The development of device learning based on contextual teaching and learning improve mathematical communication skills class VII

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Abstract. This study aims to develop mathematical learning devices The aim is for students to be able to communicate ideas with symbols, tables, diagrams, or other media to clarify the state of a mathematical learning problem called mathematical communication skills. it is necessary to develop a device with an approach to improve the student’s mathematical communication skill. The CTL approach can help students to create mathematical communication skills. Because with CTL, students can find the subject learned by linking it to real-life situations so that they can apply it in everyday life. The indicators of communication capabilities developed are illustrating mathematical ideas, using symbols/notations and mathematical operations, selecting and writing relevant mathematical strategies and giving conclusions at the end of the answer. The development model used is the Plomp model, which consists of three phases. First is the initial investigation phase, the second is the development or prototype development phase, and the third is the evaluation phase.

1. Introduction
Communication skills are very important for students in their daily life, where students can communicate ideas/ideas that are in his mind both verbally and in writing. mathematical communication skills help students sharpen the way students think, as a tool to assess students' understanding, help students organize their mathematical knowledge, help students build mathematical knowledge, improve mathematical problem-solving abilities, advance their reasoning, build self ability, improve social skills, and useful in establishing mathematical communities [1]. In fact students' mathematical communication skills are still low. It can be seen from several studies that have been done before. Among the research conducted by Ratnawati [2] stated that the mathematical communication skills of seventh grade students of SMP Negeri Koto Salak Dhamasraya were still low in the even semester of the academic year 2012/2013 with the results of developing an educational oriented CTL workbook for mathematics learning so that the products produced were valid then the books work must be validated and tested for use to see aspects of pratikalitas and effectiveness.

Based on the results of the author's observation in February 2019 at MTsS Tapuz and MTsS Muhamadiyah Kurai Taji. The author gives two test questions in the form of mathematical communication skills. The following percentage of students' abilities on both questions can be seen in Table 1.
Table 1. Students’ abilities on the two given questions

| School            | Persentation of communication ability students for question number 1 | Persentation of communication ability students for question number 2 |
|-------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
| MTsS Kurai Taji   | 42.8%                                                               | 19%                                                                 |
| MTs Tapuz         | 47%                                                                 | 5.8%                                                                |

Based on the table above it can be seen that MTsS Muhamadiyah Kurai Taji and MTsS Tapuz students in the initial test of communication skills for number one question the percentage of correct answers is still below 50%, while for number two questions the percentage of correct answers is still below 30%. It can be analyzed that the communication skills of MTsS Muhamadiyah Kurai Taji and MTsS Tapuz students are still low. Then based on the results of interviews conducted with teachers at MTsS Muhamadiyah Kurai Taji and MTsS Tapuz shows in the learning process students are still unable to re-express a mathematical description in their language, unable to provide written explanations for the answers given.

The problems encountered above need to be improved in mathematics learning so that the goals and objectives of mathematics learning are achieved. The achievement of the objectives of mathematics learning is inseparable from the learning tools used. The learning tools used are the Student Worksheet (LKPD) and the Lesson Plan (RPP).

LKPD is one of the facilities to help and facilitate teaching and learning activities to form effective interactions between students and teachers to increase the activities of students in improving learning outcomes. According to Trianto [3] "Student Worksheet (LKPD) is a guide for students used to conduct investigations or problem solving". LKPD in the learning process has quite a lot of uses. For educators, through LKPD, it can lure students to actively engage with the subject discussed so that it is easy in the application of subject learned by students.

The existence of innovative LKPD is the hope of all students because the LKPD will create a more enjoyable learning process. With the existence of LKPD, every educator cant prepares and make their own teaching subject.

The development of LKPD is supported by the Lesson Plan (RPP). The RPP will assist the teacher in implementing the learning process so that the objectives of the expected learning goals can be achieved. According to the Minister of Education and Culture [4] the RPP needs to pay attention to the principles of drafting and components of the RPP. The RPP functions as a reference for educators to carry out learning activities to be more targeted and run effectively and efficiently. The lesson plans to be developed contain learning steps using the CTL approach.

Research on the development of learning tools based on the CTL approach has been carried out by several national-level researchers. Among the research conducted by Ratnawati [2] concluded that constructivism-based mathematics learning devices developed had met valid, practical and effective criteria. Saleh Haji [5] concluded that the mathematical communication skills of students who were taught through contextual learning were better than students who were educated through conventional learning. Nurul Fajri [6] concluded that the correlation of connection ability and communication ability was better in the experimental class with a correlation strength range in the strong correlation category.

Furthermore D Selvianiresa [7] concluded that the CTL approach can be successful when learning uses collaborative interaction with students. Nidyia Indrilla [8] concluded that CTL learning was more effective in conventional learning.

Learning the CTL approach is a Contextual Teaching and Learning approach providing opportunities for active students and meaningful learning so that students can receive learning from the teacher easily. According to Johnson [9] CTL is contextual learning allowing students to connect the contents of the subject with the context of everyday life so that learning is more meaningful. The
CTL approach can involve students actively in learning. The reason for choosing the CTL approach is because in learning students are less able to express description of mathematics in their own language, less able to provide a written explanation of the answers given. So through the CTL approach students are expected to be able to communicate mathematical ideas contained in mathematical problems so that students can pour the results of their thinking both verbally and in writing.

In this study, the implementation of learning used to adapt the development model adopted by Tjeerd Plomp. Plomp [10] provides a development model consisting of three phases, namely the initial investigation phase (preliminary research), the phase of development or prototype making (development or prototyping phase), and the assessment phase.

2. Subject and methods

This type of research is research and development (research and development), which aims to produce learning devices that are valid, practical, effective and in accordance with conditions in the field. According to Nana [11] "development research is a process or steps to develop a new product or perfect existing products that can be accounted for. According to Sugiyono [12] Research and Development is a research method used to produce certain products and test the effectiveness of these products. The product to be developed is a mathematics learning device based on the Contextual Teaching and Learning (CTL) approach in seventh grade MTs.

In this research, the development model carried out is the Plomp model. Plomp divides the development phase into three phases, namely preliminary research, the design and development phase (development or prototyping stage), and the assessment phase (assessment stage) [10]. The Plomp model was chosen because it has advantages and advantages in the practicality of products with three stages, namely one to one, small group and field test stages [13].

At the stage of the initial investigation (preliminary research), the researcher made preparations consisting of needs analysis, student analysis, curriculum analysis, and concept analysis. The stage of developing or making prototypes (development or prototyping stage) is that researchers design and develop learning devices in stages by using formative evaluations to improve and improve the prototypes developed. While at the assessment phase, the researcher evaluates semi-summatively so that in concluding the final prototype or the product being developed is in accordance with the Contextual Teaching and Learning (CTL) approach.

3. Result and discussion

At the stage of Initial Investigation (Preliminary Research) aims to obtain information about existing problems and the possibility of needing improvement and innovation. In addition, it is also to establish and define the conditions needed in the development of learning devices developed. This stage is done by analyzing the objectives within the boundaries of the subject in class VII of the MTsS Muhamadiyah Kurai Taji. At this stage there are several activities, as follows:

3.1. Needs Analysis

Needs analysis is done to get information about the problems found in learning in schools that are both faced by teachers and students. Information gathering was carried out by interviewing mathematics teachers in seventh grade of MTsS Muhamadiyah Kurai Taji, observing the implementation of learning conducted by observation, questionnaires for students and testing the initial conditions of mathematical communication skills of students. The results of the needs analysis are taken into consideration in designing learning tools based on the Contextual Teaching and Learning (CTL) approach. The research focus on needs analysis is as follows:

1) Has the mathematics learning objectives contained in the curriculum been achieved?
2) What is the learning process so far?
3) Can the teaching subject used in the learning process reach the set learning objectives?

Based on the results of interviews with teachers, the learning objectives in the curriculum have not been reached optimally. In the learning process at school, there are still students who have not reached
3.2. Curriculum Analysis
At this stage, a review of the curriculum used by the school for mathematics subjects of seventh grade MTs was carried out. The results of this analysis serve as guidelines in the development of mathematical learning tools with the Contextual Teaching and Learning (CTL) approach. Based on the results of the authors' observations that have been made, namely the curriculum used in the 2013 curriculum. The focus of the researchers on curriculum analysis is as follows:
1) Which subject (SK, KD) can be presented to the LKPD with the Contextual Teaching and Learning (CTL) approach?
2) Is the subject sufficient to achieve curriculum goals? If not, what needs to be added?
3) Is the subject well ordered? If not, what order should it be? Why is that?

3.3. Student characteristics
This analysis is conducted to determine the characteristics of students. These characteristics include academic abilities obtained based on information from educators, the students' penchant for colored teaching subject and the difficulties faced by students. To find out the characteristics of students is done by giving questionnaires to students of class VII MTs. The researcher's focus on student analysis is as follows:
1) How are the characteristics of grade VII MTs students related to mathematics learning?
2) What teaching subject / LKPD do students want?
Based on the observation that has been done by the author by giving a questionnaire to the students regarding the instructional subject / LKPDs that are desired that the LKPD can be in the form of attractive color images, interesting LKPD in easy-to-understand language.

3.4. Concept Analysis
At this stage, activities are carried out detailing and systematically arranging the subject to be studied by students. The results of the analysis are used to prepare aspects related to the design and development of mathematics learning devices. Concept analysis aims to identify facts, concepts, principles, and procedures that must be mastered by students. Furthermore, the results of this analysis are used as a benchmark for compiling learning devices. The focus of researchers on. Curriculum concept analysis is as follows:
1) What essential concepts are needed for learning (which are obtained based on curriculum analysis) so that they can help in achieving the desired competencies?
2) What is the concept map of these concepts?

4. Conclusion
Mathematical communication skills are the ability of students to express ideas/ideas that they convey through oral or written. The mathematical communication skills of students in learning can be raised with the CTL approach. Because the CTL approach can train students to build confidence, respect each other, work together because it requires students to communicate in groups, then because the CTL approach that is contextual can also help students to learn meaningfully, where students can develop ideas, models, and images by conveying them systematically related to everyday life in solving mathematical problems.

For students to have optimal mathematical communication skills, learning tools are needed that facilitate teachers and students. RPP is one of the learning tools that really help the implementation of learning effectively. Learning devices function to guide the course of the learning process. The availability of adequate learning devices will help teachers in implementing the learning process to achieve the expected learning goals and objectives.
However, what was found in the field showed that learning devices had not facilitated the achievement of learning objectives so as not to encourage students to build knowledge that resulted in low learning outcomes of students. Constructivism approach can help build students' knowledge that is when students want to convey ideas students can construct knowledge by asking questions, discussing in groups.

The reason for using the CTL approach is that students can associate new information with the knowledge and experience they already have before. Because the brain constantly searches for meaning and stores things that are meaningful, the teaching process must involve students in the search for meaning and students are able to understand the meaning of the lessons they are learning. This is because students are actively involved in learning mathematics LKPD is one of the Student Worksheets that contains teaching subject that have been packaged in such a way, which also contains a series of activities in the investigation, and is expected to be used by students both in groups and in individual.

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