

MATH ANXIETY

What Educators need to know

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What is math anxiety?:

- ❖ “A person’s negative affective reaction to situations involving numbers, math, and mathematics calculations” (Ashcraft & Moore, 2009 p. 197).
- ❖ Working Memory impacted- especially detrimental for children whose math ability is already low. Achievement scores are not reflective of their true abilities (Ashcraft & Moore 2009)
- ❖ Those individuals who are anxious in math, tend to avoid all avenues related to math including avoiding elective math courses in school, not pursuing degrees that require math, as well as avoiding STEM careers (Ashcraft & Moore 2009; Beilock & Maloney, 2015).

How it develops:

- ❖ ***Passed down from math anxious parents and teachers-*** Research has indicated, that if educators or family members have high-anxiety related to math, there is a higher likelihood that these children are likely to develop anxiety in math as well (Beilock & Maloney, 2015; Beilock, Gunderson, Ramirez, Levine & Smith, 2010).
- ❖ ***Teaching Style-*** There is less focus placed on understanding, and more emphasis on getting results and being successful (Jackson & Leffingwell 1999 as cited in Finlayson, 2014), time pressure and high-stake conditions are created in the class (Ashcraft & Krause 2007; Ashcraft & Moore 2009).
- ❖ Perpetuated when children are asked to perform under pressure- may lead to decreased performance as they worry about completing the question and dealing with their anxiety simultaneously (Ashcraft & Krause, 2007)

What can be done to mediate the effects of Math Anxiety:

- ❖ Teachers must first “recognize some of the symptoms and indicators of math anxiety in their students, such as students drawing a blank on a test or exam; or the notion that incorrect answers are bad, and correct answers are good” (Finlayson, 2014 p. 101).
- ❖ ***Constructivist view of teaching*** - i.e Allowing learners to be actively engaged in their learning through meaningful participation and knowledge building activities, and leading with the students interests. It is the process that is focused on heavily (Finlayson, 2014).
- ❖ ***Expressive Writing*** - helps students reframe the task into a rewarding challenge as opposed to a threat (Beilock & Maloney, 2015).

❖ **Early Interventions to boost numerical & Spatial Abilities** - Providing simple strategies such as engaging parents and children in activities that involve more number and spatial talk (Gunderson & Levine, 2011; Levine, Suriyakham, Rowe, Huttenlocher, & Gunderson, 2010 as cited in Beilock & Maloney, 2015).

❖ **Providing practice & diversifying strategies** (Finlayson, 2014)

Activity: For the purpose of this activity, I would like to look at an aspect of mathematics which may facilitate math anxiety. Word problems. As someone who had difficulty with word problems as a child, I wanted to look at a modified version of an example that I came across recently.

Imagine you are a child who is experiencing math anxiety. Your parents are very anxious and uncomfortable in doing math. As a result, when you ask for homework help they do their best, but you still feel uncomfortable. Your teacher has a traditional method of teaching, is by-the-book, and provides limited opportunity to work in groups or discuss concepts being learned in class. You come to school one day and your teacher has given you a test. They have given you limited resources to use, and your teacher has just called out that there are only 5 more minutes left to complete the test. They also tell you at this time that you will be taking up the answers as a class once the time is up. You have been struggling to understand this question. Now, taking these conditions into account, take a look at the following question and try to answer it as quickly as possible before the 5 minutes is up. As you do so, think about what this child may be experiencing.

Four friends went out on a road trip together across Canada. Peter, Kris, Margaret and Stephanie took turns driving. Peter drove the most, and Margaret drove the least. Kris drove twice as many kilometers as Margaret but only half as many as Stephanie. Peter drove 3 times as many kilometers as Kris. In total they drove 7150 km. How many kilometers did Peter drive?

Example and idea adapted from Zippin L. (2014). Math by the Month: Road Trippin'. *Teaching Children Mathematics*, 20, 544-545.

Educators may choose to employ the four-step method listed in Moretti, Stephens, Goodnow & Hoogeboom (1989): Find out, Choose a Strategy, Solve it and Look Back and use the *Work Backwards* approach.

Find out: What is the question we have to answer (*How many km did Peter drive?*), What do you know about the amount of km driven by each person? (*i.e Margaret drove the least. Kris drove twice as many km as Margaret but half of Stephanie, Peter drove 3 times as many km as Kris*)

Choose Strategy: To solve this problem you need to begin with the specific information you've been given (*7150 km total driven*). What can you do now? (*Find the lowest common denominator x or Margaret*)

Solve it: How can you figure out what each person drove if you have the total number of km and the lowest common denominator? Which variable do you have a definite number for? (x) Begin with

this number and work backwards. What can we determine now?. Keep working backwards until all variables are accounted for. How many km did each person drive?

Look Back: Review the problem and information you were given again. Does it make sense? Is it reasonable?

Answer:

$13x = \text{Total number of Km (7150km)}$

$x = 550\text{km (3300} \div 6 = 550\text{km)}$

Peter $3 \times (2x) = 6x \text{ -----} \rightarrow 3300\text{km (6} \times 550 = 3300\text{km)}$

Kris $2 \times (x) = 2x \text{ -----} \rightarrow 1100\text{km (2} \times 550 = 1100\text{km)}$

Margaret $x \text{ -----} \rightarrow 550\text{km (3300} \div 6 = 550\text{km)}$

Stephanie $2 \times (2x) = 4x \text{ ---} \rightarrow 2200\text{km (4} \times 550 = 2200\text{km)}$

Therefore Peter drove 3300km

Now imagine if:

You were able to jot down your thoughts and feeling on what you were feeling about before the test (or in this case question), your teacher embraced a constructivist view of teaching that encouraged mistakes and capitalized on your interests, there were no time pressure and your math anxious parents were provided with support so they could help you. How might you be feeling now?

Look fors: Encouraging more group work, taking away time limitations, checking for comprehension and providing opportunities to ask questions throughout, looking out for children's interests and making meaningful connections to content, encouraging a growth mindset.

References:

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