

A Psychoeducational Approach to Understanding and Supporting Students with Math Learning Difficulties and Disabilities

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OVERVIEW

1. Psychoeducational Framework for Math Interventions
2. Supports for Non-Brain-Based Math Learning Challenges
3. Supports for Brain-Based Math Learning Challenges
4. Discussion / Case Study?

PART I: A Psychoeducational Framework for Thinking about Math Interventions

The Common Question

Question:

What are the best interventions for students who are struggling with math?

What educators want:

- Research-based programs
- Games
- Books
- Outlined activities

What do you recommend and how can I get it?

Guiding Principles

- All kids can learn math
- Math learning is developmental and involves the whole child
- There are many roots to math learning challenges
- The best interventions are those that address students' actual underlying learning needs

My Approach to Intervention

1. Understand the learning needs and challenges via appropriate assessment (formal or informal)
2. Identify desired learning goals
 - Content mastery
 - Developing mathematical thinker
 - Developing independent math learner
 - A happy, healthy child
3. Support based on understanding, goals, and available resources

The Roots of Math Learning Challenges

Brain-Based Disabilities

- Calculation
- Visual processing
- Executive functioning
- Secondary experiences

Non-Brain-Based Factors

- Environmental factors
- Social-emotional / behavioral factors
- Developmental skill deficits

PART II: Supporting Non-Brain-Based Math Learning Challenges

Supporting Non-Brain-Based Difficulties

1. Address the underlying root directly
2. Scaffold learning and bridge the learning gap while development is in progress
3. Supplement instruction
 - In-school support
 - Intervention program
 - Outside support

Supporting Non-Brain-Based Difficulties: *Environmental Factors*

Developmentally appropriate instruction

- Content
- Pace
- Format
- Accessibility

Supportive learning environment

- Behavioral/social norms
- Classroom practices
- Safety, kindness, respect

1. *Address the underlying root*
2. *Scaffold learning and bridge the learning gap*
3. *Supplement instruction*

Supporting Non-Brain-Based Difficulties: *Social-Emotional / Behavioral Factors*

Beliefs & Attitudes

- The importance of math
- What it means to learn math
- Beliefs about self as a math learner

Student Engagement

- Presence
- Doing the work
- Best effort

1. *Address the underlying root*
2. *Scaffold learning and bridge the learning gap*
3. *Supplement instruction*

Supporting Non-Brain-Based Difficulties: *Skills Deficits*

Active Learning Skills

- Asking questions or seeking help
- Taking / using notes
- Learning through classwork, homework, and studying
- Keeping track of assignments, materials, dates, etc

Math Thinking and Problem Solving Skills

- Prior knowledge
- Developmentally immature approaches to solving problems
- Over-reliance on memorization and algorithms
- Number throwing and number crunching

1. *Address the underlying root*
2. *Scaffold learning and bridge the learning gap*
3. *Supplement instruction*

PART III: Supporting Brain-Based Math Learning Challenges

Supporting Brain-Based Difficulties

1. Teaching Strategies
2. Student Learning Strategies
3. Accommodations
4. Psychoeducation
5. Understanding, nurture, patience, empathy & love

Supporting Brain-Based Difficulties: *Calculation Difficulties*

Difficulty accessing basic math facts

Difficulty with thinking that requires math fact automaticity

Difficulty doing complex calculations

Difficulty solving applied problems

1. Teaching Strategies
2. Learning Strategies
3. Accommodations
4. Psychoeducation
5. Understanding...& love

Supporting Brain-Based Difficulties: *Calculation Difficulties*

Teaching Strategies

- Teach with simpler numbers when introducing new concept
- Minimize need for calculation when teaching new concept
- Provide student with the math fact answer (human calculator)

Learning Strategies

- Side math is real math
- Talk aloud
- Use a multiplication table
- Use a calculator – but don't let the calculator be your brain

Accommodations

- Multiplication table!!!
- Calculator for complex arithmetic operations only.
- Extra time for math fact calculation and strategy use
- Breaks to alleviate high cognitive load and effort
- Blank paper

Psychoeducation

Understanding, nurture, patience, empathy & love

Supporting Brain-Based Difficulties: *Visual Processing Deficits*

Difficulty remembering / retaining visual information

Difficulty seeing, perceiving, and managing visual information

Difficulty manipulating visual information

Difficulty quickly and accurately processing visual information

1. Teaching Strategies
2. Learning Strategies
3. Accommodations
4. Psychoeducation
5. Understanding...& love

Supporting Brain-Based Difficulties: *Visual Processing Deficits*

Teaching Strategies

- Scaffold visual processing
- Supplement with language
- Present visual information with challenges in mind

Learning Strategies

- Talk aloud
- Spread out / write big enough for your brain
- Show all your thinking / don't hold it in your head
- Write it out so you can stare at it
- Stop and stare

Accommodations

- Extra time for visual processing and strategy use
- Breaks to alleviate high cognitive load and effort
- Blank paper

Psychoeducation

Understanding, nurture, patience, empathy & love

Supporting Brain-Based Difficulties: *Executive Functioning Deficits*

Impulsivity/inhibition

Cognitive rigidity

Sustained attention

Organization

1. Teaching Strategies

2. Learning Strategies

3. Accommodations

4. Psychoeducation

5. Understanding...&
love

Supporting Brain-Based Difficulties: *Executive Functioning Deficits*

Teaching Strategies

- Scaffold executive functioning
- Model and reinforce executive functioning skills
- Present problems and activities with challenges in mind

Learning Strategies

- Slow your roll / stop and think / don't let your hand rush your brain
- Beginner's mind / open mind / fresh mind
- Written math strategies

Accommodations

- Extra time for self-regulation and strategy use
- Breaks to alleviate high cognitive load and effort
- Blank paper

Psychoeducation

Understanding, nurture, patience, empathy & love

Supporting Brain-Based Difficulties: *Secondary Experiences & Learning Challenges*

Cognitive overload and feeling overwhelmed or exhausted

Resistance & acceptance of learning needs/differences

Thoughts and feelings

Experiences of undiagnosed students

DISCUSSION

Thinking about your thinking:

- What do you find compelling/interesting?
- What do you want to learn more about?
- Where does this take your thinking about math interventions?

Thinking about your practice:

- How does this apply to what you are seeing in your schools?
- What are limitations to developing and implementing effective math interventions?
- What is needed in your schools, or in schools in general?
- Where do you/school psychologists fit into this picture?

THANK YOU

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