

MATHEMATICS ANXIETY AMONG STUDENTS: AN OVERVIEW

¹ISHFAQ AHMAD BHAT

Ph.D. Research Scholar, Department of Education Annamalai University, Chidambaram, Tamil Nadu, India

Email- ishfaqbhat099@gmail.com

²Dr. G. ARUMUGAM

Associate Professor, Department of Education Annamalai University, Chidambaram, Tamil Nadu, India.

Email-drgaruumugam@gmail.com

Abstract:

Mathematics or number anxiety undoubtedly plays a role in math problems. Anxiety is a powerful motivator, but poorly understood. In practice, anxiety has a negative impact, which, by eliminating it, increases the likelihood that future learners will engage in avoidance behavior. Mathematical anxiety can be considered a form of learned helplessness. They have no way of avoiding the pain of mathematics, so they accept it completely and endure unpleasant social and psychological pain until it is over. Therefore, the present study will be an attempt to highlight the main important causes among students behind math anxiety. Also, the present study highlights the symptoms through which we can easily identify the children that have fear of mathematics and finally study suggest some preventive measures with the help of which anxiety can be reduced.

Key words: Anxiety, Causes, Mathematics, Symptoms and Students.

I. Introduction

Mathematics as an expression of the human mind reflects the active will, the contemplative reason, and the desire for aesthetic perfection. Its basic elements are logic and intuition, analysis and construction, generality and individuality.

Richard Courant

Mathematics is that the science that deals with the logic of shape, quantity and arrangement. Math is all around us, in everything we do. it's the building block for everything in our daily lives. Mathematics, the science of structure, order, and relation that has evolved from elemental practices of counting, measuring, and describing the shapes of objects. It deals with logical reasoning and

quantitative calculation, and its development has involved an increasing degree of idealization and abstraction of its subject material. Mathematics is a crucial subject with broad applicability to standard of living, yet mathematics is commonly considered as a difficult subject in schools. Mathematics is one of the major subjects in the school education which is considered as the toughest subject in the existing subject. Many school going students scarred of the subject like scaring from an evil. Around the world, the fear of Mathematics is spreading and students think they will fail in the subject. Some students also think that Mathematics is the score running subject which can ruin the score and academic marks of students.

Mathematics is the means of sharpening the individual's mind, shaping his reasoning ability and developing his personality, hence, its immense contribution to the overall and basic education of the people of the planet (Asiedu-Addo and Yidana, 2000). Fajemidagba, Salman & Ayinla (2012), have described Mathematics as a core science subject and gear for the event of any science-based discipline. These include, technology, astronomy, graphics, industry and analytical reasoning in daily living. Ayinla (2011) also posited that mathematics is that the pillar of all knowledge, showing its relevance to all or any disciplines. Onwuachu & Nwakonobi (2009) noted that mathematics is that the foundation on which the full essence of living revolves and therefore the platform for scientific and technological innovation.

Since 1950's, anxiety in mathematics has been considered as a problematic situation in educational settings. In those years both Gough (1954) and Dreger & Aiken (1957) defined anxiety as a negative emotional reaction to mathematics. Also, they describe how number anxiety was differed from general anxiety. Thereafter, there are a good body of research that specialize in anxiety in mathematics. this is often not simply because of mathematics' being crucial element of the varsity curriculum but also its being an important element of life.

Mathematics anxiety described as a negative feeling or response to mathematics (Ashcraft, 2000; Gresham, 2010; Maloney & Beilock, 2012 and Richardson & Suinn, 1972). These negative feelings are caused by poor performance and lack of comprehending notions in mathematics. Mathematics anxiety created as a result of these feelings can have an impression on all age groups from grade school students to adults (Alkan, 2013a & 2013b; Ashcraft, 1995; Cemen, 1987; Wu, Willcutt, Escovar & Menon, 2014). Math's anxiety has been defined by Tobias and Weissbrod (1980) as "the panic, helplessness, paralysis, and mental disorganization that arises among some people once they are required to unravel a mathematical problem" and it's thought to affect an

oversized proportion of the population. Tillfors (2003) defined phobia as learned emotional responses and it causes frequent severe and intense anxiety. Mathematics anxiety or phobia will be defined as a sense of tension that hinders one from efficiently tackling mathematical problems. Many students have negative attitude towards mathematics which influences their approach to solving mathematics problems which can result to phobia and subsequent poor performance within the discipline. Gierl and Bisanz (1995) see the construct as feeling of tension and anxiety that interfere with the manipulation of numbers and therefore the solving of mathematical problems during a wide selection of ordinary life and academic situations. Prolonged feeling of mathematics phobia impacts negatively on the interest of students within the subject.

II. Review of Related Literature

Kumar and Karimi (2010) examined the relationship between math anxiety, and students' mathematical performance. A group of 424 school understudies reacted to an arithmetic uneasiness poll. They even examined the contrasts among boys and girls in math uneasiness. Results of the study revealed that math anxiety is negatively correlated to students 'mathematical performance and that it affects males and females in the same way (Kumar & Karimi, 2010).

Lyons and Bei lock (2012) revealed that anxiety is tied to low math grades and standardized test scores, yet not all math-anxious individuals perform equally poor in the material. They indicated that, even-though basic math abilities are important for every-day life, many people feel anxious when they have to do math during their daily routine. More importantly, Lyons and Bei lock (2012) found out that highly math-anxious individuals showed significantly poorer math performance relatively to a non-math material (Lyons & Bei lock, 2012).

Aslan et.al (2013) studied the Impacts of Preschool Teachers' Mathematics Anxiety and Beliefs on Children's Mathematics Achievement. The results of this study reveal that the teacher's arithmetic anxiety doesn't result in any significant variations on children's mathematics action whereas their beliefs regarding mathematics education build a major distinction on children's mathematics achievement. In addition, these results show that children's whose academics have high beliefs scores have higher performance. It ought to be useful to boost teachers' beliefs regarding arithmetic education in infancy. Besides, the current research conducted with preschool children. A further study with more focus on the effects of teachers' attitudes and anxiety on older children's mathematics achievement is therefore suggested.

Buckley (2013) pointed out that many believe that only students who are blessed with high intelligence are capable of developing higher mathematical skills. The researcher divulged about the fact that a series of experiments, completed by a US research, has shown that anxiety can lead to a drop-in math performance during an exam by hindering the amount of resources an individual depends on to complete a mathematical test. Buckley (2013) also revealed that, because of anxiety, students can develop a negative attitude towards mathematics as many anxious individuals usually try avoiding subjects, courses and careers that involve math, which in turn may limit their opportunities and career path-ways.

Boruah and Saikia (2014) conducted a study on Mathematics Phobia among the Degree Students of Jorhat and Golaghat District of Assam. The study tries to know the cause of Mathematics Phobia. The main objective of study was to find the basic reasons of Mathematics phobia among the students. The study mentions that lack of sufficient no of Mathematics books in the college library, lack of practical classroom facilities etc. are the causes of Mathematics phobia.

Kaur (2017) conducted a study on Math-Phobia: Causes and Remedies. The study revealed that math-phobia exists among students, which is characterized by feverish feelings in math class, difficulty in understanding math problem among others. Highlighted causes include poor student-teacher relationship, nonconductive environment for math class among others. Concerted efforts should be made by all stakeholders in solving the problem to improve students' mathematics achievement.

Mollah (2017) conducted a study on Mathematics Anxiety among the School Students. The study described the causes of Mathematics anxiety, its' impacts on students and way of mitigation from Mathematics anxiety. Mathematics anxiety can be manifested as psychological, physical as well as behavioral expression. It has negative impact on performance, achievement and social development of the students. There are so many different reasons to create Mathematics anxiety such as teacher's negative attitude, un-psychological teaching methods, negative class room experience of students, parents' unrealistic expectation and high-stake test pressure. If the issue of Mathematics anxiety is not dealt with sincerely, it could have grim effect in many areas of our whole education system. In this issue teacher should most responsible and they should follow the teaching learning procedure 'concrete to abstract' and easy mathematical problem to harder. To mitigate the Mathematics anxiety the external support system is not only teachers' activities but also includes parents' attitude and peer groups.

Vesile, A. (2018) A Systematic Review Research: ‘Mathematics Anxiety’ in Turkey. The point of this study was to lead an orderly survey examine focusing on considers with respect to 'Mathematics anxiety'. 59 papers were reanalyzed in order to answer the questions derived from the main aim in terms of the rules of systematic review method. These studies were reviewed and analyzed by taking account of their aims, designs, sampling and results. While doing this, the similarities and differences of the reviewed studies were also found. It was seen that most of these studies conducted with middle school students. It was also found that the majority of reviewed studies were designed according to quantitative approaches. The review shows that mathematics anxiety is resulted from students’ achievement, self-efficacy and fear along with parents’ and teachers’ lack of supports in mathematics.

Agouti et.al (2018) studied the Effect of Math Anxiety on Students’ Performance in the Intermediate and Secondary Classes. Consequences of the examination have uncovered that anxiety has a solid negative connection and a critical impact on the general mathematical evaluation of the sample of students in the intermediate and secondary levels excluding grade twelve.

Zhang et. al (2019) analyzed the Relationship Between Math Anxiety and Math Performance: A Meta-Analytic Investigation. The aim of this research was to explore the link between MA and math performance. The outcomes showed a vigorous negative math tension execution interface. Besides, with respect to the examination of mediator factors, this negative connection was more grounded in the investigations that included Asian understudies, yet this connection was the most vulnerable in the investigations that included European understudies. Additionally, this negative connection was more grounded in the investigations inside a senior secondary school gathering, while it was the most fragile in the examinations inside a rudimentary gathering. At long last, this negative connection was most grounded among considers that utilized a custom test and studies that evaluated critical thinking abilities.

III. Causes of Math Anxiety

Finlayson (2014) reported that math’s anxiety is usually linked with the kind of teaching styles experienced in the classroom, which often focus on memorization and rote recitation. Their early math’s teaching may have been from teachers who were anxious themselves, and thus over-compensated by emphasizing a black-and-white, right-or- wrong approach.

The following are the Major causes of math anxiety.

Pressure caused by time limits on tests

The deadlines that timed tests impose on students lead them to feel anxious. This leads them to forget concepts that they have no problem remembering at home. Since these tests can have a negative impact on grades, the student's fear of failure is confirmed. This creates a vicious circle that can be difficult to break.

Fear of public embarrassment

Math anxiety has also been linked to negative emotions from the past. If a student has been scolded for getting an answer wrong, it can make his or her anxiety worse. The same is true if he or she has been embarrassed in front of others.

Influence of teachers

Students can also pick up on their teacher's feelings about math. If a teacher is excited and positive about math, the students will be as well. But if educators are negative about it, it can have the opposite effect.

IV. Symptoms of Math Anxiety

Following are symptoms of the math anxiety.

Unusual nervousness when doing or thinking about math

Even thinking about the subject of math is enough to cause stress to the student.

Passive behaviour

The student is either too afraid of failure, or simply thinking about math brings so many negative emotions, that he or she is unwilling to even try.

Feeling of being alone

The student feels that he or she is the only one incapable of finding the solutions, even if the math is extremely complicated.

Feeling of permanency

The student begins to believe that he or she is naturally bad at math and always will be, so he or she gives up trying to improve.

Lack of confidence

The student expects never to know the answers to math questions, so the student depends on other people to do math for him or her. Example: expecting his or her parents to help with homework.

Panic during tests or when called on to answer questions

The classroom becomes a major source of stress for the student, especially when he or she is taking a test or expected to contribute in class.

V. Preventive Measures

The following are the measures that can help in the reduction of math anxiety.

Positive Reinforcement

Students who struggle with math must realize that they can excel in math. Review homework with your child and suggest all the right questions he / she has. Insist on correct answers rather than mistakes. If possible, surround the student with positive teachers and students.

Get a Tutor

Teachers can greatly influence students' feelings about mathematics. Although the teacher is passionate about math, it replaces teaching with a qualified teacher. Instructors can provide personalized attention that is difficult to obtain in school. They help students work through their problems in a low-pressure environment. Tuition also improves student confidence.

Reframe Anxiety

Reframing anxiety can have an improvement in mathematics performance. Have a student write down his or her worries about math before doing it. By having to think critically, students can realize their fears are unfounded. Young children can draw pictures as a substitute for writing. Assist reframing by having students see tests and assignments as challenges instead of threats.

Make Math Fun!

Try to create positive emotions by making math fun. One way to do this is to connect math to the child's interests. For example, if the student likes sports, use sport-related word problems.

Use Different Resources

To clarify any Math confusion, you can refer to other Math texts, use flash cards, journal, research the internet, create a study group and/or use available tutoring on campus.

Overcome Negative Self Talk

Perhaps one of the most important ways that you can do better is simply by having a positive attitude. Avoid negative self-talk. Set high expectations and rise to the occasion.

VI. Conclusion/ Suggestions

To prevent fears in students, math teachers must be periodically re-trained so that new methods of teaching math can be considered. Secondary schools should have counseling units to reassign students who are thinking about mathematics so that they know the importance and purpose of mathematics in their daily activities. The mathematics curriculum should not be overloaded at the secondary school level to prevent fear among students. Teachers must have good teacher-student relationships to understand their students' problems. Students learn math best when it comes to their daily lives. Students enjoy experimenting. To learn math at any depth, students must learn and understand the rules and procedures as well as engage in their search. Give special training to math teachers. Recruitment of a sufficient number of teachers in institutions with proficiency in mathematics and extensive knowledge. Providing a math lab and starting practical classes in math. Math's can be popularized by setting up a math club and conducting a discussion about the importance and application of mathematics. Math's can also be popularized by the Math Olympiad in Quiz Competition and Students. Asking questions is also, a way to reduce math's anxiety as some students are reluctant to ask questions in fear of looking stupid. Asking questions is a sign of strength and other students in the classroom will be glad that you asked (because they have questions too!).

Researchers advise teachers that math anxiety can negatively impact student performance and adopt a student-centered approach to contributing to the learning and performance of highly anxious students. In addition, future research should be devoted to examining the effects of math test anxiety in the secondary and elementary grades and to determine which math chapters are most likely to stimulate students' math anxiety.

References

1. **Agouti, M. F., Shehayeb, S. & Mchiek, M. (2018).** The Effect of Math Anxiety on Students' Performance in the Intermediate and Secondary Classes. *International Journal of Science and Research*, 8(9), 739-745.
2. **Alkan, V. (2013a).** Reducing mathematics anxiety: The ways implemented by teachers at primary schools in Turkey. *International J. Soc. Sci. & Education*, 3 (3), 795-807.

3. **Alkan, V. (2013b).** Mothers and their relation with pupils' mathematics anxiety. *International Global Research Analysis*, 2(4): 83-86.
4. **Ashcraft, M.H. (2002).** Math anxiety: Personal, educational, and cognitive consequences. *Current Directions in Psychological Science*, 11(5), 181-185. <http://dx.doi.org/10.1111/1467-8721.00196>
5. **Aseidu-Addo, S. K. and Yidana, I. (2000).** "Mathematics Teachers Knowledge of the subject Content and the Methodology". *Journal of the Mathematical Association of Ghana*, 4(12), 45-51.
6. **Aslan, D., Oğul, I. G. & 3, Taş, I. (2013).** The Impacts of Preschool Teachers' Mathematics Anxiety and Beliefs on Children's Mathematics Achievement.
7. **Boruah, S. & Saikia, J. (2014).** Mathematics Phobia among the Degree Students of Jorhat and Golaghat District of Assam: A Study. *International Journal of Science and Research*, 3(4), 232-234.
8. **Buckley. (2013).** Deconstructing math's anxiety: Helping students to develop a positive attitude towards learning math's. Retrieved from Australian Council for Educational Research Occasional Essays, 1-3: <https://research.acer.edu.au/cgi/viewcontent.cgi?article=1016&context=learning-processes>.
9. **Cemen, P. B. (1987).** The nature of mathematics anxiety. (Report No. SE 048 689). Stillwater: Oklahoma State University. (ERIC Document Reproduction Service No. ED 287 729).
10. **Dreger, R., & Aiken, L. (1957).** The identification of number anxiety in a college population. *Journal of Educational Psychology*, 48(6), 344-351.
11. **Fajemidagba, M., Salman, M. & Ayinla, L. (2012).** Effect of teachers' instructional strategy pattern on senior school students' Performance in Mathematics word problem in Ondo, Nigeria. *Journal of Education and Practice*, 3(7), 159-168.
12. **Finlayson, M. (2014).** Addressing math anxiety in the classroom. *Improving Schools*, 17(1), 99-115.
13. **Gierl, M. J. & Bisanz, J. (1995).** Anxiety and attitude related to Mathematics in grade 3 and 6. *The Journal of Experimental Education* 63(2), 139-158.

14. **Gough, M. F. (1954).** Mathemaphobia: Causes and treatments. *Clearing House*, 28, 290-294. Retrieved from <http://www.jstor.org/stable/30176259>
15. **Gresham, G. (2010).** A study exploring exceptional education pre-service teachers' mathematics anxiety. *Issues in the Undergraduate Mathematics Preparation of School Teachers*, 4, 1-14. Retrieved from <http://www.k-12prep.math.ttu.edu/>
16. **Kaur, G. (2017).** Math-Phobia: Causes and Remedies. *International Journal for Research in Applied Science & Engineering Technology*, 5(VI), 1248.
17. **Kumar, V., & Karimi, A. (2010).** Mathematics Anxiety, Mathematics Performance and Mathematics Anxiety, Mathematics Performance and. Retrieved from *Journal of the Indian Academy of Applied Psychology*. 36(1), 147-150.
18. **Lyons, I., & Beilock, S. (2012).** Mathematics Anxiety: Separating the math from the Anxiety. Retrieved from (Research study, University of Chicago, Department of Psychology: <http://www.edweek.org/media/mathanxiety.pdf>).
19. **Maloney, E., & Block, S. (2012).** Math anxiety: who has it, why it develops, and how to guard against it. *Trends in Cognitive Science*, 16(8), 404-406.
20. **Mollah, K. (2017).** Mathematics Anxiety among the School Students. *Pramana Research Journal*, 7(11), 122-127.
21. **Richardson, F.C., & Suinn, R.M. (1972).** The mathematics anxiety rating scale: Psychometric data. *Journal of Counseling Psychology*, 19, 551-554. <http://dx.doi.org/10.1037/h0033456>
22. **Richard Courant Quotes. (n.d).** BrainyQuote.com. Retrieved March 1, 2020, from BrainyQuote.com Web site: https://www.brainyquote.com/quotes/richard_courant_205929
23. **Tobias, S. & Weissbrod, C. (1980).** Anxiety and Mathematics: an update. *Harvard Educational Review*, 50(1), 63-70.
24. **Tillfors, M. (2003).** Why do some individuals develop social phobia? A review with emphasis on the neurobiological influences. *Nord Journal of Psychiatry (Taylor & Francis)* 58(4), 267-276.
25. **Wu, S.S., Willcutt, E.G., Escovar, E., & Menon, V. (2014).** Mathematics achievement and anxiety and their relation to internalizing and externalizing behaviors. *Journal of Learning Disabilities*, 47(6), 503-514.

- 26. Zhang, J., Zhao, N., & Kong, Q. P. (2019).** The Relationship Between Math Anxiety and Math Performance: A Meta-Analytic Investigation. *Front. Psychol.*, <https://doi.org/10.3389/fpsyg.2019.01613>
- 27. Vesile, A. (2018).** A Systematic Review Research: ‘Mathematics Anxiety’ in Turkey. *International Journal of Assessment Tools in Education*, 5(3), 567-592.
- 28. What Is Math Anxiety. (2018, March 14).** Retrieved March 1, 2020, from <https://www.oxfordlearning.com/what-is-math-anxiety/>