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THE IMPROVEMENT OF STUDENTS' MATHEMATICAL COMMUNICATION ABILITY AND LEARNING INTEREST ON JUNIOR HIGH SCHOOL THROUGH THE APPLICATION OF RECIPROCAL TEACHING

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ABSTRACT

This research is an experiment which aims to examine improving the mathematical communication skills and interest in learning of junior high school students in set material by implementing the reciprocal teaching learning model. The problem behind this research is that students' mathematical communication skills and interest in learning in set material are still in the low category, so learning alternatives are needed that can develop students' mathematical communication skills and interest in learning. The research method used is Pre-Experimental with a one group pretest-posttest research design. The population in this study were all class VII students in one of the private junior high schools in Karawang Regency. The sample in this research was 25 students with a purposive sampling technique. The instrument used is a communication skills test and a non-test in the form of a learning interest questionnaire. Based on the analysis of the data obtained, it shows that students' mathematical communication skills after implementing the reciprocal teaching model are better, namely from 8.32 to 75.32 and students' interest in studying set material after using the reciprocal teaching model is 60% in the low interest category and 40% with the high category which was previously 32% in the very low category and 68% in the low interest category. Thus, it can be concluded that the application of the reciprocal teaching model can improve the mathematical communication skills and interest in learning of class VII SMP students in set material, although not optimally.

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INTRODUCTION

Mathematics is a basic science that must be studied at every level of education and is the basis for the development of science and information technology which has an important role in the development of students' thinking power. Apart from that, studying mathematics also has a very important role in answering everyday problems. One of them is the set material. This material plays an important role in developing students' potential in analyzing an event and can help students to think rationally, carefully and independently. Research by Dwi Listiana & Sutriyono (2018) stated that 68.9% showed errors in stating sets, errors in understanding problems related to universal sets and parts as well as errors in set operations. Difficulty in set material is because students cannot yet express sets, set symbols and cannot identify existing problems. Therefore, mathematical abilities are needed, one of which is mathematical communication skills.

This is also emphasized in the objectives of mathematics learning, namely that students must have the ability to communicate ideas using symbols, tables, diagrams or other media to clarify situations or problems (Aryanti, 2020). Apart from that, the importance of mathematical communication was also expressed by Umar (Ramadhan & Minarti, 2018) who stated that mathematical communication needs to be developed by students in honing their mathematical thinking skills both orally and in writing so that students can provide appropriate responses between students. However, in reality, students' mathematical communication skills are still relatively low. The research results of Yanti et al. (2019) stated that indicators of communication skills in relationship and function material have not been fulfilled optimally, such as errors in indicators expressing a situation, picture, diagram or real object into language, symbols, ideas or mathematical models in the medium category, namely 16 students, next errors in explaining ideas, situations and relationships verbally and in writing were still in the low category, as many as 21 students, then the indicators for listening, discussing and writing about mathematics were in the low category, namely 20 students.

A part from that, research from Nofrianto et al. (2017) revealed that students' communication skills in algebra material still show students' inability to use students, provide clear definitions of the symbols used, which causes errors in modeling the problems they face. According to Wahyuni et al. (2019) stated that students' mathematical communication skills in junior high school students are still very low, namely as many as 65% of students cannot explain mathematical ideas, express and complete events related to daily life in mathematical symbols. In research conducted by Ramadhan & Minarti (2018), it was found that junior high school students' communication skills in circle material were still not good. This was seen from 25 students, but only 1 student had sufficient mathematical communication skills. Apart from that, based on the results of observations made by researchers, it shows that the average student communication skills are still low, namely 85% of students cannot solve questions well and correctly. This is due to several domain factors, that factor is students' interest in learning which has not yet emerged. According to Gie (Robiah et al., 2019) revealed that one of the causes of student failure is a lack of interest.

According to Herzamzam (Khasanah & Nugraheni, 2022), interest in learning is a motivation in humans that creates interest and even attention to participate in the learning process. Apart from that, Friantini & Winata (2019) revealed that the factors that influence the emergence of interest in learning are 1) lessons that attract students if there is a visible connection between the lesson and reality; 2) assistance given by teachers to their students in achieving certain goals; 3) opportunities given by teachers to students to play an active role in the teaching and learning process; 4) the teacher's attitude of trying to increase student interest. In connection with the importance of communication skills and students' interest in learning in mathematics lessons on set material, teachers strive for learning by implementing learning models that can encourage students to practice mathematical communication

skills and students' interest in learning such as learning models.reciprocal teaching.

Model reciprocal teaching according to Westera (Mahadewi et al., 2020) there are three purposes, namely as a guide in developing good understanding skills, as a process of interaction involvement to develop communication skills among students and between students and teachers, and as a training medium for using various other people's points of view. when solving a problem. Research by Haerini et al. (2019) shows that there are significant differences in learning interest between students who use modelsreciprocal teaching better than using the usual learning model. In Astuti & Purwanto's (2021) research, it shows that there is an influence of 0.41 which is included in the medium category on students' mathematical communication skills in classes that use the learning model.reciprocal teaching. Furthermore, research from Ammy (2022) states that the learning modelreciprocal teaching has a positive influence on mathematics learning outcomes, which can be seen from the average value of the control class of 79.84375, while the average value of the experimental class which uses this model is 90.46875.

Based on this description, the author is interested in conducting research related to students' communication skills and interest in learning using learning modelsreciprocal teaching. The aim is to determine the increase in students' mathematical communication skills and interest in learning through the application of learning models reciprocal teaching.

METHOD

Method study This is Pre-Experimental with design research used is one group pretest and posttest design. According to Sugiyono (2012) design This depicted as following :

Pretest	Treatment	Posttest
O_1	X	O_2

Figure 1. One Group Pretest and Posttest Design

Population study is whole student class VII in a private junior high school in the district Karawang, amounting to 50 students. Election sample use technique purposive sampling as many as 25 students . Data collection using instrument test and non- test. Instrument notes form hot interest learning which consists of 8 statements. As for indicators interest Study that is feeling happy, interested students , attention in learning and engagement student. Besides that is, research it also uses instrument test shaped question description ability communication mathematics consisting of 6 (six) adjusted questions with indicator ability communication mathematical according to Sumarmo namely:

a) State things real, situation, and event daily to in form of mathematical models (images, tables, diagrams, graphs , expressions , algebra)
b) Explain ideas and mathematical models (images , tables , diagrams, graphs , expressions , algebra) to in Language normal .
c) Explain and create statement studied mathematics
d) Listen , discuss and write about mathematics
e) Read with understanding something presentation written
f) Make conjecture , composing argument , formulate definitions and generalizations .

The test instrument is tested first and then analyzed for validity, reliability, distinguishing power and difficulty index to guarantee the quality of this instrument.

The data obtained was in the form of quantitative data and qualitative data and then analyzed using

statistical tests in the form ofsoftware IBM SPSS 25 andMicrosoft Excel. Before determining statistical tests, the data is tested for normality and homogeneity first. Apart from that, the learning interest data was categorized both before and after implementing the learning modelreciprocal teaching. The following is the categorization of students' learning interests according to Trygu (2021):

Table 1. Categorization of Learning Interests

Category	Criteria
Have no interest	X = 0%
Very low interest	0% < X ≤ 25%
Low interest	25% < X < 50%
Moderate interest	X = 50%
High Interest	50% < X ≤ 75%
Interest is very high	75% < X ≤ 100%

RESULTS AND DISCUSSION

Results

Based on the results of data processing from research results on improving mathematical communication skills through the application of modelsreciprocal teaching, below are the results of descriptive statistical calculations pretest andposttest:

Table 2. Results of Descriptive Statistical Data AnalysisPretest-Posttest

	Pretest				Posttest			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Communication Skills	8.32	3.45	4	16	75.32	6.16	64	88

Based on table 2, it is found that the average resultspretest students' communication skills before implementing the learning modelreciprocal teaching amounted to 8.32, whereas after applying the learning modelreciprocal teaching to 75.32. It can be seen that there is a difference in the average before and after applying the modelreciprocal teaching so it can be concluded that there has been an increase in mathematical communication skills through the application of the modelreciprocal teaching.

Quantitative and qualitative data were also analyzed using inferential statistics software IBM SPSS 25. Before statistical tests, a normality test was carried out for the datapretest-posttest. The following are the results of statistical testing for data normalitypretest-posttest communication skills:

Table 3. Data Normality Test Results Pretest-Posttest Communication Skills

	Shapiro-Wilk	
	Pretest	**Posttest**
Communication Skills	0.003	0.223

The following is the data normality test hypothesispretest-posttest mathematical communication skills:

H_0 = data is normally distributed

H_1 = data is not normally distributed

The test criteria are if Sig. > 0,05 so H_0 accepted.

Based on table 3 above with testsShapiro-Wilk on datapretest andposttest mathematical communication of 0.003 and 0.223. Based on testing criteria for datapretest H_0 rejected means value data pretest not normally distributed while the dataposttest H_0 accepted means value data posttest normally distributed. Because one of the data was not normally distributed, a test was carried out

Wilcoxon. Following are the test results Wilcoxon pretest-posttest student communication skills:

Table 4. Test results Wilcoxon Pretest-Posttest

Communication Skills

	Posttest - Pretest
Z	-4.383[b]
Asymp. Sig. (2-tailed)	.000

The following is the test hypothesisWilcoxon mathematical communication skills:

$H_0 : \mu_1 \geq \mu_2$ = Students' mathematical communication skills are no better after applying the modelreciprocal teaching

$H_1 = \mu_1 < \mu_2$ = Students' mathematical communication skills are better after applying the modelreciprocal teaching

The test criteria are if Sig.> 0,05 so H_0 accepted.

Based on test resultsWilcoxon In table 4, the significance value obtained is 0.000/2 = 0.000. The data shows that value Sig. < 0.05 until H_0 is rejected, it is concluded that students' mathematical communication skills are better after applying the modelreciprocal teaching. Thus, the application of the modelreciprocal teaching can improve students' mathematical communication skills on set material. Learning modelreciprocal teaching encourage students to be more active so that mathematical communication skills also increase.

Next, the results of data processing from research results on student learning interest after implementing the modelreciprocal teaching, The following are the results of descriptive statistical calculations before and after implementing the modelreciprocal teaching:

Table 5. Results of Descriptive Statistical Data Analysis of Before and After Questionnaires

Model Implementation Reciprocal Teaching

	Before				**After**			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Interest in Learning	20.2	3.06	13	28	28.96	4.88	22	37

Based on table 5, the average results of the student interest in learning questionnaire before applying the modelreciprocal teaching as much as 20.2 while after the modelreciprocal teaching to 28.96. This shows that there is an increase in student interest in learning after implementing the modelreciprocal teaching on set material. Next, data on categorization of students' learning interests before and after implementing the model reciprocal teaching as follows:

Table 6. Categorization of Student Learning Interests

Before		**After**	
Category	**Percentage**	**Category**	**Percentage**
Very low interest	32 %	Low interest	60 %
Low interest	68 %	High interest	40 %

Based on table 6, students' learning interest before implementing the modelreciprocal teaching in the very low category it was 32%, namely 8 people, and in the low interest in learning category it was 68%, namely 17 people. Next, students' interest in learning after implementing the modelreciprocal teaching in the group material in the low category it was 60%, namely 15 people, and in the high category it was 40%, namely 10 people.

Discussions

Based on the research results, it shows that there is an increase in mathematical communication skills after applying the modelreciprocal teaching which is very significant, which can be seen from the average value before learning of 8.32 and after learning by applying this model it is 75.32. This is also reinforced by the findings in Putri's (2016) research which states that the mathematical communication of students who receive learning with the approach increasesreciprocal teaching significantly better i.e. onpretest the average value is 34.53, meanwhileposttest the average value is 73.39. Apart from that, research by Verawati Dangus & Jelatu (2019) revealed that the use of modelsreciprocal teaching more effective than the CTL model on students' communication skills.

Increasing students' mathematical communication skills after applying the modelreciprocal teaching because during the learning process it is carried out according to the 4 stage modelreciprocal teaching which students do in groups, namelyquestioning, clarifying, predicting, andsummarizing. In the model, students are guided to understand each solution in the LKPD sheet and express their thoughts and concepts so that they can help students develop their communication skills both during discussions and when presenting the results of discussions in front of the class. This is reinforced by Doolittle, Hicks, Triplet, Nichols, & Young (Verawati Dangus & Jelatu, 2019) who state that summarizing provides encouragement to create context for understanding the specifications of a text so that students are trained to think and write down information obtained from the problem presented. and communicate it.

In addition to improving students' communication skills, the modelreciprocal teaching It can also increase students' interest in learning mathematics, especially in set material. This can be seen in the average value of students' learning interest before using the modelreciprocal teaching in the very low and low categories, but after using this model the categories of high and low learning interest. Although there are still students in the category of low interest in learning, if we look at the average value of students' interest in learning, there is an increase, namely 20.2 to 28.96. This was triggered by the enthusiasm of students in carrying out mathematics learning activities and starting to reduce the habit of playinggame online in class (Haerini et al., 2019). Apart from that, according to the ARCS theory (Attention, Relevance, Confidence, Satisfaction) (Niken Vioreza et al., 2020) that students will be motivated if what they learn attracts attention, is relevant to their needs, and can increase their self-confidence. Based on the results of the researcher's observations, students seemed more enthusiastic in learning and studied the following material independently.

In general, the implementation of learning uses models reciprocal teaching according to the researcher's plan. This is confirmed by the results posttest which shows the average score of mathematical communication skills after applying the model reciprocal teaching better, and shows that there are differences in students' learning interest between before and after implementing the normal learning model.

CONCLUSION

Based on results the above analysis, concluded that ability communication mathematics and interests Study student to lesson mathematics especially in material set with apply learning models reciprocal teaching more Good than apply learning normal. Reciprocal teaching model research is necessary done with aspect cognitive other like understanding concept, solution problems and so on. Math teacher can implementing the reciprocal teaching model in classroom learning considering this model influential positive to ability communication mathematics and interests Study student.

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