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Development of Mathematics Learning Equipment in STAD-Type Cooperative Learning in Class VIIIA Yapman Soroako SMP, Luwu Timur Regency

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***Abstract*: This research was development research that aims to develop learning tools of mathematics in STAD type cooperative learning in class VIIIA SMP YApman Soroako. The subjects of the study were VIIIA Junior High School students Yapman Soroako with 22 students with the composition of 14 students and 8 female students. The development of this mathematics learning consists of four stages, namely the limitation stage, the design stage, the development stage, and the deployment stage. The results of this development study show that: (1). For the preliminary test obtained the average score of mastery ability of student mathematics was 64.45 from ideal score 100nwith standard deviation of 9.77 and is in the medium category, (2). For the final test obtained an average score of 73.36 from the ideal score of 100 with a standard deviation of 93 is in the high category, (3). There is an increase in mastery of mathematics students from the category of being a high category, (4). Students' responses to learning mathematics tools in the form of student worksheets, and lesson plans tend to be positive, (5). Students are more active and creative follow the learning activities.**

***Keywords*: Cooperative, STAD, Student.**

1. Introduction

National education functions to develop capabilities and shape the character of the nation; aims to develop the potential of students to become human beings who believe and are devoted to God Almighty, have a noble character, are knowledgeable, capable, creative, independent, and become democratic and responsible citizens". All this time, the mathematics learning process has been found using conventional methods such as expository methods, demonstrations, drills, and lectures. This process only tends to pursue the imposed curriculum targets, the impact of the benchmark used is not the student's mastery of a material but based on whether or not the material was taught. On the other hand, students are burdened with using shortcuts to get good grades. One of them is looking for questions that have been issued by the teacher in the previous year and memorizing the answers or asking the teacher for tutoring in the hope of getting training like the questions that will be tested. Conditions like this cannot develop aspects of student learning abilities and activities to improve mathematics learning outcomes, because students are not active in learning, so in this case, students have difficulty in learning mathematics.

Teaching is an activity in which the teacher conveys the knowledge or experience possessed by students. The purpose of teaching is so that the knowledge conveyed can be understood by students because good teaching only if the results of students are good" (Hudoyo, 2003).

Sudjana (Urpiah, 2004) said that: learning is neither memorizing nor remembering. Learning is a process characterized by changes in a person, changes as a result of the learning process can be shown in various forms. Skinner (Suherman, 2001) suggests that learning is the behavior when people learn, then the response becomes better. On the other hand, if he does not learn, his response decreases. In line with that, according to Hilgard (Slameto, 1987) that learning is a process of changing activities and reactions to the environment, the change in activity in question includes knowledge of behavioral skills.

Every effort is made so that students succeed in mastering mathematical knowledge and skills to be able to solve problems both in mathematics itself and in other sciences. If the effort is successful, it is said that the transfer of learning was successful. The purpose of teaching is expectations, namely what is expected of students who learn. More firmly, Robert F Meager (in Mohamad Ali, 1987:32) suggests that the purpose of teaching is the intention that is communicated through statements that describe the changes expected from students.

Herman Hudoyo (1990) Cooperative learning can be divided into two categories, namely: the first category is called group learning method or Group Study Method, and the second category is called project-based learning or Project-based learning, also known as active learning.

The characteristics of learning that use cooperative learning are as follows: (1) Students work together in groups cooperatively to complete the learning material, (2) Groups are formed from students who have high, medium, and low

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abilities, (3) Whenever possible group members consist of different races, cultures, ethnicities, genders, (4) rewards are more group-oriented than the individual. STAD consists of a regular cycle of teaching, cooperative learning in teams, mixed abilities, quizzes, and other rewards or rewards given to the team whose members exceed their previous record.

STAD consists of a cycle of regular teaching activities as follows: (a) Teaching: presenting lessons, (b) Learning in Teams: students learn and their teams are guided by student activity sheets to complete the subject matter, (c) Tests: students take individual quizzes or assignments (eg essay or performance tests), (d) Team Awards: Team scores are calculated based on team members' improvement scores, and certificates, class newsletters, or bulletin boards are used to reward teams that score successfully tall.

Slamet Kislan (Wijayanti, 1999) that instructional development is a systematic way of identifying, developing, and evaluating a set of materials and strategies that are directed to achieve certain educational goals. The result of instructional development is an instructional system in the form of a set of teaching and learning materials and strategies that can empirically and consistently achieve certain instructional goals.

Based on the description of the two models above, there are three similar stages, namely definition, development, and assessment. By looking at the advantages of the two models, the author uses the 4-D Thiagarajan model. This is because in compiling learning tools, the first thing that must be done is curriculum analysis which is in the early stages of this model. This 4-D model is also more detailed and can make it easier for the designer to determine the next step. And finally, in this model, the designer can freely conduct trials and revisions many times until it is seen that the device with maximum quality is obtained.

Based on the introduction above, the problem in this research is how to develop learning tools on the subject "Using the Pythagorean Theorem to determine the length of the sides of a right triangle", based on cooperative learning. The learning tools in question are Student Activity Sheets (LKS), and Learning Plans (RP). The document starts here. Copy and paste the content into the paragraphs.

2. Research Methods

This type of research is development research which includes the development of learning tools, which consist of (1) Student Worksheets, and (2) Lesson Plans.

A. Location and Research Subjects

This research was conducted at Yapman Soroako Middle School, East Luwu Regency. And the research subject is the VIIIA grade students of SMP Yapman Soroako, East Luwu Regency, with a total of 22 students, consisting of 14 male students and 8 female students.

B. Development of Mathematics Learning Tools

The development of mathematics learning tools used refers to Thiagarajan's 4-D model. This model is a learning development approach system that includes 4 stages, namely restriction, design, development, and dissemination. At the dissemination stage, it cannot be done in this study. The following is a detailed description of the stages of developing the 4-D model used in this study.

1) Restriction Phase

The goal is to determine and determine the learning conditions which include learning objectives, and restrictions on learning materials. The steps are as follows.

- *Curriculum analysis 200-4 Middle school mathematics*

Based on the competency-based curriculum (KBK) for SMP which is the basic knowledge, skills, and values that are reflected in the habits of thinking and acting. The general principles in this KBK are student-centered learning, student empowerment, and full and continuous student involvement. Therefore, it is better to use learning strategies related to cooperative learning. While the scope of material or material for studying mathematics in junior high schools includes an emphasis on numeracy skills so that the material that is mostly given in junior high schools is arithmetic units.

- *Student analysis*

Student analysis is a study of the characteristics of students by the design of learning device development. The characteristics include the background of academic ability (knowledge) and cognitive development.

- *Concept analysis*

Concept analysis is used to identify the main concepts that will be taught and then systematically arranged the relevant concepts.

- *Task analysis*

This task analysis includes an analysis of the tasks performed by students during learning based on the junior high school curriculum. The goal is to make it easier for teachers to formulate specific learning objectives (indicators of achievement of learning outcomes) to be achieved.

- *Specification of learning objectives*

The aim is to convert the objectives of concept and task analysis into specific learning objectives, which are expressed by behavior. Furthermore, the specific learning objectives are used as the basis for compiling tests and designing learning tools.

2) Design Phase

The goal is to produce a prototype of the learning materials developed, including the preparation of tests and the development of learning materials. The steps are as follows:

- *Arranging Test*

Based on concept analysis and assignment analysis, then a test that will become a data collection instrument of students' level of mastery towards the material to be taught can be arranged.

- *Media Selection*

The selection of media in this study was adjusted to the results of assignment analysis, concept analysis, student characteristics, and existing facilities at school.

- *Format Selection*

The selection of formats in the learning device development includes the selection of formats for designing the content of

the material, the selection of learning strategies, and learning resources.

- *Initial Design*

The initial design in question is the design of all activities which must be done before the trial is carried out. As for the initial design of the learning device, among others:

1. Student Activity Sheet (SAS), reinforcement, review, and enrichment.
2. Lesson Plan (LP).

All learning devices produced at this stage are called learning tools draft 1.

3) Development Stage

The purpose of this development stage is to produce the final form of the learning device after going through revisions based on input from experts and trial data. The steps that must be taken at this stage are as follows:

- *Expert interpretation*

Steps of expert interpretation include content validity. This means that the validator examines all the learning devices that have been produced (draft 1). Furthermore, the suggestions from the validators are used as material for consideration and the basis for making revisions. After repairing the 1st draft device (revision 1), the learning tool draft 2 is obtained.

- *Trial*

Before conducting a limited trial in the field, the learning device draft 2 was simulated by the author. For example, one of the LPs is taken to be simulated. Furthermore, suggestions and criticisms from reviewers, partner teachers (subject teachers), observers as material for consideration and the basis for making improvements (revision 2) to the learning device draft 2. The result of this improvement is the learning device draft 3 which is ready to be used for further trials.

Furthermore, the experiment was carried out only limited to one class. The purpose of the trial is to get input from students and teachers in the field to revise draft 3. The learning activities in this trial step are carried out by the author himself as the teacher. The series of trial activities have 3 stages are the initial test, the implementation of the learning process, and the final test. After the trial is complete, the next step is to improve (revision 3) the learning device draft 3 based on the data from the test results. Finally, the final result of this step is the learning device draft 4.

4) Deployment Stage

In this study, the deployment stage was not carried out, this is because the implementation was only a limited trial.

3. Research Result and Discussion

The initial test scores are grouped into five categories, so the score frequency distribution is shown in Table 1.

The table 1, shows that in the initial test there were 0,00% of students who were in the very low category, 27,27% were in a low category, 22,73% of the students were in the moderate category, 50,00% of the students were in the high category. and students who are included in the very high category are 0,00%. If the student's average score of 64,45 is converted into the five categories above, then the achievement of Class VIIIA students of SMP Yapman Soroako on the initial test is moderate.

Table 1
Distribution of frequency and percentage of mathematics scores for class VIIIA students of SMP Yapman Soroako on initial test

No.	Mark	Category	Frequency	Percentage (%)
1	0 - 34	Merk Low	0	0.00%
2	35 - 54	Low	6	27.27%
3	55 - 64	Moderate	5	22.73%
4	65 - 84	High	11	50.00%
5	85 – 100	Very High	0	0.00%

Learning achievement scores are grouped into five categories, then the frequency distribution is obtained in Table 2.

Table 2 shows that of the 22 students in the final test, there were 0,00% of students who were in the very low category, 0,00% of the students were in a low category, 9,09% of the students were in the moderate category, 68,18% students who are in the high category, and students who are included in the very high category are 22.73%. From the average score of mathematics learning achievement of 73,36, it is in the high category.

Table 2
Distribution of Frequency and Percentage of Mathematics Scores for Class VIIIA Students of SMP Yapman Soroako on Final Test

No.	Mark	Category	Frequency	Percentage (%)
1	0 - 34	Merk Low	0	0.00%
2	35 - 54	Low	0	0.00%
3	55 - 64	Moderate	32	9.09%
4	65 - 84	High	15	68.18%
5	85 – 100	Very High	5	22.73%

The tendency (dominance) of student activity in each meeting which is the observation indicator that students find several ways to solve problems at the beginning of the meeting tends to be lacking but the few meetings after it has increased. The second observation indicator, students find some answers to problems at the beginning of the meeting are also still lacking. The two things mentioned above are caused by the tendency of students to solve problems by relying on only one solution by following the solution given by the teacher. In the third observation indicator, students expressed their thoughts that their tendency was still lacking. As in the fifth indicator, students submitted problems that were still at a low level. However, at the next meeting, there was an increase in both indicators.

In contrast to the observation indicators, students' dare to ask questions is not at a low level, this can be seen from the enthusiasm of students with the appearance of various questions from students. In this observation indicator at the beginning of the meeting until the end of the meeting, there was a slight increase.

Some of the observation indicators above, significantly led to the observation indicators that the six students used a model that led to formal notation, at the beginning of the meeting it was still lacking but at the next meeting it increased although it was still somewhat unsatisfactory.

In the second observation indicator, the teacher emphasized

the importance of students' efforts to find answers at the beginning of the meeting, which was very good, this lasted until the next meeting.

The teacher's observation indicators encourage students to respond to the thoughts expressed by their friends at the beginning of the meeting which has shown good scores up to the next meetings it continues to increase. The sixth observation indicator that teachers respect various opinions and control negotiations shows a good score sometimes even good enough, this is because teachers sometimes forget to give awards to students. Meanwhile, in the seventh observation indicator, the teacher divides students into several groups, is shows good scores.

Based on the things mentioned above, the efforts made by the teacher in the form of teacher activities in learning activities starting from LP-I to LP-II need to increase the provision of direction to students' answers, so that students not only find one way to solve problems but also various ways. or strategies used.

Filling a questionnaire about student responses to mathematics learning activities as follows:

- Some students like math, some don't like math. According to them, mathematics is difficult and full of challenges, especially in working on problems that require understanding and thoroughness.
- Some students think that mathematics is an important lesson so that they can be smart in counting because it is found every day in the life.
- Some argue that mathematics is sometimes easy and sometimes difficult. When they understand the material, they say that mathematics is easy. Likewise, when they do not understand, they say that mathematics is difficult, causing them to dislike and get bored.

4. Conclusion

Based on the results of the trial discussion on students of class VIIIA SMP Yapman Soroako by using cooperative mathematics learning STAD model type can be concluded as follows:

- A mathematics learning tool was obtained on the subject of the Pythagorean Theorem which includes lesson plans, and student activity sheets (SAS).
- The trial result of the developed device can be described as follows:
  a) Students' learning achievement on the initial test with an average of 64.45 and the final test obtained an average of 73.36, experienced a high increase in mastery of mathematics.
  b) Student activity at each meeting tends to increase based on learning that is dominated by active students.
  c) The teacher's activity at each meeting tends to not be too dominating on learning activities.
  d) Student Responses to STAD-type cooperative learning activities is generally positive.

5. Suggestions

- As a follow-up, STAD-type cooperative learning activities should be applied to other classes and different teachers.
- The embodiment of a fun and meaningful learning situation, then one of the alternatives taken by the teacher is to use learning strategies that are adapted to the level of intellectual readiness of students.

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