Three Critical Components for Achieving Rigor

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Goals for this session
• Delineate between concepts and corresponding procedures using tasks.
• Examine three components for supporting teachers to connect concepts and procedures.
• Create a shared image of the three components in action through classroom video.

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Make Sense of this...

\[
\begin{array}{c}
\underline{134} \\
\underline{4 \ 536} \\
- \underline{4} \\
\underline{13} \\
- \underline{12} \\
\underline{16} \\
- \underline{16} \\
\underline{0}
\end{array}
\]

Making sense of problem types

<table>
<thead>
<tr>
<th>Problem Structure</th>
<th>Number of Groups (a)</th>
<th>Number of Objects in Each Group (b)</th>
<th>Total Number of Objects (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplication</td>
<td>a</td>
<td>b</td>
<td>?</td>
</tr>
<tr>
<td>Sharing Division</td>
<td>a</td>
<td>?</td>
<td>c</td>
</tr>
<tr>
<td>Measurement Division</td>
<td>?</td>
<td>b</td>
<td>c</td>
</tr>
</tbody>
</table>

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- Delineate between concepts and corresponding procedures using tasks.
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Three Critical Components

1. Know the mathematics.
2. Choose the right tasks.
3. Make the connections explicit.

Representing Division

Now Consider 384 ÷ 4
Solve it with long division in a meaningful way.
How would you support teachers to use this task to connect concepts and procedures in a pulled small group?

Representing Division

How do we provide teachers with an image of what this looks like during instruction?
Observe this the video of a grade 5 pulled small group.
Where did you see these three critical components?
1. Know the mathematics.
2. Choose the right tasks.
3. Make the connections explicit.

Plan with the TQE Process in Mind
- **Tasks** – connect to learning goal and help identify misconceptions.
- **Questions** – highlight mathematical practices and uncover misconceptions.
- **Evidence** – describes misconceptions and guides necessity of providing scaffolding and offering extensions.

Consider this Grade 1 class as they explore a problem provided in context.

How are the three critical components present in this video and how do they interact with the TQE Process?
Three Critical Components

• What mathematics was important to know for teaching?
• What was important about this task?
• What connections can be made explicit?

PROBLEM
Stefan has 7 stickers. How many more stickers does he need to have 15 stickers altogether?

Plan with the TQE Process in Mind

• Select appropriate Tasks to support identified learning goals,
• Facilitate productive Questioning during instruction to engage students in the Mathematical Practices, and
• Collect and use student Evidence in the formative assessment process during instruction.

Three Critical Components

1. Know the mathematics.
2. Choose the right tasks.
3. Make the connections explicit.
Consider Algebra & Bridges

Bridge of length 2

Bridge of length 3

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How many beams are in a bridge of length 2?

How many beams are in a bridge of length 3?

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<table>
<thead>
<tr>
<th>Length</th>
<th>Number of Beams</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td></td>
</tr>
</tbody>
</table>
Number of beams for length n?

Plan with the TQE Process in Mind

- Select appropriate Tasks to support identified learning goals,
- Facilitate productive Questioning during instruction to engage students in the Mathematical Practices, and
- Collect and use student Evidence in the formative assessment process during instruction.

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