

# The Influence of Reciprocal Learning Model on Mathematics Learning Achievement of Grade X Students at SMAN 1 Tinambung

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## ABSTRACT

This study is experimental research using the quasi-experimental design. This study aims to describe mathematics learning achievement of students taught by using reciprocal learning model is higher than using conventional learning model. This research was conducted in SMAN 1 Tinambung. The populations in this study were all students of class X MIA SMAN 1 Tinambung. The sample of this study included two classes, namely the experimental class and the control class. Data were collected by using observation, questionnaires, and learning achievement tests. Data analysis techniques were descriptive analysis and inferential analysis by using SPSS 23 for windows. Descriptive statistic analysis used N-Gain showed that the average score of mathematics learning achievement for the control class was 0.66 while for the experimental class was 0.75. As for the hypothesis test analysis that used a t-test (independent sample test), the significant value obtained was  $0.027 < 0.05$ , which means mathematics learning achievement of students taught by using reciprocal learning model is higher than that of students taught by using conventional learning model.

**Keywords:** *Reciprocal teaching model, Learning achievement, Mathematics.*

## 1. INTRODUCTION

Education is a very long process. Its success is determined by various factors, including children as the subject of education, parents and teacher as educators, appropriate materials, a supportive environment, and various learning models and appropriate media. Education has a vital role in life since it is a process of changing the attitudes and behavior of a person or group of people to mature humans through teaching and training [10].

Mathematics is one of the basic science that students need to succeed in the world of education. Mathematics must be studied at every level of education. Students are said to be successful in learning mathematics if they can achieve the goal of mathematics education at school. One of them is that students understand mathematics concepts [6].

As mathematics is necessary for everyday life, the government has been trying to improve education, especially mathematics education, by including mathematics in the National Science Olympiad (OSN) since the first competition in Yogyakarta on September 10, 2002 [2]. However, the government's efforts to advance education, especially mathematics, have not produced an optimal result. This can be seen from the mathematics learning outcomes in mathematics, which are still in a low category. According to data from the Ministry of Education and Culture (KEMENDIKBUD), the national average score of the National Examination (UN) for the Senior High school level or its equivalent in the 2017/2018 academic year declined, including in mathematics.

The head of the research and development section of the Ministry of Education and Culture in an article entitled The Average UN Mathematics for High

School is down [8], said, for students in the High school level majoring in science, the average score

2017, with an average value of 41.92. In addition, the decline of the National Examination score for mathematics subjects for the high school level program social science and language reached 4.73 and 2.48, respectively.

The low mathematics learning achievement of students also occurred at SMAN 1 Tinambung. Based on the result of the Field Experience Program (PPL), interviews, and observations of the class X mathematics teacher at SMAN 1 Tinambung held on December 10, it was found that the learning achievements of class X students were still very low. It can be seen from the daily test scores, quizzes, assignments, and final semester test scores (UAS), where many students had not reached the minimum completeness criteria (KKM) set by the school, which was 70.00.

Based on the data from the daily test of class X MIA SMAN 1 Tinambung on the topic of function, it was found that students learning achievements were still relatively low. This can be seen from their mathematics learning outcomes that only 64 of 180 students in total reached the Minimum Completeness Criteria (KKM) score. In other words, the percentage of students who completed the criteria was 35.56%. Those who did not complete was 64.44%. Besides, from interviews and observations, the factors that affect the low learning achievement of students at SMAN 1 Tinambung were the lack of students' interest in learning mathematics because they assume that mathematics was quite difficult and unpleasant, the lack of students' activeness during the learning process and many students ignored the teacher when explaining the topic. The teacher applied conventional learning models, which made students not enthusiastic about following the learning process. Conventional learning (direct instruction) sets the teacher as the main source of information. It plays a dominant role in the learning process so that students become bored and not interested in learning [3]. The conventional learning model refers to behavioristic psychology, where the teacher acts as an information center (Teacher centered). The teacher is a source of information that causes students to always depend on the information conveyed [5].

A teacher should apply learning methods or models that support teaching and learning activities. Learning models in the classroom must be exciting

for the 2018 Mathematics National Examination was 37.25. This figure has decreased by 4.67 compared to and varied to be active in the learning process. One of them is by using the Reciprocal learning model. The Reciprocal learning model is a learning model that provides opportunities for students to learn independently, creatively, and become more active so that students can understand the material they are learning better. According to Anne Brown [5], Reciprocal teaching is that students learn the material independently and then deliver that material. Reciprocal teaching is a learning model in the form of activities to teach the material to friends. In other words, students act as a teacher explaining material to their friends. The teacher, on the other hand, acts as a facilitator [7].

Many researchers have studied reciprocal learning models, including Reski Awaliah and Ridwan Idris [4]. They have studied the Effect of Using Reciprocal Teaching Models on Mathematics Learning Achievement for Class VIII MTSN Balang-balang Subdistrict, Bontomarannu's district, Gowa regency. They found that the reciprocal learning model positively affected the mathematics learning achievement of students in grades VIII at MTSN Balang-balang, Bontomarannu district, Gowa regency.

Based on the description above, the researcher is interested in conducting a study titled "The influence of Reciprocal Learning Model on Mathematics Learning Achievement of Grade X Students at SMAN 1 Tinambung".

## **2. RESEARCH METHOD**

This is quantitative research with a quasi-experimental method. This study was carried out in SMAN Tinambung within one month. The populations in this study were all students of class X MIA SMAN 1 Tinambung. The sample of this study included two classes, namely the experimental class and the control class. Each class consisted of 32 students, and these two classes had the same level of ability which tended to be low-ability. The reciprocal learning model was applied in the experimental class, while the conventional learning model (direct instruction) was applied in the control class. The topic being studied during the application of the learning models was trigonometry. A pretest and posttest were given to both classes before and after applying the learning model, respectively.

The research instruments used were learning outcome tests, observation sheets, and questionnaires that have been tested for their validity. The tests, which were in the form of essays was used to measure the level of students' mathematics learning achievement, observation sheets were applied to observe the student activities and the implementation of the learning model by the teacher, and questionnaires were used to determine students' responses on the reciprocal learning model. The types and forms of questions given to both classes were the same. To test the hypotheses in this study, the data of the mathematics learning achievement of students was examined using a t-test after carrying out the normality and homogeneity test. These data analyses occupied a significance level of 5%.

### 3. RESULTS AND DISCUSSION

#### 3.1. Research Result

Descriptively, the data on students' mathematics learning achievement from pretest and posttest in the experimental and control classes are given in Table 1 and Table 2, respectively.

**Table 1.** Pretest result of the experimental class and the control class.

Statistics	Experimental Class	Control Class
Max	54	55
Min	10	10
Mean	27,59	28,53
Median	25,50	27,50
Mode	35,00	10,00
Variance	161,60	162,25
Standard Deviation	12,71	12,73

Table 1 above compares the descriptive analysis results of the pretest conducted in the experimental class and the control class. It can be seen that the highest score in the control class was 55, which was higher than the highest score obtained by students in the experimental class that was 54. In addition, the average score obtained by students in the experimental class was lower than that in the control class.

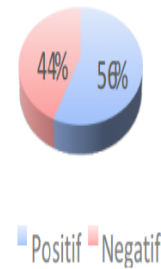
**Table 2.** Posttest results of the experimental class and control class

Statistics	Experimental Class	Control Class
Max	98	95
Min	60	52
Mean	80,87	74,62
Median	80,00	77,00

Mode	70,00	82,00
Variance	102,88	140,04
Standard Deviation	10,14	11,83

Based on table 2, the average score obtained by students in the experimental class was higher than that in the control class, and so was the median score. Thus, it can be concluded that students' learning outcomes in the experimental class are better than those in the control class.

The result of the percentage of student responses to the application of the reciprocal learning model can be seen in the following figure.



**Figure 1** Percentage of student responses

Based on figure 1 above, the percentage of positive statements of students' responses was 56%, and the percentage of negative statements of student responses was 44%. The descriptive analysis of the student response statements showed that the average value of positive statements was 3.59, and the average value of negative statements was 1.68. Based on the criteria for assessing students' responses, a score of 3.59 is in the agreed range. Therefore, using the reciprocal learning model, students' responses to learning mathematics can be categorized as positive responses.

Before performing the t-test analysis to test the hypotheses, the prerequisite tests, namely the normality and homogeneity tests, were carried out. The data from the normality test are given as follows.

**Table 3.** Normality test result

Class/Sample	Pretest	Posttest	Conclusion
	Sig	Sig	
Eksperimen (32)	0,19	0,08	Normal
Control (32)	0,20	0,20	Normal

Based on table 3 above, the significant values in both classes are greater 0.05 significance level. Thus, it can be concluded that that the population data in both groups are normally distributed.

The results of the homogeneity test of the data are given as follows.

**Table 4.** Homogeneity test result

Data	Significance	Conclusion
Pretest	0,98	Homogenous
Posttest	0,31	Homogenous

Based on table 4 above, the significant values in both pretest and posttest are greater than 0.05. Thus, it can be concluded that both data have homogeneous variance.

After conducting the prerequisite test for data analysis, it was found that both groups were normally distributed and had homogeneous variance. Then hypothesis testing using a two independent sample t-test could be carried out. Based on the results of the two-sample t-test with significant criteria 0.05, it was found that Sig <0.05, namely 0.01 <0.05. Consequently,  $H_0$  was rejected while  $H_1$  was accepted. Thus, it can be concluded that in grade 10 of the science program of SMAN 1 Tinambung, the mathematics learning achievement of students taught using the reciprocal learning model was higher than that of students taught using the learning model of conventional.

### 3.2. Discussion

In this study, the researcher acted as a teacher implementing the reciprocal learning model in class X MIA 2 SMAN 1 Tinambung. At the first meeting, the teacher explained to the students the procedure for the reciprocal learning model that would be applied. It is intended that students understand the learning model so that it does not deviate from the objectives to be achieved in its implementation.

Based on the results of the descriptive analysis of the pretest given to the students taught using the reciprocal learning model, most students (27 of 32) were in the <39 intervals, and the smallest percentage was in the 55-74 interval. The result of the descriptive analysis of the pretest given to the students taught using the direct learning model showed that the most students (81.25%) had mathematics learning achievement in the <39 intervals while the smallest percentage was in the 75-89 interval. This shows that the initial conditions of both classes before being given treatment were in the same condition (homogeneous)

Based on the results of descriptive analysis of the posttest of students taught using the reciprocal learning model, the scores of students' mathematics

learning achievement mostly were in the 75-89 interval as many as 15 students (46.9%) and the smallest percentage of the scores of students' mathematics learning achievement were in the interval <39. Based on the results of descriptive analysis of the posttest of students taught using the direct instruction model, the scores of students' mathematics learning achievement mostly were in the 55-74 interval as many as 15 students (46.9%) and the smallest percentage of the scores of students' mathematics learning achievement were in the interval <39.

Based on the result of descriptive analysis for student responses, the average score of positive statements was 3.59 with a percentage of 56%, while the average score for negative statements was 1.68 with a percentage of 44%. Thus, it can be concluded that students have a positive response to applying the reciprocal model.

From the hypothesis testing using SPSS 23 for windows, the score of significance for the posttest students taught using the reciprocal learning model was 0.01, which is smaller than 0.05. This means that the mathematics learning achievement of students taught using the reciprocal learning model was higher than that of students conducted using the direct instruction model.

These results are in line with the result of previous studies, such as by Reski Awaliah and Ridwan Idris [4], which showed that the use of the reciprocal learning model had a positive influence in improving mathematics learning achievement for class VIII students at MTSN Balang-balang, Bontomarannu District, Gowa Regency. In addition, previous research by Tatang Bagus and Nanang Khuzaini [1] also showed that using the reciprocal learning model could improve understanding of learning mathematics concepts because this model aims to make students learn quickly through an independent learning process. Furthermore, Gita, Dantes, and Sariyasa [5] also stated that the reciprocal learning model provides opportunities for students to learn independently, creatively, and more actively.

### 4. CONCLUSION

Based on the results and discussion of this study, it can be concluded that the mathematics learning achievement of students who are taught using the reciprocal learning model is higher than that of students who are taught using the conventional learning model.

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