

Mathematics and Special Education Leadership Protocols

Protocol 2:
***Essential Understandings About
Students with Disabilities***

Developed in collaboration with the MA DESE,
the MA Math Support Specialists' Network and
Education Development Center, Inc.

Massachusetts Department of
ELEMENTARY & SECONDARY
EDUCATION



Today's Work with the Protocols

- ★ 1: Shared Beliefs About Mathematics Instruction for Students with Disabilities
- ★ **2: Essential Understandings About Students with Disabilities**
- ★ 3: Essential Understandings About Rigorous Mathematics Instruction
- ★ 4: Aligning Barriers and Strategies
- ★ 5: *Responding to a Range of Learning Needs*



Protocol 2 Goals

- ★ To identify and discuss the demands, difficulties and needs of students with disabilities as learners of mathematics;
- ★ To better understand how to use an IEP as a tool to inform mathematics instruction for a student with disabilities.



Agenda

- ★ Getting started
- ★ A Quiz
- ★ 6 Areas of Demands and Difficulties for Students with Disabilities
- ★ Using the IEP As a Tool
- ★ Individual reflect-and-write
- ★ Next steps

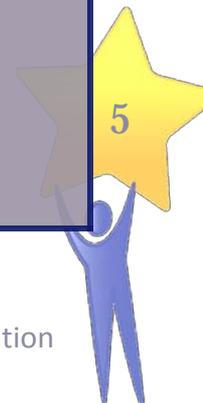




The Quiz

Directions: Solve the following basic facts. **You have 1 minute** to complete this quiz. Please remember that the + symbol means multiply, the - symbol means divide, the \div symbol means add, and the x symbol means subtract.

$8 + 2 =$	$10 - 5 =$	$8 \times 7 =$
$14 \div 7 =$	$17 \times 2 =$	$14 - 7 =$
$12 \times 2 =$	$8 \div 4 =$	$6 \times 2 =$
$10 - 2 =$	$4 \times 3 =$	$8 + 5 =$
$6 \times 5 =$	$15 - 3 =$	$9 - 1 =$
$9 \div 9 =$	$9 \div 2 =$	$8 - 4 =$



Reactions to the Quiz

- ★ How did it feel to be in the place of the quiz taker?
- ★ How might this experience translate into ways in which students with disabilities respond to typical classroom learning experiences?





6 Areas of Demands and Difficulties for Students with Disabilities: *What's Involved in Learning Mathematics?*

★ Chosen because they have an impact on mathematics learning.

Memory

Attention

Organization

Language

Conceptual Understanding

Visual/Spatial Understanding





Memory

The impact of **Memory** on learning mathematics includes:

- ★ Difficulties storing and retrieving facts
- ★ Math facts
- ★ Students' lack fluency and accuracy
- ★ Working memory
- ★ Impacts work on multi-step problems
- ★ Other theories: difficulties with language of number words or difficulties with visual representations, e.g. number lines
- ★ Difficulty holding information in mind while solving a problem
- ★ May be related to difficulties inhibiting correct answers

Sources: Gersten et. al., 2008; Mazzocco, 2007





Attention

Impact of **Attention** for learning mathematics includes:

- ★ Lack of focus on details
- ★ Lack of routines to follow
- ★ Too much text on a page
- ★ Finding key words or phrases to solve problems
- ★ Focus on only one aspect of a problem





Organization

Impact of **Organization** for learning mathematics includes:

- ★ Aligning columns and rows for computation
- ★ Problem solving
- ★ Ordering of numbers and symbols
- ★ Constant movement of manipulatives
- ★ Creating graphs
- ★ Matching tables with patterns





Language

Impact of **Language** for learning mathematics includes:

- ★ Reading Text
- ★ Math Vocabulary
- ★ Writing explanations
- ★ Sharing ideas in groups
- ★ Listening to instruction
- ★ Writing math stories





Conceptual Understanding

Impact of **Conceptual Understanding** for learning mathematics includes:

- ★ Number sense
- ★ Problem solving
- ★ Moving from concrete to abstract, i.e. equations
- ★ Making generalizations
- ★ Applying strategies to new situations
- ★ Reflecting on thinking—metacognition

Source: Allsopp et al., 2003





Visual/Spatial Understanding

Impact of **Visual/Spatial Understanding** for learning mathematics includes:

- ★ Reading tables
- ★ Diagrams
- ★ Visual examples
- ★ Trouble following graphs
- ★ May not line up numbers correctly
- ★ Following patterns from drawings

Source: Allsopp et al., 2003



Discuss

- ★ What are the essential barriers that students with these difficulties experience?
- ★ What experiences have you had with this area of demand with students or with teachers?



Using the IEP as a Tool for Supporting Students

- ★ How can a math teacher use the IEP to plan for his or her students?
- ★ What additional information could be on the IEP to help a mathematics teacher better serve his or her students with disabilities?



Write and Reflect

What are some important ideas from today that you want to note for yourself?



Wrap Up

- ★ Summarize where you ended up today
- ★ Parking lots questions
- ★ Any follow-up steps?





Next Time...

- ❖ #1 *Shared Beliefs About Math Instruction for Students with Disabilities*
- ❖ #2 *Essential Understandings About Students with Disabilities*
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- ❖ #4 *Aligning Barriers and Strategies*
- ❖ #5 *Responding to a Range of Learning Needs*

