MATH ANXIETY AS A PREDICTOR OF MATH COMMUNICATION ABILITY ON SENIOR HIGH SCHOOL STUDENTS

Dinda Haniyah¹, Hikmatul Khusna²

^{1,2} Universitas Muhammadiyah Prof. DR HAMKA, Jl. Tanah Merdeka No.20 Kota Jakarta, Indonesia e-mail: hikmatulhusna@gmail.com

Abstract

Math anxiety is one of the aspects that plays a role in the form of talent that students have, so that if math anxiety can be controlled properly, so this aspect also has an important effect on students' math communication ability. This research aims to determine math anxiety as a predictor of the math communication ability of high school students. The sample in this research was at SMAN 10 Bekasi in semester 1 of the 2022-2023 academic year class XII. The research method used is the correlational research method. The sampling technique used is Simple Random Sampling. The sample taken was 58 students. The results of the research instrument test were obtained by testing the math communication ability test instrument as many as 5 questions and the math anxiety questionnaire instrument as many as 32 questions. The results of the research instrument test were obtained by testing the math communication ability test instrument as many as 5 questions and the math anxiety questionnaire instrument as many as 32 questions. The results of this study are that there is an 8.8% relationship between math anxiety and math communication ability. Math communication ability is not only influenced by math anxiety but there are many other factors of 91.2% that affect math communication ability. So, students' communication ability cannot yet be said to be ideal. Because the average student does not have the math communication ability to ask questions and in solving math problems still depends on his friends. Meanwhile, students who have good grades are mostly due to often practicing questions at home and have the active to ask the teacher.

Keywords: math anxiety, math communication ability, predictor

Abstrak

Kecemasan matematis merupakan salah satu aspek yang berperan terhadap bentuk bakat yang dimiliki siswa, sehingga jika kecemasan matematis dapat dikontrol dengan baik, sehingga aspek ini juga memiliki pengaruh yang penting dalam kemampuan komunikasi matematis siswa. Penelitian ini bertujuan untuk mengetahui kecemasan matematis sebagai prediktor terhadap kemampuan komunikasi matematis siswa SMA. Sample pada penelitian ini di sekolah SMAN 10 Bekasi semester 1 tahun ajaran 2022-2023 kelas XII. Metode penelitian yang digunakan adalah metode penelitian korelasional. Teknik pengambilan sampel yang digunakan adalah Simple Random Sampling. Sample yang diambil sebanyak 58 siswa. Hasil uji instrumen penelitan diperoleh dengan pengujian instrumen tes kemampuan komunikasi matematis sebanyak 5 soal dan instrument angket kecemasan matematis sebanyak 32 pertanyaan. Hasil penelitian ini yaitu terdapat 8,8% hubungan antara kecemasan matematis dan kemampuan komunikasi matematis. Kemampuan komunikasi matematis tidak hanya dipengaruhi oleh kecemasan matematis tetapi ada banyak faktor lain sebesar 91,2% yang mempengaruhi kemampuan komunikasi matematis. Jadi, kemampuan komunikasi siswa belum bisa dikatakan ideal. Hal ini disebabkan rata-rata siswa belum memiliki kemampuan komunikasi matematis untuk bertanya dan dalam menyelesaikan soal matematika masih bergantung kepada temannya. Sedangkan siswa yang memiliki nilai yang bagus sebagian besar dikarenakan sering berlatih soal di rumah dan memiliki keaktifan untuk bertanya pada guru.

Kata kunci: kecemasan matematis, kemampuan komunikasi matematis, prediktor

INTRODUCTION

Ability of math communication defined as the ability of students to express their knowledge of interconnected dialogue event that occur in the classroom environment, that moment occured transfer information about math material by the student, for example like in the form of concepts, formulas, or strategies for solving a problem (Putra, 2015). Math communication ability have not yet developed (Suswigi et al., 2019). Students' math communication ability are in the lower categories, especially aspects in the ability of math communication ideas (Zayyadi, 2018). Aspects of issues related to the value of communication ability about procedures, facts, understanding concepts, and applying knowledge (Taqwa and Sutrisno 2019). Math communication ability are important for learning math, especially the students solve and interpret images, formulas, tables, demonstrations, or diagrams. This is in accordance with NCTM in (Ariawan and Nufus, 2017) that indicators of math communication ability are: (1) modeling situations using writing, either concretely, images, graphs, or algebraic methods; (2) explain math ideas or situations in writing; (3) re-expressing a math description in one's own language. In this case, math communication is important because students can share information, exchange thoughts, knowledge and understand math learning.

In the importance of communication ability, teachers must play a role in understanding math communication ability and knowing aspects or indicators of math communication ability, so that in the implementation of math learning it is necessary to design as well as possible so that the goal of developing math communication ability can be achieved. Based on what has been explained above, the indicators of this research are as follows: (1) describing images into math ideas; (2) state the situation in the form of an image and disclose it; into one's own language; (3) Develop arguments or express opinions and provide explanations for answers; (4) State the situation in the form of an image; (5) Explain a math model (image) into a story problem.

The research on math communication ability in math learning obtained positive results (Pizzie et al. 2020). According to Lindquist and Elliott in (Ariawan and Nufus 2017) communication is the essence of teaching, learning, and accessing math. Math communication in math learning is also important to improve. In line with that according to Roehati in (R. N. Afifah et al., 2022) states that the average score of students' math lessons is

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at the qualification of lacking in communicating math ideas falling into the category of less once. Some of the opinions that have been expressed above show that students' math communication ability still low. One the causes of students' low math communication ability is because students are not able to communicate math ideas in math learning. Therefore, students' math communication ability must be developed.

Math communication ability can be achieved if math learning does not encounter various problems. But in reality, there are several factors that can affect math ability that significantly also affect student achievement. One of these factors is math anxiety (Santri 2017). This arises because math is considered a difficult subject, because the characteristics of math are abstract, logical, systematic and full of confusing symbols and formulas. Aschraft and Moore mentioned that math anxiety is a condition that includes emotions of fear, tension, and discomfort felt by some individuals in situations involving math and can interfere with the performance of one's math tasks (Hidayati and Armiati 2021a).

Each student has different anxieties, depending on the student's penchant and inclination to a particular subject (Ulya, 2016). If during math learning students experience characteristics such as feeling panic, confusion, depression, anxiety accompanied by various psychological reactions, such as sweating and pale face, then the student is experiencing math anxiety (Stella 2022). Math anxiety can result in students having difficulty in learning mathsuch as not being able to solve math problems creatively and low math anxiety ability of students (Anita, 2014). Students' math anxiety can also hinder students in learning (Afifah 2020). This happens because students who have high anxiety can experience errors in writing math symbols, the meaning of math models, and students' inconsistency in the use of math symbols (Ikhsan 2019). Anxiety will have a good impact if the anxiety can still be controlled and in a reasonable category (Kusumawati and Nayazik 2017). It can be concluded in these various studies that the math anxiety aspect has a correlation as a positive predictor of students' math communication ability.

According to (Cooke et al. 2011) student anxiety can be identified from 4 aspects, namely cognitive, math knowledge / understanding, attitude and somatic. On the cognitive aspect refers to changes in a person's cognitive abilities related to math, such as not being able to think clearly or forgetting the things they usually remember. The aspect of math knowledge or so-called affective aspects is related to math knowledge, such as the emergence

of the thought that they have sufficient knowledge about math subjects. The attitude aspect or can be called the psychomotor aspect is related to attitude, for example, students become insecure when asked to do questions. Somatic aspects refer to changes in the body or physical condition of students, such as feeling weak, hands becoming cold, sweating, heart beating fast, abdominal pain and trembling according to Sintawati in (Haerunnisa and Imami 2022) Basicly math anxiety should not be a problem, if it's still in a reasonable level, since in reality anxiety is also necessary in learning for student learning motivation (Santri 2017). This is in line with the opinion (Ulya and Rahayu, 2017) states that, if the level of anxiety experienced is not too much, then the anxiety is positive, so it can be used as motivation, but if the level of anxiety is too high, then the anxiety has a negative value because it can interfere with the physical and psychic state of the student.

Several previous studies have found many negative impacts of math anxiety on math learning itself, including research conducted by (Hidayati and Armiati 2021b), it was obtained that math anxiety has a significant effect on students' math learning outcomes partially, which means that if students want to get high math communication ability, students must suppress or control their anxiety. This research conducted by (Asyri et al., 2021) the higher the anxiety of a student, there will be a tendency for the student's math communication ability to decrease. The research conducted by (Sugandi and Bernard, 2018) shows the existence of a significant relationship among math anxiety and math communication ability.

Based on the foregoing, researchers are interested in conducting research on math anxiety. The problem that will be the topic of research in this research is to find out math anxiety as a predictor of the math communication ability of senior high school students. The purpose of this research is to determine math anxiety as a predictor of the math communication ability of senior high school students. From several explanations related to the problem above, then, researchers are interested in conducting a research with the title "Math Anxiety as a Predictor of The Math Communication Ability on Senior High School Students".

METHODS

The method carried out in this research is a correlational research method. This research was conducted in the odd semester of the 2022/2023 school year. This research aims to determine math anxiety as a predictor of the math communication ability of high **Prima: Jurnal Pendidikan Matematika** Vol. 7, No. 1, January 2023, 77-88

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school students. The research sample at SMA Negeri 10 Bekasi, the sample taken was a class XII as 58 students. Sampling is carried out using the Simple Random Sampling method. The free variable in this research is math anxiety while the bound variable is the student's math communication ability.

Data collection was carried out through questions in the form of questionnaires adopted from Qausarina in (Haerunnisa and Imami, 2022) where the questionnaire contained statements containing cognitive, affective, psychomotor and somatic aspects of math anxiety. Some of the statement items on the questionnaire "Saat di kelas saya memahami materi matematika, tetapi ketika kembali ke rumah saya lupa materi yang telah dipelajari sebelumnya." and; "Saya bisa memahami materi matematika yang dijelaskan oleh guru dengan baik". The research instrument in the form of a student math anxiety questionnaire consists of 32 statements and the scoring of questionnaire answers using the Likert scale, consisting of five answer choices, namely Strongly Agree (SS), Agree (S), Neutral (N), Disagree (TS), and Strongly Disagree (STS).

The collection of test data is carried out by providing math communication ability questions where there are 5 test questions in accordance with indicators of math communication ability. An one of example of a test instrument is presented in Figure 1.

Figure 1. Test Instrument of Communication Math Ability

- Perhatikan ruang kelasmu, jika titik sudut ruang kelas diberi nama ABCD pada lantai dan EFGH pada atap kelas. Misalkan ukuran kelas tersebut adalah 3 × 3 × 3 meter. Disalah satu dinding akan dipasang sebuah paku yang terletak tepat ditengah-tengah diding. Paku tersebut akan di hubungkan ke semua sudut yang ada di kelas menggunakan tali.
 - a. Sebutkan yang diketahui dan ditanyakan dalam soal.
 - b. Ada berapakah tali yang terhubung ke paku tersebut.
 - c. Gambarkan keadaan kelas tersebut.
 - d. Tentukan ukuran tali terpanjang yang digunakan.
- Diketahui kubus ABCD.EFGH dengan panjang sisi 6 cm, diketahui titik K adalah titik potong diagonal sisi ABCD. Kemudian titik L adalah titik potong diagonal sisi EFGH.
 - a. Sebutkan yang diketahui dan ditanyakan dalam soal.
 - b. Gambarlah EK // LC
 - c. Hitung jarak antara ruas \overline{EK} dan \overline{LC}
 - d. Simpulkan kedalam bahasa sendiri

Math anxiety data and math communication ability were processed using SPSS Statistic 24 using simple linear regression analysis and correlational analysis. The prerequisite tests of

data analysis used are normality and linearity tests. The hypothesis testing technique used is a regression analysis test.

RESULTS AND DISCUSSION

The data collected in this research are data on students' math anxiety scores and math communication ability. Math anxiety data is obtained by distributing questionnaires and math communication ability data is obtained by question tests. The following is presented a description of the data from the research The data obtained are analyzed with normality test, lineriarity test, correlation test.

Table 1. Normality Test among Math Anxiety Questionnaire and Math Communication Ability Test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized
		Residual
Ν		58
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	18.75127261
Most Extreme Differences	Absolute	.116
	Positive	.064
	Negative	116
Test Statistic		.116
Asymp. Sig. (2-tailed)		.052 ^c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Based on the results of the analysis of math anxiety data and the math communication ability of students, the normality test results from table 2. It can be seen from the table above that the data is already distributed normally because the value of sig. $\alpha > 0,05$ is 0,052 > 0.05.

Then is to conduct a linearity test among the math anxiety questionnaire and the math communication ability test. Here are the results of the linearity test:

Table 2. Linearity Test among Math Anxiety Questionnaire and Math Communication Ability Test

ANOVA Table							
			Sum of		Mean		
			Squares	df	Square	F	Sig.
Tes	Amon	(Combine	13885.401	31	447.916	1.439	.173
Kemamp g Groups d)							
uan		Linearity	1936.243	1	1936.23	6.221	.019
Komunika 4							

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si * Angket	Deviation from Linearity	11949,166	30	398.306	1.280	.263
Kecemasa	Within Groups	8092,617	26	311.254		
n Matemati s	Total	21978.017	57			

It can be seen from the table above that there is a linear relationship among math anxiety and math communication ability. This is because the level of syignifiability of Deviation from Linearity is > 0,05 which is 0,263 > 0,05.

From the table Anova obtained information among math anxiety and math communication ability. However, to find out the correlation or relationship of the variables x and y has a positive or negative effect, a correlation test can be carried out (Asyri et al., 2021). Table 4 informs the results of the correlation test.

Correlations						
			Kemampuan			
		Kecemasan	Komunikasi			
		Matematis	Matematis			
Kecemasan Matematis	Pearson Correlation	1	.024*			
	Sig. (2- tailed)		.297			
	Ν	58	58			
Kemampuan Komunikasi Matematis	Pearson Correlation	.024*	1			
	Sig. (2- tailed)	.297				
	Ν	58	58			

Corrolations

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation table informs that the pearson correlationya value is 0,024 with a sig. (2-tailed) 0,297. This means that the two variables have a positive relationship because 0,297 > 0,05. it says positive because in the correlation table it is all positive.

Next is regression testing. Regression tests are performed to determine whether there is an effect of math anxiety on math communication ability. Regression itself has several aspect results, namely the Model Summary, ANOVA Table, and coefficients table. Here are the results of regression testing:

Table 3. Model Summary

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.297ª	.08 8	.072	18.918

a. Predictors: (Constant), Angket Kecemasan Matematis

b. Dependent Variable: Tes Komunikasi Matematis

To see the effect given, you can see the R Square table. The value of R Square in table 5 that the correlation value among the two variables above is 0,297. Furthermore, the coefficient of determination (R Square) is 0.088. This means that the predictor of math communication when researching against math anxiety has an effect of only 0.088 or 8.8%. Thus, it was concluded that there was no significant value among math anxiety and students' math communication ability (Anita, 2014). Then, math anxiety as a predictor is also very weak with 8.8% due to math communication ability of 91.2% and effect by other factors.

Table 4. Regretion Test through ANOVA

	ANOVAª						
	Sum of		Mean				
Model	Squares	df	Square	F	Sig.		
Regression	1936.234	1	1936.234	5.410	.024 ^b		
Residual	20041.783	56	357.889				
Total	21978.017	57					

a. Dependent Variable: Tes Komukasi Matematis

b. Predictors: (Constant), Angket Kecemasan Matematis

Table 4 shows the results of calculated F value is 5,410 with a significance level of 0,024 < 0,05. Then it can be known that there is a positive effect of math anxiety on students' math communication abilitys.

Table 5. Coefficients Table

Coefficients^a

					Standardized		
			Unstandardized Coefficients		Coefficients		
Model			В	Std. Error	Beta	t	Sig.
1	(Constant)		24.200	17.166		1.410	.164
	Angket	Kecemasan	.447	.192	.297	2.326	.024
	Matematis						

a. Dependent Variable: Tes Komunikasi Matematis

The results in table 5 of the constant value (a) is 24,200 and the math anxiety value (b) is 0,447. Thus, the regression equation is as follows:

Y = 24,200 + 0,447x

This shows that the constant value of student math communication is 24,200 and the regression coefficient x is 0,447 which means that every addition of 1% confidence value, the student's math reasoning value increases by 0.447. Furthermore, it can be concluded that low math anxiety has a positive effect on students' math communication abilities. That mean is true that the lower category of math anxiety is that students, they have high category the math communication ability.

In indicator number 5, students are still found who have difficulty in making problems, because students are not used to making problems in learning math, usually students are only asked to solve problems, therefore students mut difficulties in this regard. This is also found in research (Sakarti and Susanti, 2016) which states that students are only able to absorb lessons at the beginning of the material. In the middle to the end of learning, students are unable to listen to the material properly, resulting in low math communication ability of students in solving problems given by the teacher. These results are in line with the findings of previous research according to Namkung et al in (Hidayati and Armiati, 2021) that is math communication ability have a significant negative relationship among math anxiety and math communication ability. This suggests of anxiety can actually affect student learning achievement.

Based on the results of preliminary research by testing three-dimensional material tests to class XII students and interviews with math teachers and students, it was found that there are still many students who have not been able to solve the questions correctly and appropriately and some even choose to empty the answers, and only some students can solve the questions correctly. This is because the average student does not have the math communication ability to ask questions and in solving math problems still depends on his friends. Meanwhile, students who have good grades are mostly due to often practicing questions at home and have the activeness to ask the teacher. It was obtained from the research that every student who has little math anxiety then he is able to do some good things to develop his talents, such as communicating with his friends, daring to channel opinions and respecting different opinions, having positive thoughts and behaviors in making a decision, on the contrary, students who have high math anxiety they will have difficulty in doing such things because have the thought that they are not as capable as students who dare to communicate according to research (Hidayati and Armiati, 2021).

The limitations in this research have only examines one prediktor on math communication ability not only math anxiety many other factors affect math communication ability which has 91.2% and math anxiety as a predictor is also very small with 8.8% because it is effected by other factors. Then it requires further research that examines other factors. Thus what can improve math communication ability is by creating a pleasant learning atmosphere so that students can feel calm and relaxed in learning math. Learning that is not centered only on the teacher, so that students feel involved and considered important in the learning process can also be an alternative to create conducive learning conditions (Sakarti and Susanti, 2016).

CONCLUSION

Based on research that has been carried out by class XII students of SMAN 10 Bekasi, it is known that the factors that affect math communication ability are not only math anxiety as a predictor of many other factors that affect math communication ability which has 91.2% and math anxiety as a predictor is also very weak with 8.8% because it is effect by other factors. This means that the higher the student's math anxiety, the lower the student's math communication ability, and vice versa, the lower the student's math anxiety, the higher the student's math communication ability. These abilities can differ in individuals from each math anxiety, where one individual can have better abilities than other individuals from the same category supported by learning insights or outside of home schooling. Future research needs to be carried out to examine the math communication ability possessed by students so that the right solution can then be found to be able to reduce students' math anxiety.

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