

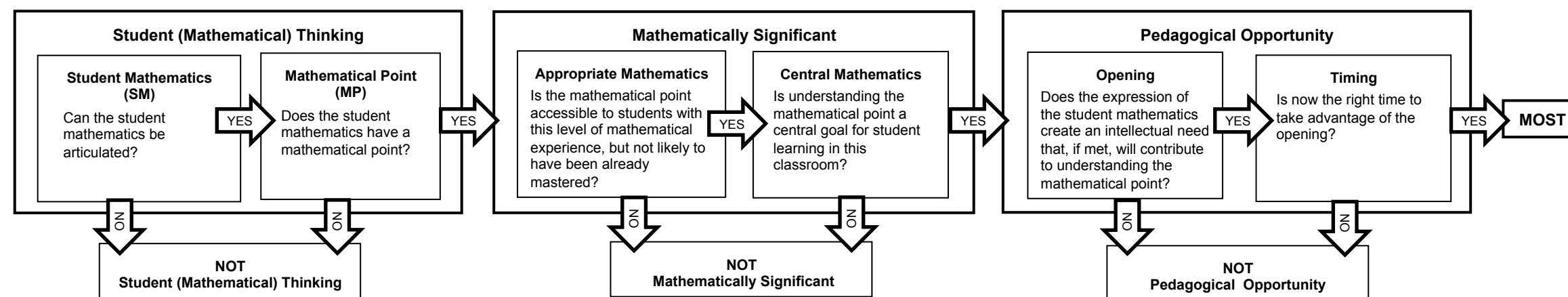
Leveraging MOSTs: Contributing to a Theory of Productive Use of Student Thinking

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LeveragingMOSTs.org

What student mathematical thinking is worth pursuing?

Mathematically significant
Pedagogical Opportunity
to build on Student
Thinking



How might instruction capitalize on MOSTs?

Principles Underlying Quality Mathematics Instruction:

- Mathematics is at the forefront
- Students are positioned as legitimate mathematical thinkers
- Students are engaged in sense making
- Students are working collaboratively

We theorize that the teaching practice of *building* simultaneously enacts these four principles in response to student thinking.

Building:

Making student thinking the object of consideration by the class in order to engage the class in making sense of that thinking to better understand an important mathematical idea.

Building on Student Mathematical Thinking Sub-Practices Prototype:

1. Make the object of consideration clear. (**make precise**)
2. Turn the object of consideration over to the students with parameters that put them in a sense-making situation. (**grapple toss**)
3. Orchestrate a whole-class discussion in which students collaboratively make sense of the object of consideration. (**orchestrate**)
4. Facilitate the extraction and articulation of the mathematical point of the object of consideration. (**make explicit**)

What are teachers' orientations related to using student thinking?

Orientations include "beliefs, dispositions, values, tastes and preferences" that affect "how [teachers] perceive and interpret their environment," which can shape how a teacher prioritizes their goals and resources (Schoenfeld, 2011, p. 15). We hypothesize that these orientations might **help** or **hinder** a teacher's implementation of the *building practice* and their ability to capitalize on MOSTs.

MOST Criteria					
SM	MP	Appropriate	Central	Opening	Timing
The teacher believes that sometimes students do not say what they mean.	The teacher wants the students to realize that you cannot ignore the x-values when finding the slope of the line between two points.	The teacher believes that teaching mathematics involves building off what students know.	The teacher feels that monitoring student work and sequencing are an important part of the lesson.	The teacher assumes that if a student's answer is correct but the mathematics of their statement is incomplete, the student probably got lucky.	The teacher treats student thinking differently based on the stage of learning (introductory or solidifying) in the classroom.

Principles Underlying Building			
1. The mathematics of the instance is at the forefront.	2. Students are positioned as legitimate mathematical thinkers.	3. Students are engaged in sense making.	4. Students are working collaboratively.
The teacher believes that students learn by comparing mathematical work (in some cases, she provides the alternative solution/method to be contrasted with a student's work).	The teacher believes that some students are smarter than others and prefers to make teaching decisions based on students' ability levels.	The teacher believes in step-by-step (highly scaffolded) mathematical learning.	The teacher believes that it is important for students to participate and be engaged in class discussions.

Sub-practices of Building			
1. Make the object of consideration clear (make precise)	2. Turn the object of consideration over to the students with sense-making parameters (grapple toss)	3. Orchestrate the students' process of making sense of the object of consideration (orchestrate)	4. Facilitate the extraction and articulation of the MP (make explicit)
The teacher believes that all students need to be at the same place in their understanding of what's on the table.	If a student expresses that they have an idea, the teacher prefers to go back to that student (validating the student's idea) if it's during whole class discussion.	The teacher believes that students can identify mistakes and question the work of fellow students without him intervening to ask questions.	The teacher believes students will not learn if she shows them what to do or if she shows her thinking.

How do teachers respond to MOSTs?

In order to analyze how teachers respond to student thinking we have developed a coding scheme that captures the relationship between student thinking and a teacher's response.

Actor: Who is publicly invited or allowed to consider the instance of student thinking?

Move: What is the actor doing or being asked to do with respect to the MOST?

The extent to which the teacher's move engages students in making sense of the MOST

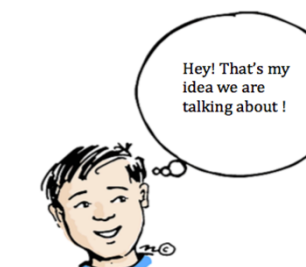
Dismiss
Adjourn
Validate

Literal
Adapt
Collect

Repeat
Clarify

Evaluate
Correct

Allow
Elaborate
Connect
Justify



Recognition: To what extent is the student who contributed the instance likely to recognize their idea in what is being considered?

Mathematics: To what extent does the MOVE focus on improving students' understanding of the *mathematical point* (MP) of the MOST?



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