International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 11, Issue 8
August, 2024
Pages: 922-933

Analysis of Numeracy Skill and Mathematical Anxiety Among Eighth-Grade Student at State Junior High School in Kulon Progo Regency

Umy Maysyaroh; Kana Hidayati

Yogyakarta State University, Indonesia

http://dx.doi.org/10.18415/ijmmu.v11i8.6175

Abstract

This study aims to describe numeracy skills among grade VIII students in public junior high schools in Kulon Progo Regency, mathematical anxiety among grade VIII students in public junior high schools in Kulon Progo Regency, differences in numeracy skills and mathematical anxiety based on school categories, differences in numeracy skills and mathematical anxiety based on gender, and the relationship between numeracy skills and mathematical anxiety. This research was a survey study using both quantitative and qualitative approaches. The population consisted of Grade VIII students in public junior high schools in Kulon Progo Regency for the academic year 2023/2024, totaling 4,317 students, with a sample size of 377 students. The sample was drawn from schools categorized into high, moderate, and low strata using stratified proportional random sampling. Data collection involved a numeracy skills test comprising 20 items and a non-test instrument in the form of a 32-item mathematical anxiety. Data analysis used crosstabs, MANOVA, and Pearson's correlation. The research results indicate that the average numeracy score of Grade VIII students in public junior high schools in Kulon Progo Regency falls into the basic category, at 38.09, the average mathematical anxiety score of Grade VIII students in public junior high schools in Kulon Progo Regency is low, at 84.73, there are differences in numeracy skills and mathematical anxiety among Grade VIII students in public junior high schools in Kulon Progo Regency based on school categories, there were no significant differences observed in numeracy skills and mathematical anxiety among students based on gender, there are significant correlation between numeracy skills and mathematical anxiety among Grade VIII students in public junior high schools in Kulon Progo Regency.

Keywords: *Survey Research; Numeracy Skills; Mathematical Anxiety*

Introduction

Numeracy skills play a crucial role in shaping the future of society in the digital age and are also significant for the development and growth of a country (Atasoy & Güçlü, 2020). Numeracy abilities enable students to gain new experiences by solving problems involving reasoning. Numeracy competence is an international issue under the Sustainable Development Goals (SDGs), formulated by the United Nations (Elfert, 2019).

Currently, the Indonesian education system is entering a new era with the implementation of the Merdeka Curriculum. The Merdeka Curriculum is expected to create a more relevant, contextual, and enjoyable learning process for students. Nationally, the government has introduced a new breakthrough in national assessment, shifting from the National Examination (UN) to a new evaluation system known as the National Assessment (AN). One component tested in the AN is the Minimum Competency Assessment (AKM), which measures numeracy skills in mathematics (Kemdikbud, 2021). However, even though the Merdeka Curriculum has been implemented since 2021, recent data indicates that students' numeracy skills in Indonesia remain low. The 2023 Education Report shows that overall, numeracy skills of Indonesian students at elementary, junior high, and high school levels are categorized as moderate, with only 40.63% of junior high school students meeting minimum numeracy competencies. This means that more than 50% of Indonesian students have not yet achieved the minimum numeracy competency.

Kulon Progo Regency, which has a numeracy literacy rate below 40%, ranks fourth among the five regencies in the Special Region of Yogyakarta. This indicates the need for further research on numeracy skills, such as the study conducted by (Wijaya, 2023) on numeracy in Purworejo Regency. The results showed that junior high school and Madrasah Tsanawiyah students fall into the category of needing special intervention, with 67.20% of students generally requiring special intervention, and none of the students achieving proficient criteria.

One factor that can influence success in learning mathematics is managing mathematical anxiety. The negative relationship between mathematical anxiety and mathematics performance is a global issue. According to meta-analysis evidence, mathematical anxiety negatively impacts mathematics performance, with an effect size of $r = 0.27$ for elementary school students and $r = 0.36$ for junior high school students (Caviola et al., 2022; Zhang et al., 2019). Research related to mathematical anxiety was conducted by (Sidney et al., 2019), showing that anxiety about mathematics can affect performance by inhibiting the implementation of student strategies. Another study by (Habibullah, 2019) analyzed mathematical anxiety by distributing questionnaires to 141 students from different school categories, namely high, medium, and low strata in Bantul Regency. The results showed that the mathematical anxiety of eighth-grade students at state junior high and Islamic junior high schools in Bantul Regency was categorized as low, with an average score of 76.74. Specifically, the average score was 73.07 for high-strata schools, 77.30 for medium-strata schools, and 78.14 for low-strata schools.

Based on the explanation above, theoretically, numeracy skills and mathematical anxiety have a reciprocal relationship in achieving educational goals. The absence of similar research in Kulon Progo Regency motivates and provides a rationale for conducting research related to numeracy skills and mathematical anxiety in Kulon Progo. This is important considering the urgency of numeracy skills in addressing increasingly complex problem-solving challenges in developing 21st-century skills. Additionally, managing students' mathematical anxiety needs attention so that mathematics can foster positive emotional attitudes in students.

Method

This research is a survey study employing both quantitative and qualitative approaches. The quantitative approach is used to analyze the test scores and math anxiety questionnaire scores of students. In contrast, the qualitative approach is used to analyze data in the form of students' verbal responses and behaviors during the study. The research was conducted in 13 state junior high schools in Kulon Progo Regency, Special Region of Yogyakarta, categorized into three strata: high, medium, and low.

Data collection in this research was conducted through tests to gather data on numeracy skills and non-test methods to obtain data on students' levels of mathematical anxiety. Additionally, interviews were conducted to obtain more detailed information about the strategies used by students to solve mathematical problems based on their numeracy skills.

Table 1. Numeracy Ability Domains

Domain	Domain
Content	Numbers
	Algebra
	Geometry dan Measurement
	Data and Uncertainty
Context	Personal
	Socio Cultural
	Scientific
Cognitive Level	Understanding (*Knowing)*
	Application (*Applying)*
	Application (*Reasoning)*

In this study, the content materials follow the topics used in the numeracy instruments based on the learning progression from the 2022 Minimum Competency Assessment (AKM) framework. The personal context relates to the role of mathematics in students' personal lives, the scientific context relates to the role of mathematics in science and technology, and the socio-cultural context relates to the role of mathematics within a community.The cognitive level of *knowing* involves students' conceptual knowledge with key actions such as recalling, identifying, classifying, calculating, retrieving, and measuring. The cognitive level of *applying* involves the ability of students to apply their mathematical knowledge to solve problems, with key actions such as selecting strategies, representing/modelling, applying/implementing, and interpreting. The cognitive level of *reasoning* pertains to students' mathematical reasoning abilities, with key actions such as analyzing, synthesizing, evaluating, drawing conclusions, and making justifications.

The non-test instrument in this study is a questionnaire measuring the level of mathematical anxiety. The assessment of mathematical anxiety involves four aspects and four dimensions, which are outlined in the questionnaire consisting of 32 statements. The four aspects are content, learning process, teacher, and tests. Meanwhile, the four dimensions of mathematical anxiety are cognitive, affective, somatic, and behavioral. The statements include 12 positive and 20 negative items.

Table 2. Dimensions of Mathematical Anxiety

Dimension	Indicator
Cognitive	Disruptions in thinking, memory, and attention leading to worry and fear.
Affective	Unpleasant feelings such as restlessness, nervousness, tension, and apprehension.
Somatic	Physical symptoms resulting from anxiety, such as sweating, rapid heartbeat, and abdominal discomfort.
Behavioral	Behaviors resulting from anxiety, including difficulty sitting still and attempts to withdraw from anxiety-inducing situations.

This study employs evidence of content validity and construct validity. Content validity is used to validate the numeracy test items. Meanwhile, the mathematical anxiety questionnaire is validated using both content and construct validity. Content validity is obtained through content analysis conducted by expert judgment or a validator. In this study, content validation was performed by two mathematics education lecturers from Yogyakarta State University (UNY). The validated instruments were then revised according to the suggestions and feedback provided by the validators.

The categorization of students' numeracy skills is based on the levels of numeracy competence established by Pusmenjar Kemdikbud, which are Proficient, Competent, Basic, and Need Special Intervention (Kemdikbud, 2020, p. 30). The categorization of numeracy skill scores is presented in Table 3 below:

Table 3. Numeracy Ability Categories

Range	Category
$X \geq \underline{x} + 1,5\,SB$	Proficient
$\underline{x} \leq X < \underline{x} + 1,5SB$	Competent
$\underline{x} - 1,5SB \leq X < \underline{x}$	Basic
$X < \underline{x} - 1,5SB$	Needs Special Intervention

For the classification of students' mathematical anxiety scores, three categories are used, as presented in the following table.

Table 4. Criteria for Mathematical Anxiety

Interval	Score	Criteria
X ≥ Mean + 1SD	X ≥ 99,9	High
Mean – 1SD ≤ X < Mean + 1SD	69,5 ≤ X < 99,9	Moderate
X < Mean – 1SD	X < 69,5	Low

In addition to descriptive analysis, inferential statistical analysis is also used to analyze numeracy skills and mathematical anxiety data.

a. Manova Test

The Pillai's Trace test statistic in Multivariate Analysis of Variance (MANOVA) is used to determine whether there are differences in numeracy skills and mathematical anxiety among eighth-grade students at state junior high schools in Kulon Progo Regency based on school category, and to identify differences in numeracy skills and mathematical anxiety among eighth-grade students based on gender. The assumptions that must be met before conducting MANOVA analysis include the multivariate normality test and the homogeneity of covariance matrices test.

b. Correlation Test

To further understand how variables correlate, a correlation test is conducted. The Pearson correlation test aims to determine the strength of the relationship between paired scores, whether positive or negative (Ary et al., 2010). To determine the relationship between numeracy skills and mathematical anxiety, the Pearson Product Moment correlation is used.

Table 5. Guidelines for Interpreting Pearson Correlation Coefficients

Coefficient Interval	Strength of Relationship
$0,00 \leq r_{xy} \leq 0,19$	Very Weak
$0,20 \leq r_{xy} \leq 0,35$	Weak
$0,36 \leq r_{xy} \leq 0,65$	Moderate
$0,66 \leq r_{xy} \leq 0,85$	Strong
$0,86 \leq r_{xy} \leq 1,00$	Very Strong

Results and Discussion

Students' numeracy skills are described in general and based on the domains of numeracy, which include content domain, context domain, and cognitive level. Additionally, numeracy skills are also described based on gender. The data from the measurement of students' numeracy skills, categorized by

school type, are presented in the following table.

Table 6. Mean and Standard Deviation of Numeracy Scores

Descriptive Statistics	School Stratum			Overall
	High	Moderate	Low	
n	88	148	141	377
Mean	47,44	41,32	28,86	38,09
Standard Deviation	16,26	15,52	13,96	16,86
Maximum Observed Score	80	75	70	80
Minimum Observed Score	20	10	5	5
Maximum Theoretical Score	100			
Minimum Theoretical Score	0			

Table 18 presents the descriptive statistics of the numeracy skills of eighth-grade students at state junior high schools in Kulon Progo. The results indicate that schools in the high-strata category have the highest average score (M = 47.44) compared to the overall average and the averages of the other strata (medium and low). The frequency and percentage of students in each numeracy skill criterion for each school category are shown in the following table.

Table 7. Criteria for Numeracy Ability in Each School Category

School Stratum		Numeracy Ability Criteria					Total
		Proficient	Competent	Basic	Needs Intervention	Special	
High	*F*	9	31	41	7		88
	%	10,22	35,23	46,59	7,95		100
Moderate	*F*	4	46	84	14		148
	%	2,70	31,08	56,75	9,45		100
Low	*F*	0	16	76	49		141
	%	0	11,35	53,90	33,11		100
Total Students		13	93	201	70		377

Table 8. Students' Numeracy Ability Based on Gender in Each School Stratum

Gender	Descriptive	School Stratum			Overall
		High	Moderate	Low	
Male	n	41	66	72	179
	Percentage	22,90%	36,87%	40,22%	100%
	Mean	45,00	40,98	32,01	38,29
	Criteria	Basic	Basic	Basic	Basic
Female	n	47	82	69	198
	Percentage	23,73%	41,41%	34,84%	100%
	Mean	49,57	41,58	25,58	37,90
	Criteria	Basic	Basic	Basic	Basic
Total Students		88	148	141	377

The distribution of numeracy skills based on content domains includes number, algebra, geometry and measurement, and data and uncertainty. The overall averages, from highest to lowest, for the content domains are as follows: geometry and measurement (M = 2.20); algebra (M = 2.17); number (M = 1.66); and data and uncertainty (M = 1.58). This indicates that among the 20 questions designed to measure

numeracy skills, the content area with the lowest average is data and uncertainty. The distribution of numeracy skills based on context domains includes personal, socio-cultural, and scientific contexts. The mean and standard deviation for the context domains show that the overall average for the personal context (M = 3.01) is higher compared to the other two domains: socio-cultural (M = 2.03) and scientific (M = 2.48). The distribution of numeracy skills based on cognitive levels includes knowing, applying, and reasoning. The mean and standard deviation for the cognitive levels are presented in Table 25. The number of numeracy questions provided is as follows: knowing (5 items), applying (5 items), and reasoning (10 items). The results show overall averages of knowing (M = 2.52; SD = 1.32), applying (M = 2.18; SD = 1.17), and reasoning (M = 2.90; SD = 1.91). This indicates that, among the 20 numeracy questions presented, students find reasoning the most challenging. Descriptions of numeracy skills based on gender are presented in the following table.

Table 9. Mean and Standard Deviation of Students' Mathematical Anxiety

Descriptive Statistics	**Overall**	**School Category**		
		High	Moderate	Low
n	377	88	148	141
Mean	84,73	83,06	84,59	85,92
Standard Deviation	15,24	17,41	14,27	14,78
Maximum Observed Score	134	134	126	121
Minimum Observed Score	39	39	48	43
Theoretical Maximum Score	160			
Theoretical Minimum Score	32			

The description of mathematical anxiety based on the number of students in each category shows that 63 students (16.7%) from eighth grade at state junior high schools in Kulon Progo fall into the "High" category. Additionally, 258 students (68.4%) are in the "Moderate" category, and 56 students (14.9%) are in the "Low" category. Overall, the highest proportion of mathematical anxiety is found in the "Moderate" category, with 258 students (68.4%), slightly differing from the "High" category, which includes 156 students (41.37%).

The overall average for the cognitive dimension is the highest compared to the other dimensions. The overall averages, from highest to lowest, are as follows: cognitive (M = 23.39); behavioral (M = 22.45); affective (M = 22.21); and somatic (M = 16.67). Descriptions of numeracy skills based on gender are presented in the following table.

Table 10. Mathematical Anxiety of Students Based on Gender in Each School Stratum

Gender	**Description**	**School Stratum**			**Overall**
		High	Moderate	Low	
Male	n	41	66	72	179
	Mean	84,00	83,96	89,11	86,04
	Criteria	Low	Low	Low	Low
Female	n	47	82	69	198
	Mean	82,25	85,09	80,25	83,55
	Criteria	Low	Low	Low	Low
TTotal Students		88	148	141	377

The table above presents data on mathematical anxiety by gender across different school strata. At schools in high, medium, and low strata, the average score for mathematical anxiety is higher for male students compared to female students. Among male students, the highest mathematical anxiety score is

observed in low-stratum schools, at 89.11. For female students, the highest mathematical anxiety score is found in medium-stratum schools, at 85.09. Overall, the average mathematical anxiety score for male students is 86.04, which falls into the "Moderate" category, while the average score for female students is 83.55.

To examine differences in numeracy skills and mathematical anxiety among eighth-grade students at state junior high schools in Kulon Progo based on high, medium, and low school strata, a MANOVA test was conducted using SPSS 26. Multivariate normality was assessed by creating a scatter plot between the squared Mahalanobis distance and Chi-Square. If the Chi-Square approximates a straight line and about 50% of the Mahalanobis distances are less than or equal to the Chi-Square, H0 is accepted, indicating that the sample is from a normally distributed population. The correlation coefficient between the two data sets is then examined. If the correlation coefficient is greater than the critical value or the significance value is less than 0.05, a significant correlation is present. The results of the normality test can be found in the appendix.

Table 11. Results of Normality Assumption Test for Each School Stratum

School Stratum	Correlation Coefficient	Significance	Decision
Higher Stratum	0,990	0,000	Normal
Medium Stratum	0,994	0,000	Normal
Low Stratum	0,994	0,000	Normal

The next assumption test is the homogeneity test. The homogeneity test is conducted using Box's M test, with the following results:

Table 12. Results of Covariance Matrix Homogeneity Test Based on School Category

Box's M	***Sig.***	**Decision**
8,121	0,234	Homogeneous

In the homogeneity of covariance matrices test output, a significance value of Sig. = 0.234 was obtained, which is greater than alpha = 0.05. This indicates that the covariance matrices are homogeneous. According to the Multivariate Tests table output, the Pillai's Trace value is 0.200 with an F-value of 20.736 and a significance value of Sig. = 0.000. This means that school categories significantly affect numeracy skills and mathematical anxiety among state junior high school students in Kulon Progo Regency.

In the Univariate Test table with numeracy skills as the dependent variable, an F-value of 46.351 with Sig. = 0.000 was obtained. This indicates that school categories significantly affect numeracy skills. However, for mathematical anxiety as the dependent variable, the F-value is 0.960 with Sig. = 0.384, suggesting that school categories do not significantly affect mathematical anxiety among students.

Further analysis of numeracy skills was conducted using Tukey's Post-Hoc test, given that the data is homogeneous. This test revealed significant differences: between high-stratum and medium-stratum schools (p-value = 0.008), high-stratum and low-stratum schools (p-value = 0.000), and medium-stratum and low-stratum schools (p-value = 0.000). This indicates significant differences in numeracy skills across school strata.

Multivariate normality tests were conducted based on gender (male and female) by creating scatter plots of squared Mahalanobis distance against Chi-Square. If the Chi-Square approximates a straight line and about 50% of the Mahalanobis distances are less than or equal to the Chi-Square, H0 is accepted, suggesting that the sample comes from a normally distributed population.

Table 13. Results of Normality Assumption Test for Each Gender

Gender	Correlation Coefficient	Significance	Decision
Male	0,996	0,000	Normal
Female	0,989	0,000	Normal

Differences in numeracy abilities and Mathematical Anxiety of class VIII students of Public Junior High Schools in Kulon Progo Regency are also seen based on male and female gender.

Table 14. Output of Covariance Matrix Homogeneity Test Based on Gender

Box's M	*Sig.*	Decision
11,591	0,009	Not Homogeneous

In the output of the covariance matrix homogeneity test, a significance value of Sig. = 0.009 was obtained, which is less than alpha = 0.05. This indicates that the covariance matrices are not homogeneous. According to Rencher (2002) multivariate statistical tests (except Roy's Criterion) are robust or resistant to violations of multivariate normality and homogeneity assumptions.

Based on the Multivariate Tests table output, the Pillai's Trace value is 0.008 with an F-value of 1.427 and a significance value of Sig. = 0.241. This means that gender differences do not significantly affect numeracy skills and mathematical anxiety among state junior high school students in Kulon Progo Regency. In the Univariate Test table with numeracy skills as the dependent variable, an F-value of 0.510 with Sig. = 0.822 was obtained. This indicates that gender differences do not significantly affect numeracy skills. For mathematical anxiety as the dependent variable, an F-value of 2.527 with Sig. = 0.113 was found. This indicates that gender differences do not significantly affect mathematical anxiety. The tabulation of numeracy skills with mathematical anxiety is presented in the following table.

Table 15. Cross-Tabulation of Numeracy Ability and Mathematical Anxiety

Numeracy Ability		Math Anxiety Criteria			Sum
		High	Moderate	Low	
Proficient	F	1	7	5	13
	Percentage	0,3%	1,9%	1,3%	3,4%
Competent	F	5	69	19	93
	Percentage	1,3%	18,3%	5,0%	24,7%
Basic	F	33	141	27	201
	Percentage	8,8%	37,4%	7,2%	53,3%
Needs Special Intervention	F	24	41	5	70
	Percentage	6,4%	10,9%	1,3%	18,6%
Overall	F	63	258	56	377
	Percentage	16,7%	68,4%	14,9%	100%

The cross-tabulation results of numeracy skills with mathematical anxiety indicate that students with numeracy skills categorized as proficient correspond to a moderate and low level of mathematical anxiety. Students with numeracy skills categorized as competent correspond to a moderate level of mathematical anxiety (18.3%), followed by a low level (5%). Students with numeracy skills categorized as basic correspond to a moderate level of mathematical anxiety (37.4%), followed by a high level (8.8%). Meanwhile, students with numeracy skills categorized as needing special intervention correspond to a moderate level of mathematical anxiety (41%), followed by a high level (6.4%). Based on this tabulation, it can be concluded that as students' numeracy skills improve, their mathematical anxiety tends to decrease. However, there are also some students with numeracy skills requiring special intervention who have a low level of mathematical anxiety, with a small percentage of 1.3%. Additionally, there are students with proficient numeracy skills but with a high level of mathematical anxiety, totaling 1 student

(0.3%).

Table 16. Numeracy Ability Scores of Students Based on Categories of Mathematical Anxiety

Category	N	Mean	Std. mean
Low	56	45,45	19,12
Moderate	258	38,58	15,81
High	63	29,52	15,47

Based on Table 44, it is observed that students with low mathematical anxiety have an average numeracy skill score of 45.44, students with moderate mathematical anxiety have an average numeracy skill score of 38.58, and students with high mathematical anxiety have an average numeracy skill score of 29.52. This indicates that as students' numeracy skills improve, their mathematical anxiety tends to decrease.

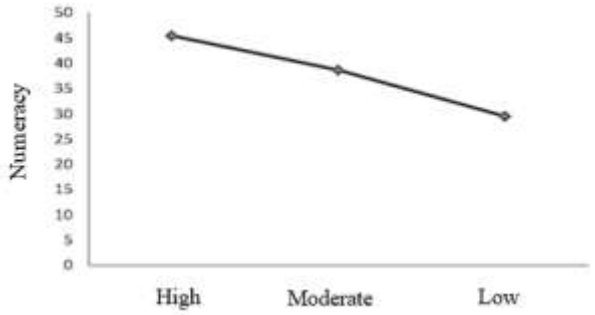

Figure 1. Graph of Numeracy Skills by Categories of Mathematical Anxiety (High, Moderate, Low)

Based on Figure 1, it is evident that students with higher numeracy scores are categorized within a low level of mathematical anxiety, whereas students with lower numeracy scores tend to fall into a high level of mathematical anxiety.

A correlation test was conducted to infer the relationship between numeracy skills and students' mathematical anxiety. The correlation test utilized the Pearson Product-Moment to examine the relationship between numeracy skills and mathematical anxiety. The decision criteria are as follows: H0 is rejected if the significance value is < 0.05, and H0 is accepted if the significance value is > 0.05. According to Table 46, the correlation value between numeracy skills and students' mathematical anxiety is 0.212 with a significance value of 0.000. This significance value is < 0.05, leading to the rejection of H_0. Therefore, it can be concluded that there is a relationship between numeracy skills and mathematical anxiety among eighth-grade students at State Junior High Schools in Kulon Progo Regency.

When examining the relationship between numeracy skills and mathematical anxiety based on school categories—namely high, medium, and low strata—the level of relationship varies, as presented in the following table.

Table 17. Results of Correlation Test between Numeracy Ability and Mathematical Anxiety

School Stratum	Correlation Coefficient	Sig.	Category
General	-0,212	0,000	Significant, Negative, Weak
High Stratum School	-0,279	0,008	Significant, Negative, Weak
Medium Stratum School	-0,210	0,010	Significant, Negative, Weak
Low Stratum School	-0,133	0,117	Not Significant, Weak

The next test conducted is a regression analysis to predict the extent to which the dependent

variable is influenced by changes in the independent variable. Based on the regression test, a constant value (α) of 58.007 was obtained with a regression coefficient (b) of -0.235 (see Appendix 16). Thus, the regression equation is Y = 58.007 - 0.235X. The regression coefficient b of -0.235 indicates that a decrease in mathematical anxiety by one unit can increase numeracy skills by 0.235, assuming other variables remain constant. Additionally, a significance value of 0.000 was obtained, where 0.000 < 0.05, leading to the conclusion that mathematical anxiety significantly affects numeracy skills among eighth-grade students at State Junior High Schools in Kulon Progo Regency. The extent of the influence of mathematical anxiety on students' numeracy skills can be observed from the coefficient of determination (R Square), where mathematical anxiety accounts for 4.5% of the variance in numeracy skills, while the remaining 95.5% is influenced by other variables.

Based on the data obtained from the research sample, the average numeracy score for students overall is 38.09 with a standard deviation of 16.86. Using the interval estimation formula, with a 95% confidence level, the numeracy skills of junior high school students in Kulon Progo Regency are estimated to be between 36.38 and 39.79, which falls into the basic category. For the average mathematical anxiety score among students overall, it is 84.73 with a standard deviation of 15.24. Using the interval estimation formula, with a 95% confidence level, the mathematical anxiety of junior high school students in Kulon Progo Regency is estimated to be between 83.19 and 86.27, which falls into the moderate category.

Table 18. Interval Estimation of the Average Numeracy Ability and Mathematical Anxiety of the Population

Variable	Interval	Category
Numeracy Ability	$36{,}38 \leq \mu \leq 39{,}79$	Basic
Mathematical Anxiety	$83{,}19 \leq \mu \leq 86{,}27$	Moderate

This study supports the findings of Jolejole-Caube et al. (2019), which reveal that students with higher mathematical anxiety tend to have lower math performance, whereas students with lower anxiety perform better in mathematics. Similarly, research by Khairunnisa & Fitri (2023) indicates a negative relationship between anxiety and students' problem-solving abilities. Additionally, Tamrin et al. (2024) found that students who experience higher levels of math anxiety are less likely to understand mathematical concepts. This is consistent with the theory proposed by Salkind & Rasmussen (2008), which posits that a small amount of anxiety can serve as motivation and lead to optimal learning outcomes, whereas excessive anxiety can hinder students' concentration and induce fear of learning. Various strategies can help reduce mathematical anxiety among students, such as creating a safe classroom environment, employing engaging teaching methods, providing intentional feedback, involving parents, and fostering a growth mindset (Blyth, 2022).

Conclusion

Based on the research findings and discussion, the following conclusions are the average numeracy score for junior high school students in Kulon Progo Regency is 38.09 out of a maximum score of 100, with a standard deviation of 16.86, indicating a basic category. The average mathematical anxiety score for eighth-grade students in Kulon Progo Regency is 84.73 out of a maximum score of 160, with a standard deviation of 14.78, falling into the moderate category. Specifically, the average score for cognitive aspects is in the moderate category with a score of 23.39. The average score for affective aspects is also in the moderate category with a score of 22.21. The average score for somatic aspects is in the low category with a score of 16.67, while the average score for behavioral aspects is in the moderate category with a score of 22.45. There is a significant difference in numeracy ability and mathematical anxiety among junior high school students in Kulon Progo Regency based on school category (F = 20.736; α = 0.05; Sig. = 0.000). There is no significant difference in numeracy ability and mathematical anxiety among junior high school students in Kulon Progo Regency based on gender (F = 1.427; α = 0.05;

Sig. = 0.241). There is a significant negative correlation between numeracy ability and mathematical anxiety among eighth-grade students in Kulon Progo Regency (r = -0.212; α = 0.05; Sig. = 0.000).

Recommendations

Based on the research findings and conclusions, the following recommendations are made For Teachers, it is recommended that teachers design lessons or utilize teaching media that can help improve students' numeracy skills and familiarize them with contextual problem-solving or numeracy tasks. For Students, Students with high mathematical anxiety should aim to reduce negative thoughts about mathematics, build self-confidence, and create a relaxed and calm learning environment. Students with moderate mathematical anxiety should work on reducing their anxiety levels, while those with low mathematical anxiety should manage their anxiety effectively to turn it into motivation and achieve optimal learning outcomes. For the Education Department, It is advised that the information obtained from Minimum Competency Assessment (AKM) or Standard Assessment (ASPD) should be maximized in its implementation to ensure that the assessment is oriented towards and impacts the improvement of student capabilities.

References

Atasoy, R., & Güçlü, N. (2020). Evaluation of Numeracy Skills of Adults According to the Results of PIAAC 2015 in Turkey. *World Journal of Education*, *10*(2), 27. https://doi.org/10.5430/wje.v10n2p27.

Blyth, J. (2022). Math Anxiety: Finding Solutions to a Multifaceted Problem. *BU Journal of Graduate Studies in Education*, *14*, 2022.

Caviola, S., Toffalini, E., Giofrè, D., Ruiz, J. M., Szűcs, D., & Mammarella, I. C. (2022). Math Performance and Academic Anxiety Forms, from Sociodemographic to Cognitive Aspects: a Meta-analysis on 906,311 Participants. *Educational Psychology Review*, *34*(1), 363–399. https://doi.org/10.1007/s10648-021-09618-5.

Elfert, M. (2019). Lifelong learning in Sustainable Development Goal 4: What does it mean for UNESCO's rights-based approach to adult learning and education? *International Review of Education*, *65*(4), 537–556. https://doi.org/10.1007/s11159-019-09788-z.

Habibullah. (2019). *Analisis Kesulitan Penyelesaian Soal Cerita dan Math Anxiety Siswa Kelas VIII SMP dan MTs Negeri di Kabupaten Bantul*. Universitas Negeri Yogyakarta.

Jolejole-Caube, C., Dumlao, A. B., & Abocejo, F. T. (2019). Anxiety Towards Mathematics and Mathematics Performance Of Grade 7 Learners. *European Journal of Education Studies* . https://doi.org/https://doi.org/10.5281/zenodo.2694050.

Kemdikbud. (2021). *Framework Asesmen Kompetensi Minimum (AKM)*. Pusat Asesmen dan Pembelajaran, Badan Penelitian, Pengembangan dan Perbukuan, Kementerian Pendidikan dan Kebudayaan.

Khairunnisa, E., & Fitri, A. (2023). Pengaruh Kecemasan Matematis terhadap Kemampuan Pemecahan Masalah Siswa Kelas 11 SMA Negeri 1 Bojong. Prosiding Seminar Nasional Pendidikan Matematika. *Seminar Nasional Pendidikan Matematika, Prosiding Mulawarman, Universitas Mulawarman*, *3*, 49–54. https://jurnal.fkip.unmul.ac.id/index.php/psnpm.

Rencher, A. C. (2002). Methods of multivariate analysis. In *Choice Reviews Online* (Vol. 33, Nomor 03).

John Wiley & Sons, Inc. https://doi.org/10.5860/choice.33-1586.

Salkind, N. J., & Rasmussen, K. (2008). *Encyclopedia of educational psychology*. Sage Publications.

Sidney, P. G., Thalluri, R., Buerke, M. L., & Thompson, C. A. (2019). Who uses more strategies? Linking mathematics anxiety to adults' strategy variability and performance on fraction magnitude tasks. *Thinking and Reasoning*, *25*(1), 94–131. https://doi.org/10.1080/13546783.2018.1475303.

Tamrin, M., Afifah, S., Intan Salsabila, K., Herman, T., & Hasanah, A. (2024). *Pengaruh Kecemasan Matematika Terhadap Kemampuan Pemahaman Konsep Matematis Peserta Didik*. *17*, 21–30.

Wijaya, A. (2023). Kemampuan numerasi dan Growth Mindset siswa SMP dan Madrasah Tsanawiyah di Kabupaten Purworejo. *Jurnal Riset Pendidikan Matematika*, *10*(2), 153–164. https://doi.org/10.21831/jrpm.v10i2.66831.

Zhang, J., Zhao, N., & Kong, Q. P. (2019). The relationship between math anxiety and math performance: a meta-analytic investigation. *Frontiers in Psychology*, *10*(AUG). https://doi.org/10.3389/fpsyg.2019.01613.

Copyrights