

Teachers' Perceptions of Productive “Use” of Student Mathematical Thinking

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Incorporating Student Mathematical Thinking



- The mathematics education community encourages instruction that meaningfully **incorporates** students' mathematical thinking (e.g., NCTM, 2000, 2007, 2014)
- Researchers have documented the benefits of such **incorporation** (e.g., Fennema, et al., 1996; Stein & Lane, 1996)
- Don't know what teachers think – an important starting place for our work in developing teachers' productive use of student mathematical thinking

Research Question



Mathematical
Opportunities
in Student
Thinking

What are teachers' perceptions of productive use of student mathematical thinking during whole class discussion?

Productive Use of Student Mathematical Thinking (PUMT)



Mathematical
Opportunities
in Student
Thinking

- A teacher must honor students as legitimate creators of mathematics
- “Use” of student thinking must be done in the service of facilitating the learning of significant mathematics
- A teacher orchestrates student learning during a lesson by doing something purposefully with student mathematical thinking that has surfaced.

Productive Use of Student Mathematical Thinking



“engage[s] students in making sense of mathematical ideas that have originated with students – that is, ...to *build* on student mathematical thinking by making it the object of rich mathematical discussion.” (p. 92)

Leatham, K. R., Peterson, B. E., Stockero, S. L., & Van Zoest, L. R. (2015). Conceptualizing mathematically significant pedagogical opportunities to build on student thinking. *Journal for Research in Mathematics Education* 46(1), 88-124.

Hypothetical Learning Process for PUMT - Conjecture



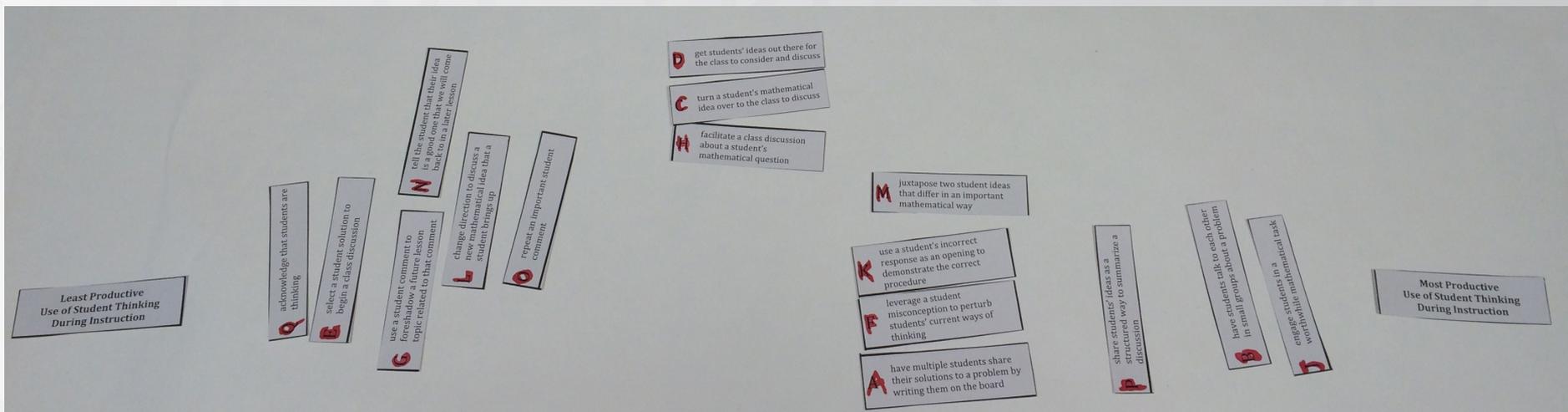
Mathematical
Opportunities
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Thinking

- Reject Active Student Participation
- Value Student Participation
- Value Student Mathematical Thinking
- Elicit Student Mathematical Thinking
- Interpret Student Mathematical Thinking
- Build on Student Mathematical Thinking

Card Sort Interview

14 Teachers (6 male, 8 female; 1-20 years exp; 6-12 grades) were given cards that described teacher moves one might associate with classroom discourse, such as:

- “get students’ ideas out there for the class to consider and discuss”
- “juxtapose two student ideas that differ in an important mathematical way”
- “repeat an important student comment”



Analysis



Mathematical
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- Summarized each teachers' perception of PUMT
- Used summaries and HLP to develop coding framework
- Asked the following questions of the coded interviews:
 1. What are teachers' perceptions of productive use of student thinking?
 2. To what extent do those perceptions align with the PUMT HLP?

Conjectured relationship between the PUMT HLP and various types of use



Mathematical
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PUMT HLP	Type of Use
Elicit Student Mathematical Thinking 7 teachers	Engagement Validation Replacement
Interpret Student Mathematical Thinking 2 teachers	Assess Clarify Launch
Build on Student Mathematical Thinking 3 teachers	Pondering Establishing Extracting

2 teachers crossed Interpret and Build

Implications for professional development of teachers



Mathematical
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- To help teachers improve use of student thinking teacher educators need to understand what teachers view as productive use of student thinking.
- A common understanding of use may support teacher educators and researchers in having meaningful conversations about productive use and further research in this area.