The Instruments Development Of Cooperative Learning Model Type Murder With CTL Approach To Improve Mathematics Learning Achievement

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Abstract. This research aims to produce a product in the form of learning instruments on cooperative learning model type MURDER with CTL approach. The learning materials used in this research are cube and cuboid in the second semester of the eighth grade. This research method consists of defining stage, design stage, and development stage. The test of the instrument was conducted to the eighth grade students of SMP Negeri 24 Surakarta. Learning instruments developed in this study consist of syllabus, lesson plan, students’ worksheet and mathematics achievement test. The syllabus contains cube and cuboid material. The lesson plan and students’ worksheet are prepared in accordance with the model of cooperative learning type MURDER with CTL approach. The learning achievement test is arranged according to the basic competencies and indicators on the cube and cuboid material. The experiments conducted in SMP Negeri 24 Surakarta on the material of cube and cuboid, it can be concluded that the instruments are valid for measuring mathematics learning achievement. After getting a learning with cooperative learning model type MURDER with CTL approach, students experience improvement in mathematics learning achievement.

Keywords: CTL Approach, Instruments, Mathematics Learning Achievement, MURDER.

INTRODUCTION

Mathematics is a subject studied by every level of education in Indonesia. According to Suherman [8] mathematics is the logical discipline of thinking and processing, both quantitatively and qualitatively. Mathematics learning achievement in Indonesia is still less satisfactory, this can be seen from the results of TIMSS in 2015, Indonesia is the 45th rank. The low mathematics learning achievement can be caused by the lack of innovation in the learning done by the teacher. Learning innovation can be a learning model and learning media. Innovative learning model that can increase student learning interest is cooperative learning model. One model of cooperative learning is a cooperative learning model type MURDER with CTL approach.

Cooperative learning model type MURDER according to Hythecker, et al. in Lee [4], A number of cooperative learning techniques have been developed by scholars in the cognitive psychology tradition, e.g., the dyadic MURDER script, which asks students to collaborate to perform the thinking tasks or summarizing and elaborating on reading material. The steps of cooperative learning model type MURDER according to Jacobs [3] are divided into six main activities namely: 1) Mood (setting the mood and learning steps), 2) Understand (silent reading), 3) Recall (repeating ideas without seeing back), 4) Detect (finding errors and mistakes in the summary), 5) Elaborate (giving examples, relationships, opinions, reactions, implementations, questions), 6) Review (summarizing the whole section after completing the entire sections). Wahyuningsih [11] stated that cooperative learning model type MURDER has limitations, among others, it has not used the contextual problems to students. Modification to minimize the lack of cooperative learning model type MURDER is cooperative learning model type MURDER
with CTL approach. According to Rusman [6], the CTL approach is the relevance of any learning material or topic with the real life.

Hamalik [1] stated that learning media is something that can be used to transfer the message (learning materials), so it can stimulate students' attention, interest, thought, and feelings in the learning activities to achieve certain learning objectives. The students' worksheet is one of the instructional media developments that can be used in the learning process in the classroom, because the students' worksheet can help them to get information about the concept learned. Trianto [10] stated that students' worksheet is their guidance that is used to conduct investigation and problem-solving activities. Students' worksheet according to Ramadanti [5] consists of six main elements including title, learning guidance, basic competence or subject matter, supporting information, task or steps in the assessment. Students' worksheet is usually used to guide students in finding concepts or principles (formulas, characteristics). Students' worksheet in this research is used for cooperative learning model type MURDER with CTL approach.

According to observation results in SMP N 24 Surakarta and interview with mathematics teachers, it is known that students still do not really understand about the cube and beam and the learning resources used are still focused on the handbooks provided by the government. Packaging material on it is not provided by the steps and basic concepts causing students accustomed to looking at the formula without understanding the concept. The impact of material packaging is that students only memorize the formula and find it difficult if they are given a variety of questions. In addition, the learning that occurs in the classroom still uses direct learning model. Based on the problems above, the researchers think that it is needed to develop the instrument of cooperative learning model type MURDER with CTL approach in order to improve mathematics learning achievement. The development of this instrument consists of syllabus, lesson plan, students' worksheet, and mathematics achievement test. The problem statement of this research is how to develop the instrument on cooperative learning model type MURDER with CTL approach to improve mathematics learning achievement.

**RESEARCH METHODS**

This research is a research development (Research and Development). According to Sugiyono [7] research and development is a research method used to produce a specific product and test the effectiveness of the product. This research is focused on the instrument development of cooperative learning model type MURDER with CTL approach. This research used 3-D development model which is a modification of 4-D development model. Consisting of three stages of development according to Sumaji [9], there are definition (Define), design (Design), and development (Develop)

The defining stage is divided into 3 aspects namely curriculum analysis, student analysis and student needs analysis, described as follows:

1. **Curriculum Analysis**
   - Curriculum analysis refers to the 2013 curriculum. The 2013 curriculum guidance book which contains standard competencies, basic competencies and learning objectives of mathematics is analyzed for designing the instrument development of cooperative learning model type MURDER with CTL approach that will be used for this research.

2. **Student Analysis**
   - Student analysis is used to know the characteristics of students in the mathematics learning process. In this study the subject is taken from the eight grade students of SMP N 24 Surakarta. Student analysis is used as a foundation in the development of the instrument to be designed.

3. **Student Needs Analysis**
   - Student needs analysis is used to identify problems in the learning process related to the use of students’ worksheets. Observation result in SMP N 24 Surakarta, it is shows that there is not students’ worksheets used in the process of learning mathematics in the classroom. So in this study also conducted the instrument development in the form of students’ worksheets.
   - The design stage is the stage for the preparation of the instrument. Preparation of instruments is tailored to the material of cube and cuboid. These materials are mathematics material for the eight grade in the second semester. Instruments in this study are syllabus, lesson plan, students’ worksheet, the blueprint of mathematics achievement test and mathematics learning achievement test. The mathematics learning achievement test in this research is about multiple choice type test consisting of 40 items.
   - Development stage produces syllabus, lesson plan, students’ worksheet, the blueprint of achievement test and learning achievement test for cube and cuboid material. This stage consists of three stages:
     1. **Validation**
        - Validation is done to determine the validity of the instrument to be used. Instruments are consulted and discussed with three validators. The validation sheet contains an explanation of the content, language and
Validation activities are performed to obtain valid and reliable instruments used in mathematics learning.

2. Revision Stage
Revision stage is done if the validation of the instrument performed by the validators, there are some parts that need to be improved. The revised instrument is returned to the validators for further discussion whether it is reliable or not for mathematics learning. If the result is reliable and valid then the next stage is a trial to the school.

3. Trial Stage
The trial stage of students’ worksheet is done on the eight grade students of SMP N 24 Surakarta.

Data collection tools used in this research are validation sheet and interview guide. All data collected from the expert team validation process will be analyzed in descriptive qualitative. The results of the validation sheet and interview guide analysis are used as references for revising, so that it is obtained the instruments of cooperative learning model type MURDER with CTL approach that are valid.

RESEARCH RESULTS AND DISCUSSIONS

This research has been done by using the instruments of cooperative learning model type MURDER with CTL approach for the eight grade Junior High School on the cube and beam material. At the stages performed are obtained the following results:

1. The Result of Defining Stage
This stage is an early stage before developing instrument of cooperative learning model type MURDER with CTL approach. The defining stage is used as the foundation in developing students’ worksheet that will be designed for the research. At this stage there are three analyzes conducted as follows:
   a. The Result of Curriculum Analysis
   The curriculum analysis is conducted on standard competencies, basic competencies, achievement indicator competencies, learning objective and the eight grade Junior High School material. Based on the result of curriculum analysis, the following results are obtained: the standard competencies used are the material about understanding the characteristics of cube and cuboid and their parts, and determining its size; basic competencies used are identifying the characteristics of cube and cuboid and their parts, making cube and beam nets, calculating the surface and volume of cube and cuboid.

   b. The Result of Student Analysis
   Student analysis performed on the eight grade students who became the subject of testing the instruments. The subjects of this study are the eight grade students of SMP N 24 Surakarta consisting of 30 students, 18 male students and 12 female students. The age range of the eight grade students of SMP N 24 Surakarta is in the 13 to 15 years old. In general, children in that age, their thought is complete and able to overcome the hypothesis. According to Heleni [2] at that age the child is able to solve the problem in a better way than the child who is still in the thinking of concrete operations.
   The observations results done by the researchers note that students are less focused and interested in the ongoing learning mathematics. In addition, students find difficulties in understanding the material, less active in learning and only memorize the formula, so that when they are given a variety of questions they are confused. Based on the characters found, it is necessary to develop an instrument that can facilitate the character possessed by the students to a better direction in learning mathematics. As a result, this study also developed students’ worksheet.

   c. The Result of Student Needs Analysis
   The observation result in SMP N 24 Surakarta shows that there is no students’ worksheet used in mathematics learning. The learning that occurs only using the handbook, so that students are less in conceptual understanding. The existence of students’ worksheets can lead them to find concepts. In addition, they are more passionate and active in following the mathematics learning. Based on the observation result, it shows that students need worksheets as teaching materials that can involve them to actively participate in finding the concept of mathematics learning. In summary, this study also developed students’ worksheet.

2. The Result of Design Stage
The design of the instrument consists of syllabus, lesson plan, students’ worksheet, the blueprint of mathematics achievement test and mathematics learning achievement test for cooperative learning model type MURDER with CTL approach. The preparation of the syllabus appropriate with the cube and cuboid material, consisting of identifying the elements of cube and cuboid and its parts, finding the cube and cuboid nets, determining the surface area of cube and cuboid, determining the volume. The preparation of lesson
plan is tailored to the learning steps with cooperative learning model type MURDER with CTL approach. The preparation of students’ worksheets is adjusted to the standard competencies, basic competencies and learning objectives. The researchers develop the second semester of the eight grade students mathematics worksheet for cube and beam material. Their worksheet is divided into four, namely the first students’ worksheet contains the material identifying the elements of the cube and beam and its parts, the second students’ worksheet contains the material of finding the cube and beam nets, the third students’ worksheet contains the material about how to determine the surface area of the cube and beam, the fourth students’ worksheet contains the material determining the volume of cube and beam. The arrangement of the blueprint and mathematics learning achievement test in accordance with standard competencies, basic competencies, and indicators consist of 40 items of multiple choice.

3. The Result of Development Stage

The stage done after the design stage of the instrument is to develop an instrument to know the validity. This stage consists of three stages:

a. Validation

Validation is done to determine the validity of the instrument to be used. Instruments are consulted and discussed with three validators. The selection of validators is based on their expertise in mathematics and believed to have the ability as a validator in this study. During the validity process, there are several revised sections according to validators’ suggestion. The validation sheet contains an explanation of the content, language and display. Validators provide the following assessment:

1) The systematic writing of syllabus in accordance with the curriculum guide used, namely the 2013 curriculum.
2) The preparation of the lesson plan is in accordance with the steps of cooperative learning model type MURDER with CTL approach.
3) The preparation of students’ worksheets is in accordance with the standard competencies, basic competencies and learning objectives.
4) The preparation of the blueprint and mathematics achievement test, there are some issues that need to be revised.

b. Revision Stage

Revision stage is done if the validation of the instrument performed by validators there are some parts that need to be improved. The revised instrument is returned to the validators for further discussion whether it is reliable or not for mathematics learning. The result is reliable and valid then the next stage is a trial to the school.

c. Trial Stage

Trying out the mathematics learning achievement test was done on the eight grade students of SMP N 24 Surakarta. They are given a prior learning by cooperative learning model type MURDER with CTL approach. After that, they do a test of mathematics learning achievement consisting of 40 items. The results of their answers are calculated its reliability, discriminating power and the level of difficulty item. The results of test achievement test are as follows:

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Discriminating Power</th>
<th>The Level of Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r_{11} = 0.963$</td>
<td>$D \geq 0.3$ Good</td>
<td>$0.3 \leq P \leq 0.7$ Medium</td>
</tr>
</tbody>
</table>

After conducting the achievement test, the average mathematics score of the eight grade students of SMP N 24 Surakarta has increased from 7.9 to 8.4. It can be concluded that their mathematics learning achievement after the trials improve quite well.

**CONCLUSION**

Based on the results of validation and trial, it can be concluded that the instruments developed are as follows:

1. The syllabus is prepared in accordance with the curriculum guidance used, that is the 2013 curriculum and contains cube and cuboid material.
2. Lesson plan is prepared in accordance with the steps of cooperative learning model type MURDER with CTL approach.
3. Students’ worksheet is prepared in accordance with standard competencies, basic competencies and learning objectives.

4. The blueprint and mathematics learning achievement test are prepared in accordance with the standards competencies, basic competencies and indicators consisting of 40 items of multiple choice.

After running the trial run the eight grade students of SMP N 24 Surakarta, it is obtained valid instruments that can improve mathematics learning achievement.

REFERENCES
