# EFFECTIVENESS OF APPLICATION OF COOPERATIVE LEARNING MODEL JIGSAW TYPE AND STUDENT TEAM ACHIEVEMENT DIVISION (STAD) TYPE TOWARD MATHEMATICS LEARNING OUTCOMES IN CLASS VIII

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**ABSTRACT**

The application of conventional learning models in school plus student's mindset that mathematics is difficult, too many questions, too many formulas, making the lack of interest in learning mathematics of students, consequently the learning of mathematics unattractive so that influence on student learning result of the student. This study aims to determine the effectiveness of the application of cooperative learning model type Jigsaw and Student Team Achievement Division (STAD) to the results of learning mathematics. The population in Gamping (SMP Muhammadiyah 2 Gamping) Sleman Regency 2016/2017 academic year is divided into three classes, which amounts to 110 students. Two classes took samples with a random sampling technique. They obtained Class VIIIC as Experiment Class I, Class VIIIB as Experiment Class II, and Class VIIIA as Trial Class. Data analysis techniques used include a prerequisite test using normality test with Chi-Square formula, homogeneity test with F test, and hypothesis test with T-test. The results showed that: (1) There was no difference in mathematics learning results between the Jigsaw type cooperative learning model and Student Team Achievement Division (STAD). This is indicated by the value $T_{count}$ = -0.08566 <$T_{table}$ = 1.99394 at a significant level of 5% and df = 71. (2) There is nothing better between the Jigsaw type cooperative learning model and the Student Team Achievement Division (STAD) type. (3) Jigsaw cooperative learning model and Student Team Achievement Division (STAD) can improve students' mathematics learning outcomes.

**Keyword :** efektivitas, model pembelajaran kooperatif Jigsaw, model pembelajaran kooperatif Student Team Achievement Division (STAD)

## INTRODUCTION

Education is one of the needs that cannot be separated from human life, which is also a benchmark for a nation's progress. The progress of a nation can be seen from the quality of its education. Good quality education will undoubtedly produce quality human resources (HR) as well. School is one of the educational institutions as a means of the learning process to develop self-potential so that every human being can grow and develop by its potential. The function of education is so that students can develop their potential actively. Efforts to improve the quality of education cannot be separated from the role of a teacher as a human resource with a variety of skills. A teacher is a crucial person for students because all teachers' attitudes and behaviors are seen, heard, and imitated by students. Teachers and students are in the process of educative interactions with different tasks and roles (Bahri Djamarah, Syaiful. 2011: 105-107). In the teaching and learning process, the teacher is in charge of delivering the subject matter, while the students play a role as the subject who receives the material. The teacher must transfer his knowledge with a sense of responsibility and dedication. Therefore, a teacher is required to master the material to be conveyed and be skilled in delivering it so that the knowledge delivered can be right on target.

Mathematics is no longer a strange thing among students. Mathematics is identical to a complicated subject, consisting of many numbers and formulas. Some even consider mathematics a scourge so that even hearing the name is frightening. However, mathematics has a huge role in human civilization. Because of its huge role mathematics has become one of the main subjects at every level of

education. Even in every inch of life, we realize that we are always in contact with mathematics. According to James and James in Suherman, Erman et al. (2003: 16) states that mathematics is a branch of science about logic, regarding the form, composition, magnitude, and concepts related to one another in large numbers which are divided into three fields, namely algebra, analysis, and geometry. School mathematics is mathematics given in schools, which is in the Basic Education and Secondary Education Curriculum. This school mathematics is taught in Elementary Education (SD and SLTP) and Secondary Education (SLTA and SMK). Mathematics consists of parts of mathematics chosen to develop students' abilities and skills, and form a right person who blends in with the development of Science and Technology (Science and Technology). This means that mathematics is still mathematics with the characteristics of mathematics itself. That is, it has an abstract event object and a consistent deductive mindset (Suherman, Erman, et al. 2003: 55-56). Based on the results of observations of researchers while carrying out basic apprenticeships, advanced apprenticeships, to applied apprenticeships at SMP Muhammadiyah 2Gamping, the researchers knew that students' mathematics learning outcomes were low. This is reinforced by the data of the Odd End Semester semester 2016/2017 data. The following data is the average score of the final test of mathematics subjects in class VIII SMP Muhammadiyah 2 Gamping odd semester 2016/2017 academic year shown in Table 1.

**Table 1.** Mathematics Grade VIII Grade Odd Semester SMP Muhammadiyah 2 Gamping 2016/2017 Academic Year

| Score | VIIIA | VIIIB | VIIIC |
|---|---|---|---|
| Average | 31,6216 | 35,5405 | 37,9722 |
| Max | 40 | 50 | 50 |
| Min | 22,5 | 25 | 30 |
| < MCC | 37 | 37 | 36 |
| >MCC | - | - | - |

(source: SMP Muhammadiyah 2 Gamping Sleman Yogykarta)

Table 1 shows that many students have not yet reached the MCC (Minimum Completion Criteria) set by the school, 70. Many factors affect student learning outcomes, especially in mathematics. One of them is where students are less actively involved in learning mathematics. It could be due to the learning model used in the classroom that is still conventional and not varied, causing low student interest in mathematics. Plus, most students think that mathematics is a difficult and unpleasant subject when compared to other subjects. Students feel that there are too many formulas to memorize, too many questions to do, plus students do not dare to ask the teacher if there is a subject matter that is not understood. Students also feel bored, bored, and uninspired if the math class lasts at the last hour. Inappropriate learning models significantly affect student interest in learning, which has an impact on mathematics learning outcomes of many students who do not meet the MCC.

Learning models are very influential in teaching and learning activities in the classroom. Creative and innovative learning models can increase student interest in learning and reduce student boredom and boredom. Adi in Suprihatiningrum, Jamil (2016: 142) states that the learning model is a conceptual framework that describes the procedure in organizing learning experiences to achieve learning objectives. Therefore, in learning mathematics, it takes a learning model that can encourage students to be more active, enthusiastic, and creative in their learning activities. One of the most commonly used learning models is the cooperative learning model. According to Rusman (2010: 202) cooperative learning model is a form of learning in which students learn and work in a collaborative group whose members consist of four to six people with heterogeneous group structures. Some types of cooperative learning models used are the Jigsaw and Student Team Achievement Division (STAD). According to Ibrahim, et al. (in Isjoni 2009: 39-41) cooperative learning is developed with the hope of achieving at least three learning objectives, namely: 1) Academic learning outcomes, through cooperative learning students are expected to help each other in understanding difficult concepts to solving problems together so that both the upper and lower groups receive the benefits of increased learning outcomes; 2) Acceptance of individual differences, another goal of cooperative learning is

broad acceptance of different people based on culture, race, social, and abilities because groups are formed heterogeneously; 3) Development of social skills, indirectly cooperative learning teaches collaboration and collaboration skills among group members to achieve shared goals.

In a study conducted by Kurniawan Martina (2010) and Yulianis Pratiwi (2008) that the Jigsaw type cooperative learning model and Student Team Achievement Division (STAD) were effective in improving student learning outcomes than conventional learning models. This study selected cooperative learning type Student Team Achievement Division (STAD) and Jigsaw because, based on research by Betha Ugaharia (2009) shows that the Jigsaw type cooperative learning model is more effective in improving student learning outcomes than the Student Achievement Division (STAD) cooperative learning model. The material used in this study is the tangent circle, which has five subtopics. This material involves understanding concepts and solving problems that are consistent with the objectives of this study. The division of sub material used has the same weight so that it matches the learning model used. This study aims to: 1) find out whether or not there is a difference in the type of Jigsaw and Student Team Achievement Division cooperative learning models towards the mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 2 Gamping Sleman Regency in 2016/2017 school year. 2) find out which one is more effective between the Jigsaw type cooperative learning model and the Student Team Achievement Division on the mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 2 Gamping Sleman in the 2016/2017 school year.

**METHODS**

This research is a type of experimental research that is carried out deliberately to seek the emergence of variables. In this study applying the Jigsaw cooperative learning model and Student Team Achievement Division (STAD) in mathematics learning to examine further its effect on student mathematics learning outcomes. This research involves two classes, namely experimental class I and experimental class II. In the experimental class, I was given learning using the Jigsaw cooperative learning model. In the experimental class, II was given learning using the Student Team Achievement Division (STAD), the learning model. This research was conducted at SMP Muhammadiyah 2 Gamping Sleman Regency, which is located at Jalan Godean Km.5 Sumberarum Village, Gamping District, Sleman Regency, Special Region of Yogyakarta. The implementation of this research includes the learning process and data retrieval, which was carried out in the even semester of March 20-31, 2017, towards students of class VIII of SMP Muhammadiyah 2 Gamping, Sleman Regency. The population in this study were eighth-grade students of SMP Muhammadiyah 2 Gamping Sleman Regency in the even semester of the 2016/2017 academic year, 110 students divided into three classes, namely classes VIII A, VIII B and VIII C. Sampling in this study was conducted using techniques random sampling of class VIII at SMP Muhammadiyah 2 Gamping. In sampling, a list of research objects (samples) is first made. In this case, there are three classes as a population, while the number of classes that will be used for research is two classes consisting of Experiment Class I and Experiment Class II.

The technique used to retrieve data in this study is the Test Method. In this study, the type of test used is the Achievement Test (posttest). This Achievement Test (Posttest) is given to students of the experimental class after the students are given treatment. This test instrument is in the form of multiple choice. The test results are used to determine student learning outcomes on the subject matter of the tangent circle. In this study, the instruments used were divided into two types: data collection instruments, namely the student achievement test (posttest) and the instrument for learning tools consisting of Lesson Plans, Student Worksheets, and achievement tests. Before the treatment of the two experimental classes is carried out first homogeneity test to find out whether the two experimental classes have the same initial ability so it can be said that the population is homogeneous. Based on the homogeneity test obtained $F_{count} = 1.54204 < F_{table} = 1.74784$, so it is known that the population is homogeneous.

**RESULTS AND DISCUSSION**

The results of student achievement tests (posttest) showed an increase in student mathematics learning outcomes in the experimental class I and in the experimental class II as summarized in Table 2.

**Table 2.** Summary of Comparison of Values Before and After Treatment

| | Experiment I (Jigsaw) | Experiment II (STAD) |
|---|---|---|
| Early proficiency | | |
| Average | 51,61111 | 50,27027 |
| Max | 36 | 34 |
| Min | 72 | 72 |
| < MCC | 2 | 1 |
| >MCC | 34 | 36 |
| Mathematics Learning Results | | |
| Average | 63,61111 | 63,78378 |
| Max | 40 | 40 |
| Min | 80 | 80 |
| < MCC | 9 | 13 |
| >MCC | 27 | 24 |

Data analysis of student mathematics learning outcomes (posttest) obtained an average for experimental class I with the Jigsaw-type cooperative learning model. It also increased by 23.25081% to 63.61111, where 69.44% of the number of students had reached the MCC, and 30.56% has not yet reached the MCC. Simultaneously, the average for the experimental class II with the Student Team Achievement Division (STAD) cooperative learning model increased by 26.88171% to 63.78378, where 51.35% of the total number of students had reached the MCC, and another 48.65% had not yet reached MCC. Based on the description of the students' initial mathematical ability and the value of students' mathematics learning outcomes (posttest) it can be seen that there is an increase in students' mathematics learning outcomes from both experimental classes.

After testing the hypothesis using the T-test on the results of students' mathematics learning achievement tests (posttest) obtained $t_{count} = -0.08566$ and $t_{table} = 1.99394$ so obtained $t_{count} < t_{table}$ which means there is no difference in learning outcomes between Jigsaw type cooperative learning models and Student Team Achievement Division (STAD) cooperative learning models. Because from the results of the two-party T-test, it is known that there is no difference between the two learning models, then there is no need to do a one-party T-test. Next to answer the hypothesis is done by comparing the two results of student mathematics learning.

**Table 3.** T-Test Results for Mathematical Learning Outcomes

| $t_{count}$ | -0,08566 |
|---|---|
| Significant level | 5% |
| df($n_1$+$n_2$-2) | 71 |
| Testing criteria | There is a difference if $\|t_{count}\| < t_{table}$ |
| Information | There is no difference |

Statistically, it is known that there is no difference between the learning outcomes of students being taught with the Jigsaw cooperative learning model and the Student Team Achievement Division (STAD). However, when viewed in numbers, there has been an increase in student learning outcomes. So it is known that both learning models can both improve student mathematics learning outcomes. It is assumed that the factors that cause the difference in learning outcomes between Jigsaw cooperative learning models and Student Team Achievement Division (STAD) cooperative learning models are: 1) Jigsaw learning model and Student Team Achievement Division (STAD) are both models of cooperative learning wherein the learning process applying the formation of small groups to support the

learning process; 2) The instrument used in its implementation is less than optimal; 3) The learning process is not running optimally; 4) Social environment that is less conducive.

From the results of statistical calculations using the T-test, it is known that there are no differences in learning outcomes between the Jigsaw type cooperative learning models and the Student Team Achievement Division (STAD). However, in terms of numbers when viewed from the average value of students, it is known that an increase occurred after the learning process using a cooperative learning model both with the type of Jigsaw and with the type of Student Team Achievement Division (STAD). From the data obtained, it can be seen that all classes experienced an increase in learning outcomes. However, the most significant improvement was shown by the experimental class II with the Student Learning Achievement Division (STAD) cooperative learning model. However, for completeness MCC's achievement, the greatest improvement was shown by the experimental class I with the Jigsaw type cooperative learning model.

## CONCLUSION

Based on the results of this study, the conclusions from this study can be drawn as follows: 1) There is no difference in learning outcomes between students taught using the Jigsaw type cooperative learning model and the Student Teams Achievement Division (STAD) cooperative learning model in class VIII SMP Muhammadiyah 2 Gamping Sleman Regency 2016/2017 school year. This is indicated by the value of $t_{count} = -0.08566$ and $t_{table} = 1.99394$ which results in $H_0$ being accepted and $H_1$ being rejected; 2) There is nothing better between the Jigsaw type cooperative learning model and the Student Team Achievement Division (STAD) cooperative learning model in class VIII students of SMP Muhammadiyah 2 Gamping Sleman Regency in the 2016/2017 school year; 3) Jigsaw cooperative learning model and Student Team Achievement Division (STAD) can both improve student learning outcomes. This is shown by the increase in the average class taught by using the Jigsaw cooperative learning model up by 12.00000% and the average class taught by the Student Team Achievement Division (STAD) cooperative learning model up by 13.51351%.

Based on the results of the study, the authors propose the following suggestions: 1) For schools, this research provides input to the school to always evaluate the learning process to create an optimal learning process to improve the quality of education in schools; 2) For teachers, the results of this study indicate that the use of Jigsaw cooperative learning models and Student Team Achievement Division (STAD) cooperative learning models can both improve student mathematics learning outcomes so that researchers advise teachers to be able to apply varied, interesting learning models, fun so that it can improve student learning outcomes in mathematics; 3) For students, each student should be able to get used to following the learning process with cooperative learning models in addition to the learning models that are often done at school. Also, students have to practice a lot of working on math problems and are always required actively to express opinions during the learning process; 4) For subsequent researchers, this research can be used as a reference for the preparation of scientific work and is expected to develop and use other cooperative learning models to improve student mathematics learning outcomes.

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