
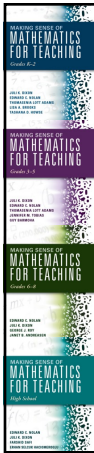


Fighting Fixed Mindsets: Instructional Shifts for Mathematics

Juli K. Dixon, Ph.D.
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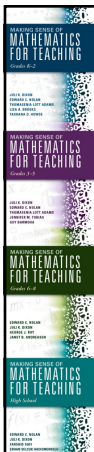
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Four Recommendations of *Catalyzing Change* (NCTM, 2020)

- Broaden the purposes of learning mathematics,
- Create equitable structures in mathematics,
- Implement equitable mathematics instruction, and
- Develop deep mathematical understanding.

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Now find the sum.

$$7 + 8$$

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Support all learners with **math fact fluency**

THE fact tactics FLUENCY PROGRAM

JULIE DIXON

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Why is this sort of activity important?

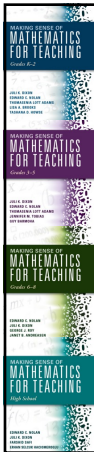
Readiness for algebra requires “a grasp of the meaning of the basic operations of **addition**, **subtraction**, multiplication, and division. It must also include use of the **commutative**, **associative**, and distributive properties; **computational facility**; and the **knowledge of how to apply the operations to problem solving**” (NMAP, 2008, p. 17).

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Goals for this Session

- Make sense of five culture shifts to support young learners 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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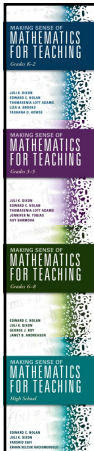


Plan with the TQE Process in Mind



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

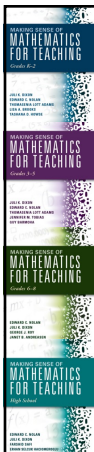
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Five shifts in classroom culture

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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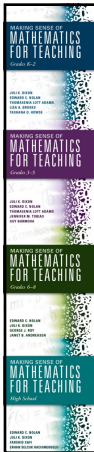


Culture Shift 1: Students provide the strategies

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.

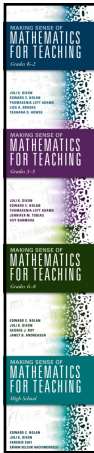
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Culture Shift 1: Students provide the strategies

The learning goal should determine the structure of the lesson.

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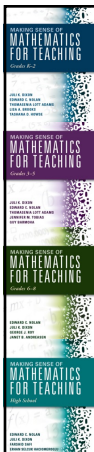


Culture Shift 1: Students provide the strategies


Learning Goal for Grade 1:

Add and subtract within 20 using strategies.

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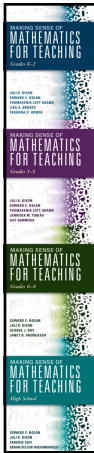
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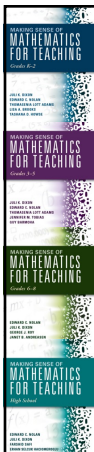


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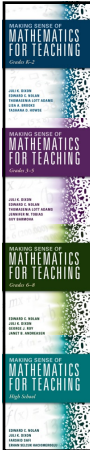


Plan with the TQE Process in Mind



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What about word problems?

Consider the following problems:

Jessica has 8 key chains. Calvin has 9 key chains. How many key chains do they have all together?

Jessica has 8 key chains. Alex has 15 key chains. How many more key chains does Alex have than Jessica?

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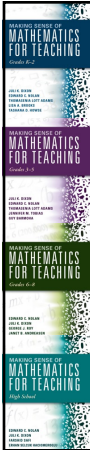
Culture Shift 1: Students provide the strategies

PROBLEM

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

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Three Reads

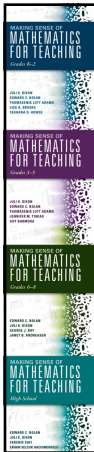
Support students to read a contextualized problem 3 times.

1. What is the situation?
2. What do the quantities describe?
3. What mathematical questions could you ask? (now compare)

Stanford Center for Assessment, Learning and Equity at Stanford University

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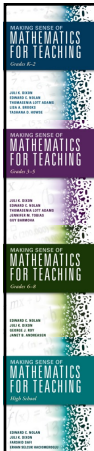
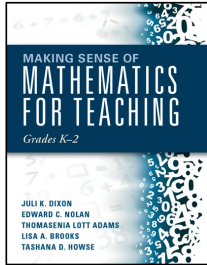

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Culture Shift 1: Students provide the strategies

We need to avoid assuming young learners think like adults.

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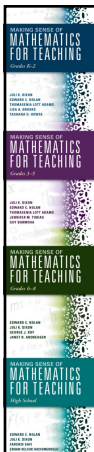




Making Sense of Mathematics for Teaching
Grades K-2

JULI K. DIXON
EDWARD C. NOLAN
THOMASENIA LOTT ADAMS
LISA A. BROOKS
TASHANA D. NOWISE

Making Sense of Mathematics for Teaching
Grades K-2

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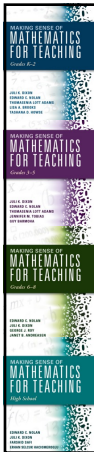


Culture Shift 1: Students provide the strategies

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

If the goal is for students to produce the strategies, then the teacher can't demonstrate them first!

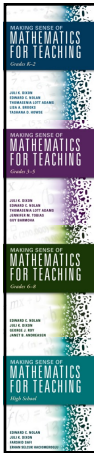
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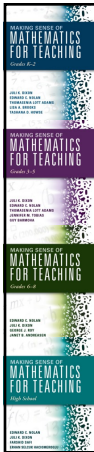
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Culture Shift 2: Teacher provides strategies "as if" from students

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

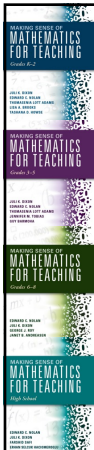
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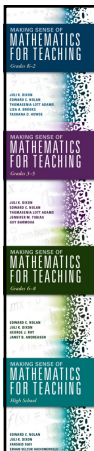
Culture Shift 3: Students create the context

Creating context helps to create meaning.

Come up with a word problem that would be modeled by:

$$_ + 8 = 15$$

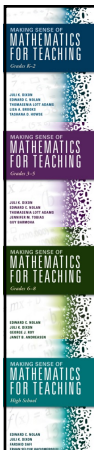
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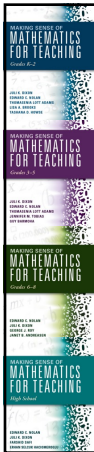


Culture Shift 4: Students do the sense making

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

This means we are making sense of the mathematics too...

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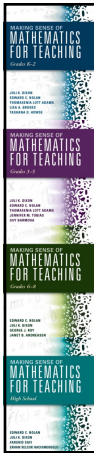
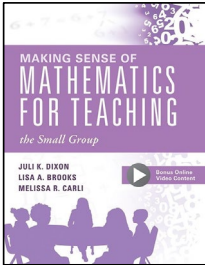



Define Shapes

Write a student friendly definition that includes an illustration for each shape.

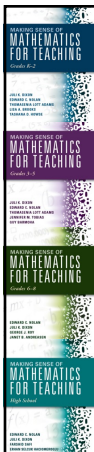
Rectangle
 Square
 Rhombus

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Making Sense of Mathematics for Teaching the Small Group

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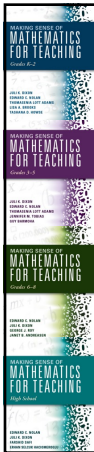


Cultivating Perseverance

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

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

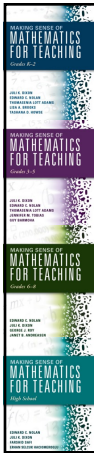
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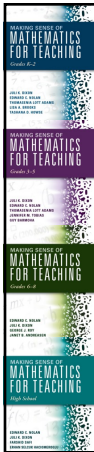
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Discourse Norms

- 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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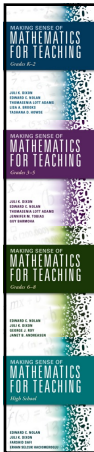
Culture Shift 5: Students talk to students

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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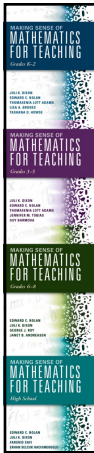


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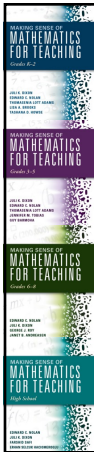
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