

Mathematically Important Pedagogical Opportunities (MIPO)

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Related Ideas in the Literature

- “critical moments in the classroom when students created a moment of choice or opportunity” (Jaworski, 1994, p. 527)
- “significant mathematical instances” (Davies & Walker, 2005, p. 275)
- “potentially powerful learning opportunities” (Davis, 1997, p. 360)
- “an issue that the teacher judges to be a candidate for classroom discussion” (Schoenfeld, 2008, p. 65)
- “novel student idea[s] that prompt teachers to reflect on and rethink their instruction” (Schifter, 1996, p. 130)

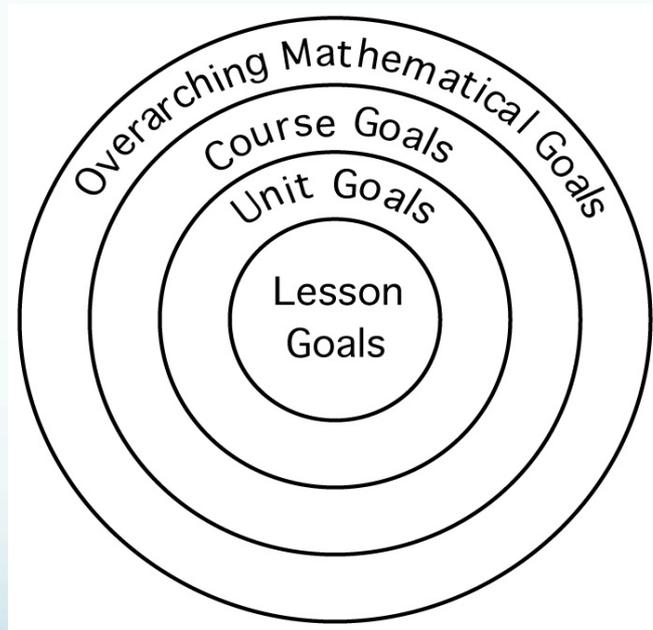
Defining MIPOs

Mathematically Important Pedagogical Opportunities (MIPPO) are at the intersection of three critical characteristics

- *important mathematics*
- *student thinking*
- *pedagogical opportunity*

Mathematically Important

- Grand Scheme + Classroom Context
- Mathematical Goal



Student Thinking

- Observable evidence of student thinking: instances where a student's actions provide sufficient evidence to make reasonable inferences about their thinking.
 - verbal utterances, board-work, or gestures
 - observable in whole-class, small-group, or individual written work.
 - observable vs. observed
- Distinction between evidence *that* students are thinking and evidence of *what* students might be thinking.

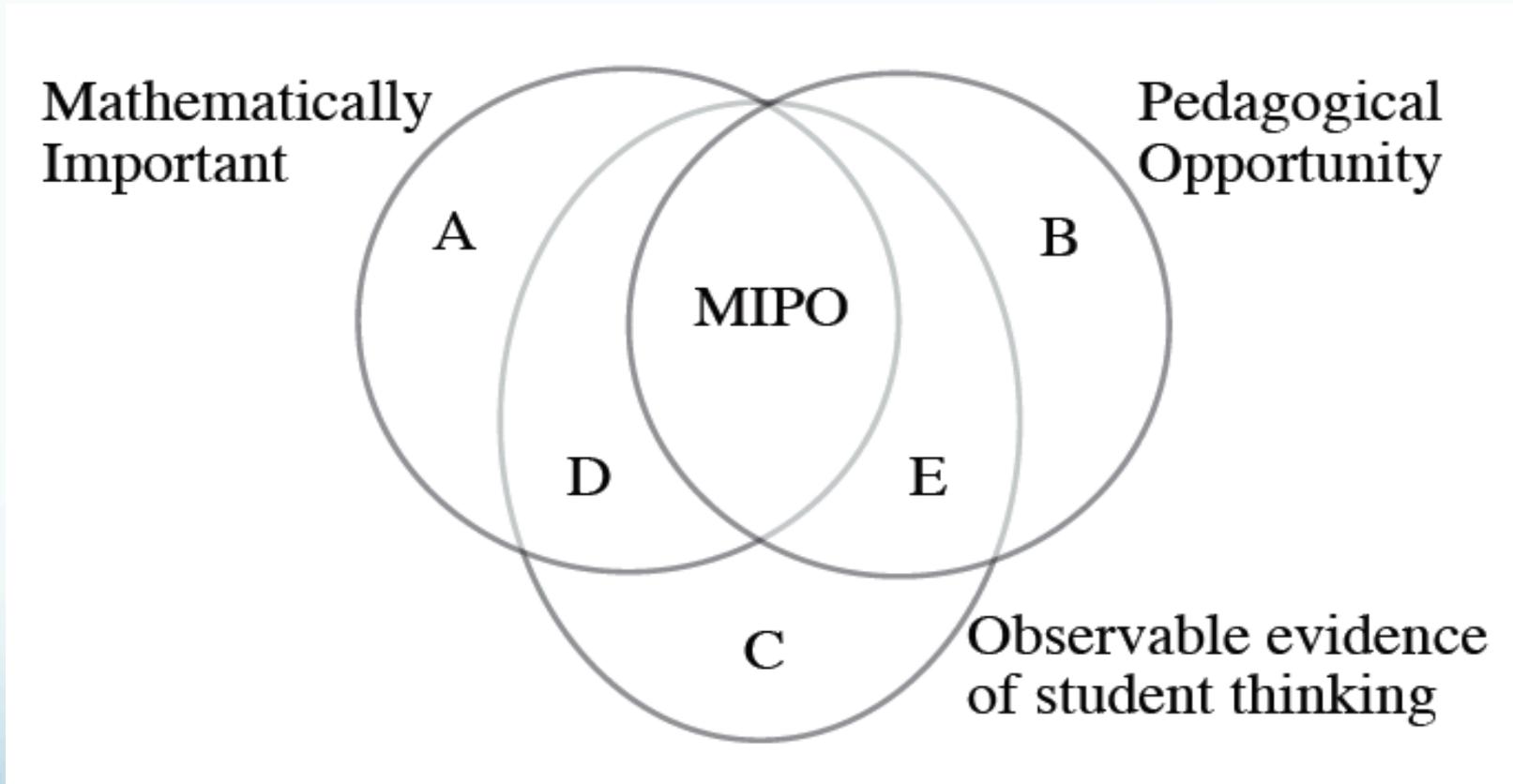
Pedagogical Opportunity

- Observable student actions that provide evidence that students are engaged with or thinking about the content of an instructional goal – **provides an opening for working towards that goal.**
- Can be cultivated by the teacher, but cannot be created independently of the students.

MIPOs

- Occur at the intersection of *important mathematics, student thinking, and pedagogical opportunities*.
- Observable evidence of student thinking related to mathematical goals for a given classroom provides pedagogical openings for working towards those goals.

Relationship among Important Mathematics, Pedagogical Opportunities and Student Thinking



5th grade - finding output values for the rule $3x + 1$ given different input values. Students are asked for the output when $\frac{1}{4}$ was the input.

1. Soochow: One and three fourths.
2. T: How would you explain it please?
3. Soochow: Because one-fourth times three is three-fourths and then you just add o— add a one.
4. T: Okay, so first you times by three and then you add one.
5. T: Who can explain why one fourth times three is three fourths? Sun Wu?
6. Sun Wu: One fourth, like one fourth of a pie and then somebody brings two more and one times three is three— three pieces of pie that came out of four pieces of pie?

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Why MIPOs

- Provides a
 - useful lens for analyzing the complexity of classroom mathematics discourse
 - vocabulary for discussing instances of student thinking that are of mathematical and pedagogical importance
- Tool for analyzing practice that
 - makes more tangible the often abstract but fundamental goal of building on student thinking
 - focuses attention on high leverage instances of student thinking