# THE EFFECTIVENESS OF THE MATHEMATICS LEARNING USING MODEL OF *TEACHING RECIPROCAL* OF THE STUDENTS' LEARNING OUTCOMES OF SMP NEGERI 1 SAWANGAN MAGELANG REGENCY

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## ABSTRACT

The learning activity is still dominated by the teacher that makes students tending to be passive in participating in teaching and learning activity in the classroom. The students' learning interest is low due to the students assume that mathematics is one of the difficult subjects, and it will affect the results of the students' mathematics learning. This research aims to find out the effectiveness of mathematics learning using the model of TeachingReciprocalof the students' learning outcomes of 8class SMP Negeri 1 Sawangan Magelang regency Odd Semester Academic Year 2016/2017. The research population is all students of 8 class consisting of 6 classes. Sample is taken by using the *sampling random* technique of the classes and it is achieved by VIII B class as the experimental and VIII C as the control class. The data collecting technique is done by documentation and test method. The instrument used is the documentation paper of UTS value Odd Semester of 8 class students and the test question of learning outcomes. Data analysis techniques are hypothesis testing and precondition test of analysis including normality test and homogeneity test. The result of research shows (1)There are differences in the mathematics learning outcomes between students using the learning model of Teaching Reciprocal than students using the direct learning model. It is based on the first hypothesis test with a significance level of 5% and 61 freedom degree that it is achieved $t_{count} = 2,38748$ and $t_{table} = 1,99996$ then $H_0$ rejected and $H_1$ accepted. (2) The Learning Model of Teaching Reciprocal is more effective than the direct learning model on the results of students' mathematics learning. It is based on the second hypothesis test with a significance level of 5% and 61 freedom degree that it is achieved $t_{count} = 2,38748$ and $t_{table} = 1,670385$ then $H_0$ rejected and $H_1$ accepted.

**Keywords:** Learning Mathematics, Reciprocal Teaching, Learning Outcomes

## INTRODUCTION

Education has an important role in human life. With education, humans are able to develop their potential to become quality personalities and characters. Improving the quality of human resources is a prerequisite for achieving development goals. Law No. 20 of 2003 concerning National Education System article 1 paragraph 1 states that: "Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual strength, self-control, personality, intelligence, morals noble, and the skills needed by himself, society, nation, and state ". Education is one of the programs that is highly focused by the government to meet the needs of skilled and ready-to-use human resources in competing domestically and internationally.

Learning outcomes can take the form of changes in cognitive, affective, and psychomotor abilities, depending on the purpose of teaching. Based on the results of interviews with mathematics teachers in class VIII SMP Negeri 1 Sawangan on Saturday, May 14, 2016, learning mathematics so far is still using the direct learning model. The teacher still dominates the class so that students tend to be passive in learning activities. The results of interviews with students that some students still think mathematics is one of the subjects that is considered difficult. The way the teacher explains sometimes makes students less understanding of the material the teacher is conveying. Not all students have the ability to listen, observe, and take notes properly because every student has a way of learning and responding to different problems. This resulted in low student interest in learning and caused student learning outcomes to be less than optimal as seen in the results of students' Mathematical Midterm tests

in the subjects of the Two-Variable Linear Equation System (SPLDV) grade VIII of SMP Negeri 1 Sawangan Academic Year 2016/2017 as the following:

**Table 1.** The mid term test Grades Data Grade VIII Mathematics Subjects of SMP Negeri 1 Sawangan Academic Year 2016/2017 Odd Semester

| Class | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| The highest score | 93 | 91 | 92 | 93 | 84 | 85 |
| Lowest value | 30 | 35 | 34 | 40 | 43 | 36 |
| Average | 65 | 67 | 64,5 | 66 | 63 | 61 |
| Complete | 10 | 16 | 14 | 11 | 8 | 3 |
| Not complete | 22 | 16 | 18 | 20 | 24 | 31 |
| The number of students | 32 | 32 | 32 | 31 | 32 | 34 |

(SMP Negeri 1 Sawangan)

Based on the above data it can be seen that the average student learning outcomes in mathematics are still low because under the Minimum Mastery Criteria (KKM) which is 73. Mathematics learning in schools requires a more varied learning model than before. One of them is a reciprocal teaching-learning model.

The reciprocal teaching model is a learning model in the form of activities to teach material to friends. In this learning model students act as teachers to deliver material to their friends. Meanwhile, the teacher acts more as a model who becomes the facilitator and guide. In this learning model, it contains four strategies namely Question Generating, Clarifying, Predicting, and Summarizing. The benefit of using this learning model is that students can increase their enthusiasm in learning because students are required to actively discuss and explain the results of their work well.

Based on these thoughts, researchers try to compare the use of reciprocal teaching models with direct learning models in terms of learning outcomes in mathematics. Therefore, the researcher took the title Effectiveness of mathematics learning using a reciprocal teaching model of mathematics learning outcomes of students of SMP Negeri 1 Sawangan, Magelang in the 2016/2017 school year.

Based on the background of the problem above, the formulation of the problem in this study is as follows:

1. Are there differences in mathematics learning outcomes between students who use the reciprocal teaching-learning model and students who use the direct learning model in class VIII odd semester 2016/2017 Academic Year?
2. Is the reciprocal teaching-learning model more effective than the direct learning model towards the mathematics learning outcomes of Grade VIII odd semester 2016/2017 Academic Year students?

In connection with the problem formulation that has been described, the objectives to be achieved from this research are to find out whether or not there are differences in mathematics learning outcomes between students who use the reciprocal teaching-learning model and students who use direct learning models in class VIII odd semester 2016 Academic Year 2016 / 2017 and To find out the effectiveness of the reciprocal teaching-learning model compared to the direct learning model of the mathematics learning outcomes of Grade VIII odd semester 2016/2017 Academic Year.

In the learning process at school, students' abilities can be seen from the learning outcomes generated by students in questions, problems, or assignments given by the teacher. Learning outcomes are usually used to find out how far someone's ability to the material being taught. According to Suprijono, Agus (2012: 5) "Learning outcomes are patterns of actions, values, understandings, attitudes, appreciation, and skills". According to Bloom in Suprijono, Agus (2012: 6) learning outcomes include cognitive, affective, and psychomotor abilities.

The learning model gives students the opportunity to actively learn independently and develop their mathematical communication skills, one of which is the reverse learning model of Reciprocal Teaching. According to Aris Shoimin (2014: 153) reciprocal Teaching is a learning model in the form of activities to teach the material to friends." In this learning model students act as 'teachers' to deliver

material to their friends. Meanwhile, the teacher plays a role as a model who becomes a facilitator and supervisor who conducts scaffolding. According to Trianto (2009: 173) reverse teaching is an approach to teaching students about learning strategies. Reverse teaching is a constructivist approach based on the principles of making/asking questions, where metacognitive skills are taught through direct teaching and modeling by the teacher to improve the reading performance of students who read low comprehension. According to Palinscar in Aris., Shoimin (2014: 153-154) Reciprocal Teaching contains four strategies, namely: a) Question Generating, b) Clarifying, c) Predicting, d) Summarizing.

Steps in learning Reciprocal Teaching (Aris.Shoimin, 2014: 154-155): 1) Group students and group discussions. 2) Make a question (Question Generating). 3) Present the results of group work. 4) Clarifying the problem (Clarifying). 5) Provide practice questions that contain development questions (Predicting). 6) Summarizing the material being studied (Summarizing). In learning Reciprocal Teaching has several benefits. Benefits of the Reciprocal Teaching model according to Aris. Shoimin (2014: 156): Developing student creativity, Fostering collaboration between students, Students learning independently, Students motivated to learn, Growing student talent, especially in speaking and developing attitudes, Train students to analyze problems and take problems Conclusions in a short time, students pay more attention to the lesson because they live themselves, Cultivate the courage to think and speak in front of the class.

The reciprocal Teaching-learning model has several advantages compared to other learning models. The strengths of the Reciprocal Teaching-learning model according to Shoimin, Aris (2014: 154) are as follows: a) Practicing students' ability to learn independently so that the ability to learn independently can be improved. b) Train students to explain the material learned to other parties. The application of this learning can be used by students in presenting their ideas. c) Learning orientation is investment and discovery. By discovering and investigating the concepts that are themselves discussed, students will be easier to remember a concept. Students' understanding of a concept is an understanding that is truly understood by students.

In addition to these advantages, the Reciprocal Teaching-learning model has several disadvantages. The weaknesses of the Reciprocal Teaching-learning model according to Shoimin, Aris (2014: 157) are as follows: a) Lack of student attention to the lesson and only paying attention to the activities of students who act as teachers make final conclusions difficult to reach. b) Very difficult to apply if students' knowledge of prerequisite material is lacking. c) Sometimes students who are unable will increasingly dislike the learning.

## METHODS

In this study, there are two research classes, namely the experimental class using the Reciprocal Teaching-learning model and the control class using the direct learning model. The research design used was Postest-Only Control Design.

**Table 2.** Postest-Only Control Design

| R | X | $O_2$ |
|---|---|---|
| R | - | $O_4$ |

The place of this research was conducted at Sawangan Public Middle School in class VIII B and VIII C odd semester 2016/2017 academic year. The population in this study were eighth-grade students of SMP Negeri 1 Sawangan Magelang district in the 2016/2017 school year consisting of 6 classes namely VIII A, VIII B, VIII C, VIII D, VIII E, VIII F with a total of 193 students. The sample selection in this study uses the Random Sampling technique, which is taking a random sample class and obtained class VIII B as an experimental class and class VIII C as a control class. The variables in this research are the Reciprocal Teaching-learning model and mathematics learning outcomes of Grade VIII students of SMP Negeri 1 Sawangan, Magelang Regency. Data collection techniques in this study were carried out using documentation and tests. Documentation of the data used is the value of midterm test Odd Semester VIII grade SMP Negeri 1 Sawangan which is used to determine the students' initial abilities. The test method

was used to obtain data about the mathematics learning outcomes of Grade VIII students in the Odd Semester of SMP Negeri 1 Sawangan. The test is given after being treated with different learning.

The data analysis method is a method used to analyze data obtained from research results. There are two methods of analysis in this study, namely the analysis prerequisite test which includes the test of homogeneity and homogeneity and hypothesis testing.

The normality test is used to test whether the data obtained on each variable is normal distribution or not, meaning that there is a spread of data between the highest value to the lowest value in the sample. If the data is normally distributed then data analysis can be done to prove the research hypothesis. In this case, the normality test uses the Chi-squared formula ($\chi^2$). $\chi^2$ obtained from the calculation results then consulted the value of $\chi^2_{table}$ with α = 0.05 and degrees of freedom = (k-1). If $\chi^2_{count} > \chi^2_{table}$ (α, (k-1)), then reject $H_0$ so the data is not normally distributed and if $\chi^2_{count} < \chi^2_{table}$ (α, (k-1)), then accept H0 so the data is normally distributed.

The homogeneity test aims to determine the variance of homogeneous samples or not. The test used is the Barlett test. If $\chi^2_{count} \leq \chi^2_{table}$ then the variance of the sample is homogeneous and if $\chi^2_{count} > \chi^2_{table}$ then the sample variance is not homogeneous. The next test is the hypothesis test. Hypothesis testing is carried out to compare student mathematics learning outcomes in which learning uses the Reciprocal Teaching-learning model and student learning outcomes in mathematics using direct learning models. In this study, the hypothesis test used was using the t-test. Hypothesis testing is to prove the hypothesis that there are differences in mathematics learning outcomes between students who use the Reciprocal Teaching-learning model compared to students who use the direct learning model. The second hypothesis test is to prove which learning model is more effective between students who use the Reciprocal Teaching-learning model compared to students who use a direct learning model on mathematics learning outcomes.

**RESULTS AND DISCUSSION**

After both classes were given treatment, student learning outcomes were measured through a repeat test. The results of student learning performed prerequisite tests and hypothesis testing.

Prerequisite tests for student learning outcomes include: 1) normality test, based on the normality test calculation it appears that $\chi^2_{stat}$ experimental class learning outcomes namely 4,413 less than $\chi^2_{table}$ ie 7.8147 at a significant level of 5% and df = 3 which means the data are normally distributed. While in the control class $\chi^2_{stat}$ control class learning outcomes are 0.430 less than $\chi^2_{table}$ namely 7.8147 at 5% significance level and dk = 3 which means the data is normally distributed. 2) homogeneity test, based on calculations it appears that $\chi^2_{count}$(4,474) <$\chi^2_{table}$(5,9915) at a significant level of 5% and df = 61 which means homogeneous data.

Hypothesis testing student learning outcomes include: 1) Test the first hypothesis, from the results of the analysis conducted it appears that $t_{count}$(2,38748) >$t_{table}$(1,99996) at a significant level of 5% and df = 61, so H0 is rejected and $H_1$ is accepted, which means that there are differences in mathematics learning outcomes between students who use the Reciprocal Teaching-learning model compared to students who use the direct learning model in class VIII odd semester of SMP Negeri 1 Sawangan Regency Magelang 2016/2017 school year. 2) The second hypothesis test, from the results of the analysis, carried out it appears that $t_{count}$(2,38748) >$t_{table}$(1,670385) at a significant level of 5% and dk = 61, so that $H_0$ is rejected and H1 is accepted, which means that students who use the Reciprocal Teaching-learning model are more effective than students who use the direct learning model of mathematics learning outcomes for VIII grade students of SMP Negeri 1 Sawangan, Magelang 2016 / 2017. Before the experimental class and the control class are given treatment first, pay attention to the initial ability of the sample. The initial ability is taken from the Odd Semester Midterm scores. For homogeneity test, the initial ability is obtained $x^2_{count}$(10,4194) <$x^2_{table}$(11,0705) which means that both classes have the same initial ability variance.

Learning using the Reciprocal Teaching model can make students play an active and independent role when learning activities. Students understand the material themselves with their respective abilities. Students can be motivated to learn on their own so that learning outcomes can be optimized. Whereas in the control class learning activities in the classroom are more dominated by the teacher so that students become less active to ask questions about material that they have not yet understood.

Based on the results of the analysis and discussion described above, the following research conclusions can be drawn:

1. There is a difference between students' mathematics learning outcomes using the Reciprocal Teaching-learning model and students who use the direct learning model in class VIII odd semester students of SMP Negeri 1 Sawangan, Magelang, 2016/2017 school year.
2. Mathematics learning using the Reciprocal Teaching-learning model is more effective than students who use the direct learning model of mathematics learning outcomes for Grade VIII students of SMP Negeri 1 Sawangan, Magelang in the 2016/2017 school year.

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