

STRENGTHEN RESILIENCE WITH MATH ANXIETY



By: Kate Hughes

You hear the chime. Chairs scrape across the floor. You see your classmates walk towards the meeting space and find a spot on the rug. Your teacher gets out the easel markers and some linking cubes. It is time to start math. What is happening in your body right now? Many students are coming into schools with symptoms of anxiety that are preventing them from engaging in their learning. Anxiety is associated with feelings of panic, tension and helplessness. Anxiety affects the brain's working memory. Some students experience symptoms of anxiety only when they are faced with a math task. Why?

At All Learners Network, we often work with teachers and their relationships with math. It is so clear that negative experiences with math are pervasive and affect one's self image as a mathematician for the remainder of their life. Confronting your "math story" if you struggled with math anxiety is challenging and can bring up feelings of shame, anger and embarrassment.

FIGHT, FLIGHT, FREEZE

When students experience anxiety, they often have a flight, fight or freeze reaction depending on their sensory profile. Some students will hear the chime to join the teacher on the rug for math class and have an immediate and noticeable change in behavior. Students experiencing anxiety can have physical symptoms like headaches, stomach aches or fatigue. They can have an emotional reaction of instant overwhelm or panic, stating they hate math, or engage in negative self- talk. When a person feels anxious they feel unsafe. One's brain can't think critically when it is focused on survival. The sudden rush of adrenaline may cause the student to fight, flight or freeze from the new demand.



Avoidant behaviors, or flight behaviors, range in their outward appearance. They might be very passive such as putting your head down or looking down at the rug. They might be slightly more noticeable such as asking to go to the bathroom or water fountain or taking a long time to gather materials or sharpen a pencil. Flight behaviors can be more extreme such as bolting from a classroom without permission or climbing furniture to get up high.

Fight behaviors are often very noticeable. Students might begin arguing with another student or staff member. They might have a burst of angry energy they can't control at the moment. Big behavior is the most efficient communication technique. It gets your point across immediately and often gets a response immediately. It often gets your wants or needs met. If you don't want to participate in math class, throw something big and loud and you almost definitely will be able to avoid that undesired task. You might get time with a preferred adult, a visit to the front office or the planning room, more time with your preferred activity, etc. These unintentionally reward the negative behavior and reinforce it as effective communication.

Freeze behaviors can look like sudden forgetfulness or panic when a task is presented. This can happen when a student has spent days practicing multiplication facts through memorization, and suddenly on the assessment they can't remember a single one. It can also occur when a student is selectively mute during math class and is unable to answer any questions.

Punitive reactions to these behaviors such as taking away recess generally don't cause much change over time. If a child is experiencing math anxiety, they need support in order to engage in the class. Behavioral psychology indicates that if we want students to exhibit desired behaviors, we have to teach them new self-help and communication techniques, or replacement behaviors. It is our job as educators to adjust the environment so that our students can thrive.

CHANGE THE ENVIRONMENT, CHANGE THE BEHAVIOR

Many teachers have supported a student dealing with significant math anxiety. It often presents as some very negative self-talk as well as a dislike of math. They might say that "math is stupid" or "they hate math". We need to let students process these feelings and then actively change the environment we are presenting to them as a math community.

Provide opportunities for sensory input that can help regulate their nervous system. All people crave different sensory experiences to regulate. What helps calm one person might do the opposite for another. Some people crave big gross motor movement like doing jumping jacks or wall push ups, bouncing on an exercise ball, carrying a gallon of paint from one side of the room to the other. Some people crave calmer gross motor



movement such as going for a walk or doing some light stretching and breathing. Some people crave fine motor experiences like playing with puddy, stress balls, rubbing their hands on different textures like sequins or loose sand. Some people crave auditory experiences like noise-cancelling headphones or listening to music or a familiar audiobook. Experiment with some different sensory experiences and see what helps a student regulate. If possible, have time before math begins that is designated for all students to check in with their nervous system. This normalizes taking care of your needs as important for all, rather than stigmatizes a particularly math anxious student.

Begin math with a low floor- high ceiling task with many answers. At ALN, we use the All Learners Lesson Structure, which starts with Launch. Launch is how we use the first 5-15 minutes of our math block for purposeful, discussion-rich number sense routines in our classrooms. One way to do this would be to present an intriguing image such as an array of flowers and ask what students notice. Some may count the blossoms, some may calculate the petals, some may reflect on the color or type of flower. All answers are welcome and all answers matter to the community. Increase reasoning skills through this notice and wonder exercise so that students can trust their sense making skills.

A lot of students that experience math anxiety believe that “doing” math is memorizing a series of steps that don’t make much sense. Overemphasis on memorizing the steps of a procedure can do more harm than good. The traditional method of teaching math often looks like “I do”, in which the teacher shows the steps of a procedure. Then “we do”, when the class does it slowly together. Finally, “you do” when the students are prompted to do it on their own. If a student is unable to replicate the steps of the procedure independently, they are often retaught on their own in a small group, slower, using the exact same method that already didn’t work for them.

Shortcuts or tricks such as keep, change flip when dividing fractions or removing decimal points when multiplying numbers and then reinserting them into the product after solving are hard for students to memorize. Without context or meaning, it’s just a series of steps that feels like they are designed to trip you up. They end up wondering which way does the decimal move? Students often see math as steps of a procedure that have to be memorized. Steps of a procedure are difficult to remember if one lacks conceptual understanding. Rushing to teach math anxious students the steps of a procedure in an effort to reduce the cognitive load is tempting, but backfires into students wondering where to “move the decimal” or how to “borrow a ten”.

Instead of teaching tricks and procedures, provide positive feedback for the cognitive process a child is undertaking. Feedback is important for shifting a child’s mathematical mindset from “not being a math person” to a powerful mathematician. Praise for speed and correct answers are far less helpful for changing mindset than recognizing decisions a mathematician has made or sense making strategies they have utilized.



Avoid stagnant ability based grouping that confirms student perceptions of how their math skills measure up with their peers. Utilize heterogeneous grouping that allows for all students to benefit from their peers. Create opportunities for all students to be an expert. Make a practice of sorting student work to make short, targeted interventions rather than a “low group” or “high group” that has expected membership.

Experiencing anxiety causes students to struggle to activate their short and long term memory. Offload some demands on active working memory. Directly teach students how to take notes and allow them to access their notes during problem solving. Create anchor charts as a class that can help to refresh a student's memory. Avoid teacher created anchor charts that just become wallpaper and instead create prompts and tasks that teach kids to engage with these tools.

Change how you teach math to engage students' innate curiosity. Create scenarios with manipulatives so that students have moments of discovery when they see how numbers work. Teach students how to break down a difficult problem with the ALN Problem Solving Protocol as a whole group or small group exercise. The cognitive load will decrease as this system becomes more natural. Then students can really focus on the math, and less on the overwhelm.

Students with math anxiety need to be given an opportunity to be a mathematician. Create opportunities for them to calm their nervous system to reduce the panic and tension before behaviors begin. Teach them to ask for breaks. Teach them to explore their own nervous system and find a sensory input that makes them feel more in control. Teach them strategies to access their prior learning. Provide choice in how they do their math and show their thinking. Create an environment that focuses on the method of problem solving as opposed to the answer. Math anxiety will likely always exist, and we can change the environment in which students learn math to make it better.

