

Development Of Mathematical Learning Media Based On Contextual Teaching And Learning (CTL) To Improve Students' Mathematical Problem Solving Ability For Grade VIII Of Junior High School

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Abstract – Based on preliminary observations made at Junior High School IT Iqra 'Solok City, students' mathematical problem solving abilities were still low. The low ability of students to solve problems was due to the lack of learning media (lesson plan and worksheet) that are able to facilitate these problem solving abilities. Based on that problem, the development of learning media (lesson plan and worksheet) using the Contextual Teaching Learning (CTL) was needed. The purpose of this study was to create a mathematical learning media based on Contextual Teaching and Learning (CTL) to improve the problem solving skills of students in grade VIII that were valid, practical and effective. The development research model used was the Plomp development model. This model consisted of three stages, namely the initial investigation stage, the development stage or prototyping and the assessment stage. This research was the initial investigative stage.

Keywords – Mathematical Problem Solving Ability, CTL Approach, Learning media.

I. INTRODUCTION

Mathematics is important to be given to every student, from basic education to higher education. Learning mathematics does not only focus on mastering mathematical material as a subject, but also to achieve ideal goals. The goal of learning mathematics is mastery of the math skills needed to understand the world around us in real life. It can also be said that mathematics as a means of cultivating Life Skills. Skill that can be cultivated through mathematics learning are in Permendikbud number 58 of 2016 concerning Guidelines for Mathematics Subjects and Permendikbud number 21 of 2016 concerning Content Standards, namely students are able to use thinking and reasoning skills to solve a problem, be

able to communicate ideas effectively, and have attitudes and behaviors in accordance with mathematical values. This is in line with the general goals of mathematics learning formulated by the National Council of Mathematical Teachers (NCTM, 2000) that there are five basic mathematical abilities that students must master, namely problem solving, communication, reasoning and reasoning and proof, connection and representation. Therefore, problem solving ability is one of the abilities that every student must have as a standard that must be developed to improve the quality of learning for the better.

Problem-solving abilities are basic abilities that students must have in order to identify and solve a problem that is

being faced in the learning process. Problem solving indicators include; identify data to solve a problem, plan problem solving, solve problems and draw conclusions. When learning mathematics, students can learn to reason and also develop their learning abilities, so that students can relate to the real world, students must get the means to facilitate their thinking skills and can increase self-confidence in learning mathematics. Learning is not only remembering a few facts but learning is also a thought process, namely a process so that students can develop the potential of their entire brain (Hosnan, 2014).

Researchers also found low problem-solving abilities when conducting initial observations made on January 13, 2020, mathematics learning at junior high school IT IQRA' Solok City in the learning process was not optimal. The researcher tested it by giving 2 items for the initial test, namely: 1. A child raises a kite with a string that is 120 m long. The distance of a child's feet from the ground under the kite is 40 m. Calculate the height of the kite if the height of the hand of the person holding it is 1.2 m above the ground. 2. A ship sailing to the east for 150 km, then sailing south for 200 km. Calculate the distance of the ship now from its original place. The problems of the above can be seen from the 2 answer sheets of students in Figure 1 and Figure 2 below:

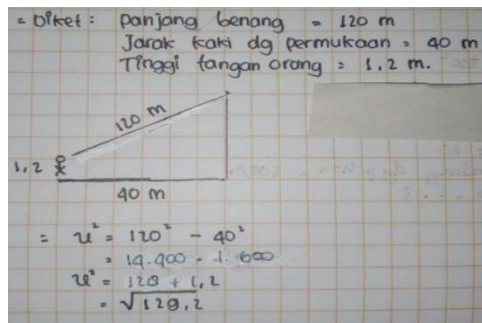


Figure 1. Examples of Students' Answers

In Figure 1, it can be seen that students after describing the information contained in the questions given, immediately enter the completion stage without any explanation about what is being asked from the questions, even though students after describing the information must write down the questions from the questions, and at the completion stage there is no translation in mathematical form, what students did is simply enter into numbers. Students do not solve the problem correctly and students only use one answer that is commonly used in solving the problem.

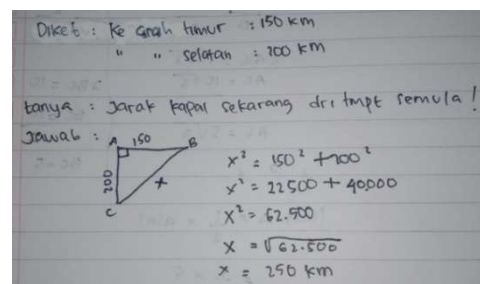


Figure 2. Examples of Answers from Students

In Figure 2, it can be seen that students cannot describe the information contained in the questions correctly, where students cannot determine the position of the ship in accordance with the predetermined direction. Another thing can also be seen from the command to make sure the answer given does not exist. Students do not use various or unique ways, students only use methods that are often used.

Based on the results of these preliminary observations by giving questions that measure the ability of mathematical problem solving to grade VIII students, the percentage of scores and achievements of students who answered the problem solving questions for each indicator can be seen in Table 1.

Table 1. Percentage of Results of Problem Solving Ability Tests for Class VIII Students of SMP IT IQRA' Solok City

Questi on num ber	Indicator	Answer percentage				achievem ent
		0 3	1	2	3	
	Understanding problem	6%	18	41	35	68%
		12	%	%	%	52%
		%	24	29	35	
			%	%	%	
1	Planning	18	18	41	24	57%
2		%	%	%	%	57%
1		12	24	47	18	
2		%	%	%	%	
1	Solve problem	29	12	35	24	51%
2		%	%	%	%	47%
1		24	35	24	18	
2		%	%	%	%	
	Checking	82	12	6%		12%
		%	%	12		21%
		71	18	%		
		%	%			
Score average		31,8%	20,1%	29,4%	25,7%	45,6%

Based on Table 1, it can be seen that the achievement of the test results for the mathematical problem solving abilities of students at the school is still low, especially on the indicators of checking the answers again with the percentage of achievement being 12% and 21%. Meanwhile, the indicators of understanding problems, planning solutions, and solving problems are still not optimal. At the time of doing the test, there were still students who had difficulties in making known pictures of the questions, and there were still some mistakes in the calculations so that the solutions given were not correct. It can also be seen in the table above that students rarely re-check the answer sheet. Therefore, there needs to be an emphasis on the indicators of checking back and briefly repeating the 3 other indicators.

Another factor that can also result in the low ability of students to solve problems is because there is no specific media available to facilitate this ability. Learning media which are teacher guidelines in teaching should be made by teachers which must be adapted to the applicable curriculum in schools and also in accordance with the characteristics of their students. The results of interviews with teachers at junior high school IT, namely teachers only use printed books provided by the school, students are less active and students experience difficulties with questions related to daily life. Teachers use textbooks that are rather difficult for students to understand, so that their use in learning is not optimal, whereas in this day and age there are many learning media that can be used by educators, such as worksheets, hand out, modules and others. In this study, researchers will develop learning tools in the form of lesson plans and worksheets. Lesson plan which is a teacher's guide in carrying out learning activities can support the development of a worksheet, where the worksheet is a printed teaching material in the form of a sheet of paper containing material, summaries and instructions for carrying out learning tasks that will be carried out by students and refers to the basic competencies that will be achieved. Because it is necessary to find a solution to be able to improve the problem-solving abilities of students so that the above problems can be solved properly. One of the lessons that might develop students' problem solving abilities is the Contextual Teaching Learning (CTL) approach.

Learning with CTL is very possible in growing and increasing the ability to solve a problem because the CTL approach can teach students in meaningful lessons, students can build their own knowledge so that they become more active. The process in CTL learning takes place naturally in the form of activities, students work and experience, the process is not transferring knowledge from the teacher to

students, the learning strategy is more needed than directly seeing the results, the form of learning is that students learn to construct. CTL does not require students to memorize formulas, students are guided to be able to connect the material studied with its application in real life.

Based on the problem above, researcher conduct research with the title "Development of Learning Media Based on Contextual Teaching and Learning (CTL) to Improve Students' Mathematical Problem Solving Ability in grade VIII of Junior High School".

II. METHODOLOGY

The development research model used is the Plomp development model. This model was developed by Tjeerd Plomp which consists of 3 stages, namely the preliminary research stage, the development or prototyping phase and the assessment phase.

The initial investigation stage is the analysis needed to describe the problem, develop learning media based on Contextual Teaching and Learning (CTL) and analyze the limitations of the subject matter to be developed. This stage aims to find out what is needed in developing the learning tools that will be produced. The initial investment stage is divided into several activities, namely needs analysis, student analysis, curriculum analysis, and concept analysis.

The needs analysis is to obtain information about the problems contained in learning in schools, both those faced by educators and students. Information collection is by making observations that aim to see the activities of students, then continue with teacher interviews which are guided by the list of teacher interview guidelines. The results of this needs analysis are taken into consideration in designing lesson plans and worksheets.

In the analysis of students is to determine the characteristics of students. This character includes academic abilities that are obtained based on information from the teacher; student penchant for teaching materials, difficulties faced by students, and also includes the environment of students; games as well as the lives of students. To find out the character of students, it is done by giving questionnaires to students.

In the curriculum analysis stage, the curriculum used by schools for junior high school grade VIII mathematics is the 2013 curriculum. There are two supporting aspects, namely indicator and basic competence. The results of this analysis are used as a guide in developing Contextual Teaching and Learning (CTL) based learning tools.

Concept analysis aims to see the general form to determine the content and subject matter needed in developing learning tools. Analysis of indicators and competency standards in line with the CTL concepts and components must be in the worksheet. The results of this analysis are used as a guide for developing learning media based on Contextual Teaching and Learning (CTL).

The prototype development stage has a flow that helps in developing and improving the product. This stage uses formative evaluation, prototype-making activities with formative evaluation which are carried out starting from self-evaluation, expert review, individual evaluation, small group evaluation and field testing.

The assessment stage where this stage aims to assess the extent to which the practicality and effectiveness of the learning tools that have been developed in the implementation of learning. Students who will take the field test are students who do not participate in individual evaluations and small group evaluations. Data from the field test results will be analyzed and the learning media will be revised again so as to create practical and effective learning media.

III. RESULT AND DISCUSSION

In the initial investigation stage, needs analysis, student analysis, curriculum analysis and concept analysis are carried out, which are described as follows:

A. Needs Analysis

When making observations in class VIII junior high school IT Iqra' Solok City, it was seen that only a small number responded to learning and many of these students had difficulty understanding the lessons given by the teacher, therefore the teacher had to repeat several times so that students could understand the lessons given. Even though the teacher has repeatedly explained the subject matter, there are still some who seem confused about the material taught by the teacher. When the learning process takes place, most students only accept what is taught by the teacher, students are rarely involved in the learning. During learning activities, teachers rarely use worksheets, teachers often use material in printed books that are distributed by schools only.

Based on the results of interviews with grade VIII mathematics subject teachers, it was found that students' mathematical abilities were still low, including the ability to solve mathematical problems. This can be seen from the giving of questions to measure mathematical problem-solving abilities to grade VIII students in the introduction,

some students said that the questions given were difficult because they were given in the form of story questions related to real life. Students have difficulty working on questions because students are fixated on teacher routines and printed books that are used as guidance in learning, if given questions that are not similar to the examples given by the teacher, students will panic to do them, so that there are students who just do it carelessly, there are also those who do it half way, and there are also those who do not offer it.

Based on the results of the interview with the teacher, when asked "what learning resources are used for teaching?", The teacher answered: there were worksheets and also printed books from school, but the worksheets were only used occasionally, more often than not, printed books were provided by the school. The worksheet had not been able to improve the ability of students in practicing their mathematical problem solving skills because the questions on the worksheet are rarely in the form of story questions that are related to the daily lives of students, the problems are only to practice numeracy skills. Sometimes there are lesson plans that are made independently by the teacher that are not yet complete with the implementation of learning carried out in class. Based on the results of observations and interviews, it is necessary to improve the learning media that have been used so far.

B. Student Analysis

Student analysis was carried out in grade VIII of junior high school IT Iqra' Solok by distributing questionnaires. Based on the results of the questionnaire given to students, it shows: many students like the method of learning in groups, the mathematics lessons given are difficult to understand by students, mathematics learning that is carried out makes students inactive, students need worksheets that are attractive and also easy to understand material along with questions related to the material, both counting questions and story questions.

Based on the analysis of these students, it is necessary to improve learning media. The development of CTL based devices can help students be more active and also with activities to construct students' knowledge with things that have been learned and something that is close to the lives of students so that students are more interested in learning. The worksheet that will be developed is related to everyday life and done in groups in order to find the concept of the lesson being discussed.

C. Curriculum Analysis

Curriculum 2013 is the curriculum used for mathematics grade VIII junior high school IT Iqra' in odd semesters with material consisting of number patterns, cartesian coordinates, relations and functions, straight line equations and two-variable linear equation systems. This curriculum analysis will guide the development of learning media based on CTL. The purpose of analyzing the basic competencies in these materials is so that indicators can be developed learning media using CTL to organize the material and also determine the objectives of the learning to be achieved.

D. Concept Analysis

Concept analysis to determine the content and subject matter needed in the development of learning tools. The concept to be used is a two-variable system of linear equations

IV. CONCLUSION

Based on this preliminary research, it can be concluded that this research was the preliminary research stage, namely needs analysis, student analysis, curriculum analysis, and concept analysis. This initial investigation must be carried out as a guide for making learning media that will be developed later and also knowing what components must be on these media in order to create learning media based on Contextual Teaching and Learning (CTL) to improve the problem solving abilities of grade VIII junior high school which is valid, practical and effective.

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