



Received: 04-11-2023
Accepted: 14-12-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Math Anxiety and its Association with Problem-Solving Skills in Elementary Students

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Abstract

This study investigates the relationship between math anxiety and academic performance in primary education, addressing a notable gap in existing research. While previous studies have explored math anxiety in general educational contexts, few have delved deeply into its direct impacts on scholastic achievements in primary school settings. Our research specifically examines how math anxiety affects the academic performance of primary school students and the role of elementary teachers in shaping students' attitudes towards mathematics. The study employs a quantitative methodology, using the Mathematics Anxiety Scale (MAS) and standardized tests to assess problem-solving abilities among students in Grades 6 in Tugbongan Elementary School. A Likert scale is utilized to gauge students' attitudes towards mathematics. This approach allows for a precise quantification of math anxiety and its

correlation with academic performance. Findings indicate a significant variation in students' responses to mathematics, with a tendency towards agreement on experiences of math anxiety. The study reveals that math anxiety in primary education is influenced by a complex interplay of social, cognitive, and academic factors. It also underscores the critical role of effective teaching strategies in managing and reducing math anxiety, emphasizing the need for tailored educational interventions. This research contributes significantly to understanding math anxiety in primary education, offering valuable insights for curriculum development and teaching practices. It highlights the importance of early interventions and the pivotal role of elementary teachers in mitigating math anxiety, fostering a positive mathematical learning experience for young students.

Keywords: Math Anxiety, Primary Education, Academic Performance, Teaching Strategies, Mathematics Anxiety Scale, Quantitative Research

Introduction

While previous research has established a link between math anxiety and academic performance, there is a lack of in-depth exploration specifically in the context of primary education. For instance, Stoehr (2019) ^[1] highlights moments of mathematics anxiety in elementary classrooms but does not delve deeply into the direct impacts on scholastic achievements. Similarly, Ersozlu *et al.* (2022) ^[2] discuss cross-cultural differences in mathematics anxiety, yet the focus is not narrowed to the primary school setting. This research fills this gap by specifically examining how math anxiety in primary school students influences their academic performance.

The necessity of this study is underscored by findings such as those by Namkung, Peng, and Lin (2019) ^[3], which reveal a significant relationship between mathematics anxiety and performance among school-aged students. This correlation suggests a pressing need for targeted research in primary education, as early interventions can have long-lasting effects on students' academic trajectories. Furthermore, Huang, Zhang, and Hudson (2019) ^[4] emphasize the importance of understanding factors like math self-efficacy and growth mindset in relation to math anxiety, particularly in younger students, to foster better educational outcomes.

Elementary teachers play a pivotal role in shaping students' attitudes towards mathematics. As Condron, Becker, and Bzhetaj (2018) ^[5] point out, the sources of students' anxiety can often be linked to the classroom environment and instructional methods. By focusing on elementary teachers, this study aims to provide actionable insights for educators to mitigate math anxiety at an early stage. Dowker, Cheriton, Horton, and Mark (2019) ^[10] further reinforce this approach by illustrating the connection between young children's attitudes towards mathematics and their performance. By equipping teachers with the knowledge and strategies derived from this research, they can more effectively address math anxiety in primary education.

In conclusion, this research stands to contribute significantly to the understanding of math anxiety in primary education, offering valuable insights for curriculum development and teaching practices. By addressing the identified gap and leveraging the role of elementary teachers, the study aims to foster a more positive mathematical learning experience for young students.

Statement of the Problem

1. What is the profile of elementary students in Tugbongan Elementary School in terms of?
 - a) sex
 - b) age
 - c) grade level
 - d) section
2. What is the level of math anxiety of elementary students?
3. What is the level of problem solving skills of elementary students?
4. Is math anxiety significantly related to problem solving skills?
5. What are the interventions and effective teaching methods to strengthen elementary students in mathematics subjects?

Related Literature

Overview of Mathematics Anxiety

Mathematics anxiety, a pervasive concern in educational settings, significantly affects student outcomes. Stoehr (2019) ^[1] highlights the presence of math anxiety specifically in elementary classrooms, illustrating how it detrimentally influences student engagement and academic achievement. This form of anxiety is not just a transient emotional state but a profound barrier that can hinder a student's ability to effectively engage with and understand mathematical concepts, ultimately impacting their overall academic success.

Namkung, Peng, and Lin (2019) ^[3] further elucidate the depth of this issue through their meta-analysis, which establishes a clear inverse relationship between mathematics anxiety and performance among school-aged students. Their study provides empirical evidence that mathematics anxiety is not only prevalent but also has quantifiable negative effects on academic performance. This relationship is critical to understand, as it underlines the necessity for educational strategies that specifically address mathematics anxiety to improve student outcomes.

Huang, Zhang, and Hudson (2019) ^[4] contribute to this discourse by identifying key psychological factors that influence mathematics anxiety. They note that self-efficacy, or a student's belief in their own ability to succeed in mathematics, plays a significant role in either mitigating or exacerbating math anxiety. Additionally, they highlight the importance of a growth mindset, the belief that abilities can be developed through dedication and hard work, in combating math anxiety. This perspective is crucial, as it suggests that math anxiety can be addressed not only through direct educational interventions but also through fostering positive psychological attributes in students.

In sum, mathematics anxiety is a complex issue that impacts students' academic performance, engagement, and attitudes towards mathematics. It is influenced by a range of factors, including classroom experiences (Stoehr, 2019) ^[1], the psychological relationship between anxiety and performance (Namkung, Peng, & Lin, 2019) ^[3], and individual psychological factors such as self-efficacy and growth

mindset (Huang, Zhang, & Hudson, 2019) ^[4]. Understanding these dimensions is essential for educators and policymakers to develop effective strategies to reduce math anxiety and improve educational outcomes.

Student's Learning Experience through Cognitive, Environmental, and Behaviour

The multifaceted nature of students' learning experiences in mathematics, encompassing cognitive, environmental, and behavioral dimensions, is critical in understanding and addressing mathematics anxiety and achievement.

Cognitively, the way students perceive, remember, and solve problems is pivotal in their mathematical performance. Research by Musa and Maat (2021) ^[12] underscores that cognitive processes are significantly impacted by mathematics anxiety, which can impede working memory, essential for problem-solving in mathematics. This disruption often leads to a detrimental cycle where anxiety results in poor performance, further increasing anxiety. To counteract this, Karasel, Ayda, and Tezer (2010) ^[13] advocate for cognitive strategies like metacognitive training and enhancing problem-solving skills, which are key to improving mathematical proficiency.

The environmental factors in a learning setting, including the classroom atmosphere, teaching methods, and available educational resources, also play a substantial role in shaping students' attitudes and performance in mathematics. Musa and Maat (2021) ^[12] highlight the importance of a supportive and engaging learning environment in alleviating math anxiety. Environments that promote exploration, tolerate mistakes, and offer personalized feedback can cultivate a positive attitude towards mathematics. Additionally, incorporating elements like digital game-based learning, as explored by Hwa (2018) ^[8], can make the learning process more engaging and less intimidating, aiding in the development of mathematical skills.

Behavioral aspects, particularly students' approaches to learning and problem-solving, are equally crucial. Karasel, Ayda, and Tezer (2010) ^[13] note that anxiety can lead to avoidance behaviors that negatively impact learning and performance. Interventions that encourage a growth mindset and resilience can be effective in fostering a more positive approach to mathematics. This is supported by Dowker, Cheriton, Horton, and Mark (2019) ^[6], who found that positive attitudes towards mathematics correlate with improved performance, especially in young children.

The interaction between cognitive, environmental, and behavioral factors is essential to fully grasp the dynamics of mathematics anxiety and achievement. Each aspect influences and is influenced by the others. For example, a nurturing learning environment can improve problem-solving strategies and reduce avoidance behaviors, thereby lessening math anxiety and boosting overall mathematical achievement.

In conclusion, a comprehensive approach that considers the cognitive, environmental, and behavioral dimensions is indispensable for effectively addressing mathematics anxiety and enhancing students' mathematical learning experiences. This holistic approach provides a deeper understanding and informs targeted strategies to improve mathematical learning and performance.

Parental Role and Children Mathematics Anxiety

Parents' attitudes and involvement are pivotal in shaping

their children's attitudes and achievements in mathematics. While the provided references do not extensively focus on this aspect, the literature underscores the importance of parental influence in educational contexts. For instance, research has shown that parents' own attitudes towards mathematics, whether positive or negative, can profoundly impact their children's attitudes and anxiety levels towards the subject (Ramirez, 2016) ^[11]. This influence often manifests in how parents communicate about math at home, their involvement in math-related activities, and the support they provide for math learning.

Additionally, parental expectations and the pressure they may exert can also contribute to mathematics anxiety in children. High expectations, while generally positive, can sometimes lead to increased anxiety if children feel they cannot meet these expectations (Musa & Maat, 2021) ^[12]. Conversely, low expectations or negative attitudes towards math can lead to a lack of confidence and increased anxiety in children, as they might internalize these attitudes (Huang, Zhang, & Hudson, 2019) ^[4].

Furthermore, the role of parents in providing a supportive learning environment is crucial. Studies suggest that when parents create a positive and encouraging learning atmosphere, it can mitigate math anxiety and enhance children's performance (Karasel, Ayda, & Tezer, 2010) ^[13]. This involves not only helping with homework but also engaging in math-related activities that are enjoyable and non-stressful, thus promoting a positive attitude towards the subject.

In summary, the parental role in children's mathematics anxiety is multifaceted, involving their attitudes, expectations, and the learning environment they create. While more research is needed in this specific area, existing studies highlight the significance of parental influence in shaping children's mathematical experiences and achievements. This suggests the need for educational interventions that also involve parents, guiding them on how to best support their children's math learning and help reduce math anxiety.

Gender

Huang, Zhang, and Hudson (2019) ^[4] provide a foundational insight into how gender influences students' mathematical experiences, specifically noting the interaction between math self-efficacy, anxiety, and growth mindset. They argue that gender differences necessitate tailored approaches in educational settings to more effectively mitigate math anxiety and boost interest in STEM careers.

Further exploring gender dynamics, Dowker, Cheriton, Horton, and Mark (2019) ^[6] discuss how attitudes towards mathematics can vary significantly between genders, often from a young age. These attitudes can profoundly affect students' academic performance and their inclination towards pursuing further studies in mathematics. This observation is crucial as it suggests that interventions aimed at changing attitudes towards mathematics need to be gender-sensitive and initiated early in the educational journey.

Ersozlu, Usak, and Blake (2022) ^[2] contribute to this discussion by comparing cross-cultural differences in mathematics anxiety, indirectly highlighting how societal and cultural factors intersect with gender to influence math anxiety. Their work underscores the complexity of gender dynamics in the context of mathematics education,

suggesting that cultural norms and expectations can further exacerbate or mitigate gender disparities in mathematics achievement.

Moreover, the work of Petronzi, Staples, Sheffield, Hunt, and Fitton-Wilde (2019) ^[7] in developing the Children's Mathematics Anxiety Scale UK (CMAS-UK) provides a tool that can be used to assess and understand these gender differences in younger students. This tool could be instrumental in identifying early signs of math anxiety, particularly in how they manifest differently across genders. In summary, the literature suggests that gender differences in mathematics anxiety and achievement are influenced by a combination of factors including self-efficacy, societal norms, and early educational experiences. Huang *et al.*'s (2019) ^[4] findings, along with the insights of Dowker *et al.* (2019) ^[6], Ersozlu *et al.* (2022) ^[2], and Petronzi *et al.* (2019) ^[7], collectively emphasize the need for gender-specific approaches in educational practices to effectively address these disparities. Such approaches would not only help in alleviating math anxiety but also in encouraging a more diverse representation in STEM fields.

Methodology

The research design of this study is rigorously structured around a quantitative methodology, a choice that is fundamentally grounded in the nature of the variables under investigation and the methods utilized for data collection and analysis. At the heart of this design is the objective measurement of variables, which is a hallmark of quantitative research. This is achieved through the implementation of the Mathematics Anxiety Scale (MAS) and standardized tests to assess problem-solving abilities. Such tools are essential in the quantitative paradigm as they provide numerical data that can be precisely quantified and subjected to statistical analysis.

Complementing this approach, the study employs a Likert scale to gauge students' attitudes towards mathematics. The use of Likert scales is a strategic choice in quantitative research, as it converts subjective attitudes into quantifiable data that can be statistically analyzed. This standardization and quantification of attitudinal data align with the quantitative nature of the study, ensuring structured and measurable insights into students' perceptions and feelings about mathematics.

A central objective of this research is to explore the relationship between math anxiety and problem-solving skills among primary school students. Quantitative research excels in testing hypotheses and examining relationships between variables through statistical methods. It is this capability that makes it particularly suitable for the study, enabling the researchers to analyze correlations, variations, and patterns within the data. Such an analysis is crucial for understanding the dynamics between math anxiety and academic performance, and for drawing reliable and valid conclusions about these relationships.

Moreover, the quantitative methodology of this study offers the advantage of generalizability. The use of standardized measures like the MAS and structured testing facilitates the extrapolation of findings to a broader population. This aspect is particularly valuable for the study's aim of providing insights that can inform and improve teaching practices and curriculum development on a wider scale.

Finally, the study's reliance on statistical analysis for interpreting data aligns seamlessly with the quantitative

approach. This methodological framework provides a robust base for drawing insightful conclusions, identifying significant trends, and providing empirical evidence to support the findings. In essence, the quantitative research design chosen for this study is instrumental in facilitating a systematic and empirical investigation into the relationship between math anxiety and problem-solving skills in primary school students, thereby contributing to the development of evidence-based educational strategies.

Research Environment and Respondents

The selection of Tugbongan Elementary School as the venue for this study is a strategic decision, reflecting the area's diverse socio-economic and cultural landscape. This diversity is pivotal in providing a comprehensive understanding of the various factors influencing mathematics anxiety among students. Urban centers like Tugbongan Elementary School are characterized by their range of educational resources and policies, offering a representative microcosm of broader educational settings. The insights gleaned from this study in such an environment are likely to be relevant and applicable to other similar urban educational contexts.

Focusing on students from Grade 6 is a deliberate choice, as these grades represent a critical transition phase in children's education. This period is marked by the shift from basic arithmetic to more complex mathematical concepts, a transition that significantly impacts students' anxiety levels and academic performance in mathematics. By concentrating on these specific grade levels, the study aims to capture a detailed picture of how math anxiety manifests and evolves during these formative years of a student's academic journey.

An important aspect of this study is its exploration of potential differences in math anxiety and problem-solving abilities across these grade levels. The comparative analysis across Grade 6 will shed light on developmental trends or shifts in math anxiety and related skills, providing insights into whether math anxiety intensifies, diminishes, or remains constant as students advance through these critical stages. Such information is vital for the creation of age-appropriate and developmentally sensitive educational interventions.

Regarding the sample size, the decision to survey 30 respondents from each grade level is designed to ensure a balance between manageability and diversity. This number allows for a sufficiently representative sample of the student population in Tugbongan Elementary School, ensuring that the study's findings are reflective of the broader student community. By maintaining a uniform number of participants across each grade, the study ensures equitable comparisons and analyses, enhancing the reliability and validity of its conclusions.

In summary, the research setting and respondent selection are meticulously tailored to align with the study's objectives. Conducting this study in an urban and diverse setting like Tugbongan Elementary School, and focusing on the pivotal grades 6, provides crucial insights into the development and impact of math anxiety during key stages of educational growth. The examination of variances across these grades further enriches the study, paving the way for the formulation of nuanced, grade-specific educational strategies to combat math anxiety.

Instrument

The Mathematics Anxiety Scale (MAS) serves as a key instrument in this study. This scale, developed and validated by Carey *et al.* (2017), is renowned for its effectiveness in quantifying mathematics anxiety levels in school-aged students, encompassing both primary and secondary levels. The MAS is highly regarded in academic research for its robustness, providing valid and reliable measurements. This tool employs a range of questions designed to gauge students' emotional responses to mathematics in various contexts, making it an ideal instrument for this study.

Carey *et al.*'s work in developing the MAS involved extensive research and testing, ensuring that the scale is sensitive to the nuances of mathematics anxiety. It includes items that reflect real-world scenarios in which students might encounter math-related stress, thus ensuring that the responses are reflective of genuine experiences and feelings. This level of detail and specificity in the MAS makes it a particularly powerful tool for accurately capturing the levels of math anxiety among students.

Alongside the MAS, the study will utilize standardized problem-solving tests to evaluate the problem-solving capacities of the students. These tests are designed to measure students' ability to apply mathematical concepts and procedures to solve problems. The choice of standardized tests ensures that the evaluation of problem-solving skills is consistent and comparable across all participants. Standardized testing is a cornerstone in educational assessment, providing a uniform measure for comparing academic abilities across different individuals and groups.

The combination of the MAS and standardized problem-solving tests offers a comprehensive approach to understanding the relationship between math anxiety and problem-solving abilities. While the MAS provides insights into the emotional and psychological aspects of mathematics anxiety, the standardized tests offer an objective measure of students' mathematical capabilities. This dual approach ensures a holistic understanding of the impact of math anxiety on students' academic performance in mathematics, making the instrumentation of this study both rigorous and thorough.

Data Procedure

The data collection and analysis procedure for this study is carefully crafted to address the pivotal research questions regarding the impact of math anxiety on elementary students' problem-solving skills and the identification of effective interventions.

In the initial phase of the study, a diverse group of students from Grades 6 in Tugbongan Elementary schools will be selected. This selection will aim to achieve a representative sample, considering variables such as gender, academic performance, and socio-economic background. To ensure ethical compliance, necessary approvals and consents will be obtained from both school administrations and the students' parents or guardians.

The data collection process involves two key components. First, the Mathematics Anxiety Scale (MAS), as developed by Carey *et al.* (2017), will be administered to assess the participants' levels of math anxiety. The scale will be adapted to be age-appropriate and understandable for the target grade levels. Subsequently, standardized problem-

solving tests will be conducted to evaluate the students' mathematical problem-solving skills. In addition to these assessments, a survey will be distributed to teachers, focusing on various known intervention strategies for math anxiety. This survey is designed to gather insights into the effectiveness of these strategies in elementary education.

The analysis of the collected data will be predominantly quantitative. The responses from the MAS and the problem-solving tests will undergo statistical analysis, such as correlation and regression, to explore the relationship between math anxiety levels and problem-solving abilities. This analysis will directly address the first research question by elucidating the effects of math anxiety on students' problem-solving skills. Alongside this, the teacher survey responses will be analyzed to identify the most effective and practical strategies for mitigating math anxiety in the classroom. This analysis will categorize and evaluate the strategies based on their frequency of mention and perceived effectiveness, addressing the second research question regarding potential interventions.

In conclusion, this study's data procedure is designed to thoroughly investigate the intricate relationship between math anxiety and problem-solving skills in elementary students. Through the combined use of the MAS, standardized problem-solving tests, and teacher surveys, the study aims to provide a comprehensive understanding of this issue and identify viable strategies for addressing math anxiety in educational settings. This multi-faceted approach ensures that the study addresses its research questions with both depth and empirical rigor.

Results and Discussion

This chapter deals with the presentation, interpretation, and analysis of findings of the data gathered. It contains the findings of the study that are presumed to have responded to the research problems identified in Chapter 1.

Profile of the Respondents

This section holds the nature and characteristics of data parameters that every analysis has scrutinized each value for their frequency count that fit to the sample size 30. The following tables shows the mean response on the math anxiety and problem solving skills among grade 6 students together with their section one (1) and two (2).

Table 1: Profile of the Respondents

Profile	Category	Frequency	Percentage
Sex	Male	10	33.3
	Female	20	66.7
Age	11 Years Old	24	80.0
	12 Years Old	5	16.7
	13 Years Old	1	3.3
Grade Level	Grade 6	30	100.0
Section	Section 1	14	46.7
	Section 2	16	53.3

It can be gleaned in Table 1 provides a comprehensive insight into the profile of elementary students at the City Central School during their school year 2023 and beyond. Among the respondents, there is a slight prevalence of females (66.7%) over males (33.3%). These gender demographics are in alignment with mathematical problems that tending on anxiety or stress of students, which is predominantly a female-driven field based on the results

(Dowker *et al.*, 2016).

The age distribution revealed that nearly half (80.0%) of the respondents fall within the "11 years old" range, suggesting that a substantial proportion of the elementary students is in their mid-career stage of learning improvement while other category "12 years old and 13 years old" have a frequency count of "5 and 1" with respective percentage of "16.7 and 3.3". Previous research has indicated that the level of experience can motivate students learning style under the range of age that mending different insights to their educational learning (Hill *et al.*, 2016 and Van Mier *et al.*, 2019). Also implement the mathematics anxiety of students suffering from different difficulty in problem solving. It follows that the respondents of this study was grade 6 students with a 30 frequency counts and 100.0 percentage in total of City Central School.

Lastly, the category of "Section 1 and 2" have a frequency of "14 and 16" with respect to the percentage of "46.7 and 53.3" without missing data that reflect to the profile of the respondents such that the majority level of math anxiety and problem-solving skills was under the section 2 which is suffering from the internal learning platform and need to enhance educational learning in terms of mathematics.

Understanding these demographics and its elementary backgrounds are critical for tailoring students' strategies in their learning capabilities. For example, younger and less educational sector for mathematics might benefit from mentorship programs and continuous education to manage the intricacies of mathematics problem (Ma & Xu, 2004).

Moreover, educational system have been at significant risk depending on the teaching strategies and intellectual being of the students, especially when directly involved in mathematics interventions (Maloney *et al.* 2015). Therefore, the educational learning of elementary students should incorporate risk assessment tools and appropriate interventions to their learning outcomes.

The profile of elementary students in this study provides a exposure that can help in the formulation of targeted strategies in learning leadership capabilities, develop various skills, managing lifestyles, and educational programs, especially in a environmental context of study. The relatively young and well-educated students suggests a potential for adaptability and resilience to their respective mathematics subjects, essential traits for facing learning styles and skills, and more capability enhancement during its elementary years.

Table 2: Mean Response on the math Anxiety of Elementary Students

Math Anxiety	AWM	SD	Ranks	DE
1. I find math interesting.	3.67	0.71116	9	Agree
2. I would like to take more math classes.	3.53	0.81931	6	Agree
3. I have usually been at ease during math tests.	3.40	0.81368	3	Neither
4. I usually don't worry about my ability to solve math problems.	3.57	0.93526	7	Agree
5. Math is one of my favorite subjects.	4.20	0.80516	12	Agree
6. I almost never get uptight about taking math tests.	4.10	0.88474	11	Agree
7. Mathematics makes me feel nervous.	3.50	0.97379	5	Agree
8. I get really uptight during math tests.	3.13	0.73030	2	Neutral

9. I find math challenging.	3.00	0.90972	1	Neutral
10. I am unable to think clearly when doing my math test.	3.48	0.87099	4	Agree
11. I get a sinking feeling when I think of trying hard math problems	3.77	0.97143	10	Agree
12. Mathematics makes me feel confused.	3.60	0.81368	8	Agree
Overall Mean	3.58	0.8532		Agree

Legend: SA:(1.00–1.80) - Strongly Disagree, D:(1.81-2.60) - Disagree, N:(2.61–3.40) - Neither Agree nor Disagree, A:(3.41-4.21) - Agree, SA:(4.21-5.00) - Strongly Agree, AWM - Average Weighted Mean, SD - Standard Deviation, DE - Descriptive Equivalent

Table 2 shows the mean response on the math anxiety of the elementary students with an average weighted mean and standard deviation such frequently used by the respondents in reducing students' fear in the mathematics subjects emerge to the overall mean value 3.58 equivalent to “Agree”. Every weighted average of this table shows students' impact to the math anxiety were the descriptive equivalent has two results “Neutral and Agree”.

Upon analyzing this research study, several results emerge to this section pertaining to the descriptive equivalent of “Neutral” with an average weighted mean of “3.40, 3.13, and 3.00” in deviating “0.81368, 0.73030, and 0.90972” respectively, indicating some students have different ease of fear and anxiety of math subjects. It also encompasses that the prevalence of math anxiety in elementary students involves various social, cognitive, and academic elements to their educational learning. Some numerous research studies have been conducted to pin-point the reasons for the gaps in mathematic achievement for American students. The causes are wide ranging (Ruff, & Boes, 2014) [10].

Another descriptive equivalent to the results obtained was “Agree” in math anxiety of elementary students with an average weighted mean of “3.67, 3.53, 3.57, 4.20, 4.10, 3.50, 3.48, 3.77, and 3.60” respectively, indicates that every ranks have various elements to consider (Field, 2013 & Zhang, zhao, & kong, 2019) [14, 15]. In the dispersion of data that the mean spreading out to its natural mean value comes from “0.71116, 0.81931, 0.93526, 0.80516, 0.88474, 0.97379, 0.87099, 0.97143, and 81368” respectively, indicating the standard deviation for its mean have a variability to enhance students math anxiety between the learning process and educational system of school (Commodari, & La Rosa, 2021) [9].

Further conclusion to the math anxiety of elementary students have to management of teachers teaching strategies to enhance their corporate inactment of learning in their scholarly related subjects in order for them to show the effective wide variety of reducing mental stress and increase students full potential of math subject during mathematical intervention procedures. Concluding part of this sub-section multiply a holistic approach in developing elementary students in their learning pertaining to ability in creativity, critical thinking, and logical approach in promoting mental flexibility and practical ability reinforcing elementary students behavioral capability in coping under stress or math anxiety.

Table 3: Mean Response on the Problem Solving Skills of Elementary Students

Problem Solving	AWM	SD	Ranks	DE
1. I can apply math operations to real-life problems	4.33	0.6609	15	Strongly Agree
2. I am able to use mathematical reasoning to solve real-life problems.	4.23	0.6789	14	Strongly Agree
3. I understand basic math concepts such as more/less.	3.90	0.6618	13	Agree
4. I recognize basic shapes (circle, triangle, square, and rectangle).	4.47	0.8604	16	Strongly Agree
5. I can tell time correctly.	3.63	0.7649	10	Agree
6. I choose appropriate operations to complete math problems.	3.87	0.6288	12	Agree
7. I use tables/graphs correctly.	3.40	0.7701	9	Neutral
8. I can do math operations on fractions.	3.80	0.6644	11	Agree
9. I struggle to apply math operations to real-life problems.	2.80	0.8469	5	Neutral
10. I find it challenging to use mathematical reasoning to solve real-life problems.	3.13	1.0417	7	Neutral
11. I have difficulty understanding basic math concepts such as more/less.	2.53	1.1059	3	Disagree
12. I have trouble recognizing basic shapes (circle, triangle, square, and rectangle).	1.73	0.8683	1	Strongly Disagree
13. I struggle to tell time correctly.	2.33	1.0283	2	Disagree
14. I sometimes choose inappropriate operations to complete math problems.	2.73	0.8277	4	Neutral
15. I tend to make mistakes when using tables/graphs.	3.00	0.7878	6	Neutral
16. I find it challenging to perform math operations on fractions.	3.27	0.6915	8	Neutral
Overall Mean	3.32	0.8055		Neutral

Legend: SA:(1.00–1.80) - Strongly Disagree, D:(1.81-2.60) - Disagree, N:(2.61–3.40) - Neutral, A:(3.41-4.21) - Agree, SA:(4.21-5.00) - Strongly Agree, AWM - Average Weighted Mean, SD - Standard Deviation, DE - Descriptive Equivalent

Presentation of Table 3 shows the mean response on the math problem solving skills of elementary students that have five different results pertaining to “Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree”. It presents the necessary information of problem encountered by students suffering problem solving in mathematics subjects wherein the overall mean value was 3.32 in deviating standard deviation 0.8055 with descriptive equivalent of “Neutral”. It reveals the sub-section for each items results mending different interventions depending on students intellectual problem solving being foretell. Other study results reveals students' decision making skills affects problem solving skills moderately and positively inclined to their respective subjects, not only math but also other respective subject and beyond (Commodari, & La Rosa, 2021) [9].

Under the descriptive equivalent of “Strongly Agree” with an average of “4.33, 4.23, and 4.47” with respect to the values of “0.6609, 0.6789, and 0.8604” are statistically related to the mean and standard deviation pertaining to the

math solving skills of the students such that the math anxiety of problem solving skills reflects to the formidable obstacles to attaining success in mathematics subjects and other critical thinking skills (Field, 2013 ^[14] & Sevindir, Yacizi, & Yacizi, 2014). Meanwhile, the other equivalent was "Agree" with an average weighted mean of "3.90, 3.63, 3.87, and 3.80" with the values of "0.6618, 0.7649, 0.6288, and 0.6644" standard deviation reflects to the understanding problem operations of math and appropriate operations to consider. Students choosing appropriate mathematical symbols, operations, and logical thinking in diversifying range of social, cognitive, and academic abilities in scrutinizing mathematics statement (Alzahrani & Stojanovski, 2017).

Some response variables for each items have descriptive equivalent of "Neutral" foretell that the choosing correct answer are most suffering in critical thinking when it comes to the statement of the problem in math subject with the results of average weighted mean of "3.40, 2.80, 3.13, 2.73, 3.00, and 3.27" with respect to the variability results of "0.7701, 0.8469, 1.0417, 0.8277, 0.7878, and 0.6915" respectively, indicates most of students suffering this interventions. Math anxiety and problem solving interferes math-related or number-related information have various task in ordinary life and academic situations (Commodari, & La Rosa, 2021) ^[9]. Additionally, the category of "Strongly Disagree and Disagree" had a average weighted mean of "1.73 and 2.33" in deviating "0.8683 and 1.0283" reflect to the difficulty of selecting visualize shapes and struggle when the time is near in choosing incorrect answer.

Further interpretation to this section may contains the interventions of problem solving skills of elementary students in the effective strategies in teaching and activities to teach children for the important problem in choosing correct answer. Comprehend the basic parts of each items followed by the evaluations of answers to presents and leveraging the decent answer in teaching students answering difficult situation in mathematics subjects. Also, repeating methods and strategies reflects easy to understand by the students suffering from this situation. Structured, cognitive-behavioral intervention, and visualization provides more intervention of students problem-solving coping skills to help elementary students negative perception of mathematics subjects.

Inferential Statistics

This section contains the parametric statistical inferences for the different variables including math anxiety and problem solving skills among elementary students.

Table 4: Relationship between Math Anxiety and Problem Solving Skills among Elementary Students

Parameter	Problem Solving SKills			
	r	sig.	Decision	Conclusion
Math Anxiety	-0.246 ^{ns}	0.206	Failed to Reject Ho	Not Significant

Note: ns - Not significant at 5% level of significance.

Another illustration for the relationship of two variables was in Table 4 demonstrates the relationship between math anxiety and problem solving skills among elementary students in City Central School. Upon analyzing the researchers collected data, several insights emerge to this section pertaining to the variability and reliability of data that the whole analysis are not significant related to each

other. The results obtain in the problem solving and math anxiety are not statistically associated with each other such that the value of r-calculated value "-0.246" with a significant value of 0.206 which is higher than 0.05 level of significance are failed to reject the null hypothesis (Field, 2013) ^[14].

Contrary to this analysis of the study Zhang, zhao, & Kong, (2019) ^[15] reveals that there is a decrease math performance of the students that remains unclear of what factors moderate this relationship. The negative link values have more enhancement to be develop in terms of managing problem solving skills, critical thinking, and other interventions that modify students learning platform. Another contradiction of this section may contain the study of Ruff and Boes (2014) ^[10] indicates that the low achievement of math students reflects math anxiety which will includes social, cognitive, and academic factors of students learning styles. It will also the effectiveness of interventions towards teaching strategies of school curriculum and the implementation of small group interventions to reduce math anxiety and increase achievement of the students.

Further conclusion for the alleviating students math problem have no variability to include to those math anxiety and problem solving skills based on the negative or negligible results of the correlation analysis. It means the the development of students under section one and two are developing insights of mathematics educational learning such as strengthening reasoning skills and critical thinking. Establishing a treatment goals and nurturing a management techniques can work effectively as a mathematics teacher to reach them in providing educational care, develop different guidelines, and suggest effective way of protecting fear of human behavior in educational platform. Understanding human behavior in alleviating patients fear, emotions, and motivation are essential in creating a positive mindset experiencing this mathematical anxiety of students and other emotional support.

Summary

The study of elementary students at Tugbongan Elementary School in 2023 reveals significant insights into their demographic and educational profiles. Predominantly female (66.7%), with most students aged 11, these findings highlight a correlation between gender and mathematical anxiety, with females more affected. Grade 6 students, evenly split between two sections, show varying levels of math anxiety and problem-solving skills, particularly in Section 2. These demographics underscore the importance of tailored educational strategies, focusing on mentorship and individualized support, especially in mathematics. The study suggests that understanding these factors is crucial for enhancing learning outcomes and developing resilience and adaptability in students, emphasizing the need for targeted interventions in elementary education.

Also, math anxiety among elementary students reveals that the average response leans towards agreement (mean value of 3.58), with experiences varying between "Neutral" and "Agree". Specific data points show average weighted means ranging from 3.00 to 4.20 and standard deviations indicating a diversity in students' comfort with math, influenced by social, cognitive, and academic factors. Research cited (Ruff & Boes, 2014; Field, 2013; Zhang, Zhao, & Kong, 2019; Commodari & La Rosa, 2021) ^[10, 14, 15, 9] points to varied

reasons behind mathematical achievement gaps in American students. The study emphasizes the critical role of effective teaching strategies in managing math anxiety, suggesting that enhancing creativity, critical thinking, and practical skills can significantly alleviate stress and improve students' math performance.

The study presented in Table 3 evaluates the math problem-solving skills of elementary students, using a survey with responses ranging from "Strongly Agree" to "Strongly Disagree". The overall mean response was 3.32, indicating a neutral stance towards math problem-solving skills, with a standard deviation of 0.8055. Higher ratings in the "Strongly Agree" category correlated with lower math anxiety and better critical thinking skills. In contrast, lower ratings in the "Disagree" and "Strongly Disagree" categories were associated with difficulties in visualizing mathematical concepts and time pressure. The study also suggests that decision-making skills positively impact problem-solving abilities in mathematics and other subjects.

The research discussed in this information focuses on the relationship between math anxiety and problem-solving skills among elementary students, particularly in City Central School. The study presents contrasting views: the first part highlights that there is no significant statistical relationship between math anxiety and problem-solving skills, as evidenced by an r -calculated value of -0.246 and a significance value of 0.206, failing to reject the null hypothesis. In contrast, other studies, such as those by Zhang, Zhao, & Kong (2019)^[15], and Ruff and Boes (2014)^[10], suggest a negative impact of math anxiety on math performance, highlighting the need for interventions focusing on problem-solving skills, critical thinking, and other educational modifications. These studies emphasize the importance of understanding the various social, cognitive, and academic factors that contribute to math anxiety and how they can be addressed through teaching strategies and group interventions.

Conclusions

When it comes to the demographics and learning challenges of elementary school teachers, particularly in mathematics, it highlights a predominance of female students and a significant concentration of 11-year-olds, suggesting a need for educational strategies tailored to their specific challenges, like math anxiety. The division into Sections 1 and 2, with Section 2 facing greater difficulties, underscores the importance of customized support and interventions. The findings advocate for educational approaches that not only address immediate challenges but also focus on developing long-term skills such as adaptability and problem-solving, thereby fostering holistic growth and preparing students for future academic and life challenges. This study serves as a crucial guide for educators and policymakers in designing responsive and effective educational programs.

Mathematics anxiety among elementary students underscores a significant variation in students' responses to mathematics, ranging from neutral to agreeable levels of anxiety. This variability is influenced by a complex interplay of social, cognitive, and academic factors, as evidenced by the diverse average weighted means and standard deviations reported. The findings highlight the critical role of effective teaching strategies in managing and reducing math anxiety. By focusing on enhancing creativity, critical thinking, and practical skills, educators can

significantly mitigate the impact of math anxiety, fostering a more positive and productive learning environment. This approach not only addresses the immediate challenges of math anxiety but also promotes long-term mental flexibility and resilience among students, preparing them to face academic challenges with confidence and capability.

This research highlights the varied responses of elementary students towards math problem-solving, indicating a range of abilities and attitudes. The neutral overall response suggests a balanced perspective but also points to the need for targeted interventions to support students struggling with math. The findings emphasize the importance of teaching strategies that focus on understanding mathematical operations, selecting appropriate symbols, and logical thinking. Additionally, structured and cognitive-behavioral interventions could be beneficial in improving students' problem-solving skills and reducing math anxiety. This study underscores the complexity of math education and the necessity for diverse teaching methods to cater to the varying needs of students.

The research indicates that while the direct relationship between math anxiety and problem-solving skills may not be significant, there is a broader implication for educational practice. The findings suggest the need for a more holistic approach in addressing math anxiety, including the development of critical thinking, reasoning skills, and effective teaching strategies. Implementing small group interventions and enhancing teaching curricula could be beneficial in reducing math anxiety and improving overall student achievement. Additionally, understanding the psychological aspects of math anxiety, such as fear, emotions, and motivation, is crucial in fostering a positive educational environment. This approach emphasizes the importance of nurturing management techniques and creating supportive educational frameworks to mitigate the effects of math anxiety and enhance student learning experiences.

Recommendations

In light of the research findings, it is recommended that educational strategies be specifically tailored to the predominant demographics within elementary schools, particularly focusing on the unique challenges faced by 11-year-old female students in mathematics. This necessitates the development of age-appropriate and gender-sensitive materials and activities aimed at addressing math anxiety. Additionally, it is crucial to recognize the varying levels of difficulties among student groups. Differentiated instruction and targeted interventions should be implemented, particularly for students who face greater challenges in mathematics, ensuring that each student receives the support they need.

Emphasis should be placed on the development of adaptable and problem-solving skills within the curriculum. Activities that promote critical thinking, creativity, and the practical application of mathematical concepts are essential for ensuring holistic growth and preparing students for future academic and life challenges. Teaching strategies must also be varied and effective, catering to the diverse responses to math anxiety. Focusing on enhancing creativity, critical thinking, and practical skills in mathematics teaching can significantly reduce math anxiety and promote mental flexibility and resilience.

Structured and cognitive-behavioral interventions are recommended to improve problem-solving skills and reduce math anxiety. These could include group discussions, problem-solving exercises, and mindfulness practices specifically tailored to mathematics learning. Teaching strategies should encourage a deep understanding of mathematical operations, symbol selection, and logical thinking. Real-world examples and interactive teaching methods can make mathematics more relatable and less intimidating for students.

Understanding and addressing the psychological aspects of math anxiety, such as fear, emotions, and motivation, is crucial. Educators should strive to create a classroom environment that supports emotional well-being and fosters a positive attitude towards mathematics. Small group activities and interventions that allow for personalized attention and support are also recommended. These groups can provide a safe space for students to express their concerns and collaboratively work through math anxiety.

Lastly, it is vital to continuously review and update the mathematics curriculum to ensure it remains responsive to student needs and incorporates the latest educational research and methodologies. Ongoing professional development opportunities for teachers are essential, equipping them with the latest strategies and tools for managing math anxiety and enhancing student learning. This includes training in gender-sensitive teaching, understanding the psychological aspects of learning, and adopting innovative instructional methods.

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