

Factors Affecting the Senior High School Students' Math Anxiety on their Mathematics Performance

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Abstract

The study aimed to determine the level of student- and teacher-related factors contributing to anxiety in mathematics, focusing on students' interest and study habits, and teachers' skills, personality traits, and instructional materials. It also explored the significant effects of these factors on students' mathematics performance. The study utilized a descriptive research design and included 130 senior high school students from LSPU - SCC enrolled during the academic year 2022-2023.

The results revealed a significant effect of the factors related to students and teachers on why they experience anxiety, which in turn results in satisfactory performance in mathematics. The findings indicate that teachers' personalities play a vital role in addressing mathematical anxiety and developing students' interest in the subject. Maintaining a connection between teachers and learners through interactive classroom activities enhances students' study habits. Teachers' mastery of the lesson content increases learners' performance. Approachable teachers help learners to easily deliver tasks and feel more comfortable asking questions. The use of manipulative and other non-traditional devices engages learners in the teaching-learning process.

To address these issues, teachers must create strategic intervention materials to support low-performing learners, attend seminars to enhance their skills and personality traits, and encourage students to develop a love for mathematics.

Keywords: Mathematics, math anxiety, performance

1. Introduction

Anxiety is a general term for several disorders that cause nervousness, fear, apprehension and worries. Anxiety disorders involve not only adults, they are also most common health problems experienced by young people. Math anxiety is an intense emotional feeling of anxiety that people have about their ability to understand and to do Mathematics. According to Tobias S. (1995), Mathematics anxiety has been defined as feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of Mathematical problems in a wide variety of ordinary life and academic situations. Math anxious students have a math-phobia or the fear in mathematics. Students who suffer from Math anxiety feel that they are incapable of doing activities and classes that involve Math. Many students or learners have experienced Math anxieties in schools consequently. Reported consequences of being anxious towards Mathematics includes the avoidance of Mathematics and the decline in Math achievements. This kind of 'anxiety' is the first detected in the late 1990s.

Mathematics plays a very important role in life of a human beings. The importance of studying Mathematics was to produce competent person who is able to apply the knowledge of Mathematics in everyday life. Current reforms in Mathematics education that put the 'spotlight squarely on the social and cultural aspects of mathematical development' (Walshaw & Anthony, 2008) require teachers to ensure that all students have opportunities to develop Mathematical disposition. Teachers play a big part in Math anxious students. Students with Math difficulties are willing to take more risks if they feel that the teacher is there for them. The teacher needs to find the students' strengths and build on what they know. Trying to create a higher confidence level in the student will help them to relax and feel better about learning Math.

Math can also affect the students' career choice. Some students tend to choose less Math courses in order for them to avoid difficult Math subjects. It is therefore no surprise that people with Math anxiety tend to avoid college majors and career paths that depend heavily on Math. Math anxiety is linked to poor math performance, and can make teaching the subject a daily struggle for the teachers. Teachers can help their students overcome their math anxiety by boosting their self-confidence, strengthening their basic skills by using a step-by-step approach to students, help to develop a growth mindset of course the teachers should make the lessons fun and exciting. One of the most important things that the teachers should do is that they should not put down a wrong answer. Math anxiety can also be triggered when failing in Math that leads to lowering self-confidence. Positive support from the teacher is crucial to Math anxious student. Incorrect responses or answers must be handled in a positive and good way to encourage the students to participate and enhance the student's confidence. Students' Interest and Study Habits greatly affect their anxiety in Math as well as the Teachers' Teaching Skills, Personality Traits and Instructional Materials.

1.1 Statement of the Problem

The main purpose of this research was to know the effects of the student-Related factors and the Teacher-Related factors on the students with Math anxiety.

Specifically, it sought to answer the following questions:

1. What is the mean level of the student-Related Factors in terms of:
 - 1.1 Interest and
 - 1.2 Study Habits?
2. What is the mean level of the Teacher-Related Factors in terms of:
 - 2.1 Teaching Skills
 - 2.2 Personality Traits and
 - 2.3 Instructional Materials?
3. What is the mean performance of the students in terms of first Sem?
4. Is there a significant effect on the Related Factors of Math Anxiety to students' performance

2. Methodology

The study utilized the descriptive research design. The descriptive research method is a scientific tool for gathering information and describing the specifics of behaviors, patterns, or other phenomena. This method also allows the researchers to gather information needed to form a hypothesis. The current study used the questionnaire method to obtain descriptive results.

The participants were 130 Senior high school students of LSPU - SCC enrolled during the academic year 2022-2023. They were asked to respond to a questionnaire. The items in the questionnaire included the

students' related factors of having math anxiety in terms of interest and study habits aside from this teacher related factors are also considered in terms of teaching traits, personality traits and instructional materials used in teaching mathematics. Simple random sampling technique was used in selecting the sample from the senior high school students. The data collected were tabulated and analyzed using Microsoft Excel. The statistical tools to be used were the mean, standard deviation and regression analysis.

3. Results and Discussion

This chapter presents a comprehensive compilation of diverse results and discusses the findings derived from the analysis of collected data in the study. The subsequent presentation and discussion in tables provide deeper insights into how student-related and teacher-related factors contribute to math anxiety among senior high school students and subsequently impact their performance in mathematics.

Table 1. Level of Student-Related Factors in Terms of Interest

Statement	Mean	SD	Remarks
1. I like learning about Math.	3.50	1.19	Agree
2. When I hear the word Mathematics, I have a feeling of dislike.	3.11	1.14	Moderately Agree
3. My math's teacher personality and the way of teaching affects my interest in listening to Math discussion.	3.76	1.06	Agree
4. I don't like anything about Mathematics. 4.	2.64	1.04	Moderately Agree
5. I like to play some games that use numbers and Math-related topics.	3.35	1.14	Moderately Agree
Overall Mean	3.27	1.17	Moderately Agree

The overall mean score of 3.27 indicates that students have a moderate level of interest in mathematics. The standard deviation of 1.17 shows that there is some variability in the responses, meaning while many students have a moderate interest, there are varying degrees of interest and disinterest among the student population. This means that while students generally have a moderate interest in mathematics, their interest is notably influenced by their teachers' methods and personalities. There is also a mix of enjoyment and dislike towards different aspects of math, with some potential in using math-related games to increase interest. Teacher's personality plays a vital role in developing students' interest in math. It can be deduced that positive and good personality of the teacher towards the delivery of instruction provides opportunities on reducing anxiety of the learners towards mathematics. If the teacher possesses well-rounded behavioral characteristics it adds to the learner's view on delivering their interest. As Wrigt (1996) hinted, teacher's attitude played a part in Math anxious students. Sainz (2020) also cited as mentioned by Roghes that creating

higher level of confidence among students will help them relax and feel better about learning Mathematics. Thus, Teacher's Personality is a factor that determines the level of interest of the learners towards Mathematics.

Meanwhile, students in Mathematics rated that they don't like anything in Mathematics as the lowest indicator- factor relating to' their interest. It means that students generally like Mathematics as a subject only that there are several factors contributing to lesser performances. Riaz (2020) said that ineffective study habits is a reason why students are not doing well in Math. On the other hand, Silvia (2006) and Bikner- Alasbahs (2018) pointed out that students' attitude shows that interest developed through active interaction between teacher and students in learning Math that is why teacher's role to magnify those interests of the learners through teaching skills, instructional materials to be utilized and teacher's personality lies solely in their hand.

Table 2. Level of Student-Related Factors in terms of Study Habits

Statement	Mean	SD	Remarks
I like to read ahead in our Mathematics book.	2.76	1.12	Moderately Agree
I ask questions when I am confused	3.73	1.21	Agree
I would like to spend more time in school doing Mathematics.	2.88	1.17	Moderately Agree
I would rather be given the right answer to a Mathematics problem than to work it out myself.	3.07	1.14	Moderately Agree
I have a real desire to learn Mathematics.	3.42	1.16	Agree
Overall Mean	3.17	1.21	Moderately Agree

The overall mean score of 3.17 indicates that students have a moderate level of positive study habits related to mathematics. The standard deviation of 1.21 shows that while many students have constructive study habits, there is notable variability in their approaches. Students show a mixed but generally positive approach to their study habits in mathematics. They actively seek clarification when confused and have a desire to learn, but there is some preference for external help over self-reliance in problem-solving. Reading ahead and spending extra time on mathematics are moderately agreed upon, indicating room for improvement in proactive study habits. As Abid (2016) claimed that academic achievement corresponds student's study habits. Nevertheless, conducting advance lessons in Math through reading declines study habits of learner. This implies that in some cases it can be attributed to the management of students. This claim is validated by Riaz (2020) as saying that some students do not solve or practice Mathematical problems because they assumed that Mathematics consume their time which constitutes low achievement

Thus, a well-planned schedule of activity among students is necessary to develop their study habits in Math by improving their performances and reducing their anxiety towards the subject.

Table 3. Level of Teacher- Related Factors in terms of Teaching Skills

Statement	Mean	SD	Remarks
My math teacher is a great teacher.	4.12	1.09	Agree
My math teacher presents material in a clear way.	3.94	1.10	Agree
My math teacher knows a lot about Math and discusses the topics clearly.	4.08	1.06	Agree
My mathematics teacher doesn't seem to enjoy teaching Mathematics.	2.29	1.15	Disagree
Nobody understands what our math teacher discussing.	2.79	1.22	Disagree
General Weighted Mean	3.44	1.35	Agree

The overall mean score of 3.44 indicates that students generally agree that their math teacher possesses good teaching skills. The standard deviation of 1.35 shows some variability in students' perceptions, but the overall sentiment is positive. This reveals that being a great teacher is a crucial factor in students' development particularly in addressing students' anxiety towards Mathematics, along with being great, the teacher must be an expert in the field of discipline. In addition, it concludes that Mathematics teachers enjoy teaching the said subject as the respondents disagree on the statement that their teacher doesn't seem to enjoy teaching Mathematics. As mentioned by Woolfolk (2021) intrinsic motivation is an internal personal factor that motivates the learners towards learning. Thus, teachers need to enjoy intrinsic motivation towards work to be great and attain great out- comes through teaching capability and skills.

Table 4. Level of Teacher- Related Factors in terms of Personality Traits

Statement	Mean	SD	Remarks
My math teacher is strict.	2.92	1.11	Moderately Agree
My math teacher corrects my mistake in a good way.	3.94	1.08	Agree
My math teacher knows when we are having trouble with our work and helps us to understand the topic.	4.00	1.12	Agree
My mathematics teacher doesn't like students to ask questions.	1.96	1.05	Disagree
My math teacher motivates us and make Math interesting.	3.74	1.28	Agree
Overall Mean	3.31	1.37	Moderately Agree

The overall mean score of 3.31 indicates that students moderately agree with positive perceptions of their teacher's personality traits. The standard deviation of 1.37 shows some variability in students' responses, but the general sentiment is favorable. This emphasizes that positive personality of the teacher magnifies students' interests towards understanding mathematical concepts. As mentioned in the previous discussions, it is a factor that affects the level of interest of the learners. Inability of the teacher to sense if the students desire to ask questions could hinder students' opportunity to learn. As cited by Saduz (2018) the teacher needs to

find the strengths of the students and build their own understanding. The teacher needs to find the easy way to determine whether or not her instructions have been successful. Therefore, personality traits of the teacher can increase or decrease student's performance.

Table 5. Level of Teacher- Related Factors in terms of Instructional Materials

Statement	Mean	SD	Remarks
My math teacher provides game about our topic.	3.37	1.39	Moderately Agree
My math teacher discusses Math lesson explicitly by using explanations, representations, and/or examples.	3.93	1.16	Agree
My math teacher doesn't create ways for students to understand the topic clearly.	2.25	1.14	Disagree
My mathematics teacher doesn't give us group activities that are related to our topic.	2.39	1.18	Disagree
My math teacher doesn't give us a recitation to enhance our self-esteem.	2.39	1.19	Disagree
Overall Mean	2.86	1.38	Moderately Agree

The overall mean score of 2.86 indicates that students moderately agree with positive perceptions of their teacher's use of instructional materials. The standard deviation of 1.38 shows some variability in students' responses. This means that utilization of strategic instructional materials and explicitly use those materials with corresponding explanations, representations and/or examples. Teachers also should utilize manipulative so that students' interests be aroused towards the process of instruction. As uttered by Ekwueme and Igmwe (2021), teacher who makes use of appropriate instructional materials to supplement his teaching will enhance students' innovative and creative thinking as well as help them become enthusiastic to learn. Nonetheless, if the teacher doesn't create ways for students to understand the topic clearly, it disrupts interest among learners. In particular non-utilization of instructional materials like objects or devices will not make learning meaningful to the learners as revealed by Ikerionwu (2020). Therefore, extensive and strategic employment of instructional materials brought an affirmative result on teaching-learning process.

Table 6. Level of Student Performance in Mathematics in terms Quarter grades

Grading Scale	First Quarter		Second Quarter		Descriptors
	Frequency	Percentage	Frequency	Percentage	
90-100	4	3.07%	8	6.15%	Outstanding
85-89	40	30.77%	46	35.38%	Very Satisfactory
80-84	69	53.08%	76	58.46%	Satisfactory
75-79	17	13.08%	0	0%	Fairly Satisfactory
Below 75	0	0%	0	0%	Did Not Meet Expectations

Overall Mean	83.78	84..96	84.37
Verbal Interpretation	Satisfactory	Satisfactory	

The table summarizes the level of student performance in mathematics in terms of their quarter grades. The data includes the frequency and percentage of students falling within specific grading scales for both the first and second quarters, along with overall mean scores. Students' performance in mathematics is generally satisfactory, with a notable improvement from the first to the second quarter. The majority of students are performing within the satisfactory range (80-84),

Table 7. Effect of Students Factors on students Math Anxiety to the Mathematics Performance

Students Factors	Beta	β	p	Analysis
Interest	0.696	0.377	0.002**	Significant
Study Habits	0.325	0.341	0.017**	Significant

Table 7 reveal that student feel anxiety in mathematics based on their interest and study habits. The interest and study habits of the students significantly affect in their performance. results highlight the importance of cultivating both interest in mathematics and effective study habits to address math anxiety and improve student performance in mathematics. Encouraging students to develop a genuine interest in the subject and promoting good study practices are key strategies for enhancing their mathematical achievement. Maintaining connection between teachers and learners through interactive activities in classroom develops students study habits. It can be deduced that positive and good personality of the teacher towards the delivery of instruction provides opportunities on reducing anxiety of the learners towards mathematics. If the teacher possesses well-rounded behavioral characteristics it adds to the learner's view on delivering their interest. As Wright (1996) hinted, teacher's attitude played a part in Math anxious students. Sainz (2020) also cited as mentioned by Roghes that creating higher level of confidence among students will help them relax and feel better about learning Mathematics. Thus, Teacher's Personality is a factor that determines the level of interest of the learners towards Mathematics

Table 8. Effect of Teachers Factors on Math Anxiety to the mathematics Performance

Teachers Factors	Beta	β	p	Analysis
Teaching Skills	0.706	0.374	0.025**	Significant
Teaching Personality	0.966	0.107	0.048**	Significant
Instructional materials	0.471	0.260	0.046*	Significant

Findings underscore the critical role of teachers and instructional strategies in influencing students' math anxiety levels and their subsequent performance in mathematics. Improving teaching skills, fostering positive teaching personalities, and utilizing effective instructional materials are essential strategies for enhancing student outcomes in mathematics education. Being a great teacher is a crucial factor in students' development particularly in addressing students' anxiety towards Mathematics, along with being great, the teacher must be an expert in the field of discipline. In addition, it concludes that Mathematics teachers enjoy teaching the said subject as the respondents disagree on the statement that their teacher doesn't seem to enjoy teaching Mathematics. As mentioned by Woolfolk (2021) intrinsic motivation is an internal personal factor that motivates the learners towards learning. Thus, teachers need to enjoy intrinsic motivation towards work to be great and attain great out-comes through teaching capability and skills.

5. Conclusion and Recommendations

Based on the foregoing findings, the following conclusions were drawn.

There is a significant effect on the factors related to students and teachers and why they experience anxiety that result to satisfactory performance in Mathematics. This means that teachers' personality plays a vital role in addressing the Mathematical anxiety and developing interest of the learners towards Mathematics. Maintaining connection between teachers and learners through interactive activities in classroom develops students study habits. Employment of mastery of the lesson by the teacher increase learners' performance. Being approachable of the teacher helps learners to deliver the task easily and becomes not hesitant to ask questions. Utilization of manipulative and other non-traditional devices makes the learners involve in the teaching-learning process. Teachers must create strategic intervention materials to cater the need of low performing learners, attend seminars that can help them to enhance skills and personality traits to encourage student to love mathematics.

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