

Development of Problem-Based Student Worksheets to Improve Mathematical Literacy Skills

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Development of Problem-Based Student Worksheets to Improve Mathematical Literacy Skills

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Abstract. Having good mathematical literacy skills is expected to help students solve problems related to mathematics. The focus of mathematics literacy skills on students is the ability to solve and interpret mathematical problems in various forms and situations. The purpose of this study was to determine the development process based on problems student worksheet to improve mathematical literacy skill valid and practical problems in the system linear equations of two variables material. The type of research was the development of research (Research and Development), which consists of stages are literature, study, observation, interviews, development of student worksheets. After Revised, the student worksheets was evaluated by a foeld test in a small and large scale. The verahe scale from both aare 70,66% and 75,08 % respectively. It is concluded that problem based student worksheet to improve mathematical literacy skill can be used and distributed as a learning material in mathematics learning for junior high school.

1. Introduction

The aim of curriculum 2013 is to prepare Indonesian having ability to be a devout, productive, creative, innovative, and affective person who can contribute to nation and the world. learning process in curriculum 2013 is based on student centered learning in order to master basic and core competence so student can understand the whole concept. Mathematics is one of the compulsory subjects taught at every level of education in Indonesia, starting from Elementary School (SD) higher education, senior High School (SMA). The purpose of teaching mathematics is to equipment students to have the ability to think logically, analytically, systematically, critically and creatively and their ability to operate. Through these objectives it is expected that students can develop the ability to use mathematics in solving problems related to everyday life. Based on these goals, mathematics is very important for students to learn. In learning mathematics, in order to achieve the expected learning goals, it should emphasize the principles of mathematics learning. With the principles in the learning process, students can develop science, creative power and be responsible for the course of the learning process of mathematics. So that students can understand mathematical concepts, and can apply these concepts in everyday problems. Thus, learning is expected to succeed well. Mathematical learning activities are said to be successful if student learning outcomes achieve optimal results. For this reason, support from all parties is needed. And support from all learning components. One component



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of learning is the teaching material used by the teacher. Teaching materials are a set of learning materials arranged systematically, which are used by teachers and students in the learning process. Examples of teaching materials in the form of books, worksheets, and modules that can be used by students or teachers.

Trends in International Mathematics and Science (TIMSS) and Programs for International Student Students (PISA) are the benchmark for achieving Indonesian students' mathematical abilities. The result from TIMSS 2011 show that the average achievement of Indonesian students is 386 that's means Indonesian at the low level [1]. These results indicate that Indonesian students' mathematical abilities are ranked 38 of the 42 participating countries. The results of the 2015 PISA stated that Indonesian students' mathematical abilities were ranked 69 out of 76 countries with an average score of 386. The 2011 TIMSS and 2015 PISA research showed that Indonesian students' mathematical literacy skills were still very low compared to other developing countries especially in the process of mathematical problem solving that requires the ability to examine reasons, communication skills, and interpret problems in various situations. The low level of Indonesian students' mathematical literacy skills based on reports from TIMSS 2011 and PISA 2015 is an important reason to examine more deeply about Indonesian students' mathematical literacy skills. Mathematical literacy will provide participants with an awareness and understanding of the role played by mathematics in the modern world [2].

Another reason for the importance of students having mathematical literacy skills is the emergence of PISA (Program for International Student Assessment) questions in the 2014 high school and junior high school mathematics national exam (UN). As written [3] the emergence of PISA questions at the National Examination aims to map national education, as well as measure student competencies internationally. While on the other hand, this government policy has drawn protests from various circles, especially the UN participants. The reason is that these international standard questions are considered too difficult. In this problem, students are not asked to do procedural calculations, but to analyze a problem. The problems given are in the form of story problems that can be found in everyday life and then mathematically resolved. The characteristics of the PISA question are of course different from the general UN questions that put forward procedural calculations. Therefore, if students have low mathematical literacy, the problem will be considered difficult.

Mathematical literacy is the ability of individuals capacity to recognize and understand the role played by mathematics in real life, to be able to provide proper assessment and consideration, to use mathematics that can meet a person's need to be a constructive, caring, and thinking member of society [4]. In this sense, mathematical literacy is used to emphasize mathematical knowledge, which is used in everyday life. According to de Lange [4], mathematical literacy is not limited to carrying out a number of ways or procedures, and having basic mathematical knowledge. Mathematical literacy also includes mathematical knowledge, methods, and processes, which are used and utilized in various contexts by giving inspiration and opening up insight into thinking. In line with the opinion expressed by Ningsih [4] which states that mathematical literacy includes eight competencies that must be possessed are mathematical reasoning and thinking, mathematical arguments, mathematical communication, modelling, submission and problem solving, representation, symbol and the last is tools and technology.

2. Research Method

This research is a research and development that produces problem based student worksheets to improve the mathematical literacy skill for students in junior high school. The procedures of this research include [5] : a field survey to obtain information from the teachers in a certain school about mathematical literacy skill of the students. Literature review to examine the student worksheets that will be developed through a scientific approach and strategy of what if not. Drafting of student worksheets that will be assessed by a team of experts. The worksheets that had been validated were

then tested to eleventh grade students from three schools, which have high and medium criteria of junior high school in Tasikmalaya city. Research procedure shown in the following Figure 1.

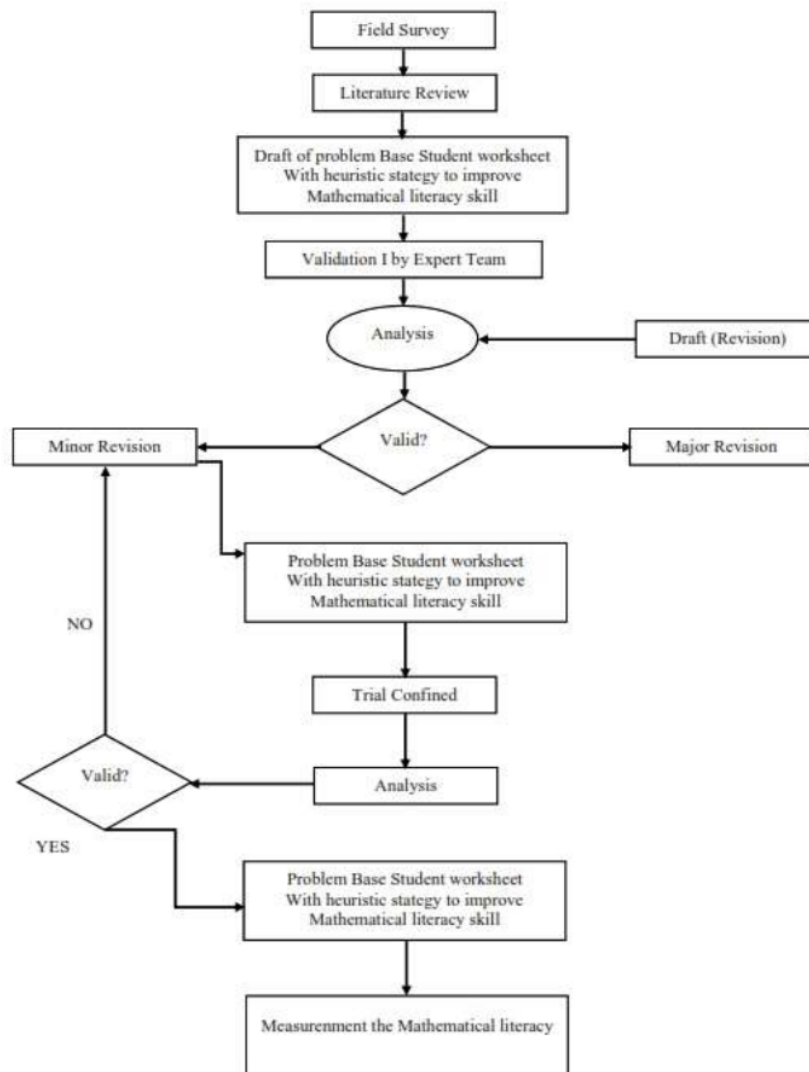


Figure 1. The Procedure of Learning Materials Development Research

3. Result and Discussion

Product created in this research are problem based student worksheets to improve mathematical literacy skill. According to result of validation from concept expert, media expert, teachers, and student. The problem based student worksheet can fulfil the students need's. Validation of concept expert shows

that problem based student worksheets is accordance with standart competence and basic competence containing suitable concept and learning activity with average score 92% as shown in figure 2

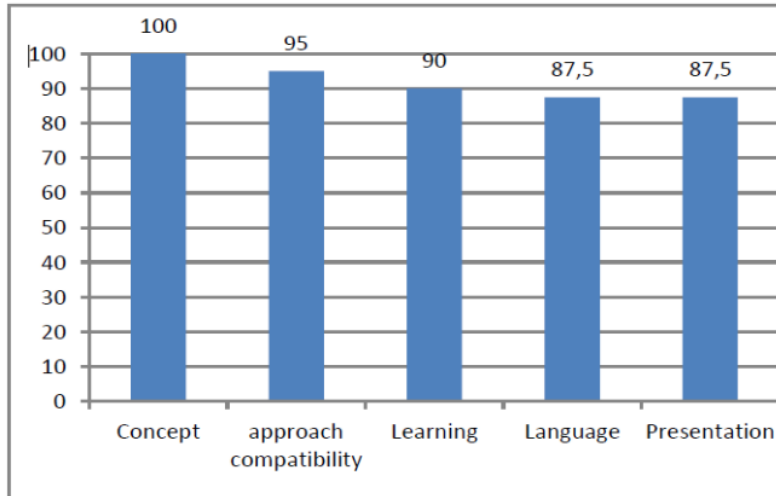


Figure 2. Validation result of concept expert

Average score for validation of media expert 15 79,56%. It shows that the **problem based student worksheets to improve mathematical literacy skills** can attract the student interest and participation.

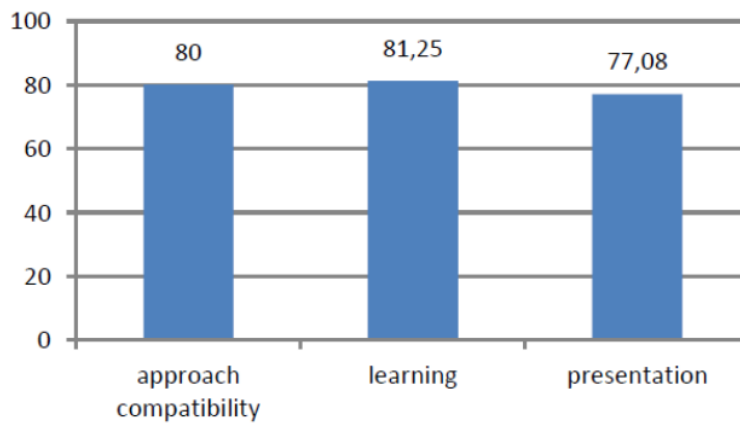


Figure 3. Validation result of media expert

According to validation from teachers, average score of the problem based student worksheets is 91,51% and the student worksheet could be tested to students as shown on figure 4

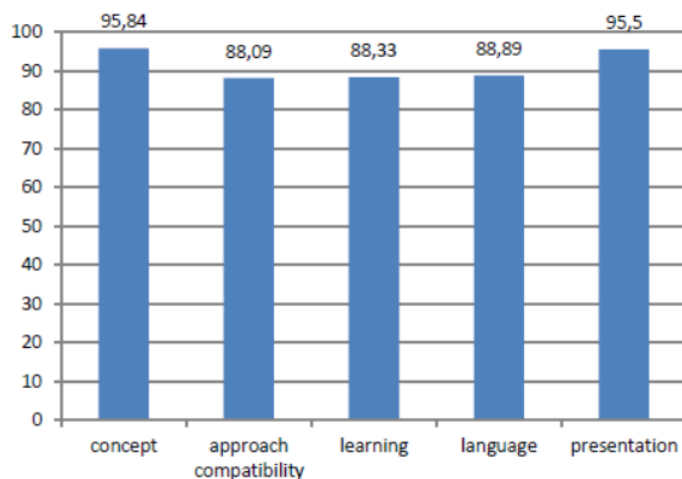


Figure 4. Validation result of teacher

The result of the problem based student worksheet assessment by field test in small scale shows that the student worksheets can be used but revision is needed in order to student can understand early. It can be shown by average score which is 68,37%. After that, the problem based student worksheet is tested by field test in large scale. The test was held in grade VIII students. The average score is 75,08% and it shows that the problem based student worksheets can be used as learning material for grade VIII students.

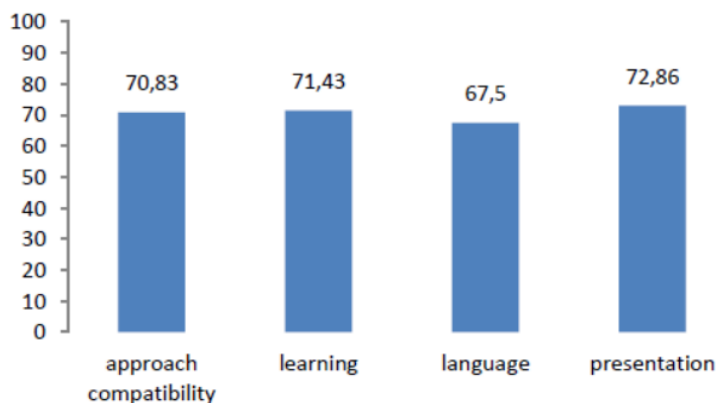


Figure 5. Validation result of student

According to interview with student using the problem based student worksheet, they feel curious and enthusiast in learning because they get direct experience and they stated that they are motivated to

conduct experiment and could understand the concept clearly. By using this student worksheet, students are interested in learning process. It could be seen when student having enthusiastic discussion with their friend or teacher. Student learn actively in learning process by conducting experiment and each group used their time to complete their student worksheet and present the data gained from experiment.

The result of this reseach states that student worksheet using discovery learning approach can be developed. This is in accordance with the data from concept expert, media expert, and the teachers stating this problem based student worksheet is suitable to develop as physics learning material. Field test in small and large scale show that this student worksheet can make student feel interested, motivated, and participated actively in learning process by this problem based student worksheet.

4. Conclusion

According to research and discussion, it can be conclude that problem based student worksheet to improve mathematical literacy skill can be used as learning material for junior high school student grade VIII.

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