
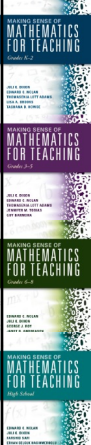


Fostering Intentional Growth in High School Mathematics Teaching and Learning through the TQE Process: A Focus on Entry Points & Multiple Representations

High School



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High School

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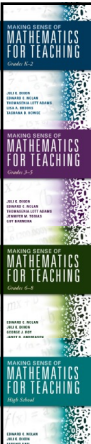
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Handout



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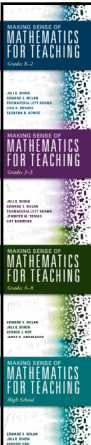



Reflective Practitioner

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)

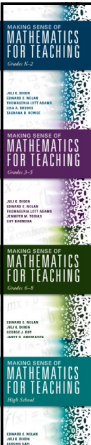
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Plan & Reflect with the TQE Process in Mind

- 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.

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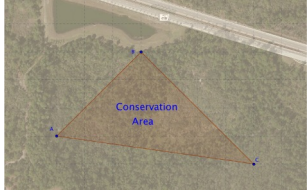
Session Goals

- 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

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Area of a Triangle

Find the conservation area designated by the triangular region on the map.



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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.

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Multiple Representations

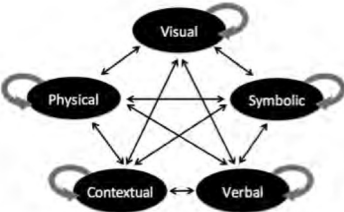


Figure 4. Translations among representations.

Huinker, D. (2015). Representational competence: A renewed focus for classroom practice in mathematics. *Wisconsin Teacher of Mathematics*, 67(2), 4-8.

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Multiple Representations

Visual Representations	Verbal Representations	Contextual Representations	Physical Representations	Symbolic Representations
Illustrate, show, or work with mathematical ideas using diagrams, pictures, number lines, graphs, and other math drawings.	Use language (words and phrases) to interpret, discuss, define, or describe mathematical ideas, bridging informal and formal mathematical language.	Situate mathematical ideas in everyday, real-world, or imaginary situations, using a variety of discrete and continuous measures (e.g., people, meters, yards).	Use concrete objects to show, or manipulate mathematical ideas (e.g., cubes, counters, tiles, paper strips).	Record or work with mathematical ideas using numerals, variables, tables, and other symbols.


Figure 2. Representational skills.

Hunkler, D. (2015). Representational competence: A renewed focus for classroom practice in mathematics. *Wisconsin Teacher of Mathematics*, 67(2), 4-8.

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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.

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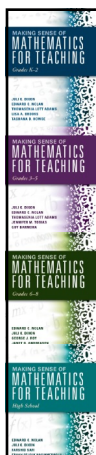
Plan & Reflect with the TQE Process in Mind




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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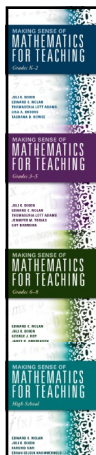
Plan & Reflect with the TQE Process in Mind




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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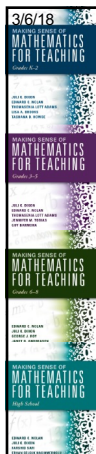
Plan & Reflect with the TQE Process in Mind



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.

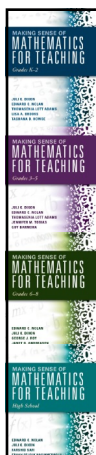
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Layers of Facilitation

- 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.

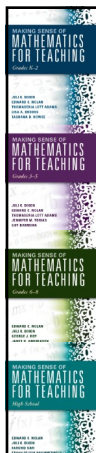
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Cultivating Perseverance

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

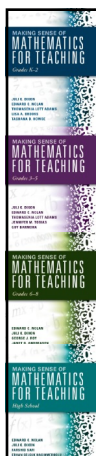
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Revisit Session Goals

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