

**Elevating Voices in Mathematics:  
Instructional Strategies for Including  
Each and Every Learner  
K-2**

**DNA  
MATHEMATICS**

#DNAmath

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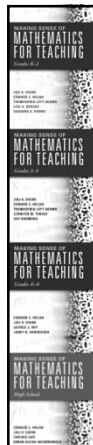
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**Let's Get Ready**

$8 + 7 - 2 \square \_ \square \_ \square \_ = 72$

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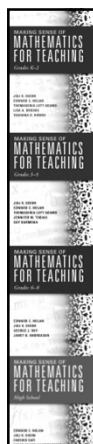
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**Connecting to Discourse**

“Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments”.

(National Council of Teachers of Mathematics, 2014, p. 10)

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## Check-in

- What's been going well about engaging learners?
- What's still challenging about engaging learners?
- What's an immediate goal for engaging learners?

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## Session Goals

- Examine strategies for creating norms to promote discourse
- Select tasks that invite each and every learner to actively engage in mathematics
- Be intentional about questioning to encourage student engagement

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## Mathematical Discourse

Mathematical discourse is the exchange of thought between and among students and teachers in the mathematics classroom.

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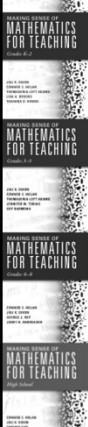
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## Mathematical Discourse in Action

- Communicate with the language of mathematics as a tool/medium of discourse

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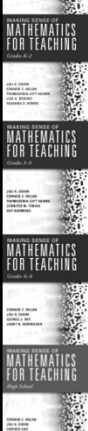
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## Mathematical Discourse

- Communicate with the language of mathematics as a tool/medium of discourse
- Communicate about the discipline of mathematics as a context of discourse
- Communicate in pursuit of an outcome (e.g., understanding, application, description, etc.)

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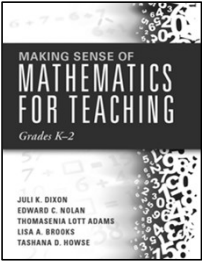
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## Making Sense of Mathematics for Teaching Grades K-2

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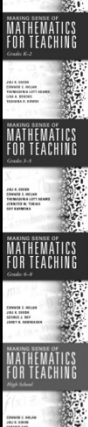
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## Reflections

How did the teacher set up the lesson to support mathematical discourse?

What did you observe about the ways students engaged in mathematical discourse?

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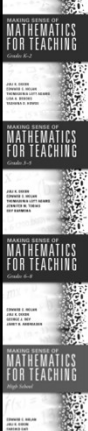
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## Engaging Students Through Mathematical Discourse

“In addition to explicitly teaching features of language (e.g., specialized mathematical language and syntax of mathematical statements) teachers are responsible for providing students with opportunities to engage in mathematical discourse across different modalities (e.g., speaking and writing)”.

(Smith, 2021)

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## Importance of Mathematical Discourse

“What students see and can collectively make use of in the public space of a classroom can support their engagement and learning in a discussion”.

(Garcia, Shaughnessy & Pynes, 2021)

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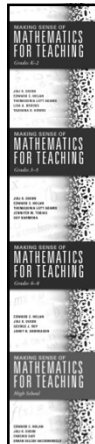
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## Teachers' Role in Promoting Mathematical Discourse

"...the deliberate actions taken by a teacher to participate in or influence the discourse in mathematics classrooms, and such actions are referred to as the teacher's discourse moves".

(Krussel, Springer, & Edwards, 2004, p. 307)

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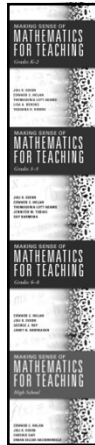
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## Teachers' Role in Promoting Mathematical Discourse

"Your approach to student talk ... helps determine the type of classroom learning community you and your students develop together".

(Nolan, Dixon, Roy, & Andreasen, 2016, p. 10)

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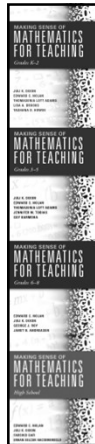
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## Norms to Promote Mathematical Discourse

"The classroom norms need to support the active thinking of students rather than the thinking of teachers... [we] should always provide students the opportunity to share strategies and make sense of the thinking of other students in order to be sure they understand mathematics with depth'.

(Nolan, Dixon, Roy, & Andreasen, 2016, p. 11)

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## Norms to Promote Mathematical Discourse

1. What do you want discourse to look/sound like?
2. What steps can you take to be intentional about promoting discourse?
3. What characteristics of tasks might encourage discourse?
4. How can you prepare for each and every learner to have an opportunity to engage in discourse?

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## Session Goals

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## Tasks

"A high cognitive-demand task provides students with opportunities to wrestle with important mathematics by requiring them to make connections to mathematical concepts and to justify solutions and strategies rather than execute known procedures".

(Hallman-Thrasher & Spangler, 2020, p. 446)

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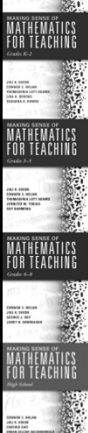
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## Plan with the TQE Process in Mind



- 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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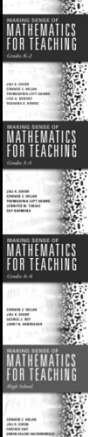
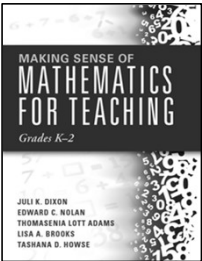
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## Reflections

What did you notice about the task?

How did this task inform the teacher about what students were learning?

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**Plan with the TQE Process in Mind**



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

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**Selecting Tasks to Engage Learners**

- Meaningful mathematics
- Interesting/Intriguing
- Accessible to the learner
- Hands-on
- Open-ended

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**Selecting Tasks to Engage Learners**

- Select a content area of your choosing.
- Write a task that would be appropriate for your students.
- Exchange cards with a table mate.
- Discuss how each task might be enhanced to increase the potential of student engagement.

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**Session Goals**

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**Questioning**

"...different types of questions prompt different levels of thinking and elicit different levels of responses from students".  
 (Boston, Candela, & Dixon, 2019, p. 58)

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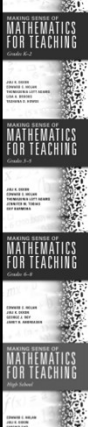
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## Questioning

1. Assessing Questions
2. Advancing Questions

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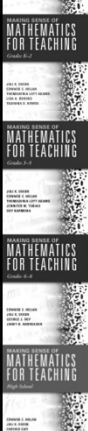
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## Assessing Questions

- Examples
- Nonexamples
- Explanations
- A look at how concepts relate
- Probing thoughts
- Whether learner has tried a particular route

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## Advancing Questions

- Clarifying information
- A different case
- A generalization
- Alternate explanations
- Applications of the content

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## Honoring Students' Voice

- Plan and prepare for mathematical discourse.
- Be intentional about engaging each and every student.
- Value all each and every student's contribution to mathematical discourse.
- Be a participant in discourse.

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## Honoring Students' Voice

“The value of student talk in mathematics lessons cannot be overemphasized. As students describe and evaluate solutions to tasks, share approaches, and make conjectures, learning will occur in ways that are otherwise unlikely to take place.”

(Van De Walle, Karp, & Bay-Williams, 2013, p. 42)

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## Revisit Session Goals

- Examine strategies for creating norms to promote discourse
- Select tasks that invite each and every learner to actively engage in mathematics
- Be intentional about questioning to encourage student engagement

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