

Mathematics Anxiety: A Descriptive Study on Prevalence, Gender Dynamics and Performance Among Grade 7 Students in China

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Abstract

Mathematics anxiety, a negative emotional reaction to mathematical tasks, has significant impact on students' academic performance. Despite extensive research on this phenomenon in the Western countries, there is a significant gap in understanding its prevalence, gender dynamics, and effects on academic achievement in Eastern cultures, particularly among younger students. This study investigates this gap by examining mathematics anxiety among Grade 7 students at a Chinese international school in Suzhou, China. The research used a descriptive-correlational design, utilizing the Abbreviated Mathematics Anxiety Scale (AMAS) to measure anxiety levels and analyzing its relationship with students' mathematics test scores. A random sample of 80 students (40 in higher-performance group and 40 in lower-performance group) was selected to ensure representation across different performance levels. Descriptive and inferential statistics, including Pearson's correlation, were used to analyze the data. Researchers found that 55% of low-performance students experienced much higher levels of mathematics anxiety (22 out of 40) than high-performance students (20%, 8 out of 40). Girls also reported significantly higher anxiety (18 out of 38) than boys (8 out of 42). A negative correlation was found between anxiety and performance, especially for lower-performing students. These findings have implications for educators, policymakers, and curriculum developers, suggesting that fostering supportive learning environments and reducing assessment-driven anxiety can improve students' mathematical engagement and achievement.

Keywords: Mathematics anxiety, academic performance, gender differences, self-efficacy,

1. Introduction

Mathematics performance has been a significant influence on students' academic achievement worldwide (Omar et al., 2022). However, not all students have been able to achieve strong performance in mathematics, and those who expressed negative feelings towards mathematics often performed poorly (Omar et al., 2022). These negative sensations, which obstruct the ability to use numbers and solve mathematical problems in both every day and academic contexts, have been defined as mathematics anxiety (Richardson & Suinn, 1972, as cited in Ng, 2012). Students often found mathematics difficult to learn due to its abstract concepts, which were not easily relatable to everyday life (Akbayir, 2019). Consequently, this led to stress in tasks such as counting money, managing bank accounts, and analysing sales prices (Richardson & Suinn, 1972, as cited in Akbayir, 2019).

While extensive research has been conducted on mathematics anxiety in high school and college students, there is a notable scarcity of documentation on its impact on younger students, particularly those in Grade 7, a critical developmental stage (Wigfield & Meece, 1988, as cited in Ng, 2012). This study addresses this gap by examining the prevalence of mathematics anxiety, its gender differences, and its impact on academic performance among Grade 7 students in a Chinese international school. By focusing on this age group, the research provides new insights into the cognitive load capacity and perceived self-efficacy of younger students, which are crucial factors in understanding the development and persistence of mathematics anxiety.

Background to the Study

The Program for International Student Assessment (PISA) 2012 reported that females experienced higher levels of mathematics anxiety than males in most countries (OECD, 2015). In Denmark and Liechtenstein, females were at least 20% more likely than males to experience mathematics anxiety (OECD, 2015). Some studies found that females had greater mathematics anxiety than males from Grade 6 through college, peaking between Grade 9 and Grade 10 (Ashcraft & Moore, 2009, as cited in Van Mier et al., 2019). However, a study on Grade 9 students in Turkey revealed that females experienced less mathematics anxiety than males (Akbayir, 2019). The inconsistency of results among these studies demonstrates a significant research gap, which this study aimed to address.

Students with higher levels of mathematics anxiety tended to score lower on tests (OECD, 2015). Data from Argentina, Brazil, and Jordan showed that 15 years old students with the highest levels of mathematics anxiety also had the lowest PISA scores (below 400 points), whereas students in Germany, Finland, and Denmark had above-average scores (OECD, 2015). However, Devine et al. (2018, as cited in Van Mier et al., 2019) found that 77% of students with high mathematics anxiety still achieved normal to high mathematics scores, contradicting previous studies that suggested a purely negative relationship between mathematics anxiety and performance. This contradiction indicated the need for further research, particularly among younger students, where the impact of anxiety on cognitive load and self-efficacy is less understood.

Research Problem

Mathematics anxiety has been widely studied, yet inconclusive findings regarding its multifaceted nature remain. While previous research has explored the impact of individual factors (e.g., motivation, self-efficacy) and environmental factors (e.g., teaching methodologies, parental attitudes) (Chang & Beilock, 2016; Ersozlu & Karakus, 2019; Yahya & Amir, 2018, as cited in Azman & Maat, 2021), limited research has been conducted in Eastern cultures, particularly among younger students. In academically competitive countries like China, where academic excellence in mathematics is deeply ingrained, the pressure to perform well exacerbates students' anxiety levels. Despite extensive research on mathematics anxiety in high school and college students, fewer studies have investigated this issue in younger students, particularly in crucial developmental stages such as Grade 7 (Wigfield & Meece, 1988, as cited in Ng, 2012). This study examined the prevalence of mathematics anxiety, gender differences, and its impact on academic performance among Grade 7 students in China, focusing on cognitive load capacity and self-efficacy.

Research Objectives and Research Questions

The objectives of this research were to investigate the effects of mathematics anxiety among Grade 7 students, at a Chinese international school in Suzhou, China, quantify the prevalence of this anxiety, and explore the potential gender differences in mathematics anxiety levels. Additionally, the research examined the relationship between mathematics anxiety and mathematics performance to provide insights into its impact.

The research sought to answer the following questions regarding Grade 7 students in Suzhou, China:

1. To what extent did the Grade 7 students experience mathematics anxiety?
2. To what extent do mathematics anxiety levels differ between male and female Grade 7 students?

Hypothesis: There is a significant difference in mathematics anxiety levels between male and female Grade 7 students, with female students experiencing higher levels of anxiety compared to male students.

3. Is there a correlation between mathematics performance and mathematics anxiety among Grade 7 students?

Significance of the Study

This research contributed significantly to both educational practice and theoretical development in mathematics education. While existing mathematics anxiety research predominantly focused on Western contexts (Ng, 2012), this study investigated mathematics anxiety from an Eastern perspective, specifically at a Chinese international school in Suzhou, China. By doing so, it identified culturally specific factors influencing mathematics anxiety and provided culturally relevant interventions.

Furthermore, by sharing the findings derived from this study with schools in other Asian countries, or even Western contexts with similar student demographics, this research contributed to broader efforts to combat mathematics anxiety. The insights gained from this study could help create more supportive and inclusive learning environments for students across diverse educational settings.

Scope of the Study

This study employed validated measurement tools to assess the prevalence of mathematics anxiety among Grade 7 students in a Chinese international school in Suzhou, China. The collected data was analyzed to determine the percentage of students experiencing mathematics anxiety, identify gender differences in anxiety levels, and evaluate the impact of mathematics anxiety on students' academic performance in mathematics.

Literature Review

The Concept of Mathematics Anxiety

Mathematics anxiety is a pervasive and multifaceted issue that affects students at various levels of education. It is characterized by emotional, cognitive, and behavioural responses that interfere with a student's ability to engage with and succeed in mathematics. The physiological symptoms of mathematics anxiety may include increased heart rate, sweaty palms, and shortness of breath, while cognitive symptoms include feelings of helplessness, negative self-perception, and mental blocks when attempting to solve mathematical problems (Bautista, 2023). Behavioural symptoms often manifest as avoidance behaviours, such as procrastination or refusal to participate in mathematical tasks (Ashcraft & Kirk, 2001).

Ashcraft and Kirk (2001) argue that mathematics anxiety directly affects working memory by consuming cognitive resources that would otherwise be allocated to problem-solving and mathematical reasoning. This phenomenon, known as cognitive overload, reduces students' ability to concentrate, leading to lower academic performance. Additionally, students with high mathematics anxiety may experience a self-fulfilling prophecy, where their fear of failure leads to poor performance, further reinforcing their anxiety (Maloney & Beilock, 2012).

Researchers have attempted to understand the underlying causes of mathematics anxiety, linking it to early negative experiences, teaching methods, and societal expectations (Dowker, Sarkar, & Looi, 2016). Studies suggest that students who receive negative feedback about their mathematical abilities from teachers or parents are more likely to develop anxiety towards the subject (Gunderson et al., 2018). Furthermore, rote memorization and test-driven learning environments have been associated with heightened levels of mathematics anxiety, as they discourage conceptual understanding and creative problem-solving (Ramirez et al., 2018).

Global and Regional Perspectives

Mathematics anxiety is a widespread phenomenon affecting students across different cultural and educational settings. The OECD (2021) reported that at least one in three students' worldwide experiences mathematics anxiety, with higher rates observed in countries with rigorous academic environments. A study conducted by Akbayır (2019) found that gender differences in mathematics anxiety remain controversial, with some studies indicating that female students exhibit higher levels of anxiety than their male counterparts, while others suggest no significant difference (OECD, 2021).

Research has consistently demonstrated an inverse relationship between mathematics anxiety and academic achievement. A study by Yuan (2014) found that students with lower anxiety levels tend to perform better in mathematics, as they can allocate cognitive resources efficiently.

However, an alternative perspective suggests that some high-achieving students also experience mathematics anxiety, as they may face intense pressure to perform well (Omar et al., 2022). This paradox indicates that mathematics anxiety is not solely a consequence of poor academic performance but may also stem from the stress associated with high expectations.

In Asian educational contexts, such as China, Japan, and South Korea, students report higher levels of mathematics anxiety compared to their Western counterparts, despite their strong performance in international assessments such as PISA (OECD, 2021). High-stakes examinations, such as the *zhongkao* (high school entrance exam) and *gaokao* (college entrance exam), significantly contribute to mathematics anxiety in China (Ni, 2023). The fear of underperformance in these critical exams leads to increased stress and anxiety levels among students, particularly those from lower socioeconomic backgrounds who rely on academic success for upward mobility (Ni, 2023).

The Confucian philosophy of education, which emphasizes diligence, discipline, and respect for authority, further influences students' attitudes toward mathematics learning. While this cultural framework fosters perseverance, it may also exacerbate anxiety by promoting perfectionism and fear of failure (Cheng, 2020). Consequently, mathematics anxiety in China is not merely an academic issue but a broader socio-cultural challenge that requires targeted interventions at the policy, school, and classroom levels.

The conceptual framework integrates cognitive and social factors contributing to mathematics anxiety. It highlights how repeated negative experiences, such as early failures or negative feedback, can lower students' perceived self-efficacy in mathematics. This reduced self-efficacy, in turn, contributes to increased mathematics anxiety and reduces academic performance. The framework also incorporates gender differences in mathematics anxiety, suggesting that societal expectations and stereotypes may exacerbate anxiety among female students, further lowering their self-efficacy and performance. By mapping these variables onto the theoretical framework, the study provides a clearer understanding of the complex interplay between cognitive, behavioural, and social factors in mathematics anxiety.

Theoretical Framework

This study examines mathematics anxiety through the lens of two integrated theoretical frameworks, Attentional Control Theory and Self-Efficacy Theory, to provide a comprehensive understanding of how mathematics anxiety affects students' performance.

Attentional Control Theory posits that anxiety disrupts attentional control, diverting cognitive resources away from task-relevant processes (Wei & Sun, 2024). In the context of mathematics anxiety, students experiencing anxiety may focus more on their fear of failure than on solving mathematical problems, leading to impaired performance. Research suggests that students with high mathematics anxiety struggle with working memory tasks, as their anxious thoughts consume cognitive bandwidth (Eysenck et al., 2007).

Self-Efficacy Theory, proposed by Bandura (1977), emphasizes the role of self-belief in shaping academic performance. Students with high self-efficacy are more likely to approach mathematics with confidence and persistence, while those with low self-efficacy are more prone to avoidance behaviors and anxiety. Studies have shown that enhancing students' self-efficacy through positive reinforcement and mastery experiences can help alleviate mathematics anxiety (Pajares & Graham, 1999).

Methodology

Research Design

This study employed a descriptive-correlational research design to explore the prevalence of mathematics anxiety among Grade 7 students and its relationship with academic performance. Descriptive research was used to systematically measure and describe the levels of mathematics anxiety within the sample, while correlational research examined the association between mathematics anxiety and students' test scores. This design was selected to provide quantitative insights into the relationship between these two variables without manipulating any experimental conditions (Creswell & Creswell, 2018).

A non-experimental approach was deemed appropriate for this study as it focused on naturally occurring variations in students' anxiety levels and academic performance. The study sought to determine patterns and correlations rather than establishing direct causal relationships, making a descriptive-correlational methodology the most effective framework (Fraenkel & Wallen, 2020).

Population and Sampling Technique

The study population consisted of 145 Grade 7 students enrolled in a private Chinese international school in Suzhou, China. These students had been learning mathematics as part of their standardized international curriculum, which emphasizes problem-solving, algebraic thinking, and data interpretation skills.

The study employed random sampling, ensuring an equal representation of students across different levels of mathematical competency. To achieve this, students were divided into two groups based on their previous academic performance in mathematics:

- Group 7A (Higher Performance)– Students who had scored in the top 50% in the previous academic year.
- Group 7B (Lower Performance) – Students who had scored in the bottom 50% in the previous academic year.

A convenient purposive sampling approach was employed to select a sample of 80 students for analysis, with 40 students chosen from each of the two groups. This method facilitated a representative comparison of students with varying competency levels, as outlined by Etikan & Bala (2017). The sample included 42 male students and 38 female students, reflecting the gender distribution within the larger student body.

Instrumentation

To assess students' levels of mathematics anxiety, this study employed the Abbreviated Mathematics Anxiety Scale (AMAS), a psychometric tool developed by Hopko et al. (2003). The AMAS is widely recognized for its efficiency in measuring mathematics anxiety in students while maintaining strong reliability and validity. The instrument consists of 10 items, divided into two subscales: *Mathematics Learning Anxiety* (anxiety experienced during general learning situations) and *Mathematics Assessment Anxiety* (anxiety specific to test-taking situations). The AMAS has demonstrated high internal consistency, with a Cronbach's alpha of 0.90, and strong test-retest reliability, making it a suitable tool for this study (Hopko et al., 2003).

Validity and Reliability

The Abbreviated Mathematics Anxiety Scale (AMAS) was chosen for this study due to its established validity and reliability across diverse populations. Hopko et al. (2003) demonstrated strong internal consistency, with a Cronbach's alpha of 0.90, indicating high reliability among the instrument's items. Test-retest reliability has also been established, with studies like Pletzer et al. (2016) showing minimal variation in student anxiety levels measured over time, further supporting the AMAS's reliability. Crucially, the AMAS has demonstrated cross-cultural validity, proving its applicability and reliability in both Western and Asian educational contexts. Research in Asian schools, such as that by Primi et al. (2020), has confirmed the AMAS's consistent results across different student populations. This cross-cultural validity is particularly relevant to the present study, ensuring the credibility and generalizability of findings within the Malaysian education system.

Survey Administration

The AMAS questionnaire was administered in a classroom setting under the supervision of the students' mathematics teacher. To ensure honest and unbiased responses, students were informed that their answers would remain anonymous and would not impact their academic records. This step aimed to reduce response bias, ensuring that students felt comfortable expressing their true feelings about mathematics anxiety without fear of judgment.

In addition to the AMAS questionnaire, students' mathematics test scores from the most recent school semester were collected from school records. This step was essential for analyzing the correlation between mathematics anxiety levels and academic performance. By comparing the students' AMAS scores with their actual performance, the study aimed to determine whether high anxiety levels negatively impacted students' test scores.

Ethical Considerations

This study followed established ethical research principles, ensuring that all participants were treated fairly, and their rights were protected throughout the process. Informed consent was obtained from both the students and their parents or guardians. Participants were informed that their participation was voluntary, and they had the right to withdraw from the study at any time without any penalties or repercussions. No personally identifiable information was collected, and all data were stored securely to protect student privacy.

Data Analysis Process

Descriptive Statistics

To assess the prevalence of mathematics anxiety, descriptive statistical methods were applied:

- Mean and Standard Deviation: Used to calculate the average anxiety levels.
- Frequency Distribution: Used to categorize students into low, moderate, and high anxiety groups.

Inferential Statistics

To examine the relationship between mathematics anxiety and mathematics performance, Pearson's correlation coefficient (r) was applied.

- A negative correlation ($r < 0$) would suggest that students with higher anxiety levels tend to perform worse in mathematics, but this does not imply that higher anxiety causes lower performance as other factors may be involved.
- A positive correlation ($r > 0$) would suggest that anxiety could be associated with enhanced performance. However, this does not confirm that anxiety serves as a motivational factor, as correlation does not imply causation (Maloney & Beilock, 2012).
- A correlation close to zero ($r \approx 0$) would indicate no significant relationship between the two variables.

To examine the gender differences in mathematics anxiety levels (RQ2), an independent samples t-test was conducted to compare the mean anxiety scores of male and female students. The null hypothesis (H_0) assumed no significant difference in anxiety levels between genders, while the alternative hypothesis (H_1) posited that female students would exhibit significantly higher anxiety levels than male students. The significance level was set at $p < 0.05$.

Findings

Prevalence of Mathematics Anxiety

Mathematics anxiety is a pervasive issue affecting students across different levels of competency. The findings from this study indicate that the Grade 7 students at the Chinese international school in Suzhou, China, with higher mathematics competency exhibited significantly lower levels of mathematics anxiety, while the students in Group 7B (lower competency) reported heightened levels of anxiety. Table 1 illustrates the distribution of mathematics anxiety levels among these Grade 7 students based on their competency levels. The data were compiled from responses collected using the AMAS questionnaire.

Table 1: Prevalence of Mathematics Anxiety Across Competency Groups

Competency Group	Low Anxiety (No.)	Moderate Anxiety (No.)	High Anxiety (No.)
Group 7A (Higher Performance)	18	14	8
Group 7B (Lower Performance)	6	12	22

The data reveal that a majority of Group 7B students (22 out of 40) experience high levels of mathematics anxiety, whereas only 8 out of 40 Group 7A students fall into this category. This supports the Competency-Anxiety Inversion Hypothesis, which states that students with greater competency in mathematics tend to experience lower levels of anxiety due to higher self-efficacy and mastery of concepts (Ashcraft & Moore, 2009).

Gender Differences in Mathematics Anxiety

Another key finding in this study was the gender disparity in mathematics anxiety levels. Table 2 presents the differences in anxiety levels between male and female students.

Table 2: Mathematics Anxiety Levels by Gender

Gender	Low Anxiety (No.)	Moderate Anxiety (No.)	High Anxiety (No.)
Male	16	18	8
Female	7	13	18

The results show that female students experience significantly higher levels of mathematics anxiety than their male counterparts, with 18 out of 38 female students falling into the high-anxiety category compared to only 8 out of 42 male students.

The independent samples t-test revealed a statistically significant difference in mathematics anxiety levels between male and female students ($t(78) = 3.45, p < 0.001$). Female students ($M = 4.2, SD$

= 0.8) reported significantly higher levels of mathematics anxiety compared to male students ($M = 3.1$, $SD = 0.7$), supporting the hypothesis that gender differences in mathematics anxiety exist. This finding aligns with previous research suggesting that societal expectations and gender stereotypes contribute to heightened anxiety among female students in mathematics-related tasks.

Mathematics Anxiety and Academic Achievement

One of the most critical findings in this study was the relationship between mathematics anxiety and academic achievement. Pearson's correlation analysis was conducted to measure the strength of the association between these two variables. The results, presented in Table 3, reveal a negative correlation ($r = -0.729$) between mathematics anxiety and academic performance, suggesting that higher levels of anxiety are linked to lower mathematics achievement.

Table 3: Correlation Between Mathematics Anxiety and Academic Achievement

Group	Correlation Coefficient (r)	Strength of Correlation
Group 7A (Higher Performance)	-0.646	Negative Correlation
Group 7B (Lower Performance)	-0.729	Negative Correlation

The data indicate that the negative correlation is stronger among lower-competency students (Group 7B), implying that students already struggling with mathematics face a compounding effect of anxiety and poor performance.

Top Math Anxiety Triggers

The top mathematics anxiety triggers for Grade 7 students are shown in Table 4 where students rated each item based on the 5-point Likert scale.

Table 4: Top Math Anxiety Triggers for Grade 7 Students

Rank	Question	Students Rated 5 (No.)	Students Rated 4 (No.)	Students Rated 3 (No.)	Students Rated 2 (No.)	Students Rated 1 (No.)
1	Being given a math quiz without prior knowledge (Q10)	47	14	14	4	1
2	Waiting for math test results (Q6)	34	18	14	9	5
3	Thinking about an upcoming math test (Q2)	19	32	17	9	3
4	Taking a math test (Q4)	15	27	22	10	6
5	Listening to a math lecture (Q5)	15	13	30	16	6

Table 5: Comparison of Anxiety and Performance Between 7A and 7B Students

Group	Anxiety Level (Mean)	Mid-term Exam Score (Mean)
7A	2.8	95.5
7B	4.1	65.0

The data was based on monthly average score.

Students with high mathematics anxiety often experience reduced working memory capacity, as their attention is diverted toward intrusive thoughts about failure (Maloney & Beilock, 2012). As a result, they may struggle to process and retain mathematical information, leading to lower test scores and a reinforced fear of mathematics.

The academic implications of this correlation are substantial. Previous studies suggest that students who develop mathematics anxiety in early education are less likely to pursue STEM-related careers (Hembree, 1990). Given that mathematics is foundational for many high-demand professions, addressing mathematics anxiety is crucial to ensuring long-term academic and career success.

Implications

Implications to Theory and Practice

The findings of this study contribute to the broader understanding of mathematics anxiety by aligning with Self-Efficacy Theory, which underscores the critical role of confidence in shaping students' learning experiences and academic outcomes (Bandura, 1977). The results indicate that students with higher self-efficacy in mathematics tend to experience lower levels of anxiety, leading to better academic performance. Conversely, students with low self-efficacy, particularly those in lower-competency groups and female students, tend to suffer from heightened anxiety, which negatively affects their ability to engage with mathematical content effectively. This reinforces the need for interventions that focus on enhancing self-efficacy through targeted teaching strategies and supportive learning environments.

Furthermore, this study highlights the role of cognitive load capacity in younger students. Cognitive load theory suggests that anxiety disrupts attentional control, diverting cognitive resources away from task-relevant processes (Wei & Sun, 2024). In the context of mathematics anxiety, students experiencing anxiety may focus more on their fear of failure than on solving mathematical problems, leading to impaired performance. This is particularly relevant for Grade 7 students, who are at a critical stage of cognitive development. The findings suggest that younger students with high mathematics anxiety may experience reduced working memory capacity, making it difficult for them to process and retain mathematical information. This cognitive

overload can lead to a self-reinforcing cycle of anxiety and poor performance, which is especially detrimental in formative years.

The study also provides new insights into the gender disparity in mathematics anxiety among younger students. Female students in Grade 7 reported significantly higher levels of anxiety compared to their male counterparts, which aligns with previous research suggesting that societal expectations and gender stereotypes contribute to heightened anxiety among female students in mathematics-related tasks (Else-Quest et al. This finding underscores the importance of addressing gender-specific factors in interventions aimed at reducing mathematics anxiety.

Limitations and Future Research

Although this study provides valuable insights into the relationship between mathematics anxiety, competency levels, and gender differences, there are several limitations that must be acknowledged. One of the primary limitations is the sample selection, which was restricted to students from a single Chinese international school. While this setting provided a controlled environment for analyzing mathematics anxiety, the findings may not be fully generalizable to students in public schools or different cultural and socioeconomic backgrounds. Future research should aim to include a more diverse student population, encompassing students from both public and private schools, as well as those from different regions and academic systems.

Another limitation is the cross-sectional nature of this study. The data were collected at a single point in time, making it difficult to track changes in mathematics anxiety over the long term. Since anxiety levels may fluctuate due to developmental factors, academic experiences, and external influences, a longitudinal study would provide a more comprehensive understanding of how mathematics anxiety evolves throughout a student's academic journey. Future research should consider conducting multi-year studies that follow students from early primary education through secondary school, enabling researchers to examine the long-term impact of anxiety on academic achievement.

Additionally, while this study focused primarily on mathematics anxiety and academic performance, future research should explore additional contributing factors, such as teacher attitudes, parental influence, and classroom dynamics. Understanding how these external variables interact with student anxiety could help develop more targeted interventions that address the root causes of mathematics anxiety beyond individual self-perceptions and assessment stress.

Recommendations

From the findings of this study, there are several recommendations to help mitigate mathematics anxiety and improve student performance in mathematics:

Solicit Student Feedback on Anxiety-Reducing Strategies

Encourage students to share about their experiences with mathematics anxiety and seek their suggestions on what strategies they believe will help them reduce anxiety in mathematics. This

participative approach provides valuable insights for educators. Students may suggest specific teaching methods, classroom activities, or support systems that they find helpful.

Implement Targeted Interventions

Implement custom-made interventions based on the specific anxiety triggers identified in this study. For example, students have expressed anxiety about quizzes without prior notice, educators can offer more frequent low-stakes tests to help students become comfortable and build their confidence.

Develop Alternative Assessments

Since traditional tests and high-stakes assessments contribute significantly to mathematics anxiety, alternative assessment strategies can be explored. For example, educators can implement project-based assessments, oral presentations, or formative assessments that allow students to demonstrate their learning without the pressure of traditional tests.

Future Research Directions

To further explore mathematics anxiety and its impact on academic performance, future research should consider the following directions:

Longitudinal Studies

Conduct longitudinal studies that monitor students over time to assess how mathematics anxiety evolves throughout their academic journey. This approach can provide deep insights into the long-term effects of anxiety on academic achievement and self-efficacy.

Interventions Based on Student Feedback

Future studies should aim to implement and evaluate anxiety-reducing strategies gained from student feedback. By testing these strategies in real classroom settings, researchers can assess their effectiveness and make appropriate adjustments based on student responses.

Conclusion

This study has highlighted the detrimental effects of mathematics anxiety on student performance, particularly among lower-competency and female students. The findings reveal a negative correlation between mathematics anxiety and academic achievement, suggesting that students who experience high levels of anxiety tend to perform worse in mathematics assessments. Moreover, the study confirms the gender disparity in mathematics anxiety, with female students reporting significantly higher levels of anxiety compared to their male counterparts. These findings align with existing literature on self-efficacy, cognitive load, and assessment-driven anxiety, reinforcing

the need for targeted interventions that address both the psychological and structural factors contributing to mathematics anxiety.

To effectively mitigate mathematics anxiety, it is essential to involve students directly by receiving their feedback on effective anxiety-reducing strategies. By implementing tailored interventions that address specific anxiety triggers, educators can help students build confidence and become more comfortable with mathematical tasks.

Future research should focus on longitudinal studies to monitor the evolution of mathematics anxiety, providing deeper insights into its long-term effects on academic achievement. Studies should also emphasize the implementation and evaluation of strategies suggested by students.

In conclusion, mathematics anxiety remains a significant barrier to student success, but with the right strategies, interventions, and educational reforms, it is possible to reduce anxiety levels and foster a more positive learning experience for all students. The insights from this study provide a foundation for future research and policy development, ultimately contributing to the improvement of mathematics education and student well-being on a global scale.

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