# Specifying Equity in Practice: Setting Up Complex Tasks

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# Unsolved Problems of Practice

▸ What forms of practice support all students to substantially participate in classroom activity aimed at rigorous goals for students' mathematics learning?

▸ How can/do teachers learn to develop those forms of practice ("ambitious teaching")?

▸ In what ways might the contexts in which teachers teach be re-organized to support the development of ambitious teaching?

▸

# **Specifying** Equity in **Practice**

▸ What teachers and students do in the classroom

▸ Chunks of teaching that are learnable with high-quality support
  ▸ Able to be rehearsed in increasingly complex settings

# Specifying **Equity in Practice**

▸ If instruction was equitable, all students (including specific groups of students) would be able to substantially participate in and learn through rigorous mathematical activity

▸ Equity is not a trait of a specific practice…*it is produced in the practice of teaching and learning*

   ▸ That said, are there forms of practice that have the potential to support all students' participation in rigorous mathematical activity and are learnable?

▸ The extent to which instruction is equitable is shaped by circulating discourses about who is capable of engaging in such activity and why and what it means to do and be successful in mathematics

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# Setting Up Complex Tasks

▶ Illustrating what it might mean to specify equity in practice

# Research Context

- 8-year study designed to investigate what it takes to support instructional improvement in middle-grades mathematics at the scale of a large, urban US district

# Research Context

- Participants:
  - Large, urban US districts attempting to achieve a vision of instruction compatible with NCTM (2000) *Standards*
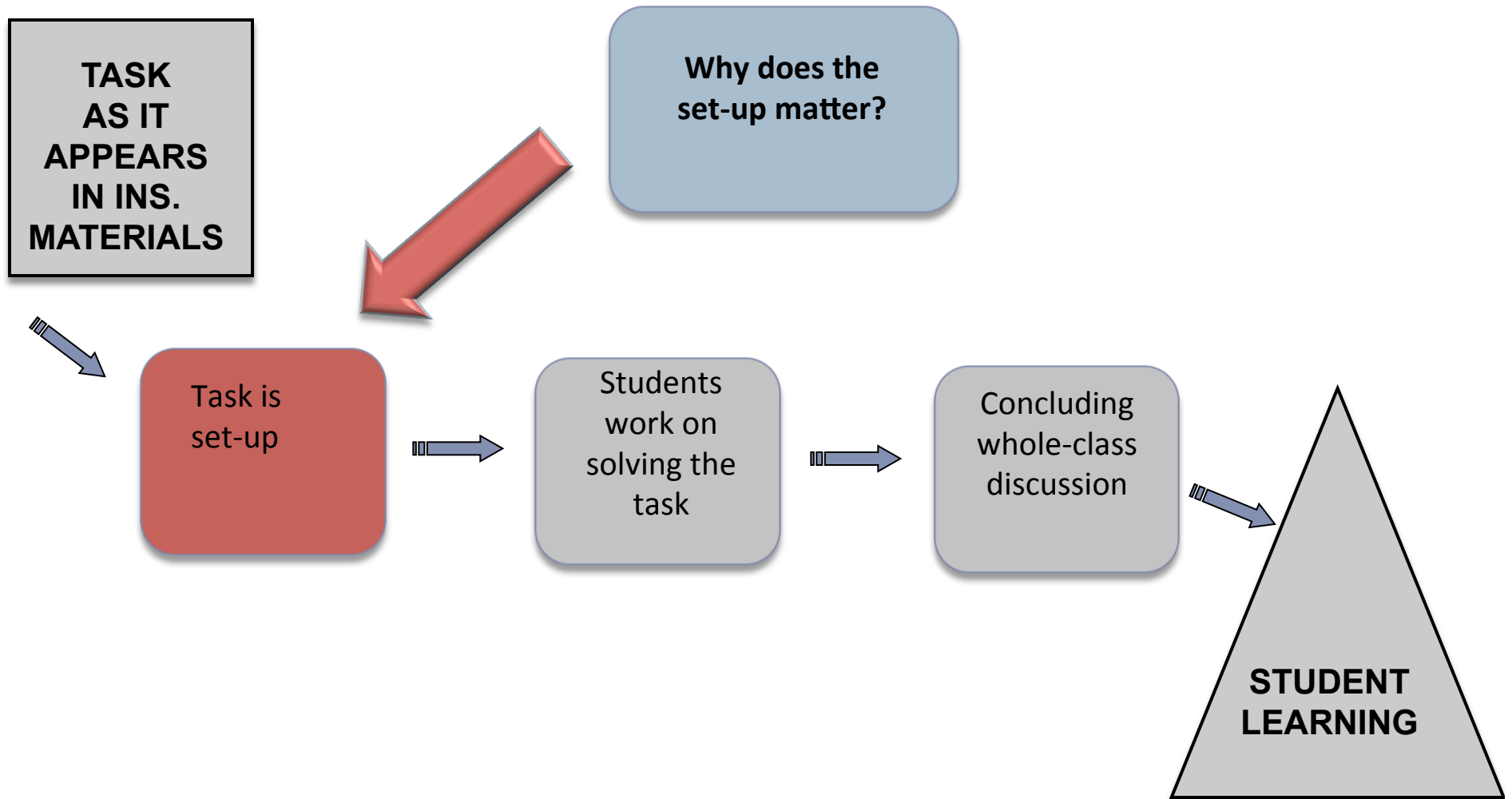
  - Phase 1 (2007-2011):
    - 4 districts
    - 120 teachers total in 6-10 schools in each district
    - Coaches, principals, district leaders

  - Phase II (2011-2016):
    - 2 districts
    - 120 teachers total in 6 schools in each district
    - Coaches, principals, district leaders

- For more information on MIST, see http://www.peabody.vanderbilt.edu/mist.xml

# Logic of a CMP2 Math Lesson

**TASK AS IT APPEARS IN INS. MATERIALS**

**Why does the set-up matter?**

Task is set-up → Students work on solving the task → Concluding whole-class discussion → **STUDENT LEARNING**

Adapted from *Mathematical Tasks Framework* (Stein, Grover, & Henningsen, 1996)

# Why the Set-Up Matters

▸ **Impacts the work of students**

  ▸ Solving the task

  ▸ Participating in the concluding whole-class discussion

▸ **Impacts the work of teachers**

  ▸ Planning for the concluding whole-class discussion

# Dollars for Dancing

Three students at a school are raising dollars for the school's Valentines Dance. All three decide to raise their money by having a dance marathon in the cafeteria the week before the real dance. They will collect pledges for the number of hours that they dance, and then they will give the money to the student council to get a good DJ for the Valentines Dance.

Rosalba's plan is to ask teachers to pledge $3 per hour that she dances.

Nathan's plan is to ask teachers to give $5 plus $1 for every hour he dances.

James's plan is to ask teachers to give $8 plus $0.50 for every hour he dances.

▶ Adapted from *Connected Mathematics Project 2* (Lappan, Fey, Fitzgerald, Friel, & Phillips, 2009)

**Part A.**  Create at least three different ways to show how to compare the amounts of money that the students can earn from their plans if they each get one teacher to pledge.

**Part B.** Explain how the hourly pledge amount is represented in each of your ways from Part A.

**Part C.**  For each of your ways in Part A explain how the fixed amount in Nathan's plan and in James's plans is represented.

**Part D.** For each of the ways in Part A show how you could find the amount of money collected by each student if they could dance for 24 hours.

**Part E.** Who has the best plan? Justify your answer.

# Dollars for Dancing

▸ What do students need to know to be able to engage in solving the task productively?

  ▸ Contextual features (aspects of the scenario that students would not understand unless they had prior experience with it)

    ▸ What a dance marathon is and what it involves

  ▸ Key mathematical ideas and/or relationships as represented in the task statement

    ▸ Accumulation of money over time

      ☐ Different ways of accumulating money over time (starting with a fixed amount and/or earning a fixed amount per every hour of dancing)

  ▸ Requires teacher judgment

▸

[CLIP 1: CONTEXTUAL FEATURES]

[CLIP 2: MATHEMATICAL RELATIONSHIPS]

# Four Aspects of High-Quality Set-Ups

▸ Explicit attention to contextual features of scenario

▸ Explicit attention to key mathematical ideas and/or relationships as represented in the task statement

▸ Student participation is aimed at developing common or compatible language ("taken-as-shared understandings," Cobb et al., 1992) to describe key features

▸ Cognitive demand is maintained

# The Set-Up Matters

- Analyzed instructional video of 132 teachers from year 3 (2009-2010) of the MIST study and found…

- When teachers maintained the cognitive demand of the task *and* attended to the contextual features and mathematical relationships in taken-as-shared ways, opportunities to learn in the concluding whole-class discussion were significantly greater.

- However, the set-ups were rarely of high-quality.

(Jackson, Garrison, Wilson, Gibbons, & Shahan, accepted pending minor revisions)

# Unsolved Problems of Practice

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# Current & Future Work

▸ Collaborating with districts to organize professional development that is:

  ▸ organized around high-leverage instructional practices (e.g., launching complex tasks)

  ▸ coordinated across role groups (teachers, coaches, principals)

  ▸ coordinated across settings (e.g., district- and school-based professional development)

# Research Team & Collaborators

MIST
MIDDLE SCHOOL MATHEMATICS AND
THE INSTITUTIONAL SETTING OF TEACHING

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- For more information on MIST, see http://www.peabody.vanderbilt.edu/mist.xml