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APPLICATION OF THE PEER TUTOR METHOD TO IMPROVE MATHEMATICAL COMMUNICATION SKILLS IN CLASS X STUDENTS

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ABSTRACT

This study aims to determine students' mathematical communication abilities through peer tutoring methods. The research method used is experimental research with a research design that is one group pretest-posttest. The population and sample of this study were class X MIPA students of SMAN 1 Lelea with a total of 20 students. The technique used in determining the sample is by using non-probability sampling technique. The instruments used in this study were test sheets for mathematical communication skills and student response questionnaires. The results showed that learning mathematics using peer tutoring methods can provide maximum results, namely that students' mathematical communication skills can increase, based on the average N-gain score of 0.72 in the high category. In addition, the results of the study also show that learning mathematics using peer tutoring methods can improve students' mathematical communication skills significantly. From the results of the N-gain test obtained, the peer tutor learning method can improve students' mathematical communication abilities. And for the results of the students' responses, namely students giving a good response to learning using the peer tutoring method with an average percentage of students using the peer tutoring method of 68.85%. Based on the results of the research that has been done, it can be concluded that this peer tutoring method can be used in learning mathematics in the classroom.

Keywords: Mathematical Communication Ability, Peer Tutor Method, Students' Mathematical Communication Ability

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PRELIMINARY

Mathematical communication skills have a very important role in learning mathematics. The importance of mathematical communication skills is because mathematical communication skills can make it easy for students to communicate with others and solve problems in mathematics learning (Fitriani & Latifah, 2021). According to Baroody (Maulyda, 2020), mentioned that there are 2 important reasons that make communication in mathematics learning need to be improved among students. First, mathematics as language, meaning that mathematics is not just a tool to aid thinking, a tool

for finding patterns, or solving problems or drawing conclusions. But mathematics is also "an invaluable tool for communicating a variety of ideas clearly, precisely, and succinctly".

This mathematical communication ability can train their mathematical thinking skills and develop students' understanding of mathematics. According to Fitriana & Prabowo (2018) argues that mathematical communication is a person's ability to express their thoughts or ideas, and is responsible for listening, interpreting, asking, and interpreting one idea with another in solving a problem both in discussion groups and in class. Communication is a way to share ideas and clarify understanding. Through this communication ideas become objects that can be reflected, improved, discussed, and developed. The communication process can also help build meaning and permanence ideas and can generalize or explain ideas (NCTM, 2000). With the ability of mathematical communication, teachers can understand how students' abilities in mathematical communication when learning in class (Handayani et al., 2018).

In fact, mathematical communication skills in Indonesia tend to be low and not as expected (Sari & Rahadi, 2014). At the time before the research was carried out, mathematical communication skills in the schools studied had low communication skills. The low ability of mathematical communication in schools can be seen from the learning outcomes of students who are still lacking. In addition, the low mathematical communication skills of students can be seen from the results of research by Wijayanto et al (2018), about the analysis of mathematical communication skills of junior high school students. Found that students' mathematical communication skills are still relatively low. In this case, students have difficulty in solving problems with indicators of making conjectures, compiling arguments, formulating definitions and generalizations, besides that students also have difficulty in solving problems with indicators of reexpressing a description of mathematical paragraphs in their own language. Based on the results of the study, students' mathematical communication skills are still low.

The low mathematical communication ability of students is influenced by several factors, one of which is in the use of learning methods in class which is still monotonous. The method that is often used in classroom learning is the lecture method, especially in mathematics learning. So that students have difficulty in communicating their mathematical ideas. This is supported by Sari (2017), who stated that the learning method that is often applied in schools is to use expository learning methods, where learning tends to be dominated by teachers as drivers of information and only given explanations to students while students tend to be passive and only listen to what is explained by the

teacher. This can result in students' mathematical communication skills being not optimal, because students are less involved in learning in class. For students' communication skills at the research site, students' communication skills are still lacking, this is based on interviews with mathematics teachers at schools that I will examine. Communication skills in schools are still lacking because students are less active and less motivated in learning mathematics. Therefore, teachers need to involve students in classroom learning so that their mathematical communication skills become optimal.

There needs to be a learning method that makes students become more active in learning mathematics. One learning method that can provide opportunities for students to become more active in communicating their knowledge is to use peer tutor learning methods (Febianti, 2014). According to Sukrawati et al (2021), the peer tutor method is a learning process that uses a learning method, which in this learning process involves someone to provide assistance and tutoring to others in learning activities. The peer tutor learning method is a learning method where in this learning utilizes students who have more privileges in classroom learning, this privilege can help provide explanation, guidance, and direction to students who have less or slow intelligence in receiving lessons in classes that are almost the same age (Abrianto, 2019). In addition, a peer tutor is a student in a class who has abilities above the average of its members who have the task of helping their friends who have difficulty in doing learning in class or difficulty in understanding the subject matter (Maulana et al, 2013).

According to Arikunto (2002), a student will more easily accept information given by friends because there is no reluctance or embarrassment to ask. The peer tutor learning method requires students to have discussions with their groups then in this discussion will be guided by one tutor who has been chosen. In this discussion, students can convey (communicate) the results of their mathematical thoughts (ideas) by providing explanations and reasons using their own language so as to build and improve the students' mathematical communication skills.

According to Febianti (2014), the steps of the peer tutor method are as follows: 1) Choose material that allows the material to be learned by students independently. Teaching materials are divided into sub-sub-materials; 2) Divide the students into heterogeneous small groups, as many sub-sub-materials as the teacher will deliver. Clever students are dispersed in each group and act as peer tutors; 3) Each group was given the task of studying one sub-material. Each group is assisted by students who are good at it as peer tutors; 4) Give them enough time for preparation, both in class and outside the classroom;

5) Each group through its representative submits sub-material in accordance with the tasks that have been given. The teacher acts as the main resource person; 6) After all groups have delivered their assignments sequentially according to the order of the sub-material, give conclusions and clarifications if there are student understandings that need to be straightened out.

Much research has been done on the mathematical communication skills of students and peer tutors. As research conducted by Sritresna (2017) on improving students' mathematical communication skills and self-confidence through the 7E cycle learning model. In addition, research by Ahdiyat & Sarjaya (2015), regarding peer tutor methods to improve mathematics learning outcomes on data processing material. While research conducted by Rhmalia et al (2019) regarding the Application of Snowball Throwing Type Cooperative Model and Peer Tutors to Improve Mathematical Communication Skills and Learning Activity of Grade VIII Students. Although mathematical communication skills and peer tutor methods have been widely studied, in this study there is a problem, namely by combining mathematical communication skills with peer tutor methods. In addition, another novelty is in the subjects that the researchers studied, in previous studies the subjects chosen were more in junior high school students. And in this study, the subjects used were grade X high school students with material on Absolute Value Equality and Inequality. The correlation between mathematical communication skills with peer tutor methods is that with this peer tutor method students can communicate the results of their mathematical ideas by discussing with their peers so as to improve students' mathematical communication skills.

METHODS

The expected objectives can be achieved by the research is to determine the improvement of mathematical communication skills in grade X students by applying peer tutor learning methods, to find out whether the application of peer tutor methods can significantly improve students' mathematical communication skills, and to find out student responses after learning using peer tutor methods. In this study, the method used is the experimental research method. According to Sugiyono (2015), experimental research methods are defined as research methods used to look for the influence of certain treatments on others under controlled conditions.

Based on the formulation of the problem and the objectives of this study, the research design used is experimental research, with a research design in the form of one group pretest-posttest design. In this study there was no control class and the sample was not taken randomly, but the sample used was a class that had been formed without changing the existing structure Sanjaya (2013). The sampling technique used by researchers is non-probability sampling. non-probability sampling is a sampling technique that does not provide equal opportunities or opportunities for every element of population members to be selected as samples (Sugiyono, 2017). This design involves one group being given a pretest, given a treatment and then given a posttest. The success of the treatment is determined by comparing pretest and posttest scores (Darmadi, 2011). The treatment given is learning mathematics using the peer tutor method.

Table 1. Research Design Design

Group	***Pre-test***	**Treatment**	***Post-test***
Eksperimen	O1	X	O2

Information:

O1 : pretest value

O2 : postest value

X : learning treatment using peer tutor method

In this study, the participants involved were high school students of class X MIPA in the Indramayu area. In this study using 1 sample group, namely class X MIPA as an experimental class with a total of 20 students. In this study, the experimental class was given treatment, namely learning mathematics on the material of equations and inequalities of absolute values of one variable using peer tutor learning methods.

The test is used to retrieve data on the results of students' communication skills. The form of the test used is a test in the form of a description question, where these questions will be filled in by students in a sequential manner. The tests given in this study were pre-test and post-test. The purpose of this test is to get the final grade of the experimental class after being given learning with the peer tutor method.

The indicators that can be used to measure oral and written communication skills according to NCTM (2000) are, 1) The ability to explain mathematical ideas through oral, written, and demonstrate them and describe them visually; 2) The ability to understand, interpret, evaluate mathematical ideas both orally and in writing in other visual forms; 3)

Ability to use mathematical terms, notations and structures to present ideas, describe relationships and situation strategies.

According to Sumarno quoted by Triana et al. (2019), indicators of mathematical communication skills are 1) converting real objects, images, and diagrams into mathematical ideas; 2) Explain ideas, situations and mathematical relationships, orally or in writing with real objects, Figures, graphs and algebra; 3) State everyday events in mathematical language or symbols; 4) Listening, discussing, and writing about mathematics.

From several opinions about indicators of mathematical communication skills from several experts, there are many aspects of mathematical communication skills that must be examined. So in this study the indicators of mathematical communication skills used are :

Table 2. Mathematical Communication Ability Indicators

No	Indicators	Question Number
1	Express mathematical ideas and be able to analyze mathematical problems	**4**
2	State everyday events with mathematical language in presenting mathematical ideas in writing	**5**
3	Explain mathematical ideas and mathematical relations in writing with Figures, graphs, diagrams, and algebra	**3**
4	Analyze and evaluate mathematical ideas	**1**
5	Solve mathematical problems and be able to deduce the results of the problem	**2**

After giving the test questions, students work out a questionnaire that will be used to find out the application of the peer tutor method in class. According to Sugiyono (2015), questionnaire is a technique to collect data by giving a set of questions and written statements to respondents to answer.

Table 3. Question Trial Results

No	Validity	Reliability	Difficulty	Differentiating Power	Information
1	Valid	Reliable	Keep	Good	Used
2	Valid		Keep	Enough	Used
3	Valid		Keep	Enough	Used
4	Valid		Keep	Good	Used
5	Valid		Keep	Good	Used
6	Valid		Keep	Excellent	Used
7	Valid		Keep	Good	Used
8	Valid		Keep	Good	Used
9	Valid		Keep	Good	Used
10	Valid		Keep	Good	Used

From the calculation of reliability, difficulty and discriminating power of the questions, all reliable questions were obtained, the difficulty level of the questions was classified as medium, the discriminating power obtained data on 7 questions with good discriminating power, 2 questions with sufficient discriminating power, and 1 question with very good discriminating power. Based on the results of the validation of the question trial, the 10 questions can be used in the research test.

Before providing treatment in class using the peer tutor method, researchers determine in advance the students who will become tutors in classroom learning. According to Sujatmiko & Ponco (2005) in choosing students to become tutors in the implementation of peer tutors, namely choosing students who have more abilities than other friends, have the branic to communicate in receiving lessons delivered by the teacher, have awareness to help other friends, can accept and be liked by students who get peer tutor programs.

Student response questionnaire grid used to determine student responses to peer tutor learning methods. The grid can be seen in the table below:

Table 4. Student Response Questionnaire Grid

No	Observed aspects	Indicators	Item No		Sum
			(+)	(-)	
1	Attention	Student interest in learning mathematics	1	5	2
2	Initial Activities	Pre-learning preparation using the peer tutor method begins	2	4	2
3	Core activities	Student interest in discussion or group work with peer tutor methods	12	6	2
4	Pros/Cons of Peer Tutors	Student interest in learning mathematics with peer tutor methods	3	8	2
5	Learning achievement	Student achievement when using peer tutoring methods	7	10	2
6	Final Activities	Student interest in final learning or evaluation in learning	9	11	2
		Sum			12

Source: Indriani & Mutmainnah (2016)

RESULT AND DISCUSSION

The students' mathematical communication skills improvement test was used to see how much the peer tutor's method had an influence on students' mathematical communication skills. After the researcher gave the initial test questions, students were

given treatment in classroom learning using peer tutor learning methods. After treatment, researchers give a final test (post-test). The results of the recapitulation of the calculation can be presented in the following table:

Table 5. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	*Pretest*	44,45	20	10,38	2,32
	Posttes	84,15	20	6,72	1,50

Table 4 shows that the descriptive value of each variable, namely the pre-test, has an average value (mean) of 44.25 from 20 data. With the distribution of data (Std.Deviation) obtained is 10.38 with a standard error of 2.32. And in the final test (post-test) has an average value (mean) of 84.15 from 20 data. The distribution of data (Std.Deviation) obtained is 6.72 with a standard error of 1.50. This shows that the final test data (post-test) is higher than the initial test (pre-test). The average results data of pretest and posttest mathematical communication skills are presented in the figure below:

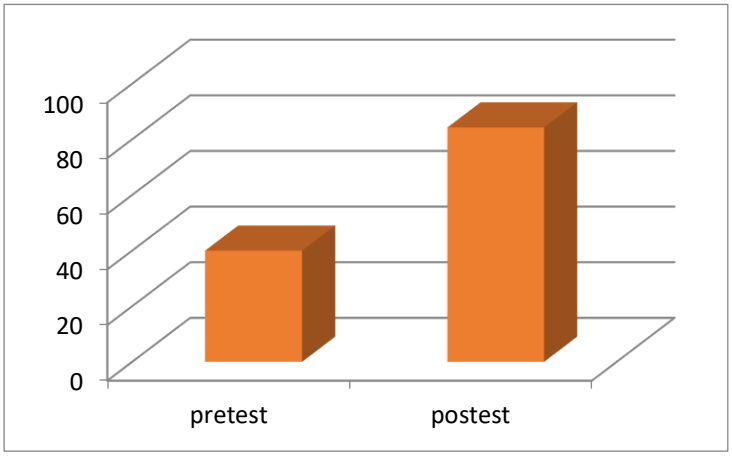

Figure 1. ***Pretest and Postest Results Graph***

Figure 1 shows the results of calculating the average Pretest and Postest obtained before learning and after learning using the peer tutor method. In the graph, there was an increase from pretest to posttest, where the pretest results got an average value of 44.45 and for the posttest results got an average value of 84.15.

The N-gain test was performed using SPSS.14 Software. The N-gain score is the difference between the posttest score and the pretest score. After all the data is collected to determine the improvement that occurs before and after learning with the treatment is calculated using the N-gain formula. According to Sudayana (2014), the N-gain test is a test used to determine the general Figure of increasing learning outcome scores between

before and after the implementation of a treatment. The N-gain index formula used is as follows:

$$N - gain = \frac{posttest - pretest}{skor\ \max - pretest}$$

The N-gain criteria are as follows:

Table 6. N-gain Value Criteria

N-gain	Interpretasi
N-gain < 0,30	Low
0,30 < N-gain < 0,70	Keep
N-gain > 0,70	Tall

Source: Hake (2002)

Data from research on improving students' mathematical communication skills on the material of equations and inequalities of absolute values of one variable are summarized in the table below:

Table 7. Results Data N-gain mathematical communication skills

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	20	0,51	0,88	0,72	,10510
Valid N (listwise)	20				

Based on the table above, it can be seen that the N-gain value with the highest value is 0.88 and the lowest value is 0.51. With an average score of 0.72 where based on the N-gain value criteria the results are included in the high category, so it can be seen that this peer tutor learning method can improve students' mathematical communication skills in class X MIPA.

Table 8. Paired Samples Test

	Paired Differences					Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
pretest - posttes	-39,70	8,08	1,80	-43,48	-35,91	19	,000

Table 7 shows the results of the tests performed. This can be known from the significant value (2-tailed). The significance value (2-tailed) of the results of the study is 0.000, based on the guidelines used, namely if the probability of significance is <0.05, from the results of the significance value of 0.000 < 0.05. Based on these results, there is an increase in significance or H0 is rejected and Ha is accepted.

Based on indicators of students' mathematical communication skills for each indicator has different results, namely:

1. Express mathematical ideas and be able to analyze mathematical problems in written form.

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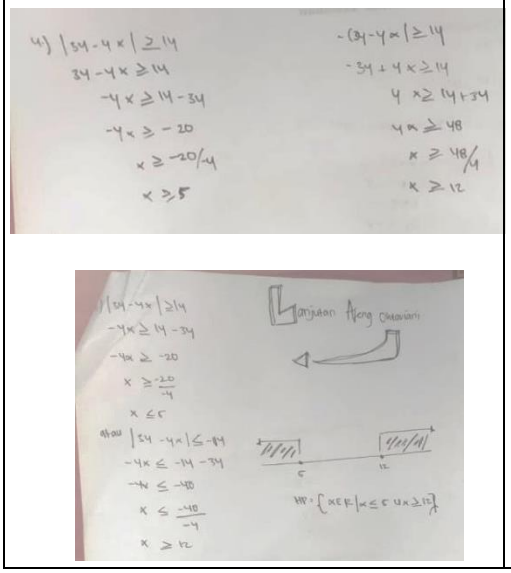
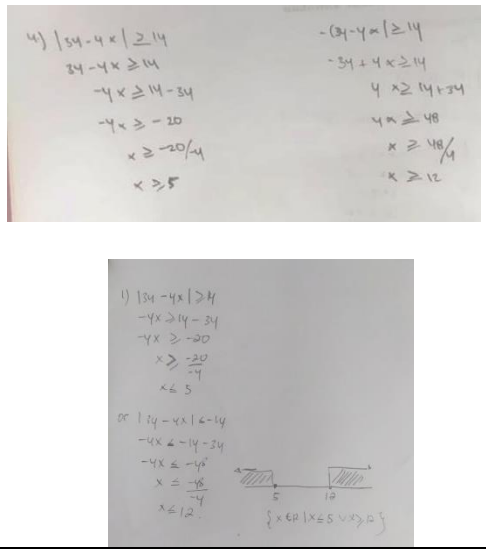
	

Figure 2. Student *Pre-test & Post-test Results*

Based on the Figure above, it can be seen that in the pre-test answers students can express mathematical ideas and can analyze mathematical problems in written form. After applying the peer tutor method, it can be seen that students are able to solve mathematical problems correctly by solving mathematical problems one by one then making interval lines and concluding them. This has significantly improved from the previous pre-test with the post-test that has been applied peer tutor method.

2. State everyday events with mathematical language in presenting mathematical ideas in writing.

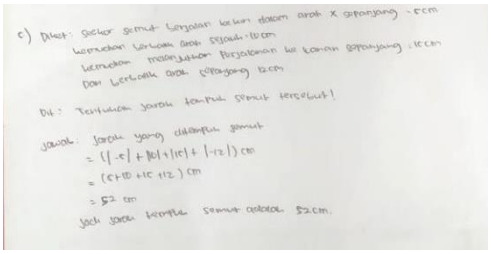
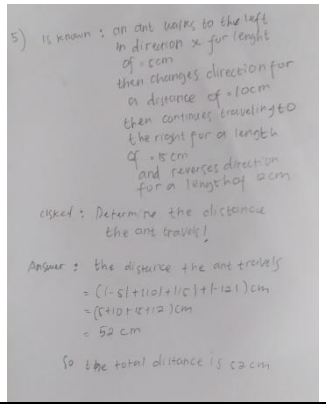
Indonesian Version	English Version
	

Figure 3. Student *Pre-test & Post-test Results*

Based on the Figure above, it can be seen that in the pre-test students cannot answer questions with these indicators, with this students are still unable to express daily events in mathematical language. This can be seen from the Figure of students not writing down the answer at all. After applying the peer tutor method, it can be seen that students are able to state everyday events in mathematical language in presenting mathematical ideas in writing, students begin to understand what is contained in the problem. This has significantly improved from the previous pre-test with post-test that has applied the peer tutor method.

3. Explain mathematical ideas in writing with Figures, graphs, diagrams, and algebra.

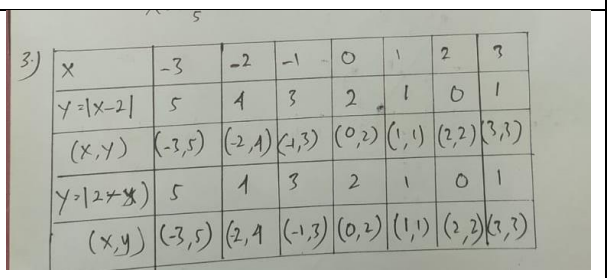
Indonesian Version	English Version
	

Figure 4. Student *Pre-test & Post-test Results*

In figure 4, it can be seen that in the pre-test answers students have not been able to explain mathematical ideas and mathematical relationships in writing with Figures. This can be seen from the pre-test answers where students only write down

what is known from the problem without solving the math problem and draw the graph. After applying the peer tutor method, it can be seen in the Figure that students are able to solve mathematical ideas and mathematical relations and students are able to describe a graph completely and correctly. This has significantly improved from the previous pre-test with post-tests that have been applied peer tutor methods.

4. Analyze and evaluate mathematical ideas.

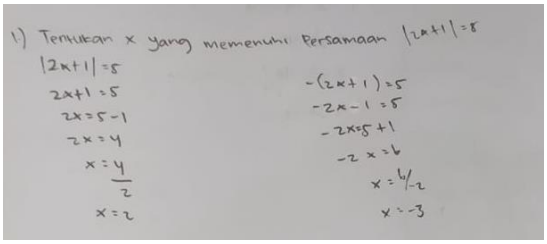
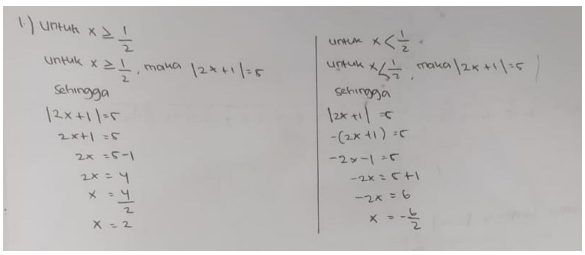
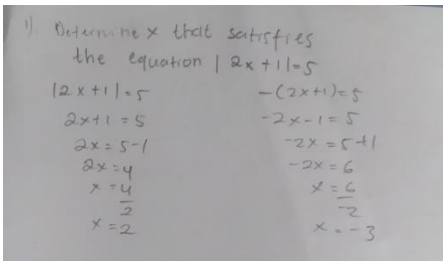
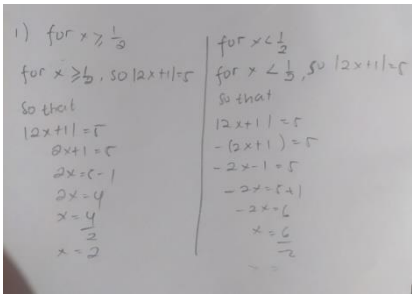
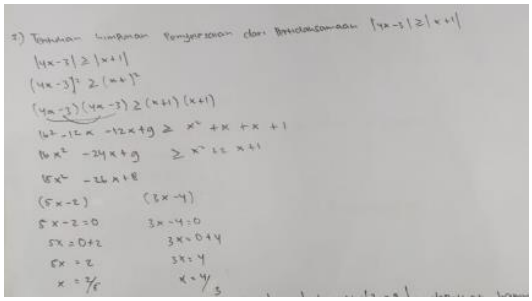
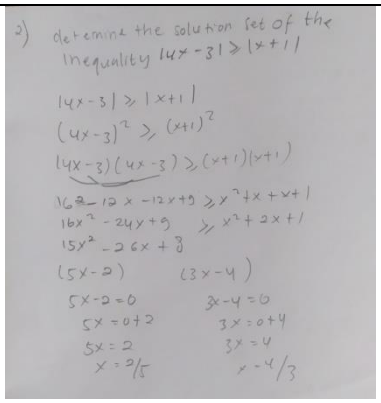
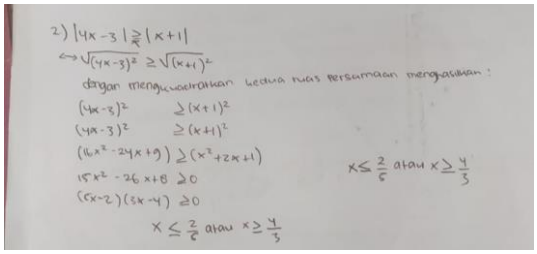
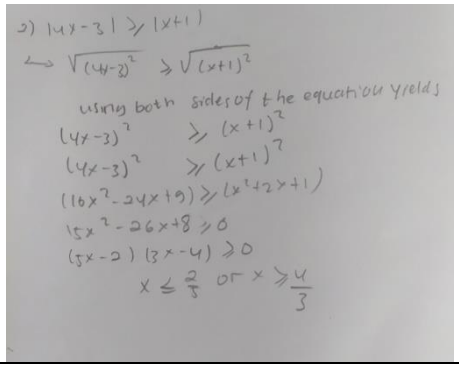
Indonesian Version	English Version
 	 

Figure 5. Student *Pre-test & Post-test Results*

In Figure 5, it can be seen that in the pre-test answers, students have a little understanding of the questions with these indicators. Students are already able to analyze and evaluate mathematical ideas but students are still not perfect in solving them. After applying the peer tutor method, it can be seen that students are able to analyze and evaluate the questions completely and correctly. This has significantly improved from the previous pre-test with post-tests that have applied the peer tutor method.

5. Solve mathematical problems and conclude the results of those problems.

Indonesian Version	English Version
	
	

Picture 6. Student *Pre-test & Post-test Results*

In Figure 6, it can be seen that the students' pre-test answers have been able to solve mathematical problems but are still unable to conclude from the results of the problem. This can be seen in the pre-test answer Figure where students can only write down the solution to a mathematical problem without writing a conclusion from the results of the problem. After being given the treatment of the peer tutor method, it can be seen that students are very capable of solving mathematical problems and students are able to conclude the results of these problems. This has significantly increased from the previous pre-test with post-tests that have been given treatment.

In learning activities that have taken place by applying the peer tutor method in class X with a total of 20 students. Then the researcher gave a response questionnaire in the form of statements that led to learning mathematics using the peer tutor method. This student response questionnaire is a total of 12 points of statements that must be given to students for responses to either positive or negative statements. The student response questionnaire is calculated using the following formula:

$$T\ X\ Pn$$

Information:

T = Total number of respondents who voted

Pn = Choice of Likert scale score numbers

To determine the interval using the highest score and percent intervention to find out the final result of the respondent using the following formula:

$$p = \frac{f}{n} x100\%$$

Information:

P = presentation of alternative answers

f = number of people filling in alternative answers

n = number of samples

Table 9. Scale of Positive and Negative Statements

Symbol	Information	Positive Score	Negative Score
TA	Totally Agree	4	1
A	Agree	3	2
D	Disagree	2	3
SD	Strongly Disagree	1	4

Source : Riduwan (2009)

The criteria for interpretation of questionnaire scores are presented in the table as follows:

Table 10. Questionnaire Percentage Criteria

Score (%)	Criterion
0%-21%	Disagree
22%-41%	Disagree Less
42%-61%	Enough
62%-81%	Agree
82%-100%	Totally Agree

Source: Sugiyono (2010)

So to find out the criteria of the 12 questionnaire statements can be known with the following table:

Table 11. Recapitulation of Student Response Results Data

No	Statement	Number of Respondents' Answers (people)				Score
		TA	A	D	SD	
1	I don't feel scared/anxious when learning maths with peer tutor methods	4	14	1	1	61
2	Before the lesson material starts, the teacher explains about the peer tutor method	3	17	0	0	63

No	Statement	Number of Respondents' Answers (people)				Score
		TA	A	D	SD	
3	With the peer tutor method, it is easier for me to understand the subject matter of mathematics	6	10	1	3	59
4	I don't need to study first if when learning mathematics the peer tutor method is used	0	8	8	4	56
5	I understand math material better if the teacher teaches	2	12	6	0	44
6	I recorded the math subject matter explained by the peer tutor	4	11	4	1	42
7	Learning outcomes are better after learning with peer tutor methods	4	14	2	0	62
8	After studying with the peer tutor method, I learned mathematics if there was a test only	0	5	7	8	63
9	I prefer at the end of the lesson to be given a math problem test	4	6	8	2	52
10	With the peer tutor method, my math test scores decreased	0	5	7	8	63
11	I prefer at the end of the lesson to be asked questions while playing the game	4	10	4	2	44
12	By using the peer tutor method I am no longer ashamed to ask questions about material that I do not understand, because my teacher is my own friend	3	8	7	2	52

The response of students who tend to agree is because the application of peer tutor methods in mathematics learning provides opportunities for them to be actively involved in mathematics learning. During the learning process students conduct discussions using the peer tutor method where students become active in talking about mathematics, students share ideas or ideas with other friends. So with this, students become happy during the learning process. Thus, it can be concluded that students respond positively to the application of peer tutor methods in mathematics learning. Based on table 11, the percentage of student responses to each indicator is then made by calculating the results of student responses obtained and then making a percentage. The average results of student responses can be seen in table 9 as follows:

Table 12. Percentage of Student Response Results

Kind	No	Score	Presentase	Criterion
Indicators of student response to peer tutor methods	1	61	76,25%	S
	2	63	78,75%	S
	3	59	73,75%	S
	4	56	70%	S
	5	44	55%	C
	6	42	52,50%	C
Indicators of student response to peer tutor methods	7	62	77,50%	S
	8	63	78,75%	C
	9	52	65%	S
	10	63	78,75%	S
	11	44	55%	C
	12	52	65%	S
	Average	**55,08**	**68,85%**	**S**

Information: A = Agree , E = Enough

Based on table 12, it is known that the percentage of student responses to the peer tutor method in mathematics learning resulted in an average percentage score of 68.85% with the "good" category.

There are several previous research results related to research conducted by researchers, namely researchers by Anderha & Maskar (2020) who examined students' mathematical communication skills and found results that students' mathematical communication skills were still included in the low to high category. In the research of Darkasyi et al. (2014), which examined the mathematical communication skills of students with the Quantum Learning Approach Learning, found the results of research that mathematical communication skills increase when given an approach in learning. And in Kusuma's (2017) research on the Effectiveness of Peer Tutor Learning to Improve Mathematical Communication Skills. The results showed that the ability of 15 mathematical communication increased when using peer tutor learning. The similarity of this study is that both examine communication skills.

The difference with the study is the sample and object studied. Based on previous research, mathematical communication skills in students are still relatively low, this is supported by Riyadi et al. (2021), in this study, researchers only gave questions to students without providing previous learning methods. According to Ansori & Sari (2016), mathematical communication skills in students increase by applying learning models in the classroom. In research conducted by Siallagan (2020), the results of his research show that using a learning model in class can improve students' communication skills. Based on previous research, it can be concluded that mathematical communication skills can be improved by applying learning methods or models in the classroom. Therefore, this study used the peer tutor method to improve mathematical communication skills.

CONCLUSION

Based on the results of research and discussion that have been obtained, it can be concluded that in classroom learning students' mathematical communication skills obtain an N-gain value of 0.72 where based on the criteria of N-gain values these results are included in the high category, so it can be known that the peer tutor method can improve students' mathematical communication skills in class X MIPA. The peer tutor's method of classroom learning can significantly improve students' mathematical communication skills. Based on the calculation of the significance test, a significance level (α) of 5% = 0.05 is obtained, then H0 is rejected and Ha is accepted. Students responded well to learning using the peer tutor method with an average percentage of students to the use of peer tutor learning methods of 68.85%.

REFERENCES

Abrianto, O. R. (2019). Penerapan Metode Tutor Sebaya Untuk Meningkatkan Hasil Belajar Dan Motivasi Belajar Siswa Pada Materi Trigonometri Kelas XI MIPA 4 SMA Negeri 1 Ambarawa. *Satya Widya*, *35*(1), 62–74. https://doi.org/10.24246/j.sw.2019.v35.i1.p62-74

Ahdiyat, M., & Sarjaya, S. (2015). Metode Tutor Sebaya untuk Meningkatkan Hasil Belajar Matematika Pada Materi Pengolahan Data. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *4*(1), 71–86. https://doi.org/10.30998/formatif.v4i1.141

Anderha, R. R., & Maskar, S. (2020). Analisis Kemampuan Komunikasi Matematis Siswa Pada Pembelajaran Daring Materi Eksponensial. *Jurnal Ilmiah Matematika Realistik*, *1*(2), 1–7. https://doi.org/10.33365/ji-mr.v1i2.438

Ansori, H., & Sari, E. M. (2016). Meningkatkan Kemampuan Komunikasi Matematis Siswa Melalui Model Pembelajaran Contextual Teaching and Learning Kelas VIII SMP. *EDU-MAT: Jurnal Pendidikan Matematika*, *4*(1), 32–39. https://doi.org/10.20527/edumat.v4i1.2287

Arikunto, S. (2002). *Dasar-Dasar Evaluasi Pendidikan*. Aksara.

Darkasyi, M., Johar, R., & Ahmad, A. (2014). Peningkatan Kemampuan Komunikasi Matematis dan Motivasi Siswa dengan Pembelajaran Pendekatan Quantum Learning pada Siswa SMP Negeri 5 Lhokseumawe. *Jurnal Didaktik Matematika*, *1*(1), 21–34. https://jurnal.usk.ac.id/DM/article/view/1336

Darmadi, H. (2011). *Metode Penelitian Pendidikan*. Alfabeta.

Handayani, R. D., Nandang, N., & Lestari, W. D. (2018). Perbandingan Kemampuan Komunikasi Matematis Siswa Antara Yang Menggunakan Metode Pembelajaran Talking Stick Dan Think Talk Write. *M A T H L I N E : Jurnal Matematika Dan Pendidikan Matematika*, *3*(2), 151–158. https://doi.org/10.31943/mathline.v3i2.99

Febianti, Y. N. (2014). Peer Teaching (Tutor Sebaya) Sebagai Metode Pembelajaran Untuk Melatih Siswa Mengajar. *Edunomic Jurnal Pendidikan Ekonomi*, *2 (2)*, 81–87. Retrieved from http://www.fkip-unswagati.ac.id/ejournal/index.php/edunomic/article/view/63/61

Fitriani, D., & Latifah, N. A. (2021). Komunikasi Matematis dalam Pembelajaran Matematika SMP. *Himpunan : Jurnal Ilmiah Mahasiswa Pendidikan Matematika*, *1*(1), 55–62. https://jim.unindra.ac.id/index.php/himpunan/article/view/3732/

Hake, R. R. (2002). Relationship of Individual Student Normalized Learning Gains in Mechanics with Gender, High School Physics, and Pretest Scores on Matematics and Spatial Visualization. *The Physics Education Research Conference;* Boise, Idaho; Augst 2002, 1-14. https://web.physics.indiana.edu/hake/PERC2002h-Hake.pdf

Indriani, A. M. F., & Mutmainnah, S. (2016). Metode Pembelajaran Tutor Sebaya Sebagai Upaya Meningkatkan Hasil Belajar Siswa. *Journal of Accounting and Business Education*, *2*(2), 1-12. https://doi.org/10.26675/jabe.v2i2.6057

Kusuma, A. C. (2017). Efektifitas Pembelajaran Tutor Sebaya Berbantuan Modul Untuk Meningkatkan Komunikasi Matematik Mahasiswa. *Cakrawala: Jurnal Pendidikan*, *11*(1), 1-8. https://doi.org/10.24905/cakrawala.v11i1.649

Maulana, N., Ibrahim, M., & Salah, M. (2013). Penerapan Pembelajaran Metode Tutor Sebaya dan Learning Contracts untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran Matematika Kelas IV A MI Islamiyah Sukun Malang. (*Skripsi, UIN Maulana Malik Ibrahim*). http://etheses.uin-malang.ac.id/7255/

Maulyda, M. A. (2020). *Paradigma Pembelajaran Matematika Berbasis NCTM* (Issue January). CV IRDH Malang.

NCTM. (2000). *Principles and Standards for School Mathematics*. NCTM.

Rahmalia, Y., Sunismi, & Walida, S. E. (2019). Penerapan Model Kooperatif Tipe Snowball Throwing dan Tutor Sebaya untuk Meningkatkan Kemampuan Komunikasi Matematis dan Keaktivan Belajar Siswa Kelas VIII. *JP3 Jurnal Penelitian, Pendidikan Dan Pembelajaran*, *14*(7), 50–56. https://jim.unisma.ac.id/index.php/jp3/article/view/3801/3415

Riduwan. (2009). *Skala Pengukuran Variabel-Variabel Penelitian*. Alfabeta.

Riyadi, S., Noviartati, K., & Abidin, Z. (2021). Kemampuan komunikasi matematis tulis siswa Samin dalam memecahkan masalah geometri. *Ethnomathematics Journal*, *2*(1), 31–37. https://doi.org/10.21831/ej.v2i1.36192

Sanjaya, W. (2013). *Penelitian Pendidikan, Jenis, Metode dan Prosedur*. Kencana Prenada Media Group.

Sari, L. S. P., & Rahadi, M. (2014). Pembelajaran Berbasis Masalah Untuk Meningkatkan Kemampuan Komunikasi Matematika Siswa Sekolah Menengah Pertama. *Jurnal Pendidikan Matematika*, *3*(3), 143–150. https://media.neliti.com/media/publications/226637-pembelajaran-berbasis-masalah-untuk-meni-34f4f621.pdf

Sari, A. K. (2017). Perbedaan Hasil Belajar Matematika Peserta Didik Menggunakan

Metode Pembelajaran Matematika Realistik dan Metode Ekspositori pada Materi Relasi dan Fungsi di Kelas VIII SMPN 205 Jakarta. *Jurnal Buana Pendidikan*, *24*, 119–125. https://doi.org/10.36456/bp.vol13.no24.a765

Setiana, Sugeng Sutiarso, E. Y. H. (2016). Efektivitas Program Catch Berbasis Tutor Sebaya ditinjau dari Komunikasi Matematis Siswa. *Jurnal Pendidikan Matematika Universitas Lampung, 5(2)*, 1-12. http://dx.doi.org/10.17977/jptpp.v3i8.11463

Siallagan, R. B. (2020). Upaya Meningkatkan Meningkatkan Kemampuan Komunikasi Matematis Siswa dengan Pembelajaran Two Stay Two Stray. *Sepren*, *2*(1), 36-44. https://doi.org/10.36655/sepren.v2i1.337

Sritresna, T. (2017). Meningkatkan Kemampuan Komunikasi Matemtasis dan Self Confidence Siswa Melalui Model Pembelajaran Cycle 7E. *Jurnal Mosharafa*, *6*(3), 17–22. http://jurnal.fmipa.unila.ac.id/index.php/semirata/article/view/882

Sudayana, R. (2014). *Statistika Penelitian Pendidikan*. Alfabeta.

Sugiyono. (2010). *Metode Penelitian Bisnis (Pendekatan Kuantitatif, Kualitatif dan R&D)*. CV. Alfabeta.

Sugiyono. (2015). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Sujatmiko, P. (2005). *Matematika Kreatif Konsep dan terapannya untuk Kelas VII SMP dan MTs*. Tiga Serangkai.

Sukrawati, N. K., Aria, K., Dewi, P., Mariani, N. N., Hindu, U., Gusti, N. I., Sugriwa, B., & Belajar, M. (2021). Implementasi Tutor Sebaya dalam Menumbuhkan Minat Belajar Siswa SD Negeri 4 Kubu Bangli pada Masa Pandemi Covid - 19. *ADI WIDYA : Jurnal Pendidikan Dasar*, *6*(3), 187–197. https://doi.org/10.25078/aw.v6i2.2828

Triana, M., Zubainur, C. M., & Bahrun, B. (2019). Students' Mathematical Communication Ability through the Brain-Based Learning Approach using Autograph. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, *4*(1), 1–10. https://doi.org/10.23917/jramathedu.v4i1.6972

Wijayanto, A. D., Fajriah, S. N., & Anita, I. W. (2018). Analisis Kemampuan Komunikasi Matematis Siswa Smp Pada Materi Segitiga Dan Segiempat. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *2*(1), 97–104. https://doi.org/10.31004/cendekia.v2i1.36

Fitriana, R. W., & Prabowo, A. (2018). The Analysis Of Student's Mathematical Communication Ability Viewed From Learning Styles Through Project Based Learning Models On Cylinder And Cone Materials ARTICLEINFO. *Unnes Journal of Mathematics Education*, *7*(3), 156–163. https://doi.org/10.15294/ujme.v7i1.22165