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The Effect of Self-Confidence and Mathematics Anxiety on Mathematical Communication Ability of Class IX Students of Madrasah Tsanawiyah

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Abstract: This research was conducted at MTsN 1 Mataram in the 2023/2024 school year with the aim of seeing the effect of self-confidence and math anxiety on student's mathematical communication skills. This type of research is descriptive quantitative research with ex post facto method. The population of this study was class IX MTsN 1 Mataram. In determining the sample, probability sampling technique with cluster random sampling type was used. The sample in this study were students of class IX-4 MTsN 1 Mataram, totaling 32 students. The instruments used in this study were self-confidence questionnaire, math anxiety questionnaire, and mathematical communication ability test. The data analysis technique used was descriptive and inferential statistical analysis. The results of data analysis showed that: (1) The average self-confidence of class IX students of MTsN 1 Mataram in the 2023/2024 school year is in the medium category, where the largest frequency is in the low category with a percentage of 37.50%. The average student math anxiety is in the low category with the largest frequency in the low category at 53.13%. And the average mathematical communication ability of students is in the high category with the largest frequency in the medium category at 40.63%. (2) There is a positive and significant influence between self-confidence on student's mathematical communication skills by 24.9%. (3) There is a negative and significant influence between math anxiety on student's mathematical communication skills by 25.6%. (4) There is a significant influence between self-confidence and math anxiety together on student's mathematical communication skills by 36.4%.

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Introduction

Mathematics is a tool that can simplify abstract situations into concrete by using mathematical ideas, language and generalizations to facilitate problem solving. Math is one of the lessons that contains numbers, symbols and symbols. Therefore, an ability to connect numbers, symbols, and symbols in learning mathematics is needed. The required ability is mathematical communication ability.

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Mathematical communication is an important part of learning mathematics because through communication, students can relate abstract mathematical ideas and language by providing opportunities for them to express their ideas in solving problems through arguments, writing, and painting pictures. Turmuzi et al. (2021:51) stated that communication is an important part of mathematics, because through communication students can exchange thoughts and ideas during the process of learning mathematics.

Although mathematical communication skills play an important role in mathematics, in reality the mathematical communication skills possessed by students still need attention. The results of research conducted by Ulymaz et al. (2022:2597) revealed that student's mathematical communication skills are still relatively low. This is shown based on the questions tested, where as many as 70.37% of students are still unable to master the three indicators of mathematical communication skills. This is in line with the results of research by Fitriani et al. (2022:1552) which shows that the level of mathematical communication skills of students in the good category is only 17.64%, the sufficient category is 47.05%, and the category is less 35.30%. So it is concluded that student's mathematical communication skills are still in the sufficient category.

In connection with this, the researcher conducted an interview with one of the mathematics teachers at MTsN 1 Mataram on July 12, 2023. From the results of the interview, the researcher obtained information that some students in class IX MTsN 1 Mataram in the 2023/2024 school year had mathematical communication skills that were still relatively low. This can be seen when students are faced with a story problem, students are not accustomed to writing what is known and asked from the problem before finding a solution to the problem, so students often misinterpret the meaning of the problem.

In addition to cognitive aspects, there are affective aspects that support in improving mathematical communication skills, namely self-confidence (Muniroh et al., 2018:480). Self-confidence plays an important role in actualizing the potential possessed by students and with self-confidence, students will be more motivated and prefer to learn mathematics. Therefore, every student needs to have high self-confidence when learning mathematics (Ghurfah et al., 2023:11).

The important role of self-confidence in learning is unfortunately not in line with the facts that occur in the field. The results of research conducted by Arofah & Hidayati (2021:333) show that the self-confidence that students have when learning mathematics has not met the indicators of self-confidence. This is in line with research conducted by Lubis et al. (2020:5) in one of the high schools in Langkat Regency, North Sumatra, which shows that the average percentage of the questionnaire as a whole is 11.42% and it is known that only a small proportion of students have self-confidence.

Based on the results of interviews conducted by researchers with one of the mathematics teachers at MTsN 1 Mataram on July 12, 2023, information was obtained that the self-confidence possessed by several ninth grade students of MTsN 1 Mataram in the 2023/2024 school year was still low. This is known when the teacher appointed the student to come forward to solve the problem given in front of the class, he just fell silent and took a long time to write the answer. In the end, the student gave up and chose to ask his friend about the answer to the problem he was working on. In addition, when given individual assignments, some students will tend to see and follow the answers of their friends who are considered smart. This is because he is not confident in his own abilities.

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In addition to self-confidence, one of the affective domains that also supports student's mathematical communication skills is mathematical anxiety. Mathematical anxiety can be defined as a sense of tension and worry that a person experiences when feeling uncomfortable when dealing with and working on math problems (Nasution & Nurdalilah, 2018:16). Salvia et al. (2022:358) suggested that the level of mathematics anxiety experienced by Indonesian students tends to be still high. In line with the results of research by Putri et al. (2019:1396) which revealed that most students have math anxiety in the moderate category with a percentage of 71.4%.

The results of previous studies are in line with the results of interviews conducted by researchers with mathematics teachers on July 12, 2023. From the results of the interviews conducted, the researcher obtained information that there were students in class IX MTsN 1 Mataram in the 2023/2024 school year who experienced anxiety during math learning. This is known when students are appointed to present their work in front of the class, students look nervous and not concentrate. In addition, some students seem to avoid math lessons by chatting more with their classmates when the teacher explains the learning material in front of the class. From the explanation of previous research and the results of interviews conducted by researchers, it shows that students tend to feel depressed when facing math problems. This can interfere with student's mathematical communication skills because they will find it difficult to convey their ideas and ideas. Based on this background, this study was conducted to see the effect of self-confidence and math anxiety on the mathematical communication skills of class IX students of MTsN 1 Mataram in the 2023/2024 school year.

Research Method

The type of research used in this research is descriptive quantitative. The research method used in this research is ex-post facto research method. This study consists of two independent variables, namely the variables of self-confidence and math anxiety, and the dependent variable, namely mathematical communication skills. The population in this study were all ninth grade students at MTsN 1 Mataram in the odd semester of the 2023/2024 school year as many as 10 classes with 316 students. The sample in this study was taken using the Cluster Random Sampling technique, so that the research sample was obtained, namely class IX 4 students with 32 students.

The data collection techniques used the questionnaire method and the test method. The instruments used in this study are a self-confidence questionnaire and a math anxiety questionnaire, each consisting of 20 statements. While the student mathematical communication ability test consists of 3 description questions with statistics material. Before the instrument is used to collect research data, it is necessary to test the validity of the instrument. The validity test used is content validity using Aiken's V formula.

Data were analyzed using descriptive statistical analysis and inferential statistical analysis. Descriptive analysis was used to describe self-confidence, math anxiety and mathematical communication skills of class IX students of MTsN 1 Mataram based on the data obtained. The data obtained were described by considering the ideal mean (M_i) and ideal standard deviation (SD_i).

Table 1: Guidelines for Determining Categories of Self-Confidence and Math Anxiety

Interval	Value	Category
$X > Mi + 1.5\ SDi$	$X > 65$	Very high
$Mi + 0.5\ SDi < X \leq Mi + 1.5\ SDi$	$55 < X \leq 65$	High

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$Mi - 0.5\ SDi < X \leq Mi + 0.5\ SDi$	$50 < X \leq 55$	Medium
$Mi - 1.5\ SDi < X \leq Mi - 0.5\ SDi$	$35 < X \leq 50$	Low
$X \leq Mi - 1.5\ SDi$	$X \leq 35$	Very low

Table 2: Guidelines for Determining Mathematical Communication Ability Categories

Interval	Value	Category
$X > Mi + 1.5\ SDi$	$X > 75.01$	Very high
$Mi + 0.5\ SDi < X \leq Mi + 1.5\ SDi$	$58.34 < X \leq 75.01$	High
$Mi - 0.5\ SDi < X \leq Mi + 0.5\ SDi$	$41.67 < X \leq 58.34$	Medium
$Mi - 1.5\ SDi < X \leq Mi - 0.5\ SDi$	$25 < X \leq 41.67$	Low
$X \leq Mi - 1.5\ SDi$	$X \leq 25$	Very low

Description:

Mi = $\frac{1}{2}$ (ideal maximum score + ideal minimum score)

SDi = $\frac{1}{6}$ (ideal maximum score - ideal minimum score)

X = Score obtained by the student

The inferential statistical analysis to answer the existing problem formulation by conducting hypothesis testing using the t test and F test. Prerequisite tests are carried out first to proceed to the hypothesis testing stage. Then a simple and multiple correlation analysis was conducted to determine the strength of the relationship between the independent variable and the dependent variable, simple and multiple linear regression analysis to determine the effect of the independent variable on the dependent variable and determination analysis to determine the contribution of the independent variable to the dependent variable partially or simultaneously. Self-confidence and math anxiety are the independent variables and mathematical communication ability is the dependent variable.

Results and Discussion

Based on the validity of the instruments carried out by expert validators, it was found that the self-confidence questionnaire, math anxiety questionnaire, and mathematical communication ability test were in the very valid category with minor improvements based on suggestions from each expert validator.

Descriptive Statistical Analysis

Based on the data obtained from the results of giving a self-confidence questionnaire, a math anxiety questionnaire and a test of student's mathematical communication skills, the following results were obtained.

Table 3: Self-Confidence Category (X_1)

Frequency	Percentage	Category
4	12.50%	Very high
7	21.88%	High
7	21.88%	Medium
12	37.50%	Low
2	6.24%	Very low
Average Score	**52.50**	**Medium**

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Based on Table 3, it can be seen that the average self-confidence of students in class IX MTsN 1 Mataram is in the moderate category, where the largest frequency is in the low category with a percentage of 37.50%.

Table 4: Math Anxiety Category (X_2)

Frequency	Percentage	Category
0	0%	Very high
3	9.37%	High
4	12.50%	Medium
17	53.13%	Low
8	25.00%	Very low
Average Score	**42.69**	**Low**

Based on Table 4, it can be seen that the average math anxiety of ninth grade students of MTsN 1 Mataram is in the low category, where the largest frequency is in the low category with a percentage of 53.13%.

Table 5: Category of Mathematics Communication Ability (Y)

Frequency	Percentage	Category
6	18.75%	Very high
6	18.75%	High
13	40.63%	Medium
5	15.63%	Low
2	6.24%	Very low
Average Score	**60.68**	**High**

Based on Table 5, it can be seen that the average mathematical communication skills of students in class IX MTsN 1 Mataram are in the high category, where the largest frequency is in the medium category with a percentage of 40.63%.

Inferential Statistical Analysis

Classical Assumption Test

1. Normality Test

   Based on the test results using SPSS 23, the following results are obtained:

Table 6: Data Normality Test Results

	Sig.	α	Decision
X_1	0.200		Normal
X_2	0.200	0.05	Normal
Y	0.153		Normal

2. Linearity Test

   Based on the test results using SPSS 23, the following results are obtained:

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Table 7: Data Linearity Test Results

	Sig.	α	Decision
X_1 with Y	0.364	0.05	Linear
X_2 with Y	0.730		Linear

3. Multicollinearity Test
   Based on the test results using SPSS 23, the following results are obtained:

Table 8: Data Multicollinearity Test Results

	Tolerance	VIF	Decision
X_1	0.850	1.177	No multicollinearity
X_2	0.850	1.177	No multicollinearity

4. Heteroscedasticity Test
   Based on the test results using SPSS 23, the following results are obtained:

Table 9: Data Heteroscedasticity Test Results

	Sig.	α	Decision
X_1	0.052	0.05	No heteroscedasticity
X_2	0.927		No heteroscedasticity

Based on the results of the prerequisite test, it is concluded that the data on self-confidence, math anxiety, and mathematical communication skills obtained are normally distributed so that it can be continued with parametric analysis. The relationship between self-confidence with mathematical communication ability and math anxiety with mathematical communication ability is linear so that it can be continued with simple linear regression analysis, and there is no multicollinearity and heteroscedasticity between the variables of self-confidence and math anxiety so that it can be continued with multiple linear regression analysis.

The Effect of Self-Confidence on Mathematical Communication Ability
Based on the test results using SPSS 23 obtained the following results:

Table 10: Results of Simple Regression Analysis of Self-Confidence on Mathematical Communication Ability

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	3.824	18.392		.208	.837
	Self-Confidence	1.083	.343	.499	3.153	.004

The results of the analysis show that self-confidence has a significant influence on the mathematical communication skills of grade IX students at MTsN 1 Mataram in the 2023/2024 school year. The magnitude of this influence can be written in the form of a regression equation,

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namely $Y = 3.824 + 1.083X_1$ which means that if the value of student self-confidence increases by one point, the student's mathematical communication skills will increase by 1.083. The positive regression coefficient value of the self-confidence variable shows a positive influence (unidirectional) between the self-confidence variable and student's mathematical communication skills. The higher the student's self-confidence, the higher the mathematical communication ability, and vice versa, the lower the student's self-confidence, the lower the mathematical communication ability.

Based on the results of the analysis shows that the coefficient of determination obtained is 0.249, meaning that the contribution given by self-confidence to student's mathematical communication skills is 24.9% while the rest is influenced by other factors. This is in line with the research of Sidik et al. (2017:226) which revealed that the contribution contributed by student's self-confidence to mathematical communication skills was 44.89% and the rest came from other factors.

In addition, based on the statistical test results of Product Moment correlation analysis, it can be concluded that there is a fairly strong positive relationship between self-confidence and student's mathematical communication skills with a correlation coefficient value of 0.499. This is in line with research conducted by Muniroh et al. (2018:484) which concluded that self-confidence and student's mathematical communication skills have a strong positive relationship with a correlation coefficient of 0.865. That is, the higher the student's self-confidence, the higher the mathematical communication ability. Vice versa, the lower the student's self-confidence, the lower the mathematical communication ability.

Self-confidence as an affective aspect in students cannot be taught, but must still be actively and continuously trained until students believe that they have strong self-confidence to face their lives in the future (Hulukati, 2016:40). Therefore, to help foster self-confidence and improve student's mathematical communication skills, an innovation in learning is needed that can make students active in learning.

The Effect of Math Anxiety on Mathematical Communication Ability

Based on the test results using SPSS 23, the following results were obtained:

Table 11: Results of Simple Regression Analysis of Math Anxiety on Mathematical Communication Ability

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	118.356	18.293		6.470	.000
	Math Anxiety	-1.351	.420	-.506	-3.216	.003

The results of the analysis show that math anxiety has a significant influence on the mathematical communication skills of grade IX students at MTsN 1 Mataram in the 2023/2024 school year. The magnitude of this influence is written in the form of a regression equation, namely $Y = 118{,}356 - 1{,}351X_2$, which means that if the student's math anxiety value

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increases by one point, the student's mathematical communication ability will decrease by 1.351. The negative regression coefficient value of the math anxiety variable shows a negative influence (opposite direction) between the math anxiety variable and student's mathematical communication skills. The higher the student's math anxiety, the lower the mathematical communication ability, and vice versa, the lower the student's math anxiety, the higher the mathematical communication ability.

Based on the results of the analysis shows that the coefficient of determination obtained is 0.256, meaning that the contribution given by math anxiety to student's mathematical communication skills is 25.6% while the rest is influenced by other factors. In addition, from the statistical test results of Product Moment correlation analysis, it can be concluded that there is a fairly strong negative relationship between math anxiety and student's mathematical communication skills with a correlation coefficient value of -0.506. This is in line with research from Winardi (2019:4) which concluded that there is a negative relationship between math anxiety and student's mathematical communication skills with a correlation level of -0.604. This means that the higher the level of student's math anxiety, the lower their mathematical communication skills. Vice versa, the lower the level of student's math anxiety, the higher their mathematical communication skills.

Excessive anxiety from within the individual can pose a threat to him, where if the anxiety is too excessive it will weaken the functions within the individual including his ability to do something (Hartanti, 2018:72). Therefore, Hulukati (2016:22) provides a solution to reduce student's math anxiety by creating a pleasant math learning environment. This will make students feel calm and relaxed without having to feel tense when learning. The creation of a pleasant classroom atmosphere will attract students to be active in learning activities and this certainly has a good impact on student's mathematical communication skills.

The Effect of Self-Confidence and Math Anxiety on Mathematical Communication Skills
Based on the test results using SPSS 23, the following results were obtained:

Table 12: Results of Multiple Regression Analysis of Self-Confidence and Math Anxiety on Mathematical Communication Ability

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	62.048	30.685		2.022	.052
	Self-Confidence	.773	.349	.356	2.216	.035
	Math Anxiety	-.983	.429	-.368	-2.292	.029

The results of the analysis show that self-confidence and math anxiety have a significant influence on the mathematical communication skills of grade IX students at MTsN 1 Mataram in the 2023/2024 school year. The magnitude of this influence is written in the form of an equation $Y = 62{,}048 + 0{,}773X_1 - 0{,}983X_2$, which means that the higher the student's self-

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confidence balanced with the lower the student's math anxiety, the higher the student's mathematical communication skills. Conversely, if student's self-confidence is low and their math anxiety is high, their mathematical communication skills will be lower. This means that self-confidence and math anxiety together affect student's mathematical communication skills.

Based on the results of the analysis shows that the coefficient of determination obtained is 0.364, meaning that the contribution given by self-confidence and math anxiety to student's mathematical communication skills is 36.4% while the rest is influenced by other factors. This is in line with the research of Umaroh et al. (2020:13) which explains that self-efficacy and math anxiety simultaneously influence student's mathematical abilities with a contribution of 9.74%.

Students who are confident in learning math will try to learn it in order to get good communication skills. However, on the other hand, anxiety in math lessons is also a factor that affects student's abilities (Sandri et al., 2019:740). This means that even though a student has high self-confidence in learning, it does not necessarily mean that he does not have anxiety. A person certainly has anxiety because anxiety cannot be eliminated. However, the level of anxiety itself can be reduced or minimized. From this explanation, it is necessary to have an effort from both students and teachers in increasing student's self-confidence and reducing student's level of anxiety in learning mathematics.

Therefore, there needs to be a solution in overcoming problems that affect student's mathematical communication skills. Santoso (2021:6) revealed that one of the things that can be done to increase student confidence and so that students do not feel anxiety when learning mathematics is by creating a pleasant learning atmosphere. With a pleasant learning atmosphere, students will feel happy and not feel tension or fear when learning math. This certainly has a good impact on students in learning mathematics which ultimately affects their mathematical communication skills.

Conclusion

Based on the research data and discussion, it can be concluded that: 1) The average self-confidence of class IX students of MTsN 1 Mataram in the 2023/2024 school year is in the medium category and the largest frequency is in the low category with a percentage of 37.50%. The average student math anxiety is in the low category and the largest frequency is in the low category with a percentage of 53.13%. And the average mathematical communication ability of students is in the high category, where the largest frequency is in the medium category with a percentage of 40.63%. 2) There is a positive and significant influence between self-confidence on the mathematical communication skills of grade IX students of MTsN 1 Mataram in the 2023/2024 school year. This means that the higher the student's self-confidence, the higher their mathematical communication skills. Conversely, the lower the student's self-confidence, the lower the mathematical communication ability. The amount of influence given by self-confidence on student's mathematical communication skills is 24.9%. 3) There is a negative and significant influence between math anxiety on mathematical communication skills of grade IX students of MTsN 1 Mataram in the 2023/2024 school year. This means that the higher the student's math anxiety, the lower their mathematical communication skills. Conversely, the lower the student's math anxiety, the higher their

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mathematical communication skills. The amount of influence given by math anxiety on student's mathematical communication skills is 25.6%. 4) There is a significant influence between self-confidence and mathematics anxiety together on the mathematical communication skills of grade IX students of MTsN 1 Mataram in the 2023/2024 school year. The amount of influence given by self-confidence and math anxiety together on student's mathematical communication skills is 36.4%.

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