Journal of Advanced Sciences and Mathematics Education
Volume 6, Issue 1, 290 - 301
e_ISSN: 2798-2351
DOI: 10.58524/jasme.v6i1.1071

Examining the influence of mathematical anxiety on the global perspective of junior high school students

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Article Info

Article history:

Received: Jan 20, 2026
Revised: Feb 13, 2026
Accepted: March 17, 2026

Keywords:

Correlational Study; Global Perspective; Junior High School Students; Mathematical Anxiety; Mathematics Education.

Abstract

Background: Mathematics is frequently perceived by students as a challenging subject, which can lead to mathematical anxiety. Such anxiety may influence students' learning experiences and their ability to interpret broader global issues.
Aims: This study aims to examine the influence of mathematical anxiety on the global perspective of junior high school students.
Method: A quantitative correlational design was employed involving 33 eighth-grade students from a public junior high school in Pontianak, Indonesia. Data were collected through a mathematical anxiety questionnaire and a global perspective questionnaire. Mathematical anxiety was examined through psychological, physiological, and social components. Prior to the main analysis, prerequisite tests including normality, linearity, and homoscedasticity were conducted. The relationship between variables was then analyzed using simple linear regression.
Results: The analysis indicates that mathematical anxiety contributed 10.3% to students' global perspective (R^2 = 0.103). However, the regression results show that mathematical anxiety did not have a statistically significant influence on students' global perspective ($p = 0.069 > 0.05$). This finding suggests that students' understanding of global issues may be shaped by other educational or social factors beyond mathematics-related anxiety.
Conclusion: Although mathematical anxiety was not found to significantly affect students' global perspective, addressing anxiety in mathematics learning remains important. Creating supportive learning environments and contextual learning experiences may help students engage more confidently with mathematics.

To cite this article: Nurhayati, N., Nirawati, R., Citroresmi, N, P., Husna, N., Wahyuni, R., Mariyam, M., Novita, E., Chandra, E., Wirasati, A. (2025). Examining the Influence of Mathematical Anxiety on the Global Perspective of Junior High School Students. *Journal of Advanced Sciences and Mathematics Education, 6*(1), 289-300.

INTRODUCTION

Mathematics has long been recognized as an important subject for developing students' reasoning, analytical thinking, and problem-solving abilities. In today's educational landscape, mathematical competence is closely related to numeracy literacy, which enables students to

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interpret quantitative information such as graphs, statistical data, and mathematical models (Sakurai & Goos, 2023; Sikko, 2023). As noted by Jardim (2021), these competencies are increasingly necessary in a world where many social and global issues are communicated through numerical evidence and data analysis.

In addition to supporting academic development, mathematics also contributes to students' broader intellectual capacity. Students who are able to understand mathematical information tend to be better prepared to interpret complex phenomena that involve quantitative evidence. Many global challenges, including climate change, economic inequality, and population growth, are commonly presented through statistical data and mathematical representations (Watson & Smith, 2022). Consequently, mathematics learning can play an important role in helping students understand and evaluate global issues more critically (Sachdeva & Eggen, 2021).

Despite its significance, mathematics is often perceived by students as a difficult and intimidating subject. Such perceptions may trigger negative emotional responses during the learning process. Students frequently experience feelings of tension, worry, or fear when they are required to solve mathematical problems or complete mathematical tasks (Buckley & Lee, 2021; Klee et al., 2022). As explained by Dávila-Acedo et al. (2022), these emotional reactions may influence students' confidence and participation in learning activities.

One psychological condition frequently discussed in mathematics education is mathematical anxiety. Mathematical anxiety refers to a feeling of discomfort or nervousness that appears when individuals interact with numbers or mathematical tasks (Furner & Duffy, 2022). Students who experience high levels of anxiety tend to avoid mathematical activities, doubt their abilities, and struggle when attempting to solve mathematical problems (Jiang et al., 2021). As education increasingly emphasizes the development of global competence, it becomes important to understand how emotional factors in learning may influence students' broader cognitive development. When students feel anxious about mathematics, their willingness to engage with numerical information may decrease. This situation could affect their ability to interpret quantitative data related to global issues (Kotronoulas et al., 2023). Therefore, examining the relationship between mathematical anxiety and students' global perspective becomes relevant in understanding how affective aspects of learning relate to broader educational competencies (Bakker et al., 2021).

Mathematical anxiety has been widely discussed as one of the affective factors that can influence students' learning experiences in mathematics. It generally refers to feelings of tension, nervousness, or fear that arise when individuals are required to engage in mathematical tasks or numerical reasoning. Such emotional responses may interfere with cognitive processes involved in learning mathematics, including attention, memory, and problem-solving performance (Scheibe et al., 2023). As suggested by Mamolo (2022), students who experience anxiety often encounter difficulties when processing mathematical information. A number of studies have reported that mathematical anxiety can influence students' academic engagement in mathematics learning. Students who feel anxious often demonstrate lower confidence and reduced motivation when dealing with mathematical activities (Li et al., 2021). Over time, this condition may limit their opportunities to develop stronger mathematical competence and numeracy literacy.

At the same time, educational discussions increasingly emphasize the importance of preparing students to understand global challenges. One concept that frequently appears in this context is global perspective. Global perspective refers to the ability to recognize global issues, understand different cultural viewpoints, and interpret information from multiple perspectives. According to Majewska (2023), students who develop this competence are more capable of analyzing complex global phenomena and participating in discussions about global challenges. Researchers have also highlighted the importance of connecting classroom learning with real-world contexts. In many cases, global issues are communicated through statistical data, charts, or numerical indicators

(Kogen, 2024). Therefore, the ability to interpret quantitative information becomes an important skill for students who are expected to understand global developments.

Although mathematical anxiety has been widely examined in mathematics education research, most studies tend to focus on its influence on academic outcomes such as mathematics achievement, numeracy literacy, or problem-solving ability. Research exploring how mathematical anxiety might relate to broader competencies beyond mathematics learning remains relatively limited (Pollack et al., 2021). In modern education, however, students are expected not only to perform mathematical procedures but also to interpret quantitative information in various contexts. Global issues such as environmental sustainability, technological change, and economic development are often discussed using statistical evidence and numerical data. As noted by Majewska (2023), the ability to understand such information is closely linked to the development of global competence. Despite this connection, relatively few empirical studies have explored whether students' emotional experiences in mathematics learning may influence their capacity to develop a global perspective. This situation indicates a research gap concerning how affective factors in mathematics education may relate to broader competencies required in contemporary education.

Investigating the relationship between mathematical anxiety and students' global perspective is important for several reasons. First, many global discussions rely heavily on quantitative data that require mathematical interpretation (Cevikbas et al., 2022). Students who experience anxiety when dealing with mathematics may feel less confident when interpreting numerical information related to global issues. Second, examining this relationship may provide insights into how emotional factors in mathematics learning influence students' broader intellectual development. Understanding this relationship may help educators design learning environments that support both students' cognitive growth and their emotional readiness when interacting with mathematical information connected to real-world contexts. Such insights may also contribute to the development of more supportive and engaging mathematics learning environments (Attard & Holmes, 2022).

Based on the considerations described above, this study aims to examine the influence of mathematical anxiety on the global perspective of junior high school students. Specifically, the research seeks to identify the level of mathematical anxiety experienced by students and to investigate whether mathematical anxiety significantly affects students' global perspective. Through this investigation, the study intends to provide empirical insights into how affective experiences in mathematics learning may relate to students' broader understanding of global issues.

METHOD

Research Design

This study applied a quantitative approach using a correlational research design to investigate the influence of mathematical anxiety on students' global perspective. A correlational design was considered appropriate because the study aimed to explore the relationship between two variables without introducing experimental manipulation. In this study, mathematical anxiety was treated as the independent variable, while students' global perspective functioned as the dependent variable. To examine the relationship between these variables, simple linear regression analysis was employed. Before conducting the regression analysis, several statistical prerequisite tests were carried out to ensure that the collected data satisfied the assumptions required for regression analysis.

Participants

The participants involved in this research were eighth-grade students from a public junior high school located in Pontianak, Indonesia. The population consisted of 340 students enrolled in

Grade VIII during the 2025/2026 academic year. From this population, 33 students from class VIII B were selected as the research sample using a cluster random sampling technique. This method was chosen because students were organized into existing classroom groups. By selecting one class as the sample, the researcher was able to maintain the natural classroom setting while ensuring that participants shared relatively similar learning environments and academic conditions.

Research Procedure

The research was conducted through several systematic stages. The process began with the preparation of the research design and the development of the instruments that would be used to collect the data. After the instruments were finalized, the researcher determined the participants using the selected sampling technique. Once the participants were identified, the next stage involved administering the questionnaires to measure students' mathematical anxiety and their global perspective. The questionnaires were distributed to the students during a scheduled session under the supervision of the researcher to ensure that all responses were completed properly.

After the questionnaires were collected, the responses were compiled and organized for further analysis. At this stage, the data were screened and prepared for statistical processing. Several prerequisite tests were then conducted to verify whether the data fulfilled the assumptions required for regression analysis. After the data met these requirements, a simple linear regression analysis was performed to determine the extent to which mathematical anxiety influenced students' global perspective. The sequence of the research stages implemented in this study is summarized in Figure 1.

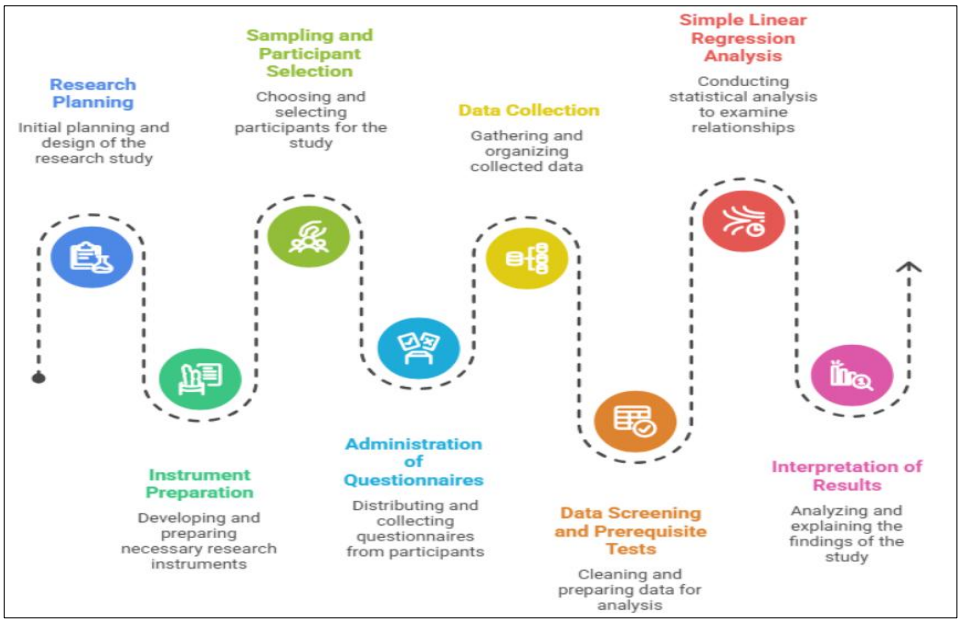

Figure 1. Flowchart of the Research Procedure

Instruments

This study used two main instruments to collect the data: a mathematical anxiety questionnaire and a global perspective questionnaire. The mathematical anxiety questionnaire was designed to measure students' emotional responses when dealing with mathematical tasks and numerical information. The questionnaire examined three key components of mathematical anxiety, namely psychological aspects, physiological responses, and social factors related to mathematics learning. These components were used to identify how students experience anxiety when interacting with mathematical activities in the classroom. In addition, a global perspective questionnaire was used to assess students' ability to understand global issues, interpret information from different

viewpoints, and relate mathematical knowledge to real-life contexts. Documentation was also used as supporting data to provide contextual information regarding the students' learning environment. The components of mathematical anxiety measured in this study are presented in Table 1.

Table 1. Components of Mathematical Anxiety Measured in the Study

Component	Description
Psychological	Feelings of worry, fear, or lack of confidence when dealing with mathematical tasks
Physiological	Physical reactions such as nervousness or tension experienced during mathematics learning
Social	Anxiety related to classroom interaction and evaluation in mathematics activities

Data Analysis

The data analysis in this study was conducted in two main stages. The first stage involved performing prerequisite statistical tests to determine whether the data satisfied the assumptions necessary for regression analysis. The normality test was carried out using the Shapiro–Wilk test to determine whether the data were normally distributed. Afterward, a linearity test was conducted to examine whether a linear relationship existed between mathematical anxiety and students' global perspective. In addition, a homoscedasticity test was performed to ensure that the residual variance remained consistent across the dataset. Once the data satisfied all statistical assumptions, simple linear regression analysis was conducted to examine the influence of mathematical anxiety on students' global perspective. The results of the regression analysis were interpreted using the coefficient of determination (R^2) and the significance value obtained from the analysis.

RESULTS AND DISCUSSION

Results

Students' Mathematical Anxiety

The data collected from the mathematical anxiety questionnaire were used to examine the level of anxiety experienced by students when engaging in mathematics learning activities. The analysis focused on identifying the variation in students' anxiety levels based on their questionnaire scores.

Table 2. Data on Students' Mathematical Anxiety Scores and Levels

No	Name	Anxiety Score	Components of Anxiety			Anxiety Level
			Psychology	Physiology	Social	
1	S1	25	✓			Low
2	S2	38	✓			Low
3	S3	17	-	-	-	Very Low
4	S4	51	✓	✓	✓	Medium
5	S5	48		✓	✓	Medium
6	S6	33	✓			Low
7	S7	21	-	-	-	Very Low
8	S8	35	✓			Low
9	S9	38	✓	✓	✓	Low
10	S10	28	✓			Low
11	S11	47	✓	✓	✓	Medium
12	S12	58	✓	✓	✓	High
13	S13	27			✓	Low
14	S14	17	-	-	-	Very Low
15	S15	44		✓	✓	Medium
16	S16	28	✓			Low
17	S17	40	✓	✓	✓	Low
18	S18	49	✓	✓	✓	Medium
19	S19	33	✓			Low
20	S20	21	✓			Very Low
21	S21	33	✓	✓		Low

No	Name	Anxiety Score	Components of Anxiety			Anxiety Level
			Psychology	Physiology	Social	
22	S22	29	✓			Low
23	S23	35	✓		✓	Low
24	S24	45	✓	✓		Medium
25	S25	57	✓	✓	✓	High
26	S26	35		✓	✓	Low
27	S27	33	✓	✓		Low
28	S28	50	✓	✓	✓	Medium
29	S29	49	✓	✓	✓	Medium
30	S30	38		✓		Low
31	S31	39		✓		Low
32	S32	45	✓	✓	✓	Medium
33	S33	26	✓			Low

As presented in Table 2, the results show that students demonstrate different levels of mathematical anxiety. The data indicate that several students fall into the very low anxiety category, while others are categorized as having low, medium, or high levels of anxiety. This variation suggests that students' emotional responses toward mathematics are not uniform and may differ depending on individual learning experiences.

A closer look at the distribution of scores reveals that most students are classified within the low and medium anxiety levels. This pattern indicates that although mathematics is often perceived as a challenging subject, many students are still able to manage their emotional reactions during mathematics learning. Nevertheless, the presence of students with high anxiety levels highlights that mathematical anxiety remains an issue that requires attention within mathematics education.

In this study, mathematical anxiety was examined through three main components: psychological, physiological, and social aspects. The psychological aspect reflects students' feelings of worry, fear, or lack of confidence when dealing with mathematical tasks. The physiological aspect refers to physical reactions such as nervousness or tension during mathematics learning activities. Meanwhile, the social aspect is related to anxiety that arises during classroom interactions, such as answering questions or participating in mathematical discussions. These components help provide a more comprehensive understanding of how students experience anxiety in mathematics learning.

The Influence of Mathematical Anxiety on Students' Global Perspective

To examine whether mathematical anxiety influences students' global perspective, several prerequisite statistical tests were conducted prior to performing the regression analysis. These tests were necessary to ensure that the collected data satisfied the assumptions required for regression analysis.

Table 3. Results of the Data Normality Test

	Variabel	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Data	Math-Anxiety	,079	33	,200*	,975	33	,626
	Global Perspective	,127	33	,198	,965	33	,356

*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

The results of the normality test show that both variables are normally distributed. The significance value for mathematical anxiety is 0.626, while the significance value for global perspective is 0.356. Since both values are greater than 0.05, the data meet the assumption of normal distribution. This result indicates that the dataset is suitable for further statistical analysis. After confirming the normality of the data, a linearity test was conducted to determine whether a linear relationship existed between mathematical anxiety and students' global perspective.

Table 4. Results of the Data Linearity Test

			Sum of Square	df	Mean Square	F	Sig.
Global_Perspective Math-Anxiety	Between Groups	(Combined)	1553,561	20	77,678	1,287	,333
		Linearity	234,694	1	234,694	3,887	,072
		Deviation from Linearity	1318,867	19	69,414	1,150	,412
	Within Gropus		724,500	12	60,375		
	Total		2278,061	32			

The results of the linearity test show that the deviation from linearity value is 0.412, which is greater than 0.05. This finding indicates that the relationship between mathematical anxiety and students' global perspective can be considered linear. Therefore, the data satisfy the linearity requirement necessary for regression analysis. To further verify the assumptions for regression analysis, a homoscedasticity test was conducted. The results of this test are illustrated in the scatterplot presented in Figure 2.

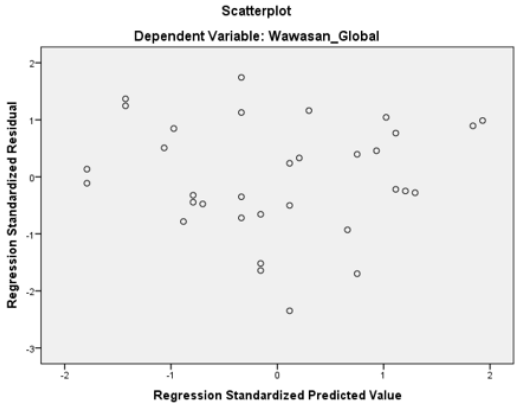

Figure 2. Scatterplot of the Homoscedasticity Test

The scatterplot shows that the data points are randomly distributed and do not form a specific pattern. This distribution indicates that the assumption of homoscedasticity has been fulfilled, meaning that the residual variance remains relatively constant across the dataset.

Since all prerequisite tests were satisfied, a simple linear regression analysis was performed to examine the influence of mathematical anxiety on students' global perspective.

Table 5. Results of the Simple Linear Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,321[a]	,103	,074	8,11881

a. Predictors: (Constatnt), Math_Anxiety

The regression analysis shows that the correlation coefficient (R) is 0.321, indicating a relatively weak relationship between mathematical anxiety and students' global perspective. The coefficient of determination (R^2) is 0.103, which means that mathematical anxiety contributes approximately 10.3% to the variation in students' global perspective. However, the significance value obtained from the regression analysis is 0.069, which is higher than the significance level of 0.05. This result indicates that mathematical anxiety does not have a statistically significant influence on students' global perspective. Although the significance value is relatively close to the threshold, the statistical test suggests that the relationship between the two variables cannot be considered significant within the context of this study.

Overall, these findings indicate that mathematical anxiety does not directly determine students' level of global perspective. This suggests that students' global understanding may be influenced by other factors beyond their emotional experiences in mathematics learning.

Discussion

Analysis of Mathematical Anxiety

The findings of this study indicate that students experience different levels of mathematical anxiety. The results of the questionnaire show that students' anxiety ranges from very low to high categories, although most students fall within the low and moderate levels of anxiety. This finding suggests that even though mathematics is often considered a challenging subject, many students are still able to manage their emotional responses during mathematics learning (Schukajlow et al., 2023). The variation in anxiety levels among students indicates that emotional responses toward mathematics are influenced by several factors. These factors may include students' previous learning experiences, their confidence in solving mathematical problems, and the classroom environment in which mathematics learning takes place. When students perceive mathematics as difficult or intimidating, feelings of tension and worry may arise and influence their participation in learning activities.

In this study, mathematical anxiety was examined through three main components: psychological, physiological, and social aspects. Psychological anxiety refers to students' feelings of worry, fear, or lack of confidence when solving mathematical problems. Physiological anxiety may appear through physical reactions such as nervousness or tension during mathematics learning. Meanwhile, social anxiety often occurs when students are required to answer questions or interact with teachers and peers in mathematics lessons (Archbell & Coplan, 2022). These components help explain how anxiety may appear in different forms during mathematics learning (Kiss & Vukovic, 2021).

Previous studies suggest that psychological anxiety can be reduced by increasing students' awareness of the importance of mathematics learning and by creating supportive learning environments (O'Hara et al., 2022). As noted by, teachers can help students overcome anxiety by presenting mathematical concepts in engaging and meaningful ways so that students begin to view mathematics as useful and relevant to everyday life.

In addition, students' self-confidence plays an important role in reducing mathematical anxiety. When students are given opportunities to successfully solve mathematical problems, their confidence gradually increases. Learning experiences that allow students to achieve small successes can help change their perceptions of mathematics and reduce negative feelings associated with the subject (Aguilar, 2021). Physiological anxiety can also be minimized by creating a comfortable classroom atmosphere. Learning strategies that incorporate games, collaborative learning, or interactive problem-solving activities may help students feel more relaxed when dealing with mathematical tasks (Fadzil & Osman, 2025).

Similarly, social anxiety may be reduced when teachers encourage positive classroom interaction. When students are allowed to express their ideas without fear of making mistakes, they may feel more comfortable participating in mathematics learning activities (Tong et al., 2021). Supportive classroom communication may therefore contribute to reducing students' anxiety during mathematics learning (Furner & Duffy, 2022).

The Influence of Mathematical Anxiety on Students' Global Perspective

The results of the regression analysis indicate that mathematical anxiety does not have a statistically significant influence on students' global perspective. Although the coefficient of determination shows that mathematical anxiety contributes 10.3% to students' global perspective, the significance value obtained from the regression analysis is greater than the threshold of 0.05. This result indicates that the relationship between the two variables cannot be considered statistically significant within the context of this study.

This finding suggests that students' global perspective may develop through learning experiences that extend beyond mathematics learning itself. In many educational contexts, students gain exposure to global issues through subjects such as social studies, civic education, language learning, and the use of digital media (Tarman & Kilinc, 2023). Access to global information through the internet and social media also allows students to develop awareness of global issues independently (Farsi, 2021).

From a conceptual perspective, mathematical anxiety is primarily related to students' emotional responses when dealing with numbers and mathematical problem-solving tasks. Although such anxiety may influence students' engagement and performance in mathematics learning, it does not necessarily limit their ability to understand broader global issues (Shabab, 2024). Students may still develop global awareness through other learning experiences that are not directly related to mathematics learning (Ye et al., 2023).

Another possible explanation for this finding is that global perspective is influenced by many factors beyond emotional experiences in mathematics learning. Students' exposure to diverse information sources, cultural interaction, and digital technology may contribute more strongly to their understanding of global issues (Alenezi et al., 2023). As suggested by, the development of global competence often occurs through interdisciplinary learning experiences rather than through a single subject area. These findings highlight the importance of adopting a holistic educational approach when developing students' global competencies. While reducing mathematical anxiety remains important for improving students' confidence and engagement in mathematics learning, strengthening students' global perspective may require learning experiences that integrate knowledge from multiple subjects and real-world contexts.

Implications

The findings of this study highlight the importance of paying attention to students' emotional experiences in mathematics learning. Although mathematical anxiety was not found to significantly influence students' global perspective, the presence of varying anxiety levels among students suggests that teachers still need to address this issue in classroom practice. Identifying students who experience anxiety can help educators design learning environments that are more supportive and engaging. By applying contextual learning strategies, collaborative activities, and real-life problem solving, teachers may help students feel more confident in mathematics while also encouraging them to connect mathematical knowledge with broader global issues.

Limitations

This study has several limitations that should be considered when interpreting the findings. The research involved a relatively small sample of students from a single junior high school, which limits the generalizability of the results to wider educational contexts. In addition, the data were collected using self-report questionnaires, which rely on students' perceptions and may not always fully reflect their actual emotional experiences. Furthermore, the study focused mainly on examining the statistical relationship between mathematical anxiety and students' global perspective, while other possible factors that may influence global perspective, such as digital literacy, social environment, and interdisciplinary learning experiences, were not explored in depth.

Suggestions

Future studies are encouraged to expand this line of research by involving larger and more diverse samples from different schools or regions to obtain a more comprehensive understanding of the relationship between mathematical anxiety and students' global perspective. Researchers may also consider using mixed-method approaches that combine quantitative analysis with qualitative data such as interviews or classroom observations in order to gain deeper insights into students' learning experiences. In addition, future research could explore other variables that may contribute

to the development of students' global perspective, including digital literacy, exposure to global issues in the curriculum, and interdisciplinary learning practices.

CONCLUSION

This study explored the relationship between mathematical anxiety and the global perspective of junior high school students. The findings indicate that students demonstrate varying levels of mathematical anxiety, ranging from very low to high categories. These differences reflect the diverse ways students emotionally respond to mathematics learning, which may be influenced by factors such as learning experiences, self-confidence, and the classroom environment. The analysis also shows that students' anxiety in mathematics can be viewed through several dimensions, including psychological feelings of worry, physiological reactions during learning activities, and social concerns that arise in classroom interactions. The statistical analysis further reveals that mathematical anxiety does not significantly influence students' global perspective. Although the regression results show that mathematical anxiety contributes a small proportion to variations in students' global perspective, the relationship between the two variables was not statistically significant. This finding suggests that students' global perspective may be shaped by a variety of other learning experiences beyond mathematics, including exposure to global information, interdisciplinary learning, and the use of digital media. Nevertheless, efforts to reduce mathematical anxiety remain important, as creating a supportive learning environment may help students engage more confidently with mathematics and better interpret quantitative information that is often related to global issues.

AKNOWLEDGMENT

The authors would like to express their sincere appreciation to the Institut Sains dan Bisnis Internasional (ISBI) Singkawang for providing support and facilities that made this research possible. The assistance and cooperation given during the research process greatly contributed to the successful completion of this study. The authors also extend their gratitude to the school administrators, teachers, and students who participated in this research and provided valuable information throughout the data collection process. Their participation and support were essential for the implementation of this study.

AUTHOR CONTRIBUTIONS STATEMENT

Nurhayati played a leading role in developing the research idea, designing the study, and coordinating all stages of the research process. She was responsible for supervising the implementation of the study and leading the data analysis and interpretation. Resy Nirawati, Nindy Citroresmi P, Nurul Husna, Rika Wahyuni, and Mariyam contributed to the development of the research instruments and participated in designing the research procedures. They also assisted in preparing the initial draft of the manuscript and contributed to the refinement of the article. Elisabet Novita, Erros Chandra, and Adenia Wirasati were actively involved in the field implementation of the research, including assisting in data collection, organizing research documentation, and supporting the overall data gathering process.

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