

# Teachers' Strategies and Needed Interventions for Alleviating Mathematics Anxiety Among Senior High School Students

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math anxiety, teachers' strategies, interventions, instructional strategies, academic interventions, behavioral interventions

**Abstract.** Mathematics anxiety is a prevalent issue that negatively affects students' academic performance in mathematics. This study aimed to address this concern by examining the different types of mathematical anxiety observed by teachers, the strategies they use to reduce it, and the interventions needed to alleviate it. Using a qualitative research design, data were collected from mathematics teachers and stakeholders through semi-structured interviews and surveys. Thematic analysis revealed three major types of mathematics anxiety: test anxiety, numerical anxiety, and anxiety toward the course of mathematics. Teachers employed various strategies, such as creating a positive learning environment, step-by-step guided instruction, game-based and activity-based learning, brain breaks, and encouraging student participation and autonomy, to help students overcome their anxiety. Additionally, proposed interventions were identified across instructional, behavioral, and academic domains. Instructional strategies include creating a supportive environment, using engaging and interactive teaching methods, and fostering a growth mindset. Behavioral interventions include mindfulness practices, brain breaks, and building strong teacher-student relationships. Academically, the interventions include addressing foundational skill gaps and establishing institutional support systems such as tutoring and emotional counseling to ensure comprehensive student support. This study emphasized the need for continuous efforts in developing effective instructional methods and support systems to promote a more positive and inclusive learning experience in mathematics.

## Introduction

Mathematics anxiety refers to the negative emotional response triggered by simply thinking about or engaging in mathematical activities. When confronted with mathematical problems or concepts, individuals who suffer from math anxiety frequently experience fear, tension, and stress (Ashcraft, 2002). The complexity of mathematical tasks can significantly contribute to this anxiety. As tasks become more challenging, individuals may experience heightened feelings of anxiety, which can interfere with their ability to focus and perform effectively. However, this anxiety is not limited to complex concepts; it can also manifest in basic mathematics tasks. This suggests that individuals may experience a sense of panic or struggle to apply their knowledge, even when they understand the concepts.

Research has consistently shown a negative relationship between mathematics anxiety and mathematics performance. This indicates that higher levels of mathematics anxiety are associated with lower student performance in mathematics. Consequently, several studies have been exploring teachers' strategies and interventions to alleviate mathematics anxiety and improve academic performance in mathematics. Employing engaging and student-centered instructional strategies, creating an emotionally supportive classroom environment, providing individualized feedback, and offering encouragement are among the strategies reported by teachers to alleviate mathematics anxiety (Zhang et al., 2024). In addition, interventions focusing on emotional regulation through cognitive reappraisal and effective study skills such as self-testing and retrieval practice have also been found to be effective in reducing mathematics anxiety (Pizzie & Kraemer, 2023).

However, no single tool is effective for reducing math anxiety among all students (Alex, 2017). This suggests that different approaches may be necessary for different individuals. Anxiety in mathematics is influenced by the diverse learning styles of students. Individuals have different strengths and weaknesses and may cope differently based on their background and educational context. Thus, these existing strategies and interventions warrant further investigation.

Additionally, each generation differs significantly in terms of learning abilities. When faced with mathematics anxiety, students from different generations may respond differently, and previous strategies may no longer be effective for current and future generations, especially as technology advances. For instance, recent studies on Generation Z indicate that this generation exhibits unique learning characteristics shaped by continuous exposure to digital technologies, which are different from previous generations (Alruthaya et al., 2021). This suggests that technological advancement influences the learning preferences, expectations, and engagement styles of students.

Thus, this study aims to address these gaps by further investigating teachers' strategies for alleviating mathematics anxiety among students. By examining teaching approaches, classroom environments, and support systems implemented by teachers, this study seeks to identify the needed interventions to alleviate mathematics anxiety among students and improve their performance in mathematics. Specifically, it seeks to answer the following questions:

1. What types of mathematics anxiety do teachers observe in their students?
2. What strategies do teachers use to reduce students' mathematics anxiety?
3. What interventions can be proposed to address mathematics anxiety?

By exploring these questions, this study aims to provide valuable insights for educators to create supportive and effective learning environments, as well as for administrators to design teacher training programs. Ultimately, the research aims to promote equity in mathematics education by ensuring that students of diverse learning styles and backgrounds have equal opportunities to succeed.

## Methodology

### *Research Design*

The study adopted a qualitative research design, which allowed for the collection of in-depth insights from mathematics teachers and stakeholders. This design was chosen as this study aimed to identify teachers' strategies and interventions for alleviating students' mathematics anxiety. A qualitative research design was used to collect and analyze non-numerical data from the participants to understand concepts, opinions, or experiences regarding mathematics anxiety. This method was well-suited for this research to understand the experiences and practices of teachers in addressing mathematics anxiety.

### *Research Locale*

This study was conducted at Ateneo de Zamboanga University Senior High School, located at La Purisima Street, Zamboanga City, Philippines, approximately 1.2 kilometers from Zamboanga City Hall. The school has a population of more than one thousand five hundred (1500), which includes students, staff, and teachers. The school offers three (3) strands: Accountancy, Business, and Management (ABM), Humanities and Social Sciences (HUMSS), and Science, Technology, Engineering, and Mathematics (STEM). The school is also equipped with modern technology classrooms and facilities such as computer and science laboratories. This school was selected due to its diverse student population and the commitment of teachers and administrators to addressing anxiety among students. Thus, it is an ideal setting for investigating teachers' strategies and interventions for alleviating mathematics anxiety among students.

### *Sampling Techniques*

To ensure the relevance and richness of the data, the study employed a purposive sampling approach. This technique is a non-probability sampling used to select participants who are most likely to give a deeper understanding and insight into addressing the students' mathematics anxiety by identifying strategies and interventions to alleviate mathematics anxiety. Participants were selected based on their experience and roles in supporting students. The teacher respondents were those who have experience teaching mathematics for more than a year. Out of twelve (12) mathematics teachers, only eleven (11) have experience teaching for more than a year. While first-year teachers can offer valuable insights for this research, they often face challenges associated with limited experience and adjustment to the profession. Their perspectives and strategies for addressing mathematics anxiety among students may still be developing. Hence, first-year teachers were excluded from this study.

Stakeholder respondents in this study were those directly involved in the educational process and who have knowledge or expertise in addressing mathematics anxiety among students. Hence, stakeholder respondents consist of the Assistant

Principal for Formation and Community Extensions, Guidance Counselor, officers of the Mathematics Club, and officers of the Parent-Teacher Association (PTA).

#### *Research Instruments*

Questionnaires for this study were adopted from different research studies related to strategies and interventions for alleviating mathematics anxiety. For the mathematics teacher respondents, guide questions were adopted from Mitchell (2018). Data were collected through semi-structured interviews, using an interview protocol consisting of open-ended questions designed to elicit detailed responses regarding teachers' strategies and interventions in addressing mathematics anxiety among students (see Appendix A). The guide questions for stakeholders were adopted from Walters (2018), which focused on their insights regarding mathematics anxiety, its impact on students, and the support they have provided to help reduce it (see Appendix B).

#### *Data Gathering Procedure*

To provide core protection for human participants of the research, the research ethics committee conducts a thorough review of the ethical acceptability of the research proposals. Research studies must comply with the law and regulations to protect human subjects and be approved by the research ethics committee. Hence, the study was submitted to the Zamboanga City Medical Center Ethics Review Board (ZCMC Ethics Review Board) for approval since it involves teachers and stakeholder respondents.

The researcher also sought permission from the principal of ADZU SHS through a permission letter to conduct the study in their school. The letter contains the title of the study, purpose, participants, mode of data collection, the type of data that will be collected, and its confidentiality. After the approval of the principal and ethics review board, teacher participants were scheduled for an orientation on the flow of the study, its purpose, risks, and benefits of taking part in it, and the duration of the interview. After orientation, participants were asked to fill out the necessary form to indicate their willingness to participate in this research study.

Since the researcher could not conduct an orientation with all stakeholders simultaneously, given their varied roles as parent-teacher association officers, guidance counselors, administrators, and Mathematics club officers, the consent form was designed to include detailed, easy-to-understand explanations of the study's purpose, procedures, potential risks, and benefits. Each stakeholder has received their consent form through physical delivery, with contact information for the researcher provided to address any questions or clarifications. Attached also in the consents is the survey questionnaire design to gather the responses of stakeholders.

Upon receiving consent from teacher respondents, semi-structured interviews were conducted. Interviews were audio-recorded with permission and were guided by open-ended questions aligned with the study's research objectives. The interview schedule was flexible and based on the availability of the participants to ensure convenience and comfort. All gathered data were handled with strict confidentiality and securely stored in password-protected digital files. Only the researcher had access to raw data, and code names were used to maintain the anonymity of participants throughout the reporting process.

#### *Data Analyses*

Thematic analysis was employed to identify and analyze patterns within qualitative data collected from teachers regarding strategies to alleviate mathematics anxiety. The analysis began with data transcription, where audio-recorded interviews were transcribed verbatim. To ensure accuracy, the researcher listened to the recordings multiple times and cross-checked the transcripts against the audio. After transcription, the researcher familiarized the data by reading the transcripts thoroughly to identify key ideas. The next step involved coding, where significant statements related to teachers' observations of mathematics anxiety and their strategies were highlighted. The study utilized a hybrid approach to thematic coding, which combines both inductive and deductive methods. Inductive coding was used in the initial phase, which allows codes to emerge naturally from the data without the influence of pre-existing theories. In the axial coding phase, a deductive approach was employed to organize the codes into broader, conceptually informed themes, such as Test Anxiety, Numerical Anxiety, and Anxiety Towards the Course of Mathematics. These themes were influenced by existing literature and provided a structured lens through which to interpret the data. Finally, the researchers interpreted the themes in relation to the research objectives. A similar process of data analysis for both teachers and stakeholders was used to determine the needed interventions for alleviating mathematics anxiety.

## Results and Discussion

### *Different Mathematical Anxieties Observed*

Through thematic analysis, three major types of mathematics anxiety emerged based on teachers' observations: Mathematics Test Anxiety, Numerical Anxiety, and Anxiety Towards the Course of Mathematics.

#### *1. Test Anxiety*

Several teachers noticed that students become anxious before and during mathematics exams. Some students experience mental blocks that stop them from answering even simple questions. As Teacher 3 shared, "Last time, there was an exam sa mathematics. One of the students just cried. Umiyak lang talaga siya tapos sabi niya sa akin na na-mental block daw siya. Kahit paano niya tingnan yung mga question doon, hindi na niya alam kung paano e-answer." (During a mathematics exam, one of the students suddenly cried. She told me she had experienced a mental block, and no matter how much she looked at the questions, she couldn't figure out how to answer them.) This shows that the pressure of taking a test can be so overwhelming that students lose confidence in themselves, even when they have studied the lesson. This observation aligns with the findings of Ashcraft and Kirk (2001), who explained that test anxiety, particularly in math, can interfere with working memory and problem-solving abilities. This indicates that test anxiety can lead to cognitive blocks and a breakdown in information retrieval during high-pressure situations.

Teacher 6 also observed that during long exams, many students experience math anxiety, especially those who did not have enough time to prepare. Without preparation, their fear increases, making it harder for them to focus and remember what they learned. Teacher 9 noted that students often ask not to be called, saying, "Sir, pwede sa iba na lang muna?" (Sir, could you please call on someone else instead?) These behaviors show that many students are afraid when their math knowledge is tested, which not only affects their performance but also their willingness to participate. As Teacher 4 added, "You could see them shaking, unsure when they gave an answer, or hesitant to give answers, or you could see it in the way they answered - there's no confidence." (You could visibly notice them shaking or hesitating when responding, clearly lacking any confidence in their answers.) This means their anxiety is so strong that it even affects their body, making them physically uneasy. Similarly, Teacher 8 noticed, "For example, even the idea of having homework, having quizzes, makes them worry a lot." Teacher 10 shared similar observations, noting, "Sometimes, they're really nervous. And then, they'll have like... It's really clear to them that they're sweating." This indicates how visible physical symptoms like sweating and nervousness can manifest during tests, which highlights the stress and pressure students feel when confronted with math evaluations. He also observed, "And if not physical, during oral recitations, quizzes, there are quizzes, too. Sometimes, when I see that they're confused, they don't know what to do; usually, that's when I notice that they have math anxiety." These observations reinforce the prevalence of anxiety both in test conditions and oral questioning, which further affirms the emotional and cognitive struggle that students face.

These physiological reactions, such as shaking, sweating, and hesitation, are in line with the findings of Hembree (1988), who documented that test anxiety manifests through both psychological distress and physical symptoms. These results confirm existing literature that shows test anxiety is not only an internal struggle but also a visible and observable phenomenon that can significantly hinder performance.

#### *2. Numerical Anxiety*

Numerical anxiety refers to students' fear of dealing with numbers and mathematical computations, which affects their confidence and willingness to participate in math-related activities. Teachers observed that some students hesitate to engage in problem-solving, even when the lesson does not involve actual calculations. Instead of attempting to work through a problem, these students withdraw and avoid participating. Teacher 2 stated, "Takot sila na 'Hala math, 'di ko ito alam. Kahit basic lang yan, di ko pa rin alam'. Pag nag-ask na ng question, nagakuba lang, kunwari nagsusulat kahit wala na man talaga. Avoid eye contact sa teacher." (They're afraid, saying things like 'Oh no, it's math, I don't know this.' Even if it's just the basics, they still feel lost. When asked a question, they hunch over, pretending to write, and avoid making eye contact with the teacher.) This shows that their anxiousness is not only about solving complex problems but also about facing numbers in general. Their body language shows that they are uncomfortable, and instead of asking for help, they try to make themselves unnoticed.

This finding aligns with the work of Lyons & Beilock (2012), who found that individuals with high numerical anxiety show increased activity in brain regions associated with the experience of pain even before solving math problems, which indicates a strong emotional reaction simply to the presence of numbers. The avoidance behavior described by teachers provides an explanation that numerical anxiety leads students to avoid situations involving mathematical reasoning, regardless of the complexity of the task.

This avoidance is also reflected in their written work. Teacher 5 added, "Because in their scores or in their written works, sometimes they write you a letter saying that 'Hindi ko kaya Ma'am. I did not understand.'" (Sometimes, students include notes in their test papers saying, 'Ma'am, I can't do this. I didn't understand it.')

This response shows that students feel helpless when faced with mathematical problems. Instead of attempting to solve the problems, they express their frustration and lack of confidence through written messages to their teachers. This reinforces the idea that their anxiety prevents them from even making an effort to engage with the tasks. This aligns with Dowker et al. (2016) findings that students with numerical anxiety often suffer from a lack of self-efficacy and may give up on mathematical tasks prematurely due to feelings of incompetence and helplessness.

The fear of numbers is so strong that some students give up before even trying. Teacher 7 emphasized, "They would still express, even after showing the solution, they would express that they're a bit lost, they still don't know how to go about it." This shows that their anxiety is deeply rooted in their perception of mathematics. Even when they have not yet been asked to solve a problem, the presence of numbers alone makes them feel intimidated. Instead of attempting to understand, they immediately shut down and distance themselves from the lesson. The physical effects of numerical anxiety can also be seen in students' reactions when they are called to participate. Teacher 1 noted, "If makita mong significant na mababa ang student, yun yung glance mo na this student is not really into math... they are really afraid on participating." (When a student's performance is significantly low, you can tell they are not inclined toward math—they are visibly anxious about participating.)

These observations suggest that their anxiety is so overwhelming that it affects their ability to function in the classroom. This response shows that their anxiety is not simply a matter of lacking knowledge but a psychological barrier that stops them from trying. This is in line with the findings of Núñez-Peña and Suárez-Pellicioni (2014), who found that math-anxious individuals exhibit lower activation in brain areas responsible for numerical processing, which contributes to avoidance and poor performance in math-related tasks.

### 3. Anxiety Towards the Course of Mathematics

Many students enter mathematics classes with a negative mindset and believe that they will fail regardless of their effort. This predetermined fear of failure makes them less likely to engage in lessons, ask questions, or put in extra effort to improve. Teacher 4 reported that some students say, "Certain statements that they gave, such as 'I hate math'." Such statements reflect a deep-rooted anxiety that is often built over years of struggling with the subject. These students view mathematics as an impossible challenge, leading them to give up before they even try. This observation aligns with the findings of Chinn (2009), who argued that negative attitudes toward math are often a product of early academic failures and emotional experiences that foster a general dislike or fear of the subject. These long-standing feelings can contribute to the belief that one's ability in a subject is static and cannot be changed, which significantly undermines motivation and persistence. Students who believe they are inherently bad at math are less likely to engage in effortful learning behaviors, which reinforces a cycle of avoidance and underachievement. These past difficult experiences create a mental barrier that prevents them from fully engaging with math as they progress to higher levels.

Teacher 1 shared, "'Hindi ko na ine-expect ang sarili ko na magkaroon ng mataas na grade' kasi they know their limitation kung hanggang saan lang sila. Wala silang self-confidence kapag Gen Math na, lalo na kapag alam nila na hindi nila field ang subject na yan." (They no longer expect high grades because they recognize their limitations. They lack self-confidence in General Math, especially when they know it's not their area of strength.) This statement shows the fixed mindset that many students adopt regarding mathematics. This lack of confidence discourages them from participating in class discussions, attempting problem-solving exercises, or even asking for help when they struggle. Meanwhile, Teacher 7 observed, "They would still express, even after showing the solution, they would express that they're a bit lost, they still don't know how to go about it." This suggests that even when teachers provide explanations and examples, some students still feel disconnected from the lesson. Their lack of understanding may be caused by the lack of basic knowledge, a fear of asking questions, or an overwhelming sense of frustration. This is consistent with the findings of Dowker et al. (2016), who noted that students with math anxiety often have gaps in foundational knowledge that make it difficult for them to grasp new content, which leads to a recurring sense of confusion and defeat.

Teacher 3 mentioned, "Malaman pa lang nila na Math ang subject, parang ayaw na nila. Marinig pa lang nila na math, alam na nila na mahirap. They cannot do it." (As soon as they know that the subject is Math, they lose interest. Just hearing it's Math makes them believe it's difficult and that they're incapable of doing it.) Instead of trying to understand or learn the lesson, these students mentally withdraw the moment they perceive a topic as challenging. Their belief that they cannot understand the lesson prevents them from putting in the effort to listen, practice, or ask questions. As a result, their learning is hindered, and they continue to struggle. Teacher 6 noted, "They don't have the interest na mag-deal or learn mathematics because they are anxious nga and iniisip na nila na mahirap." (They're not interested in learning or dealing with math

because of their anxiety and the belief that it's difficult.) This indicates that for some students, their dislike for mathematics is deeply ingrained and not just a temporary reaction to a difficult lesson. By the time they reach higher levels of education, they have already formed a strong disconnection to math, making it even more difficult to motivate them to engage in learning. Teacher 8 added, "That their automatic response was, I don't know the right word, disdain? I don't know, they suddenly have a problem with the thought that they will be having another Math class."

These findings suggest that students' beliefs about their abilities significantly influence their effort and performance. If they have already convinced themselves that they are not good at math, they are less likely to try, practice, or seek help. This is consistent with Chinn (2009), who explained that repeated experiences of difficulty and failure in mathematics can lead students to develop negative self-beliefs, which result in reduced effort, avoidance, and a tendency to disengage from mathematical tasks.

### *Teachers' Strategies to Reduce Mathematics Anxiety*

Teachers have employed different strategies to mitigate mathematics anxiety. Thematic analysis identified the following effective approaches:

#### *1. Creating a Positive Learning Environment*

Teachers emphasize the importance of building rapport with students to create a safe space for learning. They ensure students feel comfortable asking questions by fostering participation without fear of judgment. Teacher 1 noted, "What I do is I set the mood of the students. As much as possible, I do not want to have that kind of perception from the students that 'Math teacher to siya, strikta to siyang teacher, we cannot approach this teacher.' Kasi may experience ako dati na afraid ako sa teacher ko mag-ask ng question, so pag naging Math teacher ako, hindi ko ito gagawin." (What I do is set the mood for the students. As much as possible, I don't want them to have the perception that 'She's a Math teacher, she's strict, and we can't approach her.' Because I once had an experience where I was afraid to ask my teacher a question, I promised myself that when I became a math teacher, I wouldn't do the same.) The teacher further explained that students engage more when they do not feel intimidated. When students sense that their teacher is approachable and willing to help, they become more open about their difficulties in understanding math concepts. This makes learning more interactive and productive. Teacher 1 also emphasized boosting the confidence of the students, saying, "I check individually sa mga students. Para ma-boost niya yung confidence niya, yung solution niya ipapasulat ko sa board." (I check individually with the students. To boost their confidence, I ask them to write their solution on the board.)

Similarly, Teacher 6 added, "I would like to establish first the rapport yung student and teacher. During discussion, pwedeng ma-feel nila na okay lang si sir, mabait, but not during examination. Ibang usapan eh. But during discussion, kailangan ma-feel nila yung comfortable lang sila." (I would like to first establish the rapport between student and teacher. During discussion, they should feel that Sir is okay, kind, but not during the examination. That's a different matter. But during discussion, they should feel comfortable.) The teacher elaborated by trying to create a warm and welcoming atmosphere, smiling often, using encouraging words, and acknowledging every student's effort, no matter how small. The teacher also reminded them that mistakes are part of learning, and they should never be ashamed to ask for clarification. Similarly, Teacher 10 mentioned, "Sometimes, I joke around just to lighten the mood."

Teacher 9 also emphasized the importance of a positive learning environment by encouraging students, saying "Guys, huwag kayong matakot sa math kasi ito lang yung tandaan nyo na parang sa klase ko, kailangan nyo lang mag-participate." (Don't be afraid of math. Just remember, in my class, you only need to participate.) The teacher expanded on this by fostering a culture, where asking for help is normal and encouraged. Similarly, Teacher 4 underscored, "Sensitivity towards the needs of students. Even appreciating 'Oh, you recited today, and I appreciate that regardless of the answer'."

These findings align with existing literature, which emphasizes the importance of the emotional climate of the classroom, which significantly impacts students' math anxiety. According to Ramirez et al. (2018), a positive and supportive learning environment where students feel safe to make mistakes can reduce fear and anxiety. The teachers' observations confirm these findings, which highlight that when students feel accepted and supported, they become more willing to engage and express their difficulties.

#### *2. Step-by-Step Guided Instruction*

Teachers recognize that step-by-step guided instruction helps students grasp mathematical concepts by breaking down problems into smaller and manageable steps. This approach allows students to develop confidence and prevents them from feeling overwhelmed. Teacher 7 explained, "Well, usually, drills talaga. We provide them drills kasi we want them to also get to... Kasi ano talaga, ang math kasi is really something that they have to do again and again for them to understand it

and know about the process" (We provide them drills because Math is really something that they have to do again and again for them to understand it, to know about the process.) The teacher elaborated, "The second is to really accompany the student to a certain point where I have to guide them. Sometimes it takes a lot of time, kasi I would have to really go to them and check." Teacher 2 added, "Sa discussion, ang gusto kasi ng student may step by step, so sa discussion, I provide the step by step." (In the discussion, students prefer having a step-by-step approach, so I provide a step-by-step approach.) Teacher 4 also shared that breaking problems into smaller steps makes students feel that solving math problems is possible.

Many students fear math because they see problems as too complicated. But when guiding them step by step, they start to realize that they can do it. These findings support the study of Sweller et al. (2011), which explains that reducing cognitive load by breaking complex tasks into simpler components allows students to process information more effectively. When teachers implement clear, gradual instructional methods, students gain confidence and experience less anxiety.

### 3. Game-Based and Activity-Based Learning

To make learning mathematics more engaging, teachers integrate games and interactive activities such as collaborative exercises, number games, and problem-solving competitions. These strategies help reduce anxiety by shifting students' focus from fear to enjoyment. Teacher 1 shared, "First thing that I do is to think of a game-based activity. So, more on strategies that would get their attention first and to sustain that attention span of theirs. Kasi, parang very difficult. I will make it more interactive through games." Teacher 3 implements a similar strategy by incorporating games into the classroom to enhance student engagement and participation. As Teacher 3 shared "I usually incorporate game sa classrom. Kasi may mga students na nabobored sa math kase di nila ma-gets or natutulog na lang sila. There are days na ina-allot ko para maglaro kami. Dun sa laro na yun, dun yung chance nila na magparticipate sa classroom." (I usually incorporate games in the classroom because some students get bored with math, especially when they don't understand it, or they just end up sleeping. I allocate specific days for playing games. During those games, that's when they get the chance to participate in class.) The teacher recognizes that some students feel bored or disinterested in math. Thus, it provides students with the opportunity to participate actively in their learning process.

Teacher 6 also shared, "I usually employ game-based or project-based, and activity-based discussion or strategy." The teacher elaborated, "Usually, I let them play outside the classroom. I will let them play, for instance, volleyball, or touching ball. This shows that the teacher employs an engaging game-based and activity-based strategy to enhance student learning through physical activities, which creates a dynamic and interactive environment that promotes collaboration and teamwork among students.

These findings show the effectiveness of game-based and activity-based learning in reducing anxiety and increasing motivation. A systematic reviews confirm that game-based learning positively influences attitudes and emotional connection toward mathematics, which are likely key factors in lowering anxiety levels (Vankúš, 2021).

### 4. Incorporating Brain Breaks

Teachers use brain breaks to help students manage anxiety and process information more effectively. Teacher 1 explained, "I also make sure to have a brain break within the discussion. Ang brain break ay ginawa ko na siya during the first-year of teaching. Kasi I think the brain break will really help the student to analyze muna." (I make sure to have a brain break within the discussion. I started doing this during my first year of teaching because I think it helps students analyze before continuing.) The teacher emphasized that these short breaks allow students to reflect on the lesson and prepare for the next part. Additionally, the teacher observed that students use this time not only to rest but also to consult with classmates: "Some of them use their phones, but most of them discuss with their seatmates, asking about parts of the lesson they didn't understand." Teacher 1 noted that these interactions allow students to clarify confusing concepts among themselves, which fosters peer learning and reduces the pressure of asking questions in front of the whole class.

The findings of this study highlight brain breaks as a key strategy in helping students manage mathematics anxiety and process complex concepts. Existing literature supports the idea that short mental breaks improve focus, cognitive processing, and overall engagement. Research suggests that brief periods of relaxation or non-academic activities aid in consolidating learning, allowing students to retain information more effectively (Morisano & Shore, 2010). Additionally, informal peer discussions during brain breaks contribute to peer-assisted learning, as students clarify concepts among themselves, fostering better comprehension.

However, this study also challenges certain aspects of prior research. While brain breaks can improve learning, some research argues that unsupervised breaks may lead to distractions rather than improved focus (Godwin et al., 2016). The effectiveness of these breaks may depend on their structure and whether students are guided to use them productively.

This suggests a need for further research on the impact of structured versus unstructured brain breaks, particularly for students with mathematics anxiety.

### *5. Encourage Student Participation and Autonomy*

Teachers encourage student participation and autonomy to make students feel more engaged and confident. By involving students directly in problem-solving, teachers create an environment where students take ownership of their learning. Teacher 5 ensures active student involvement, explaining, "I ask them to explain, do board work. Then, after computing, they will explain it. I'll try to make sure na student-centered yung ginagawa ko." (I ask the students to explain their work and perform exercises on the board. After they complete their calculations, they will provide explanations. I strive to ensure that my approach is student-centered.) The teacher observed that when students explain their thought processes, they develop a deeper understanding of mathematical concepts. Additionally, varying activities such as group work or individual exercises help sustain their motivation: "There are times I do this as I check-up quiz. So, there are times that they do individual. There are times by group. Because when you say by group, you can see most of the students are very competitive."

Teacher 8 applies guided instruction from students, stating, "It's like a guided, guided instruction, wherein they tell me what to do, I'll be the one to write. So, they tell me the next step, what I should add, what I should multiply, and then they tell me what to do, and I write it down". The teacher emphasized that this strategy helps students build confidence because it reassures them that they are on the right track. To further reinforce learning, Teacher 8 gives practice sets, explaining, "If they can see or if they have evidence in front of them, in front of themselves, that they are improving or that they know how to do the question, they feel less anxious, it looks like." Teacher 1 also supports this by encouraging students to take their own notes, sharing, "I tell them to really write their own notes. For example sa discussion, dapat sa kanila nanggaling mga notes nila. You as a teacher, na-achieve mo na lahat sila busy during discussion kasi nagte-take down notes sila. They make sure they have their notes, and then at the end of the day, they will benefit sa kung ano yung ginawa nila." (I tell them to write their own notes. This keeps them busy during discussions, and at the end of the day, they benefit from what they wrote.)

Rather than simply copying from a presentation, students actively listen and extract key ideas themselves, which helps them engage more deeply in the learning process. These findings correspond with the literature on learner autonomy and active learning, which states that giving students control over their learning processes enhances motivation and reduces anxiety (Zimmerman, 2002). When students are allowed to participate actively and have a sense of agency, they are more likely to feel competent and less anxious.

### *Proposed Interventions to Alleviate Mathematics Anxiety: Instructional Interventions*

Based on the findings, the following instructional interventions were identified as effective in alleviating mathematics anxiety among students.

#### *1. Creating a Supportive and Encouraging Learning Environment*

The survey revealed that 9 out of 11 respondents agreed that math can convey a feeling of dread and pain, while the same number stated that students avoid math when they feel pressured. This suggests that a stress-free and supportive learning environment can help reduce math anxiety. However, 2 respondents disagreed, implying that math anxiety may be influenced by factors beyond classroom pressure.

Teachers emphasized the importance of reducing pressure in the classroom to help students feel more comfortable with math. As Teacher 5 shared, "Students see me as strict, so they are afraid to ask questions. I realized I need to remind them that they can ask freely." Another respondent from the survey responses, Stakeholder 10, stated, "Allowing students to express their anxious experiences first helps them release stress before attempting math problems." Additionally, Stakeholder 9 emphasized the importance of teacher empathy and patience, stating, "More understanding from the teachers... Approach students with low marks, make remedial classes for those who pick up slow."

These findings support previous studies that highlight the role of teacher-student relationships in reducing anxiety (Beilock et al., 2010). When teachers show empathy, patience, and openness, students are more likely to feel safe in expressing their difficulties and asking questions without fear of judgment. For students who do not believe math anxiety is influenced by pressure, providing problem-solving challenges with gradual difficulty levels can help them build resilience and engagement.

#### *2. Implementing Engaging and Interactive Teaching Strategies*

Since all 11 respondents agreed that math is a part of everyday life, it is important to connect math lessons to real-world applications to make learning more meaningful. Several respondents mentioned that students develop math anxiety because they find math abstract and disconnected from reality. As Stakeholder 2 emphasized, "Explaining that math is useful in everyday life, like managing finances or shopping, helps students see its importance." Additionally, game-based learning was identified as an effective strategy for making math more engaging. As Teacher 3 shared, "Sa pag-eencorporate sa game, may mga time kasi na kailangan ko mag-isip ng bagong game. Then paano ko ipapasok ang game nato para atleast maenjoy ng mga students."

These results indicate that contextualized and experiential learning reduces math anxiety by making mathematics more meaningful and less abstract (Fei, 2025). For students who prefer structured instruction over interactive activities, offering multiple learning modalities can help accommodate different learning preferences.

### 3. *Encouraging a Growth Mindset*

The survey revealed that 8 out of 11 respondents agreed that math anxiety impacts future career opportunities, indicating that students who lack confidence in math may avoid careers that require mathematical skills. Three respondents disagreed, suggesting that some students may develop math anxiety without it directly affecting their career choices. This finding aligns with the work of Ramirez et al. (2013), which found that students with high math anxiety were less likely to pursue math-intensive fields.

One respondent, Stakeholder 10, observed, "Some students see math anxiety as a challenge, but most develop low confidence and avoid math-related careers." Teachers also reported success in encouraging students to persist despite challenges. As Teacher 4 shared, "Just telling students you believe in them really matters. I had a student who improved from a 78 in midterms to a 90+ in finals simply because of encouragement." This reflects findings from Samuel et al. (2022), which emphasized the importance of fostering a growth mindset to enhance student resilience. For students who do not view math anxiety as a career barrier, providing exposure to diverse fields where math skills are essential can help broaden their perspectives.

### *Proposed Interventions to Alleviate Mathematics Anxiety: Behavioral Interventions*

The results of the study revealed the following behavioral interventions that may help in alleviating mathematics anxiety among students.

#### 1. *Promoting Mindfulness and Anxiety Management Techniques*

With 9 respondents agreeing that students avoid math when pressured, several teachers and stakeholders recommended mindfulness techniques to help students manage stress and refocus. Two respondents disagreed, which implies that alternative methods beyond mindfulness may be necessary for addressing math anxiety. As Stakeholder 10 suggested, "Teaching students' relaxation or mindfulness techniques helps them manage anxiety when faced with math tasks." Additionally, brain breaks were identified as a useful strategy for maintaining student engagement. As Teacher 1 shared, "Minsan, pagpasok mo pa lang, brain break na ang hinihingi. Pero it's manageable naman kasi at some point, naiintidihan ko kung saan sila nanggagaling kasi draining na din. Lalo na kapag 5th period, dismissal na, wala na silang energy." (Sometimes, students ask for a brain break even before class starts, especially in the last periods of the day.)

These findings support the literature on mindfulness programs in schools in reducing stress and anxiety while improving emotional regulation and attention (Zenner et al., 2014). This allows for improved focus and confidence in learning mathematics.

#### 2. *Strengthening Teacher-Student Relationships*

Since 9 respondents agreed that math anxiety leads to low confidence, teachers stressed that strong teacher-student relationships help students feel safe and supported. Two respondents disagreed, suggesting that personal factors outside of the teacher's influence may contribute to math anxiety. As Teacher 1 shared a success story, stating, "A student who feared math later became a math teacher after overcoming his anxiety through collaboration and encouragement." Additionally, financial struggles and peer pressure were identified as factors that worsen math anxiety. As Teacher 6 noted, "Family problems, financial issues, and bullying discourage students. A student might feel ashamed because a wealthier classmate can afford tutoring while they can't."

This is consistent with literature highlighting the importance of positive teacher-student interactions in fostering academic resilience (Reddy et al., 2018). For students who do not struggle with confidence, providing enrichment opportunities and leadership roles in math-related activities can help them further excel.

#### *Proposed Interventions to Alleviate Mathematics Anxiety: Academic Interventions*

The following academic interventions that emerged from the findings of this study were identified as effective in alleviating mathematics anxiety among students.

##### *1. Addressing Foundational Knowledge Gaps*

A major cause of math anxiety, as emphasized by 9 out of 11 respondents, is that students lack foundational skills, which leads to confusion and frustration when faced with more complex topics. Two respondents disagreed, indicating that foundational gaps may not always be the primary cause of math anxiety for all students.

Many teachers pointed out that students often struggle because they lack basic arithmetic, algebra, or problem-solving skills, making it difficult for them to keep up with lessons. As Teacher 4 noted, "One thing is the learning gaps. Added to that anxiety are the learning gaps that they are facing. They don't know how to do factoring, for example. Those concepts that needed to be mastered in junior high school." Another respondent, Stakeholder 9, explained, "Seminars, orientation, and remedial classes help students with math anxiety." This supports the literature advocating for targeted interventions to address foundational knowledge gaps as a way to reduce math anxiety (Geist, 2010). For students who do not experience anxiety due to foundational gaps, providing opportunities for advanced problem-solving and mathematical reasoning can help maintain engagement.

##### *2. Institutional Support and Policy Implementation*

With 10 out of 11 respondents agreeing that math achievement is linked to economic development, structured school-wide interventions were recommended. One respondent disagreed, which indicates that math achievement may not always be a determinant of economic success for every student. As Teacher 3 suggested, "Schools should strengthen tutorial sessions or make them a habit." Another respondent, Stakeholder 10, highlighted the need for psychological counseling, stating, "Students with severe anxiety need proper counseling, not just academic interventions."

This echoes the literature advocating for comprehensive support systems, including mental health resources, to address the multifaceted nature of math anxiety (Dowker, 2016). For students who do not believe that math achievement directly influences economic opportunities, providing interdisciplinary learning experiences that connect math to various fields can offer a broader perspective.

## **Conclusion and Recommendations**

This study aimed to identify teachers' strategies and the needed interventions to address mathematics anxiety among students, which emphasizes the role of teachers in fostering a supportive and engaging learning environment. The primary objective was to explore different teaching approaches and supports needed that can help students overcome their anxiety in mathematics and improve their academic performance. The study found that mathematics anxiety manifests in different forms, including test anxiety, numerical anxiety, and anxiety toward the course of mathematics. These anxieties often lead to avoidance behaviors, reduced confidence, and poor academic performance. The findings also highlighted the different strategies that teachers used to mitigate mathematics anxiety, and these include creating a positive learning environment, step-by-step guided instruction, game-based and activity-based learning, incorporating brain breaks, and encouraging student participation and autonomy.

To address mathematics anxiety and support student success, the study proposes interventions across instructional, behavioral, and academic domains. Instructional strategies include creating a supportive environment, using engaging and interactive teaching methods, and fostering a growth mindset. Behavioral interventions focus on mindfulness practices, brain breaks, and building strong teacher-student relationships. Academically, the interventions emphasize addressing foundational skill gaps and establishing institutional support systems such as tutoring and emotional counseling to ensure comprehensive student support. By implementing these interventions, schools and educators can create a more inclusive and anxiety-free learning environment. Furthermore, it is important to continue refining and expanding these strategies to ensure their long-term effectiveness in addressing mathematics anxiety among students.

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## Data Availability Statement

The data supporting this study are available from the corresponding author upon reasonable request.

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## Appendices

No appendices are attached to this study.