

Overcoming Math Anxiety

Abstract

Math anxiety can greatly affect a child's success throughout their education and their adult life. Since math is connected to so many professional and personal practices, it is important that we as educators and parents help children to overcome their math anxiety so they can learn the math skills that they need to succeed. Math anxiety is real and it can happen to anyone at any age regardless of their mathematical ability.

Vignette

As a student, I always thought that sweaty palms and a knot in my stomach were normal physiologic responses when beginning a new chapter in math class. It wasn't until my daughter explained to me that the reason she received a poor math grade on her report card was because she "just was not good in math" that I realized that I had passed down to her my feelings about math. Those words sounded so familiar to me. I quickly realized that unless I do something different with her, she too will silently suffer with math anxiety into adulthood.

Introduction

The Merriam Webster dictionary defines anxiety as an abnormal and overwhelming sense of apprehension and fear often marked by physiological signs (as sweating, tension, and increased pulse), by doubt concerning the reality and nature of the threat, and by self-doubt about one's capacity to cope with it.

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 anxiety can cause one to forget and lose one's self-confidence (Tobias, 1993). According to Marilyn Burns (1998), nearly two thirds of American adults have a hatred and deep fear of math. The fear of math is deeply rooted and is often initiated by a child's first experience with institutional math.

Ken Shores (2005) described how a mild case of math avoidance can quickly turn into a severe case of math anxiety. He explained how the cycle begins with an anxious math student, convinced of their inability to do math, might avoid the subject or put forth little effort, leaving significant gaps in their math development. Difficulty mounts as the student confronts more advanced skills, causing further anxiety and avoidance. Shores stated that unless math anxiety is confronted, it can turn into a permanent block. He believed that, in addition to the help and support from the child's family, teachers can help chip away at this block by helping the student approach math with confidence.

This author's review of literature will support the belief that teachers and parents must work together to help children to overcome their math anxiety. The message must be clear: math instruction must remain positive, relevant, and concrete. Teachers must provide a safe and encouraging environment for their students. In addition, parents should support their children's confidence by making everyday math connections in their lives.

Literature Review

What is math anxiety?

Math anxiety is a learned emotional response to one or more of the following: participating in a math class, listening to a lecture, working through a math problem, discussing mathematics. Moreover, such anxiety can happen on elementary school children, high school and college students (Tobias, 1993).

Math anxiety causes children to fear math. The anxiety hinders a child's ability to make math a relevant part of their everyday life. According to Sheila Tobias (1993), millions of adults are blocked from professional and personal opportunities because they fear or perform poorly in mathematics for many; these negative experiences remain throughout their adult lives. Baroody and Costlick (1998) suggested that children who develop a math anxiety tend to fall into a self-defeating, self-perpetuating cycle. He

further described a math anxiety model which illustrates how unreasonable beliefs can lead to anxiety, anxiety can lead to protective behavior, and the long term disadvantage of protective behavior can reinforce unreasonable beliefs. In this cycle and without the interception of any new techniques, children will continually feed into their anxiety and unreasonable beliefs.

How does a student develop math anxiety?

Math anxiety is often developed as a result of a student's prior negative experience when learning math in the classroom or at home. Teachers and parents often exacerbate a child's level of anxiety by imposing their personal views about math. Each negative experience is transferred into the thoughts of any future math work and ultimately causes a lack of understanding of mathematics.

Traditionally, students have been taught to memorize mathematical concepts without actually working through problems and comprehending the reason behind the math skill. This along with being unprepared greatly contributes to a child's increased level of math anxiety.

Marilyn Curtain-Phillips (1999) stated that there are three practices in the traditional mathematical classroom that cause great anxiety in many students. They are imposed authority, public exposure, and timed deadlines. She identified that teaching methods must be re-examined and there should be more emphasis placed on the specific methods which include less lecture, more student directed classes, and more discussion.

What can a teacher do to help a student overcome math anxiety?

Educators may need to take a more proactive role in encouraging students to become excited about math and see themselves as successful, confident, mathematical problem solvers (Furner & Berman, 2003). Cruikshank and Sheffield (1992) argued that if teachers fail to implement seven important measures they then cause their students to learn math anxious behaviors. These measures include teachers who:

- Show that they like mathematics
- Make mathematics enjoyable
- Show the use of mathematics in careers and everyday life
- Adapt instruction to students' interests
- Establish short-term and attainable goals
- Provide successful activities

- Use meaningful methods of teaching so that math makes sense

Similarly, Woolfolk (1995) believed that in order for teachers to help their students to deal with math anxiety they must:

- Use competition carefully
- Avoid situations in which highly anxious students will have to perform in front of a large group
- Make sure that all instructions are clear
- Avoid unnecessary time pressures
- Remove some of the pressures from major tests and examinations
- Develop alternatives to written tests
- Promote a positive disposition

In addition, Reys, Suydam, and Lindquist (1995) suggested that teachers de-emphasize speed tests or drills and avoid competition among students in order to further reduce the likelihood of creating math anxiety. They also added that communicating about mathematics and reflecting on the mathematics events that occur in the classroom would enhance mathematical power.

In order to reduce math anxiety in the classroom, teachers should also focus on the importance of classroom design. They should strive to create a space that encourages each individual's strengths and successes. Math lessons should be prepared to address a variety of learning styles. Studies have shown that students learn best when they are active rather than passive learners (Spikell, 1993). Marilyn Curtain-Phillips (1999) identified that students today have a need for practical math. Therefore, math needs to be relevant to their everyday lives. Students enjoy experimenting. To learn mathematics, she stated that, students must be engaged in exploring, conjecturing, and thinking rather than engaged in only rote learning of rules and procedures. It is recommended that all teachers incorporate technology, cooperative learning, and math manipulatives into their math lessons for all students. Teachers are encouraged to use cooperative learning by placing students in pairs or larger groups where all of the students maintain an equal role. The students will learn to share in the group's successes and accomplishments. These successes will contribute to the students overall (positive) feeling about the work. During group activities, it is the teacher's responsibility to promote the groups successes, by praising even the smallest accomplishments.

What can a parent do to help their child overcome math anxiety?

A child's self-esteem and mathematical confidence is more directly related to his or her parent's perceptions and expectations than to the student's own achievement record or the attitudes of any single teacher. Researchers often argue that learning in the home is crucial in helping all children become and remain motivated learners. They find that students' initial competence in mathematics and science grows out of family practices (Secada, 2001).

Parents should engage their children in math activities that are meaningful and fun. The focus should be placed on an activity or a group of activities that will help their children explore relationships, solve problems, and see math in a very positive light. Parents are able to help their children steer clear of the math phobia that they may have known when they were a child. Based on the research studies of Kober (1991), Swick, Boutte, and van Scoy (1995), and López del Bosque (2000), parents can do the following:

- Encourage their children's interest in mathematics and science and let them know they can succeed.
- Have high expectations and check on their children's progress.
- Get to know their children's teachers and establish partnerships with them.
- Join the parent-teacher association and visit school as frequently as possible.
- Attend pertinent workshops (e.g., family math workshops).
- Share informal educational activities (e.g., trips to the library or museum, cultural and educational events) with their children.
- Make sure their children attend school regularly.
- Seek leadership roles at schools.
- Find out about after-school, Saturday, and summer mathematics and science enrichment programs and encourage their children to participate.
- Become aware of any mathematics anxiety they may have and be careful not to pass along their fears to their children.
- Talk to their children about the relevance of mathematics and science to future success.
- Be sure their children pursue high-quality mathematics and science courses.
- Encourage their employers to support schools.

Since math anxiety does produce real symptoms and emotions within children (panic, paranoia, passive behavior, and lack of confidence), it is important for parents to distinguish these characteristics within their children when they happen and to recognize that their child is experiencing math anxiety. Parents should talk with their children about their anxieties. Discuss the feelings that the child associates with math and try to pin point when the child started to experience these feelings. Talking about math anxiety and realizing why the fears first started help children realize this is an emotional response that they can work to keep under control.

Summary

Math more than any other subject, math engenders anxiety and avoidance in students (Shore, 2005). Unless math anxiety is confronted, it can turn into a permanent road block. A person's attitude towards mathematics influences how often they use mathematics, their willingness to pursue advanced work in mathematics, and even their choice of prospective career paths (Dutton and Dutton, 1991). It is imperative that parents and teachers work together to increase a child's level of confidence, offer individualized academic support, utilize a real life approach to math, and dispel any preconceived math myths.

Sadly, math anxiety is very common. Marilyn Curtain-Phillips (1999) believed that much of this anxiety happens in the classroom due to the lack of consideration of different learning styles of students.

Today, the needs of society require a greater need for mathematics. Math must be looked upon in a positive light in order to reduce math anxiety. Therefore, teachers must re-examine traditional teaching methods which often do not match the students' learning styles and skills needed to be productive in society. Lessons must be presented in a variety of ways. Parents should also maintain an active role when encouraging their children to incorporate math into their daily routine. It is essential that educators and parents work together to assure that every child is learning that math is important, relevant, and fun so that they can learn the math skills that they need to succeed.

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