown situation in order to solve the problem. The fact shows that students' ability in solving problems, especially junior high school students, was still low. The measurement tool that can be used to refer the result of junior high school students' learning achievement is a test done by TIMSS. The average international achievement for problem solving task in geometry was 32%, the highest achievement reached by Singapore students was 75%, while the achievement of Indonesian students was only 19%. For problem solving task in algebra, the average international achievement was 18%, and only 8% was for Indonesian students (Mullis, et al., 2007). This result showed that Indonesian students' achievement in mathematics problem solving was very low.

The mathematical topics in TIMSS were already been learned by Indonesian students. Given this fact, Indonesian students used to be able to solve the problems in TIMSS correctly. But in fact, Indonesian students were not able to solve them correctly. This could happened because Indonesian students were not accustomed in solving problems that required high level of creativity yet. They were not able to solve the problems because their teacher rarely gave them any task with that criteria.

Basically, the teaching and learning activity is a communication process between the teacher and the students. The communication process not always went well, even there can be any miscommunication, or misconception. In order to solve this, beside teaching activity, the teachers should be able to develop students thinking sistematically. The teachers should guide the development of the skills instead of giving a ready-made product to the students.

The curriculum requires a mathematical instruction that use a spesific learning method in order to help the students re-invent the concept, principal that is started with a contextual problem. The students are guided to master the mathematics concept (Depdiknas, 2006). Freudenthal in Zulkardi (2002: 29-31) stated that in learning mathematics, the students have to be given as many opportunity as possible to experience the same process the ancestor did when they found the mathematics concept, because mathematics is human activity.

In mathematics teaching and learning, the teachers have to motivate their students to make them able to solve the problems and guide them until they find the solution (Hudoyo, 1988). The guidance can be given orally or in a written form, but a written help in a worksheet will be much more effective, because the students can read those guidance more than once.

To give the guidence effectively, a very well preparation is needed, especially in mastering the concepts and principals in order to solve the problems. The preparation can be done at the process of designing a hypothetical learning trajectory. By doing this, teachers' ability in presenting the learning materials can be developed.

Worksheet is an appropriate learning alternative for students since it helps them to gain more information about the concept that is learned through a sistematic teaching and learning activity (Suyitno, 1997 : 40).

Guidance or help that is given by the teacher in a worksheet can consists of one or more problem solving tricks. Related to that, Herman Hudoyo (1988 : 175) gave some clues that can be used by the teachers to guide their students so that the students are able to solve the mathematics problems, such as: 1) understanding the problem, 2) planning the solving ways, 3) solving the problem based on the plan, and 4) re-examining the solution.

In line with the hierarki of education, help or guidance given by the teacher in a worksheet has to be limited, for instance it is only in the planning phase. If there is a student who needs more help, the teacher can give an oral guidance. The important thing is the teacher has to conduct a condition in which the students are given an appropriate chance to learn.

The model of the worksheet developed by the teachers consists of several things such as Polya's problem solving framework, consists of what is "known", what is "asked", and how to check the solution.

Some of the written clues, so that the students are motivated and challenged to be able to solve the problems. The clues consist of several ways in planning how to solve the problems or questions to dig the concepts the students might have in mind to be connected with the "known" and "asked" aspects at the problems.

From those explanations, the goals of the present study are to know the quality of teachers' problem solving worksheet based on students' activity and students' ability in solving the problems.

Method

The present study is a non-hypothesis descriptive study with an observation approach. An observation was conducted in 10 junior high schools in Gunung Megang, with 9 public junior high schools and 1 private junior high school. This study was conducted in an even semester of 2012/2013 school year.
The data collected in this study was a problem solving worksheet designed by teachers, students' ability in solving mathematics problem that was collected with a test, and students' activity level in learning with worksheet that was collected with an observation. The data then analyzed to get a general image about the worksheet quality designed by the teachers.

RESULT AND DISCUSSION

Result of the Study

The problem in this study is how the quality of problem solving worksheet designed by the teacher is. Related to that issue, there are two things that have to be considered in the present study, such as (1) students' activity in learning with the help of worksheet, and (2) students' ability in solving mathematics problems.

(1) Students' activity in learning with the help of worksheet

From the observation conducted, when the students were solving the problems in the worksheet, it could be seen that there was a quite similar tendency between the 7th grade, 8th grade, and 9th grade students, which could be seen in the table below:

Table 1: The average of students' activity when solving the problems in the worksheet

No	Students' Activity	7th grade	8th grade	9th grade
1	The engagement with the task	90 %	96%	95%
2	The initiative in learning	70%	52%	62%
3	The commitment in solving the problems	78%	76%	67%
4	The confidence	53%	30%	53%

It can be seen from the table above that almost all of the students are trying to engage with the problem given in the worksheet. By considering those four forms

of students' activity as a descriptor in learning with a worksheet, the level of students' engagement in solving problems with the help of worksheet is explained below:

Table 2: Frequent distribution of students' activity level with the help of worksheet

Students' activity level	7th grade	8th grade	9th grade
Very high	32 %	17 %	34 %
High	37 %	33 %	30 %
Average	25 %	35 %	25 %
Low	6 %	15 %	11 %
Total	100%	100%	100%

(2) Students' ability in solving mathematics problems

The image of students' ability in solving mathematics problems that was collected by a daily test was shown in the table below:

Table 3: Frequent distribution of students' daily test

Score	Frequency / Grade (%)		
	7th grade	8th grade	9th grade
85 – 100	51	12	24
75 – 84	10	27	30
65 – 74	20	15	10
55 – 64	5	20	6
45 – 54	8	15	15
35 – 44	3	5	12
25 – 34	3	6	3
Total	100	100	100
Average	81,0	65,7	70,1

From the table above, it can be seen that there are 81% of the 7th graders scored 65, 54% of 8th graders scored 65, and 74% of 9th graders scored 65.

Analysis

The results of the present study show that, clasically, students' activity in learning with the help of worksheet is good enough. This is followed by their ability in solving the problems.

From the four descriptor of students' activity that were observed during the learning time, almost all of the students shows the interest to solve the problems given in the worksheet. In the solving process, there were students who were able to directly solve the problem without refering to the help in the worksheet, and those who still need some information from the teacher or try to learn the textbook. But there was also some of the students who only copied their friends' work.

Other thing that also played a role in the learning process was the teachers' dependency in designing and developing the worksheet. Highly motivated teacher were somewhat more patient in guiding their students when learning. The students felt save and eager to achieve in the learning process when the teacher guided them patiently. In other words, the teachers were more succesfull in developing motivation in students' mind.

CONCLUSION

The result of the present study showed that the quality of the mathematics problem solving worksheet designed by the teachers was good enough. It could be seen from the students' activity in the learning process was high, and students' ability in solving the problems was also good.

Related to the result of the present study, there were some suggestions as mentioned below. For the junior high school teachers, giving the worksheet to the students could help them improving their ability in solving mathematics problem. The LPTK teachers were suggested to train their students to design problem solving worksheet for mathematics instruction.

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