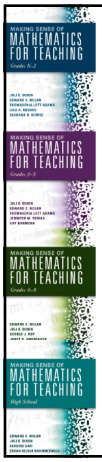

Fostering Intentional Growth in High School Mathematics Teaching and Learning through the TQE Process: A Focus on Connecting Multiple Representations

High School

DNA MATHEMATICS

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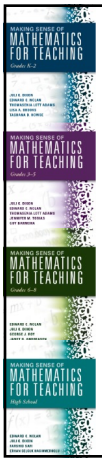

Fostering Intentional Growth in High School Mathematics Teaching and Learning through the TQE Process: A Focus on Connecting Multiple Representations

High School

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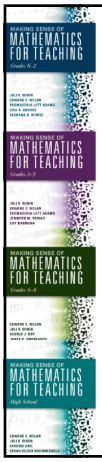

Handout

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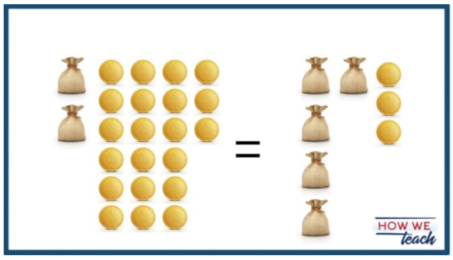
Let's Get Ready



Citation: Rinehart, M. https://howweteach.com

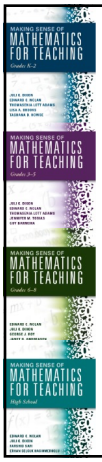
Session Goals

- Developing as a reflective practitioner through the TQE process
- Practice using student thinking and the TQE process to facilitate meaningful classroom discourse
- Reflect on building connections within and between mathematical representations through the TQE process

Reflective Practitioner

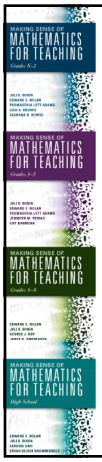
Teaching is BOTH a science and an artform!!

"[T]he practitioner's reflections initiate a personal renewal, activating new meanings of self through which new understandings of ***professional trajectory*** emerge." (Walshaw, 2010, p.488)



Plan & Reflect 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.



Session Goals

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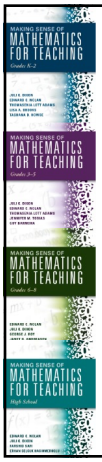
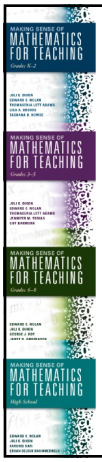


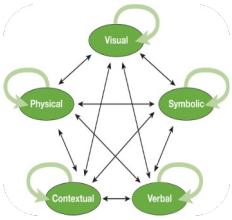
Cars and Motorcycles

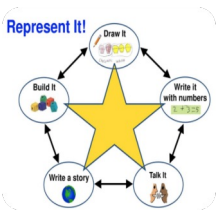
Diane looked out the window of their math classroom at the teachers' parking lot and said, "There are 13 motorcycles and cars in the lot." Steve looked out the window and said, "I see 42 wheels." The teacher asked, "How many motorcycles and how many cars are in the parking lot?"

Task Source: Smith, M. S., Steele, D., & Raith, M. L. *Taking Actions: Implementing Effective Mathematics Teaching Practices Grades 6-8*. NCTM.

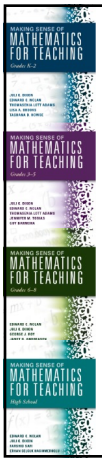


Expressing & Representing Mathematics





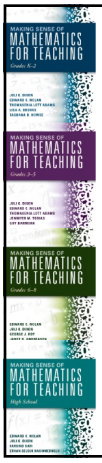
Citation: Left Image: Principles to Actions (NCTM, 2014, p. 25); (Adapted from Lesh, Post, & Behr, 1987); Right Image: Developed by Beth Schefelker (South Milwaukee School District) and DeAnn Huinker (University of Wisconsin-Milwaukee)



Use & Connect Mathematical Representations

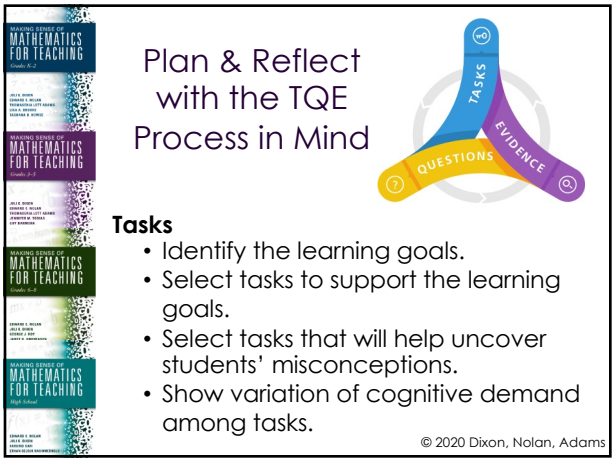
"When students learn to represent, discuss, and **make connections** among mathematical idea in multiple forms, they demonstrate **deeper mathematical understanding** and **enhanced problem-solving abilities** (Fuson, Kalchman, & Bransford, 2005; Lesh, Post, and Behr, 1987)" (NCTM, 2014, pg. 24)

Citation: National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all.* NCTM.



Making Sense of the TQE Process

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


Plan & Reflect with the TQE Process in Mind
TASKS
EVIDENCE
QUESTIONS
Tasks
• Identify the learning goals.
• Select tasks to support the learning goals.
• Select tasks that will help uncover students' misconceptions.
• Show variation of cognitive demand among tasks.
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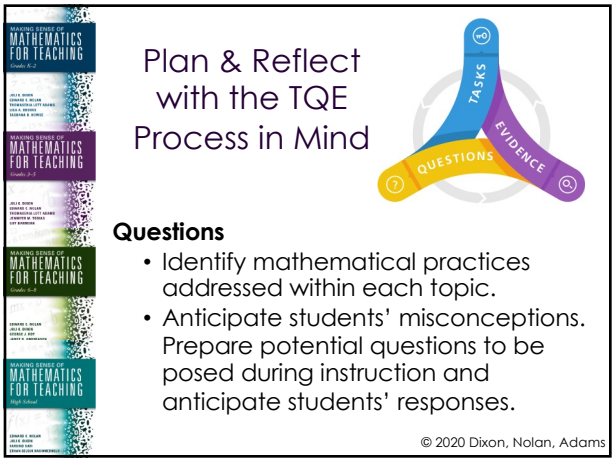
Plan & Reflect with the TQE Process in Mind
TASKS
EVIDENCE
QUESTIONS
Questions
• Identify mathematical practices addressed within each topic.
• Anticipate students' misconceptions. Prepare potential questions to be posed during instruction and anticipate students' responses.
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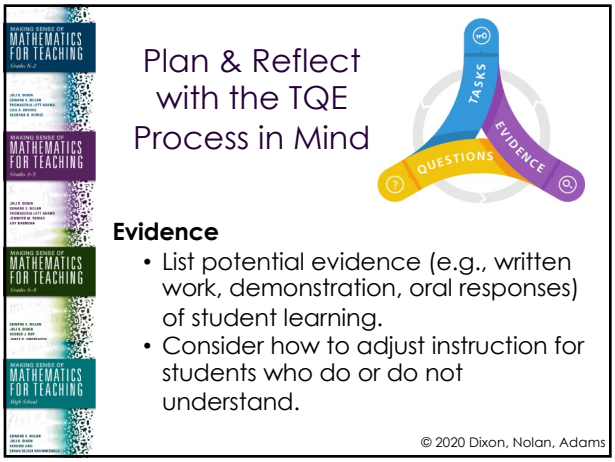
Plan & Reflect with the TQE Process in Mind
TASKS
EVIDENCE
QUESTIONS
Evidence
• List potential evidence (e.g., written work, demonstration, oral responses) of student learning.
• Consider how to adjust instruction for students who do or do not understand.
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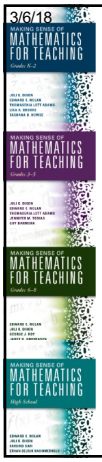
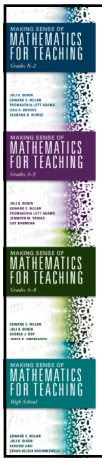


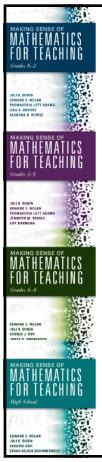
Layers of Facilitation

- I facilitate the *whole class* to engage in meaningful tasks through questioning.
- I facilitate *small groups* to extend the learning initiated in the whole-group setting, and
- I facilitate *individuals* to provide evidence of their understanding of the learning goal.



Cultivating Perseverance

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



Revisit Session Goals

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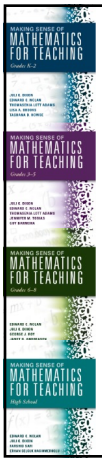
- Reflect on building connections within and between mathematical representations through the TQE process



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