Meeting the Instructional Needs of “Struggling” Learners

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My Saturday morning “elbow” partners
A Warm-up

Would You Rather...

Have the revenue from an amusement park Ferris wheel or carousel ride?

- 4 tickets to ride (Ferris wheel)
- 3 tickets to ride (carousel)

Credit: Erick Lee 3
Your Next 60 Minutes

- Why that warm-up
- Why This Workshop
- What Works (for my students)
What teachers tell me about why their students “struggle”

- Anxiety
- Lack of Engagement
- Cognitive Deficits
- Memory Difficulties
- Attention Difficulties
- Processing Difficulties
- Lack of Independence
I Started Reading
Foster Computational Fluency

- Accuracy
- Efficiency
- Flexibility
What Works #1
Fostering Computational Fluency

<table>
<thead>
<tr>
<th>Which One Doesn’t Belong?</th>
<th>66%</th>
<th>0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 (\frac{2}{3})</td>
<td>4 (\frac{4}{3})</td>
</tr>
</tbody>
</table>
## Which One Doesn’t Belong?

<table>
<thead>
<tr>
<th>$2^{-2}$</th>
<th>$2^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(\text{-}2)^2$</td>
<td>$-2^2$</td>
</tr>
</tbody>
</table>
What Works #1  Fostering Computational Fluency

Number Talks #1
How would you solve...?

209 \times 101 =
Number Talks #2
How would you solve...?

6.8 + 9.5 =
What Works #1

Fostering Computational Fluency

Number
Talks #3
Which is greater?

6 or 8
7 or 9
Number Talks #4
Does this answer make sense?

3% of 581 = 105
Your turn ~
Write a WODB or Number Talk example involving ratios.
What Works #2

Hold all students to high expectations

Teacher Estimates of Student Achievement
Effect Size 1.62

Provide Opportunities to Succeed ~ Believe in them!

Spark Curiosity ~ Encourage Challenge
What Works #2  Have High Expectations

<table>
<thead>
<tr>
<th>Topic</th>
<th>Dividing Fractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCSS Standard(s)</td>
<td>6.NS.1</td>
</tr>
<tr>
<td>DOK 1 Example</td>
<td>Evaluate.</td>
</tr>
<tr>
<td></td>
<td>( \frac{4}{9} \div \frac{2}{5} )</td>
</tr>
</tbody>
</table>

DOK 2 Example

Use the digits 1 to 9, at most one time each, to fill in the boxes to make two different pairs of fractions that have a quotient of \( \frac{2}{3} \).

\[ \quad \frac{\square}{\square} \div \frac{\square}{\square} = \frac{2}{3} \]
Depth of Knowledge
Level 2/3
What Works #2: Have High Expectations

Depth of Knowledge
Level 3

\[(\square + \square) = \square + \square + \square = \square + \square + \square + \square + \square + \square\]
Your turn: Create an “OpenMiddle” example involving ratios.
What Works #3

Promote student engagement

What’s the difference?
Levels of Engagement

Attention + Commitment = Level of Engagement

**High Attention**
- High Commitment: Engagement
  - The student associates the task with a result or product that has meaning and value for the student. The student will persist in the face of difficulty and will learn at high and profound levels.
- Low Commitment: Strategic Compliance
  - The task has little inherent or direct value to the student, but the student associates it with outcomes or results that do have value to the student (such as grades). The student will abandon work if extrinsic goals are not realized and will not retain what is learned.
- Low Commitment: Ritual Compliance
  - The student is willing to expend whatever effort is needed to avoid negative consequences. The emphasis is on meeting the minimum requirements. The student will learn at low and superficial levels.
- Low Commitment: Retreatism
  - The student is disengaged from the task and does not attempt to comply with its demands, but does not try to disrupt the work or substitute other activities for it. The student does not participate and learns little or nothing from the task.
- Low Commitment: Rebellion
  - The student refuses to do the work, acts in ways to disrupt others, or substitutes tasks or activities to which he or she is committed. The student develop poor work and sometimes negative attitudes towards formal education and intellectual tasks.

**High Attention**
- Low Commitment: Ritual Compliance
- Low Commitment: Retreatism
- Low Commitment: Rebellion

**Low Attention**
- Low Commitment: Retreatism
- Low Commitment: Rebellion

**No Attention**
- Low Commitment: Retreatism
- Low Commitment: Rebellion

**Diverted Attention**
- No Commitment: Retreatism
- No Commitment: Rebellion

Credit: Philip Schlecty 21
Student Engagement?

No attention + Low commitment

Retreatism

RETREATISM - The student is disengaged from the task and does not attempt to comply with its demands, but does not try to disrupt the work or substitute other activities for it. The student does not participate and learns little or nothing from the task.
What Works #3: Promote Student Engagement

High Attention + High commitment = Engagement

Desmos Activity Builder
Polygraph: Distance-Time Graphs
Go to student.desmos.com
Type in the class code: D7HTKZ

ENGAGEMENT - The student associates the task with a result or product that has meaning and value for the student. The student will persist in the face of difficulty and will learn at high and profound levels.
What Works #3 Promote Student Engagement

@MrsParadee
My Ss loved an @Desmos polygraph today. One of the first times Ss asked me for academic vocab. They had the need to communicate more clearly! #rmmsfam #MTBoS #iteachmath
What Works #4

Introduce relevant instructional tools

- Manipulatives
- Technological tools
- Visual models
  (Double Line/Bar Diagrams)
Forty-five is 30% of what number?

\[
\frac{is}{of} = \frac{\%}{100}
\]
Forty-five is 30% of what number?

\[ 45 \div 3 = 15 \]

\[ 15 \times 10 = 150 \]
Your turn:

Draw a double line diagram to visualize “What is 28% of 160?”
Katy runs 50 yards in a relay race. Each of her 3 teammates runs 25 more yards than the runner before. How many yards will Katy’s team run in all?
I have three dogs. When I take them to the vet I put them all on the scale at once and the scale shows that they weigh 160 pounds. Larry weighs 20 more pounds than Moe. Curly weighs 10 less pounds than Moe. How much do each of my dog’s weigh?
I have three dogs. When I take them to the vet I put them all on the scale at once and the scale shows that they weigh 160 pounds. Larry weighs 20 more pounds than Moe. Curly weighs 10 less pounds than Moe.

How much does each of my dog’s weigh?

\[L + (L - 20) + (L - 30) = 160\]
Your turn:
Draw a Bar model to visualize the following problem...
Three eighth-grade homerooms raised a total of $228 to donate to their favorite charities. Mr. L’s class donated 6 times as much as Mrs. M’s class. Mrs. P’s class donated $110 less than Mr. L’s class. How much money did Mrs. P’s class donate?
What Works #5

Minimize barriers
What Works #5

Minimize barriers

Do these students understand the structure of the problem?

...of the operations?
Numberless Word Problems

- Scaffolded word problems
- Visualize the situation
- Consider the structure of the operations
- Encourage classroom discourse
- Consider what the question could be
19. In a store, 1 can of soup costs $1.80. The store also sells a pack of 6 cans of the soup. A customer who buys 1 pack saves 15% compared to buying 6 cans separately. How much money does a customer save by buying 1 pack instead of buying 6 cans separately?

Enter your answer in the box.

$
A store sells cans of soup. You can either buy one can or you can buy a pack of cans.
A store sells cans of soup. You can either buy one can or you can buy a pack of cans. If you buy the cans in a pack, you will save some money.
A store sells cans of soup. You can either buy one can for $1.80 or you can buy a pack of 6 cans. If you buy the cans in a pack, you will save some money.
A store sells cans of soup. You can either buy one can for $1.80 or you can buy a pack of 6 cans. If you buy the cans in a pack instead of separately, you will save 15%.
A store sells cans of soup. You can either buy one can for $1.80 or you can buy a pack of 6 cans. If you buy the cans in a pack, you will save 15\%.

How much money will you save if you buy cans by the pack?
A store sells cans of soup. You can either buy one can for $1.80 or you can buy a pack of 6 cans. If you buy the cans in a pack, you will save 15%.

How much money will you save if you buy cans by the pack?
Your turn:
Turn a problem into a numberless word problem.
Task

Taylor and Anya are friends who live 63 miles apart. Sometimes on a Saturday, they ride toward each other's houses on their bikes and meet in between. One day they left their houses at 8 am and met at 11 am. Taylor rode at 12.5 miles per hour. How fast did Anya ride?
### Task
Taylor and Anya are friends who live 63 miles apart. Sometimes on a Saturday, they ride toward each other's houses on their bikes and meet in between. One day they left their houses at 8 am and met at 11 am. Taylor rode at 12.5 miles per hour. How fast did Anya ride?

### One Possible Rewrite

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor and Anya live some miles apart from each other. Sometimes they</td>
<td>What math do you see?</td>
</tr>
<tr>
<td>ride their bikes and meet each other part way.</td>
<td>What relationships do you see?</td>
</tr>
<tr>
<td>Taylor and Anya live 63 miles apart. One day Taylor rode at 12.5 mph</td>
<td>Does this change what we know?</td>
</tr>
<tr>
<td>toward Anya’s house.</td>
<td>So, what does this tell us?</td>
</tr>
<tr>
<td>They both left at 8 am and met up at 11 am.</td>
<td>What else do you want to know?</td>
</tr>
<tr>
<td>How fast did Anya ride?</td>
<td>What new information do you see?</td>
</tr>
<tr>
<td></td>
<td>How does this change your understanding of the</td>
</tr>
<tr>
<td></td>
<td>situation?</td>
</tr>
<tr>
<td></td>
<td>So, what questions could I ask you about this</td>
</tr>
<tr>
<td></td>
<td>situation?</td>
</tr>
</tbody>
</table>
Summing Up

- Foster Computational Fluency
- Hold All Students to High Expectations
- Promote Student Engagement
- Introduce Appropriate Instructional Tools
- Minimize Barriers
All means all...children in a classroom are entitled to a full and balanced curriculum that challenges them, that appropriately meets their needs, and for which they should be held accountable.”

~Skip Fennell, *Achieving Fluency*
Thank You!

Any questions?

You can find me at

@KarenGGartland

kgartland@gdrsd.org
Resources

Books:
1. Mathematical Mindsets, Jo Boaler
3. Becoming the Math Teacher You Wish You’d Had, Tracy Zager
4. The Six Success Factors for Students with Learning Disabilities, Frostig Center
5. Achieving Fluency: Special Education and Mathematics, NCTM
6. Teaching Elementary Mathematics to Struggling Learners, Bradley Witzel
7. Making Thinking Visible, Ron Ritchhart, Mark Church and Karin Morrison
8. Making Number Talks Matter, Cathy Humphreys and Ruth Parker

Websites for:
1. Would You Rather ~ wouldyourathermath.com
2. Which One Doesn’t Belong ~ wodb.ca
3. Open Middle ~ openmiddle.com
4. Desmos Polygraphs ~ teacher.desmos.com
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Isn’t that nice? :)

Examples: