

Math Anxiety

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What is it?

- Math anxiety is a feeling of tension, worry and fear in situations involving math-related activities (Wang et al., 2017).
- Anxiety disrupts cognitive processes, especially working memory (Ashcraft et al., 2007).
- Working memory is essential to mathematical problem-solving.

Why is it important to identify?

- A high degree of math anxiety has been shown to place otherwise successful students almost half a school year behind their less anxious peers (Harms, 2018).
- Ironically, children who have the highest cognitive capacity avoid using advanced problem solving strategies when they are anxious; as a result they underperform in math compared with their lower working memory peers (Ramirez et al., 2015).
- When students are taught strategies to manage their anxiety, their achievement improves (Marks Krpan, 2018).
- Math anxiety is not linked to ability, but can overshadow it (Marks Krpan, 2018).
- Without intervention, early math anxiety can quickly escalate and have life-long implications (Ashcraft et al., 2007).

How is it developed?

- Math anxiety is easily transmitted by math-anxious adults including parents and teachers (Maloney et al.).
- Math anxiety is caused primarily by the way the student is taught (Furner, 2017).

Classroom Strategies That Can Help (Furner, 2017):

- **Provide opportunities for differentiation within instruction**
 - Scaffold lessons to introduce concepts sequentially; guide students through a concept rather than introducing it all at once.
 - Let students have some input into their own evaluations.
 - Focus on formative rather than summative assessments.
- **Accommodate different learning styles**
 - Provide time.
 - Provide visualization strategies within the problem. E.g: $25-23 = ?$; "what's $5-3$? Imagine you have 5 circles. Now move 3 away, how many are left?"
- **Provide opportunities for students to build their own confidence in their abilities**
 - Include 'Low Floor/High Ceiling' activities that provide multiple entry points for learners (E.g. Dice adding games for mental math addition).
 - Focus on the problem-solving process rather than achieving correct answers.
 - Help students reframe their errors as learning opportunities.

- Celebrate success and draw attention to what students can do.
- Expose students to cross-curricular experiences that encourage the value of math in everyday life experiences.
- **Use problem-centered instruction:**
 - Manipulatives, cooperative groups, discussion of math, questioning and making conjectures, justification of thinking, writing about math, problem-solving approach to instruction, content integration, technology, assessment as an integral part of instruction, etc.

Workshop Activity Examples:

- 'Dice Race'- low floor/high ceiling (Note: give time & reframe as co-operative!)
- Gamify problems using manipulatives - E.g. How many blocks are behind my back?
- Coins - How many ways can we use these in the real world? (Build confidence)
- Paper Folding Fractions (Assessment/Differentiation/Manipulative)
- Target Game Estimation - (Discussion of math)

Address Your Personal Anxieties:

- Go back and make peace with math topics you struggled with! You may be pleasantly surprised to find certain concepts are easier to understand than you may remember!

It is Important to Highlight....

- Research shows a little bit of math anxiety is not necessarily a bad thing; it may actually help performance! (Wang et al., 2017).

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