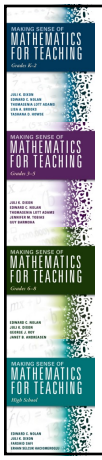

Coaching for a Difference: Planning and Enacting Effective Questioning

Edward C. Nolan
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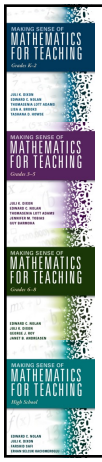
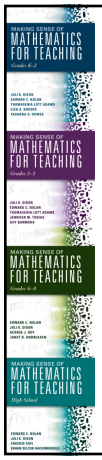


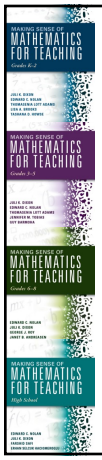
Session Goals

- Share strategies for helping teachers plan effective questioning.
- Discuss how teachers respond to student thinking.
- Highlight questioning in the TQE Process.



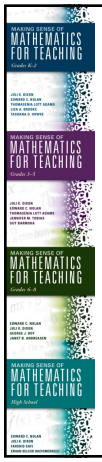
Questioning

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

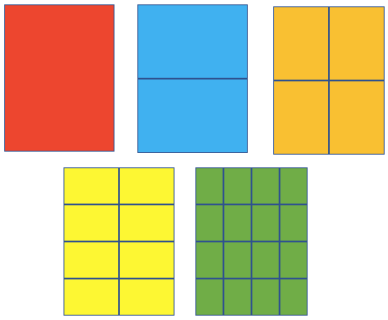


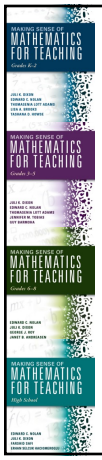
PROBLEM

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?



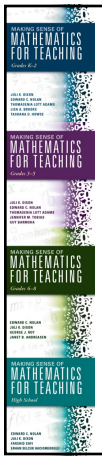
Fraction Kit





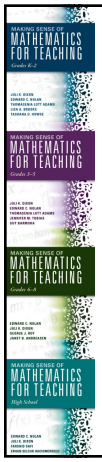
Plan with the TQE Process in Mind

- 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.



What's the learning goal?

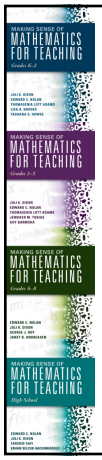
Solve real world problems involving multiplication of fractions by using visual fraction models or equations to represent the problem.



Exploration

What would uncovering possible student errors look like?

What would you look for when asking students to determine the amount of eaten brownies?

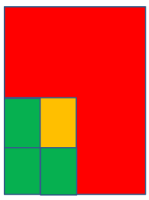


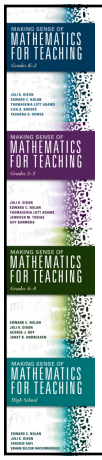
Solutions to the Task

What solutions do you expect?

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

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

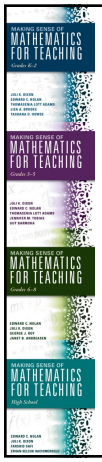




Solutions to the Task

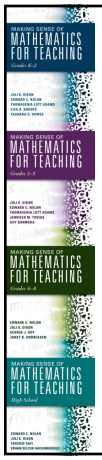
What solutions do you expect?

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



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 be difficult to create while teaching. This is why planning is so important to effective questioning (Nolan, Dixon, Roy, & Andreasen, 2016).



Focusing on Student Thinking

1. Plan multiple question-and response pathways
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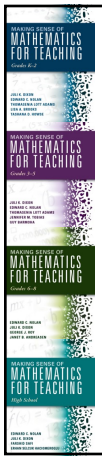
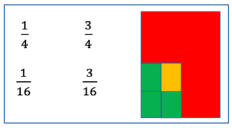
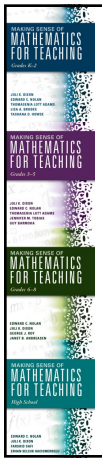


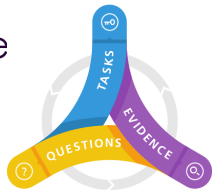
Anticipated Questions

- 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?





Making Sense of the TQE Process



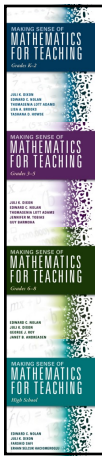
Questions

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.

Planning Questions

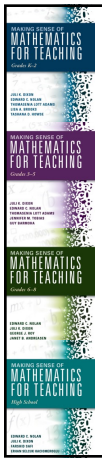
A lesson must **follow a script**, as teachers should remain flexible and open to student thinking and ideas whenever possible (Shahrill, 2013).

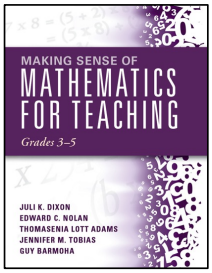
Planning questions is an important element of effective instruction, given that "**teachers need to plan a route and strategy** in order to use questions productively and develop students' thinking based on the learning objectives of their lessons" (Tienken et al., 2009, p. 42).



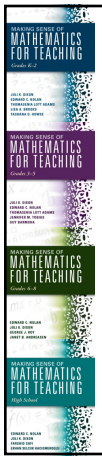
Creating an Image

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





Making Sense of Mathematics for Teaching Grades 3-5



Questions Asked in Video

Asked

- How are we going to take ¾ 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?

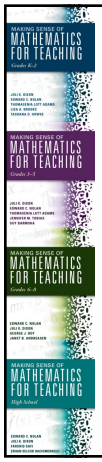
Anticipated

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

Enacting Questions

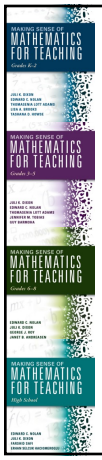
Teachers need to be able to **ask questions guided not only by the task at hand, but in consideration of students' present abilities, as well as those they need to develop in the future** (Thompson & Zeuli, 1999).

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

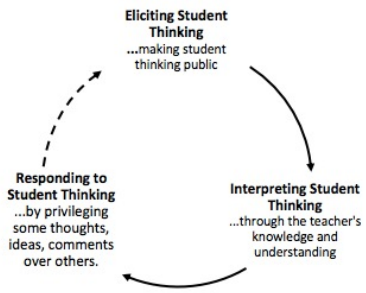


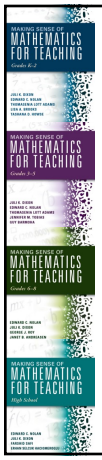
Plan with the TQE Process in Mind

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



Using Student Thinking

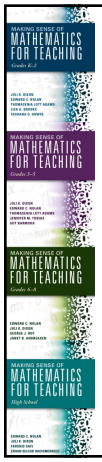




Situating Your Planning

Where do you think you are with your questioning?

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



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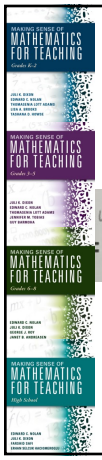
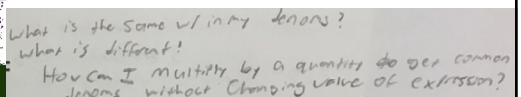


Discussing the Plan

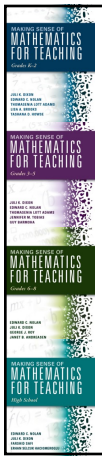
$$\frac{x}{3} + \frac{3}{x} - \frac{2}{3x} =$$



What is the same within my denominators?

What is different?

How can I multiply by a quantity to get common denominators without changing the value of the expression?



Teaching and Observing

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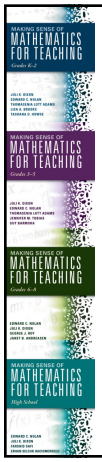

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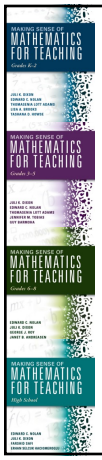
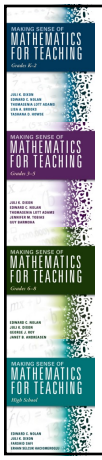


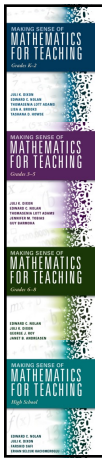
The Process in Action

Ambitious teaching (Lampert et al., 2013) requires teachers to not only use the preconceived ideas developed in their lesson plans but also **to incorporate in-the-moment decisions to integrate the focus both on the learning goal and the thinking of the students**.



Supporting Successful Teachers

- How do we prepare teachers for ambitious teaching?
- How do we support the planning and implementation of ambitious teaching?
- How do we help teachers to improve their delivery of ambitious teaching?



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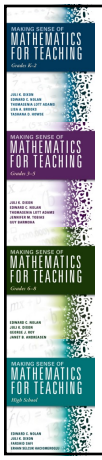

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