


How to Privilege Student Thinking through Questioning

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<http://www.dnamath.com/presentations/>

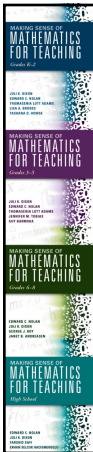
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Session Goals

- Share strategies for helping plan effective questioning.
- Discuss response strategies to facilitate student thinking.
- Reflect on how questioning can promote student engagement.

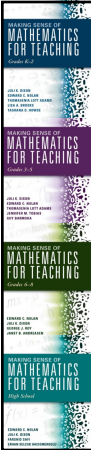
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Questioning

- Why do teachers ask questions?
- What differentiates effective questions from non-effective ones?
- How do we help build the ability to ask good questions?

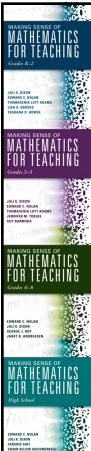
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Walk-Through

Now, we are going to “walk through” an experience of developing strategies for effective questioning...

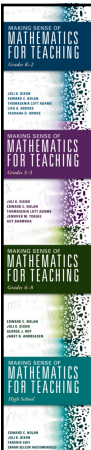
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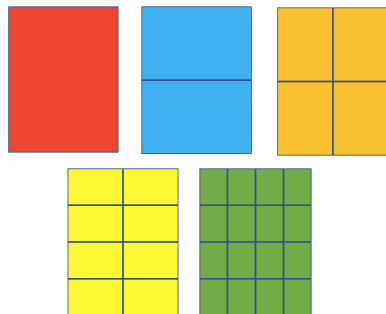
PROBLEM

Susie had $\frac{1}{4}$ of a pan of brownies.
She ate $\frac{3}{4}$ of what she had. How much
of the original pan of brownies
did Susie eat?

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Fraction Kit



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MIDDLE GRADE OF MATHEMATICS FOR TEACHING Grade 6-7


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Plan with the TQE Process in Mind



- Select appropriate **T**asks to support identified learning goals.
- Facilitate productive **Q**uestioning to engage students in mathematical practices.
- Collect and use student **E**vidence in the formative assessment process.

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What's the learning goal?

Solve real world problems involving multiplication of fractions by using visual fraction models or equations to represent the problem.

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Solutions to the Task

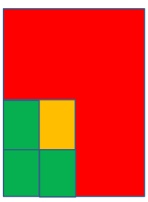
What solutions do you expect?

$$\frac{3}{5}$$

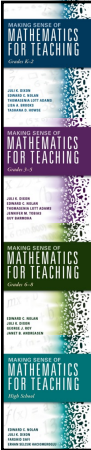
$$\frac{1}{16}$$

$$\frac{3}{4}$$

$$\frac{3}{16}$$



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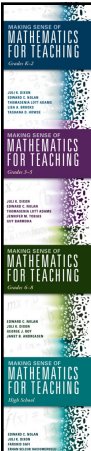


Solutions to the Task

What solutions do you expect?

What questions will you ask to generate different solutions?
What answers do you expect from these questions?

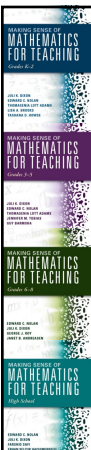
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Anticipating Questions

Teachers anticipate what may happen in the lesson, creating a **“hypothetical learning trajectory”** (Simon, 1995, p. 135) for the lesson. Effective planning can provide high-cognitive-level questions that are difficult to create while teaching. This is why planning is so important to effective questioning (Nolan, Dixon, Roy, & Andreasen, 2016).

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Focusing on Student Thinking


1. Plan multiple question-and response pathways
2. Ask open-ended questions
3. Listen actively to student answers
4. Act to privilege student thinking
5. Reflect on how the lesson engages students

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Anticipated Questions


- How do you identify the fractions that you are using from your diagram?
- How much is eaten? How much is left?
- What are you measuring? What are you answering?
- What operation is being modeled in your solution?

$\frac{3}{5}$	$\frac{3}{4}$
$\frac{1}{16}$	$\frac{3}{16}$



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Plan with the TQE Process in Mind



- Select appropriate **T**asks to support identified learning goals.
- Facilitate **Q**uestions to engage students in mathematical practices.
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Making Sense of the TQE Process



Questions

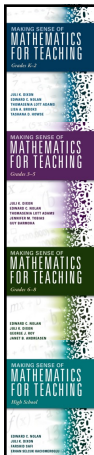
Teachers who have a deep understanding of the content they teach **facilitate targeted and productive questioning strategies** because they have a clear sense of how the content progresses within and across grades.

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Planning Questions

A lesson should **not follow a script**, as teachers should remain flexible and open to student thinking and ideas whenever possible (Shahrill, 2013).

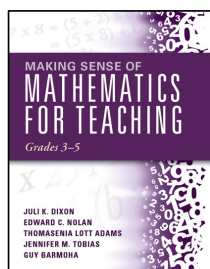
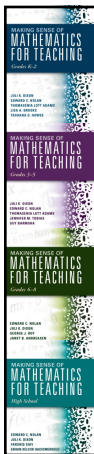
Planning questions is an important element of effective instruction, given that "**teachers need to plan a route and strategy** in order to use questions productively and develop students' thinking based on the learning objectives of their lessons" (Tienken et al., 2009, p. 42).



Creating an Image

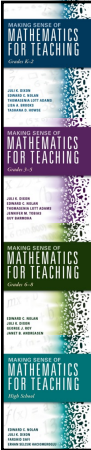
- How do the questions you plan define your classroom environment?
- How do your planned questions impact the questions you ask while teaching?

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Making Sense of Mathematics for Teaching Grades 3-5

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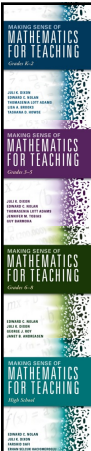


Reflections

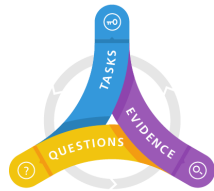
What did you notice?

What questions were asked?

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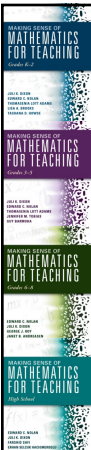


Plan with the TQE Process in Mind



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- **C**ollect and use student **E**vidence in the formative assessment process.

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Questions Asked in Video

Asked

- How are we going to take $\frac{3}{4}$ of the pieces when we only have one piece?
- You have one orange piece. How is that helping you think about this?
- How much did she eat? And how do you know that?

Anticipated

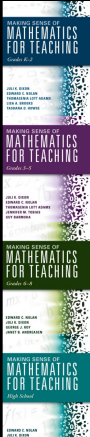
- How do you identify the fractions that you are using from your diagram?
- How much is eaten? How much is left?
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Enacting Questions

Teachers need to be able to **ask questions guided not only by the task at hand, but in consideration of students' present abilities, as well as those they need to develop in the future** (Thompson & Zeuli, 1999).

Lessons should **provide opportunities for students to use their own reasoning** in performing mathematical tasks (Lobato, Hohensee, Rhodehamel, & Diamond, 2012).

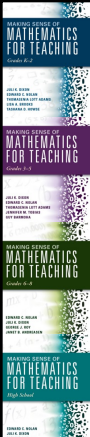


Plan with the TQE Process in Mind



- **Tasks** connect to learning goals and help identify student errors.
- **Questions** elicit mathematical understandings and common errors.
- **Evidence** drives scaffolding and guides extensions.

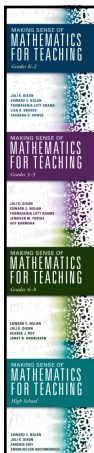
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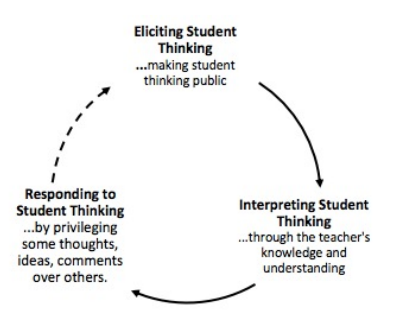
Focusing on Student Thinking

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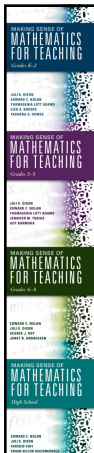
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Using Student Thinking



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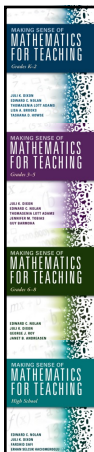


Planning a Lesson

Where do you think you are with your questioning?

*I always sit down and try to **plan out a bunch of different ones** and think about different pathways with the different specific problems we are going over and where I can see a question naturally coming in at. The difficult thing is, when I have been trying to do that ... **I get very limited participation and discussion.***

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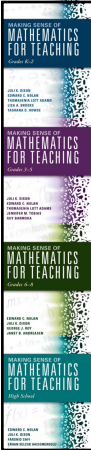


Planning a Lesson

What do you do to try to get more responses from your students?

*What I've tried doing so far is I'll try asking a question **breaking down a question into smaller parts** that will help **guide them through what the procedural focus** of what's going on ... I try to break down ... so that they have a lot better chance of getting, rather than regurgitating, so maybe it gets them to buy into their confidence.*

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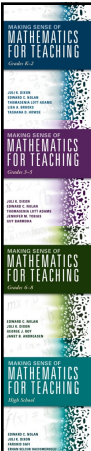


Planning a New Lesson

What's the learning goal?

Students will extend knowledge of adding and subtracting fractions to build understanding of strategies for adding and subtracting rational expressions.

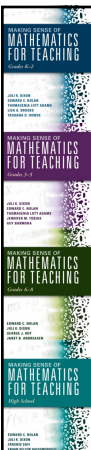
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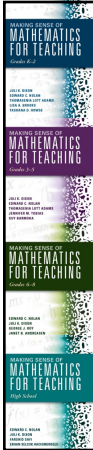
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Teaching and Observing

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- How do planned questions impact the questions asked while teaching?

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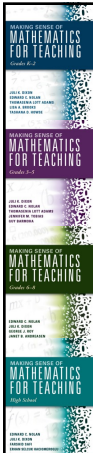


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