

Co-Teaching: Mathematics Strategies for Integrating General and Special Education

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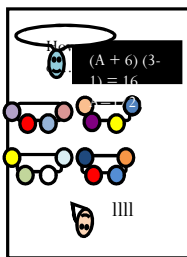
Purpose

- ▶ Engage in strategies that support all learners in a standards-based co-taught classroom
- ▶ Explore mathematical tasks involving rate, ratio, and proportional reasoning
- ▶ Provide resources for mathematical task involving equivalent expressions and radical and integer exponents.
- ▶ Use and evaluate instructional models, e.g. scaffolding, differentiation, concrete-pictorial-abstract, etc.

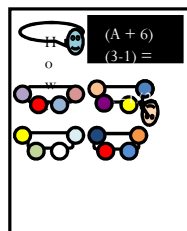
Six Co-Teaching Approaches

Large Group (T T T)

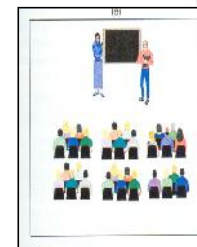
1 Teach/ 1 Observe



1 Teach/ 1 Assist



Team Teaching



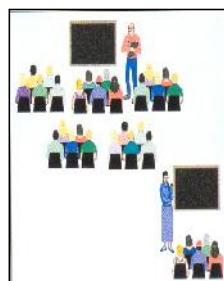
Smaller Group (SPA)

Station



4/14/2014

Parallel



Alternative Teaching





Standards for Mathematics Practice

Construct viable arguments and critique the reasoning of others



I can make conjectures and critique the mathematical thinking of others.

I can **construct, justify, and communicate** arguments by...

- ◆ considering context
- ◆ using examples and non-examples
- ◆ using objects, drawings, diagrams and actions

I can **critique the reasoning of others** by...

- ◆ listening
- ◆ comparing arguments
- ◆ identifying flawed logic
- ◆ asking questions to *clarify* or *improve* arguments

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Jordan School District 2011, Grade 4

Make sense of problems and persevere in solving them



When presented with a problem, I can make a plan, carry out my plan, and evaluate its success.

BEFORE...

EXPLAIN the problem to myself.

- Have I solved a problem like this before?

ORGANIZE information...

- What is the question I need to answer?
- What is given?
- What is not given?
- What are the relationships between known and unknown quantities?
- What tools will I use?
- What prior knowledge do I have to help me?

DURING...

PERSEVERE

MONITOR my work

CHANGE my plan if it isn't working out

ASK myself, "Does this make sense?"

AFTER...

CHECK

- Is my answer correct?
- How do my representations connect to my algorithm?

EVALUATE

- What worked?
- What didn't work?
- What other strategies were used?
- How was my solution similar to or different from my classmates'?

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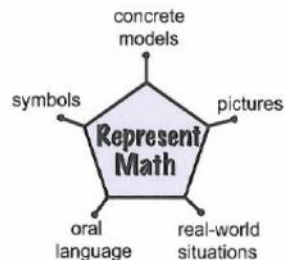
Model with mathematics



I can recognize math in everyday life and use math I know to solve everyday problems.

I can...

- ◆ make assumptions and estimate to make complex problems easier
- ◆ identify important quantities and use tools to show their relationships
- ◆ evaluate my answer and make changes if needed



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Reason abstractly and quantitatively



I can use reasoning habits to help me contextualize and decontextualize problems.

CONTEXTUALIZE

I can take numbers and put them in a real-world context.

For example, if given
 $3 \times 2.5 = 7.5$

I can create a context:

I walked 2.5 miles per day for 3 days. I walked a total of 7.5 miles.

DECONTEXTUALIZE

I can take numbers out of context and work mathematically with them.

For example, if given
"I walked 2.5 miles per day for 3 days. How far did I walk?"

I can write and solve
 $3 \times 2.5 = 7.5$

Reasoning Habits include 1) *creating an understandable representation of the problem solved,* 2) *considering the units involved,* 3) *attending to the meaning of quantities,* and 4) *using properties to help solve problems.*

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Look for and make use of structure

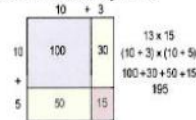


I can see and understand how numbers and spaces are organized and put together as parts and wholes.

Numbers

For Example:

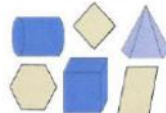
- ◆ Base 10 structure
- ◆ operations and properties
- ◆ terms, coefficients, exponents



Spaces

For Example:

- ◆ dimension
- ◆ location
- ◆ attributes
- ◆ transformation



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Use appropriate tools strategically

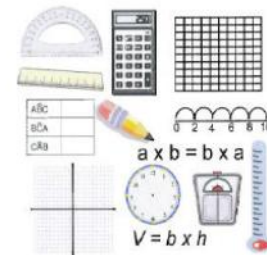


I know when to use certain tools to help me explore and deepen my math understanding.

I have a math toolbox.



- ◆ I know *HOW* to use math tools.
- ◆ I know *WHEN* to use math tools.
- ◆ I can reason: "Did the tool I used give me an answer that makes sense?"



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Jordan School District 2011, Grade 6

Look for and express regularity in repeated reasoning



I can notice when calculations are repeated. Then, I can find more efficient methods and short cuts.

For example: $25 \div 11$

$$\begin{array}{r} 2.27\overline{27} \\ 11 \overline{)25.0000} \\ \underline{-22} \\ 30 \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 30 \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 30 \end{array}$$

I am repeating this calculation. The quotient is a repeating decimal.

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Jordan School District 2011, Grade 6

Attend to precision



I can use precision when solving problems and communicating my ideas.

Problem Solving

- ◆ I can calculate *accurately*.
- ◆ I can calculate *efficiently*.
- ◆ My answer matches what the problem asked me to do - *estimate* or find an *exact answer*.

Communicating

- ◆ I can **SPEAK, READ, WRITE, and LISTEN** mathematically.
- ◆ I can correctly use...
 - math **symbols**
 - math **vocabulary**
 - **units of measure**

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Jordan School District 2011, Grade 6

Engage Learning - Vocabulary Strategies

► Four Groups

- **Two groups** - develop interactive ways to teach vocabulary associated with proportional reasoning (for example, ratio, scale factor, proportion)
- **Two groups**
 - One will develop synonym triplets (couple of words) act it out
 - The other will develop a taxonomy

Accessibility Strategies

- ▶ Spatial Reasoning
- ▶ Memory
- ▶ Attention



Mathematical Task - How strong is a gummy worm?

- ▶ Two approaches for learning
 - ▶ Implicit Instruction
 - ▶ Explicit Instruction

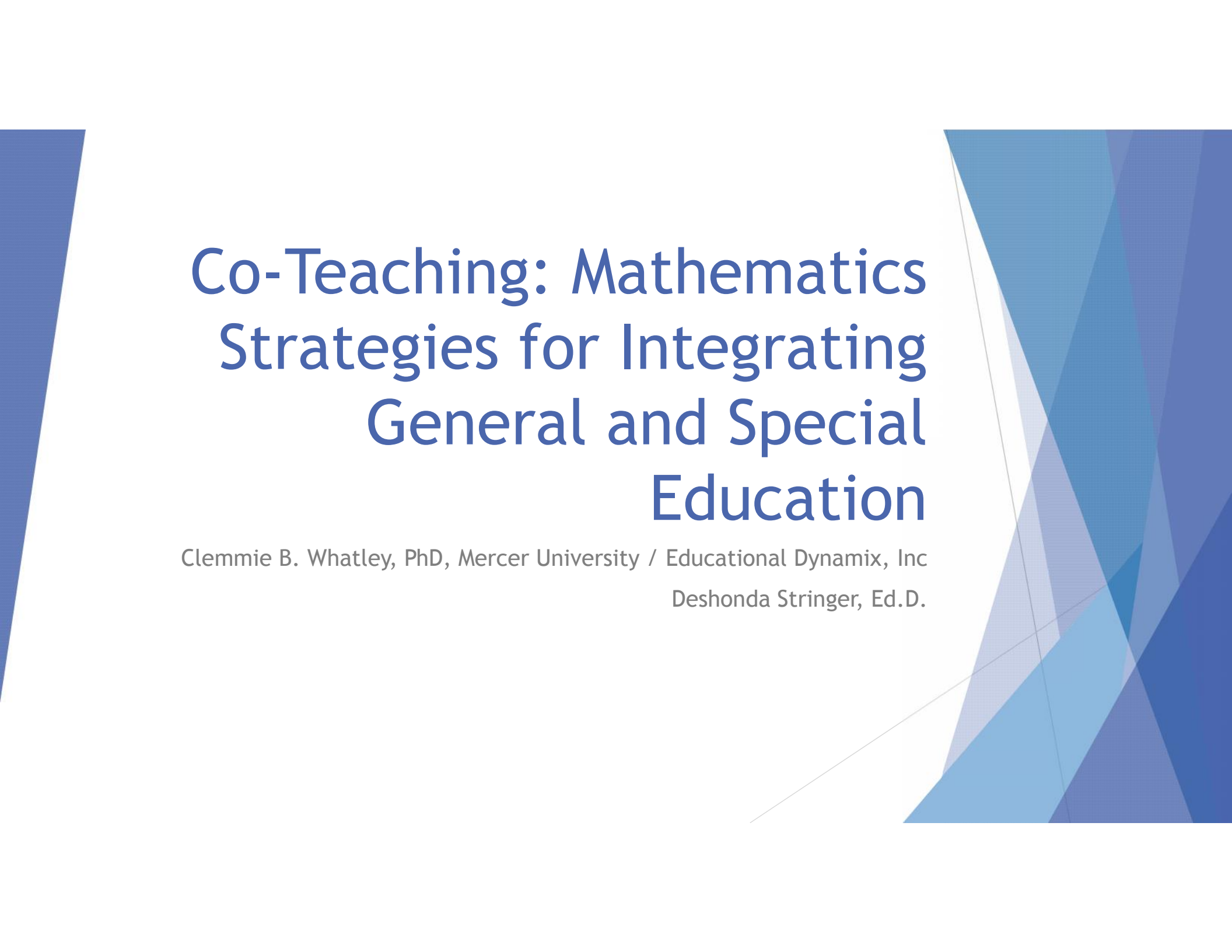


Summarizer

- ▶ What pre-requisites would be needed for this task?
- ▶ What standards did this task address?
- ▶ How were the Standards for Mathematical Practice (SMPs) addressed in this task?
- ▶ What key vocabulary was emphasized in this task?
- ▶ How could you further differentiate this task using processing deficits strategies?

Other Mathematical Tasks

- ▶ Equivalent expressions
 - ▶ [Equal as Balanced](#)
 - ▶ [Variables and expressions](#)
- ▶ Radical and integer exponents
 - ▶ <http://www.mathsisfun.com/square-root.html>
 - ▶ [..\links to presentation\cube-roots exponents.docx](#)
- ▶ Other Resources
 - ▶ [Posing Cognitively Demanding Tasks to All Students, Mathematics Teaching in Middle School, NCTM, 2013](#)
 - ▶ [Teaching Proportionality in Middle Grades Research Summary, Association of Middle Level Education.](#)



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