
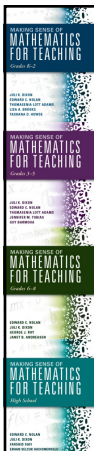


Fighting Fixed Mindsets: Classroom Culture Shifts for Mathematics

Juli K. Dixon, Ph.D.
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 www.DNAMath.com

Handout


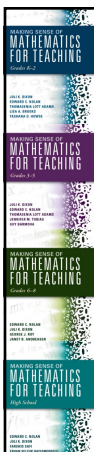
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Divide this:

$$3 \div \frac{1}{7}$$

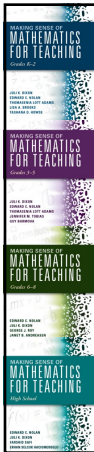
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Goals for this Session

- Make sense of five culture shifts to support students to engage in mathematical practices.
- Create a shared image of classrooms where teachers are actively fighting fixed mindsets.
- Explore the TQE Process as a tool for planning and implementing instruction.

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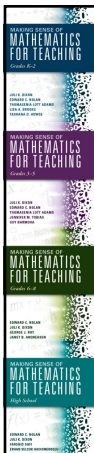


Plan with the TQE Process in Mind



- **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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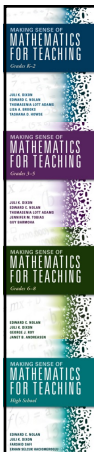


Where do we learn to divide?

In grade 3 – but not with fractions.

Come up with a word problem to represent $12 \div 4$

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Where do we learn to divide?

In grade 3 – but not with fractions.

Come up with a word problem to represent $12 \div 4$

How can this help us to make sense of $3 \div \frac{1}{7}$?

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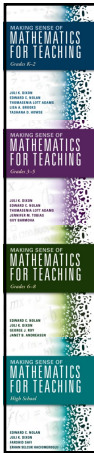


Cultivating Perseverance

- Just-in-case scaffolding
- Just-in-time scaffolding

Blog: <https://tinyurl.com/y5pcxcoq>

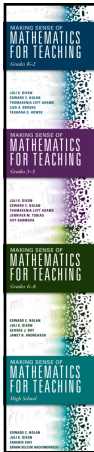
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Five shifts in classroom culture

1. Students provide the strategies.
2. Teacher provides strategies "as if" from students.
3. Students create the context.
4. Students do the sense making.
5. Students talk to students.

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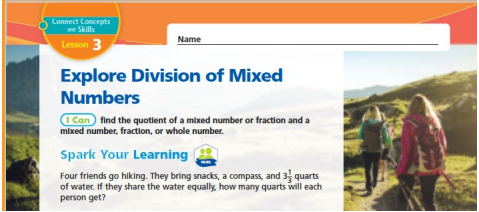
Culture Shift 1: Students provide the strategies

Teachers set the stage for students to provide the strategies.

This has the greatest return on investment if teachers have a plan for what to do with what students provide.

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Solve this:



Do not use an algorithm.
Use fraction tiles instead.

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Five shifts in classroom culture

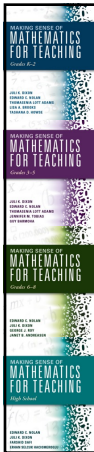
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Culture Shift 2: Teacher provides strategies "as if" from students

Teachers maintain control of the learning target by providing strategies "as if" they came from the students when necessary.

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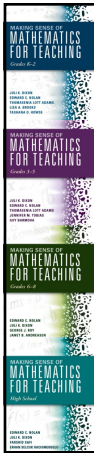
Culture Shift 2: Teacher provides strategies "as if" from students

I saw someone do this....

$\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$

What do you think the student did next? And how would you respond?

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Culture Shift 2: Teacher provides strategies "as if" from students

I saw someone do this....

$\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$ $\frac{1}{2} \frac{1}{3}$

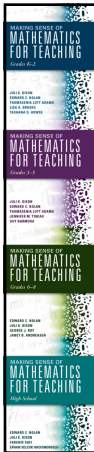
Anticipating student errors may be the most important part of anticipating student thinking.

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HMH | **into Math™**

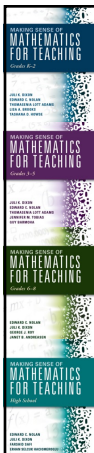
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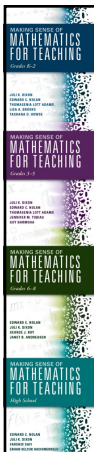
Culture Shift 3: Students create the context

Creating context helps to create meaning.

Remember this?

$$3 \div \frac{1}{7}$$

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What's your story?

Write 4 different story problems to correspond to the following expression: $26 \div 4$.

Each problem should lead to a different answer. The answers to the problems should be $6\frac{1}{2}$, 7, 6, and 2 respectively.

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Making Sense of Mathematics for Teaching
Grades 3-5

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Five shifts in classroom culture

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Culture Shift 4: Students do the sense making

Teachers must *expect* students to do the sense making.

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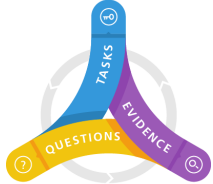
Culture Shift 4: Students do the sense making

What happens when the teacher uses Gradual Release of Responsibility (I do, we do, you do)?

If the goal is for students to do the sense making, then the teacher can't demonstrate how to do the problem first!

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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.

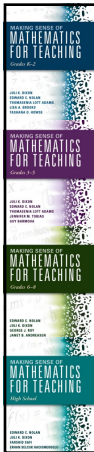
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Culture Shift 4: Students do the sense making

Learning Goal for Grade 1:

Use strategies to add two whole numbers with sums to 20.

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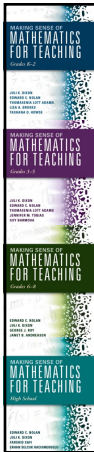
Culture Shift 4: Students do the sense making

What strategies can you use to add 7 and 8?

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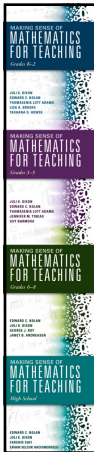


Culture Shift 4: Students do the sense making

Teachers must *expect* students to do the sense making.


Supporting good tasks during instruction is the key.

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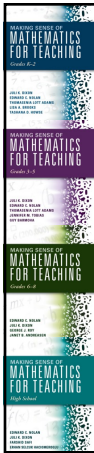


Culture Shift 4: Students do the sense making

Brandon shared 4 cookies equally between himself and his 4 friends. He started by giving each person (including himself) a half of a cookie. What could he have done next?



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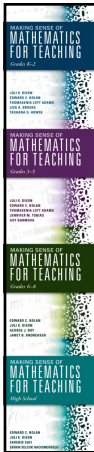


Try this.

Think through the process of adding fractions with unlike denominators without using:

- numerator & denominator, or
- top number & bottom number

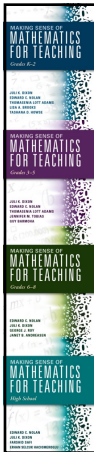
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What happens when you don't use academic vocabulary?

Everyday language should come first – take a lesson from our English Language Learners!

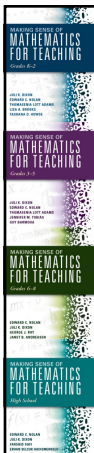
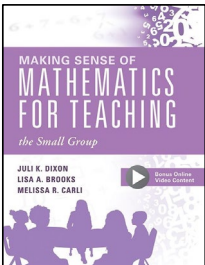
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Academic vocabulary is still important – when you introduce it is what needs to be adjusted.

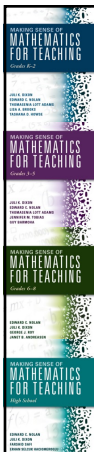
Introduce academic vocabulary as you connect concepts to procedures.

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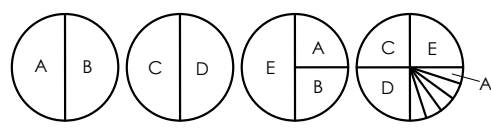



Making Sense of Mathematics for Teaching
the Small Group

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Eliciting Student Errors



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Eliciting Student Errors

What was the thinking behind the common error of $\frac{1}{3}$?

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Eliciting Student Errors

What was the thinking behind the common error of $\frac{1}{5}$?

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Five shifts in classroom culture

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Consider this task:

Spark Your Learning

Imagine you are studying monkeys and how they move. Each monkey has 2 arms and 2 legs. Choose any number of monkeys from 1 to 9 to study. How many arms and legs are there?

Show your thinking.



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Discourse Norms

- Provide explanations and justifications with solutions.
- Make sense of others' solutions.
- Communicate when you don't understand or don't agree.

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Culture Shift 5: Students talk to students


Teachers set the stage for students to talk to students.

This occurs when the teacher is an active facilitator of instruction.

This takes substantial planning, so be reasonable.

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Plan with the TQE Process in Mind



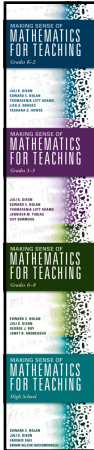
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Five Instructional Shifts

These shifts are for each and every student...

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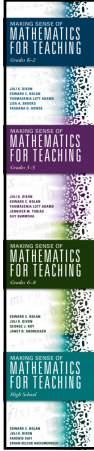


Alex had a long way to go...

- How to prioritize helped me to rethink RTI within MTSS:
 - What do you do with students are very far behind?
 - Focus on basic facts
 - Reteach everything
 - Focus on prerequisites and teach them for understanding

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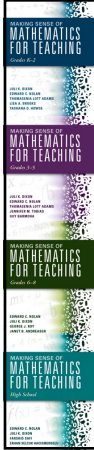


Alex had a long way to go...

- How to prioritize helped me to rethink RTI:
 - What we did:
 - Used context to make sense of operations.
 - Focused on fact strategies.
 - Used place value and strategies based on properties of operations constantly.

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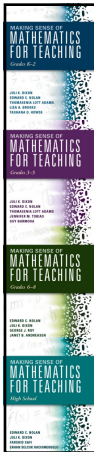


Alex had a long way to go...

Add $2,368 + 5,795$

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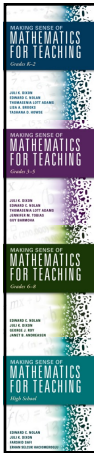
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What happens when we get to multiplication?

- Multiply 4×127

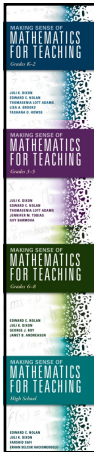
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