

# The Teacher's Role in Students' Math Anxiety

Rebecca S. Birchall

**Abstract:** It is a well-known fact that math can become a disliked subject once students begin to approach more complex topics. Students associate anxiety with the subject and their confidence decreases as a result. This unpleasant emotional response prevents students from successfully learning math. Educators need to dismiss this apprehension towards mathematics. Each teacher has their own way of looking at mathematics. The question is, how do we accomplish this anxiety reduction when all teachers perceive math differently? Teachers' attitudes towards math can also have an enormous effect on how their students will perceive math. How much do educators' perceptions of their own subject positively or negatively affect mathematical anxiety?

## Introduction

It is commonly accepted that math is a subject that is not embraced by a good majority of the population. To many, "math" is a scary word. When one person tells another that she enjoys math, there is a common response of almost disgust. "People are very happy to say they don't like math. No one walks around bragging that they can't read, but it's perfectly socially acceptable to say you don't like math" (Beilock, Gunderson, Ramirez, & Levine, 2010). But why is this? Why does math have such a negative stigma? This negativity only intensifies when the curricula gets more complex in the upper grades. Frequently, students associate anxiety with the subject and as a result, their confidence decreases. This apprehension can be deeply ingrained in educators as well. It is our job as educators to implement effective strategies to positively change students' outlook on the subject. However, teachers must first examine the relationship they have with mathematics. Educators must understand how this relationship affects their students' outlook on the subject and, in turn, their performance. In other words, educators must look at their own comfort with math and mitigate any of their own issues before teaching the subject, in order to not create more anxiety in their students. Otherwise teachers' own math anxiety can in turn create an avoidance of math altogether from their students.

In our culture there is a stigma attached to women and math which keeps them from attempting math careers. Why is this? Do teachers have the ability to help our female students change their outlook? It is hard to motivate one's students on any given day. It is even more difficult to help students when there is a stigma against a subject. How far does their anxiety go? Teaching mathematics needs to overcome the many negative perceptions. It is important to take these perceptions into consideration and work through these hurdles to best benefit our students. In order to do this we also need to untangle the difference between disliking mathematics and having anxiety of that dislike; we need to do this for both teachers and students.

When teachers indicate their own discomfort toward anything, students often pick up on these unspoken cues. And such math anxiety is pervasive: "Math anxiety functions as a disability in the sense that there are well investigated—and negative—personal, educational, and cognitive consequences of math anxiety. Unfortunately,

these negative consequences affect a substantial percentage of the population” (Ashcraft, & Moore, 2009, p.198). This anxiety can have a major impact on the different views a teacher has about different subjects. If a teacher shows a dislike for math even as they teach it, students will begin to avoid pursuing the subject.

A lack of self-efficacy often begins to become a problem with students in math early on. It pushes the students to retreat and avoid the subject all together. These students can also form a learned helplessness toward the subject. Methods need to be put in place to help keeping students from developing these feelings. But, exactly how much does math anxiety affect overall performance in a student? And how much do teacher’s feelings about math impact their students’ performance?

### **Educators’ Impact**

Just as many students have anxiety about math, so to do many teachers. Each teacher has their own way of looking at mathematics. Educators’ need effective methods need to fully accomplish the students’ needs. The question is, how do we accomplish this phenomenon when all teachers perceive math differently? Educators have to find a common “math-culture” in their classroom that is healthy and comfortable for all students, and for themselves as well. A certain type of positive discourse needs to exist in each classroom. Teachers are to support and encourage our students, while creating a safe space for mathematical conversations and discovery. It is also important for teacher to find a support system for themselves and take advice from fellow math teachers that perhaps feel more comfortable about the subject. This will help boost the confidence of educators who were once apprehensive towards teaching math. This is a step in the right direction to reduce the anxiety a student may feel, as well as their own.

The evidence is strong that the vast majority of students lack this confidence. “Internationally, on average only 14 percent of eighth grade students expressed confidence in their mathematics ability” (Mutawah, 2015, p. 242). And there are strong relationships between this lack of confidence and students’ performance in math classes. The saying, “we are our own worst enemy” rings true in this case. Because students’ mathematical achievements are negatively affected by their own perception of how well they are at math, we must help distinguish between students not understanding math and thinking they do not understand math. It is a tough concept to think through as a teacher. Our own worries can show through and, in turn, create new worries for our students. There needs to be a positive approach to the curriculum so we can show the students it is okay to have an incorrect answer; just as long as we work together and learn from it. Educators have more power than they think when dealing with students’ receptiveness to a content.

### ***Gender Influences***

If we look at the percent of female elementary teachers versus male, we find female elementary school teachers make up 87% of our educators in the country, leaving males with the remaining 13% (The World Bank Group, 2018). And because of the cultural factors mentioned earlier, a large percent of those female teachers themselves have math anxiety. The effect of having female teachers who have math

anxiety as role models has been found to contribute to the gap between male and female achievements in math. Gender performance differences can arise when female elementary school teachers convey they are not successful at or comfortable with math to their students.

Because elementary educators are not required to have much mathematical mastery in order to attain certification. Ironically, these females often have the highest levels of math anxiety out of any college major. The problem with this reality is that children are more likely to emulate the behavior and attitudes of same-gender vs. opposite-gender adults (Beilock, Gunderson, Ramirez, & Levine, 2010). Thus, math anxiety regularly begins earlier for girls than for boys due to the anxiety their female teachers possess in elementary school. Beilock, Gunderson, Ramirez, and Levine found that the more math anxiety a female teacher had, the lower her female students' math achievement would be, and the more math anxiety those female students would develop. "Teachers with high math anxiety seem to be specifically affecting girls' math achievement—and doing so by influencing girls' gender-related beliefs about who is good at math" (Beilock, Gunderson, Ramirez, & Levine, 2010, p. 1861). They found that this specifically played out in that "[f]emale teachers model commonly held gender stereotypes to their female students through their math anxieties" (Beilock, Gunderson, Ramirez, & Levine 2010, p. 1861).

Another relationship to consider when dealing with gender is self-efficacy. Self-efficacy is the belief in oneself of achieving academic goals set for oneself. According to Vakili and Pourrazavy (2017), the variables of self-confidence, learning self-efficacy and emotional self-efficacy are respectively the strongest predictors of mathematics anxiety in students. The more self-efficacy one has, the more she will achieve. Studies have found that the self-efficacy of male students is generally greater than that of female student, and that test anxiety in female students is higher than for male students. This offers another reason as to why females could be affected more than males. In fact, the research suggests that students "goal orientations" and self-efficacy "can predict about 45 percent of math anxiety" (Vakili & Pourrazavy, 2017, p. 757). Thus, a lack of self-efficacy is a strong indicator of a student's probability of having some sort of anxiety when dealing with mathematics.

Society has also built up a stereotype that females are not good at math. This assumption alone can create this lack of self-worth in female students. Children are typically aware of this stereotype as early as second grade, and it can begin to affect their academic success even at that age (Sorvo, et al., 2017, p. 321) According to Vakili and Pourrazavy (2017), "[t]he notion that math talent is innate, boys perform better in math than girls, or [that]math is a logic course" affects the performance of female students (p.760).

### ***Remedies***

A teacher's understanding of creating mastery-oriented classrooms can help them to prevent or reduce the anxiety students experience learning mathematics. As students increase in age from grade 4 to 12, generally their math scores begin to decline. Some research has suggested that creating a better environment in the math class can help alleviate some math anxiety. Thus as teachers move into more complex material, they must introduce it in a calm manner in the classroom. This can include

using dim lighting, but more importantly requires both modeling and developing positive attitudes toward math. It is also very important to keep the math classroom as low-stakes an environment as possible (Ashcraft, 2009). Cohen (2017) found that students that were less anxious were more likely to have positive attitudes toward mathematics, such as enjoying mathematics and liking their mathematics teachers. The study also found the opposite, that students who were more anxious had extremely negative attitudes towards the subject. Therefore, it is important to teach every math lesson with a positive attitude and to promote healthy discourse in our classrooms.

Not only can the attitude a teacher has towards mathematics affect the way students may perceive math, but so to can the way in which they teach the content. Newstead (1998) studied children from ages nine to eleven. She compared the mathematics anxiety of pupils taught in a traditional manner with pupils whose teachers adopted an alternative teaching approach emphasizing problem-solving and discussion of pupils' own informal strategies. The "traditional" approach, in contrast, uses standard, pencil-and-paper methods of computation, and typically uses teacher demonstration followed by individual practice. The alternative approach asked students to develop and discuss their own strategies for solving word sums, which became the principal vehicle for learning. Students worked in groups and came up with different conclusions and shared their findings with one another through conversation. Solving non-routine problems and discussing strategies in small groups was of primary importance. Students learning through this discourse-centered approach had lower math anxiety and improved performance.

## Conclusion

Mathematics is a vital subject for everyone. We must make sure not only that our students see this, but that their teachers do as well. It is easy for a student to sense a tense atmosphere due to the teacher feeling negativity towards mathematics. Thus, the more ease we make our students feel about mathematics, the better everyone will be. Students depend on their teachers to create a healthy discourse when teaching any subject. We must teach to promote self-efficacy in all of our students. This can begin with confident teachers.

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### About the Author

Rebecca Birchall attended Bowling Green State University where she earned her bachelor's in Speech Language Pathology. She then attended the University of Toledo and earned a Master of Education in Middle Childhood Education Math and Science. Rebecca is a 6th-8th grade science teacher at Old West End Academy in Toledo, Ohio.