Mathematics Teachers' Interpretations of Students' Perceptions of the Classroom Learning Environment: Opportunities for Inquiry and Insight into Pedagogical Commitments

Kara Jackson, Hannah Nieman, Daniela DiGiacomo, Fabio Campos, & Nicholas Kochmanski

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supporting secondary mathematics teachers' development of high-quality, equitable instruction

worthwhile learning goals for students ...

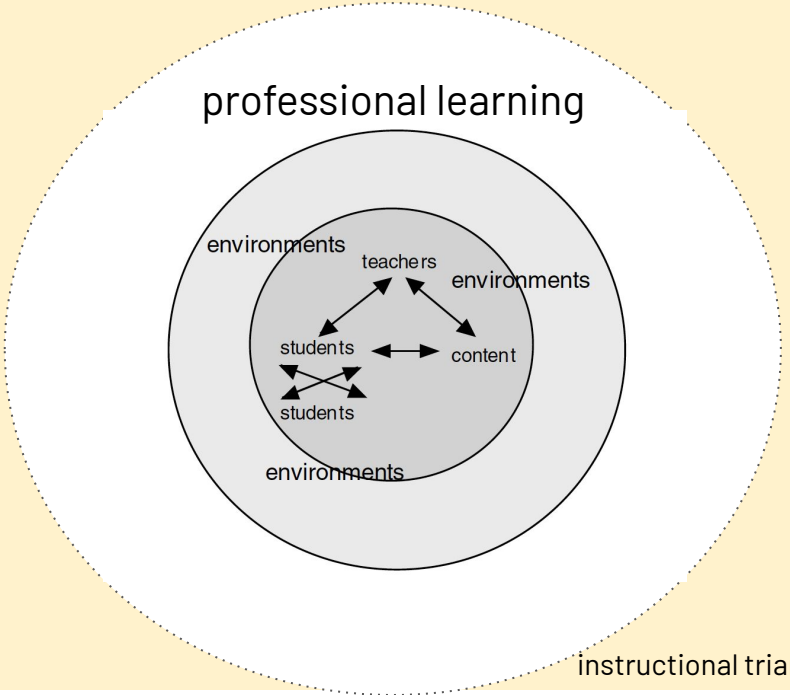
- make sense of mathematics, reason about mathematical ideas
- view themselves and others as people who 'do' mathematics

vision of teaching in which ...

- teachers engage students in solving challenging tasks
- teachers elicit and build on students' contributions to achieve mathematical agendas
- teachers support students to elaborate their reasoning, connect their ideas

supporting secondary mathematics teachers' development of high-quality, equitable instruction

- the enactment of this vision of mathematics teaching is uneven
- realizing this vision requires (in part) ongoing, professional learning



instructional triangle figure: Cohen, Raudenbush & Ball, 2003

focus of paper

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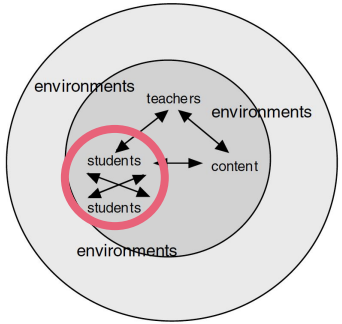
- long-term partnerships with three U.S. school districts aimed at improving secondary math teaching & learning

- developed quick, student-facing surveys of **students' perceptions of <u>key</u> aspects of the mathematics learning environment**

- designed to enhance system-wide professional learning efforts

*What is the potential of teachers' interpretations of **students' perceptions** of key aspects of the mathematics learning environment to support teacher inquiry?*



Sample Items from Whole-Class Discussion Survey

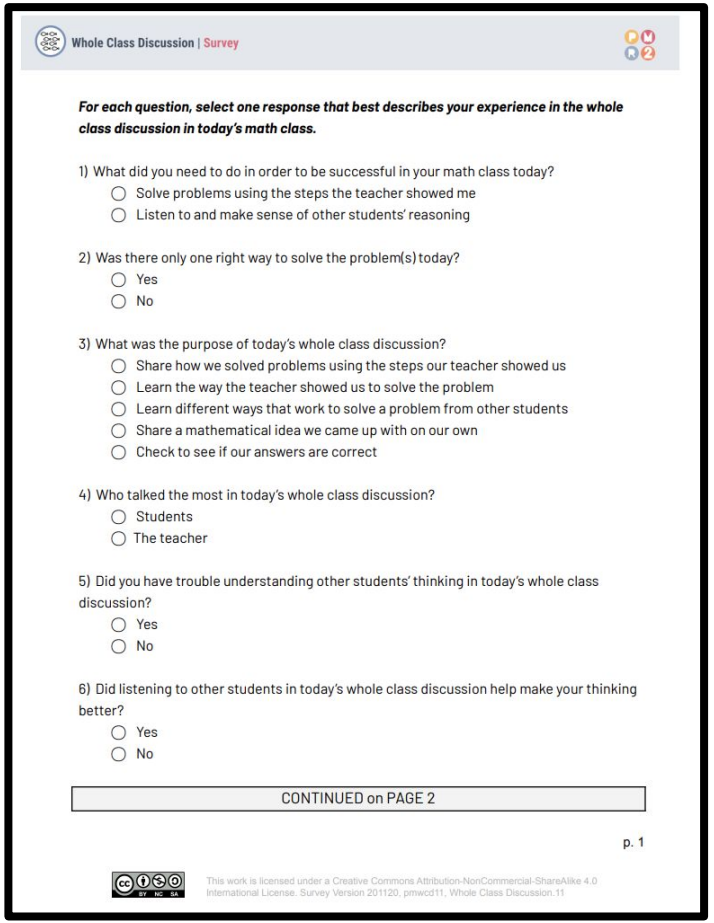
Cognitive demand of the task as implemented
Example item: What did you need to do to be successful in your math class today?

What students are accountable for in the discussion
Example item: What was the purpose of today's whole class discussion?

Extent to which discussions focus on students' ideas
Example item: Who talked the most in today's whole class discussion?

Opportunities for students to listen to, reason about, and make sense of others' ideas
Example item: Did you have trouble understanding other students' thinking in today's whole class discussion?

Extent to which students want to share their ideas and feel their ideas are valued
Example item: Were you comfortable sharing your thinking in the whole class discussion today?



Whole Class Discussion | Survey

For each question, select one response that best describes your experience in the whole class discussion in today's math class.

1) What did you need to do in order to be successful in your math class today?
- ◯ Solve problems using the steps the teacher showed me
- ◯ Listen to and make sense of other students' reasoning

2) Was there only one right way to solve the problem(s) today?
- ◯ Yes
- ◯ No

3) What was the purpose of today's whole class discussion?
- ◯ Share how we solved problems using the steps our teacher showed us
- ◯ Learn the way the teacher showed us to solve the problem
- ◯ Learn different ways that work to solve a problem from other students
- ◯ Share a mathematical idea we came up with on our own
- ◯ Check to see if our answers are correct

4) Who talked the most in today's whole class discussion?
- ◯ Students
- ◯ The teacher

5) Did you have trouble understanding other students' thinking in today's whole class discussion?
- ◯ Yes
- ◯ No

6) Did listening to other students in today's whole class discussion help make your thinking better?
- ◯ Yes
- ◯ No

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methods

(1) How, if at all, do teachers' interpretations of students' survey responses **open** possibilities for teacher inquiry?
(2) How do teacher's interpretations relate to their current **pedagogical commitments**?

Participants in this analysis:

- 9 middle-grades math teachers (1 district, 2 schools)

Data sources:

- Teacher previewed the upcoming lesson, and teacher anticipated how students would respond to the survey
- Researcher observed a lesson in which survey was administered
- Teacher interpreted the student survey data in interview with researcher

- 45 min-interview about teachers' pedagogical commitments (Erickson, 2011)

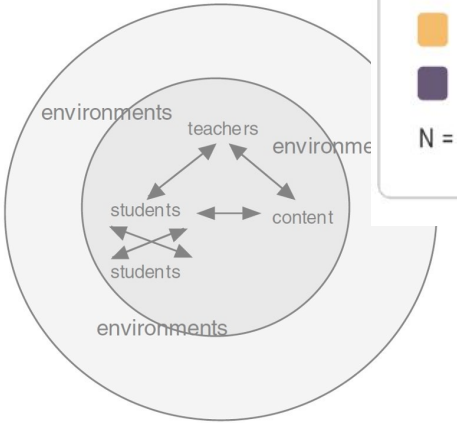
- Ongoing classroom observations and conversations with teachers

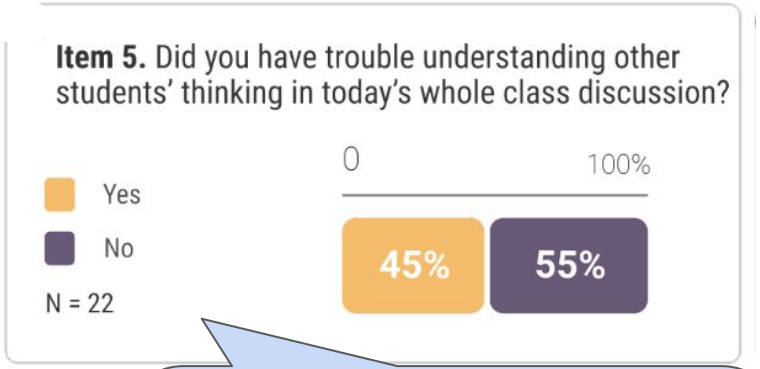
(1) How, if at all, do teachers' interpretations of students' survey responses **open** possibilities for teacher inquiry?

Openings

- **Posing questions**
- **Offering tentative, multiple, possibly conflicting explanations**

(Little, 2002; Mason, 2011; van Es & Sherin, 2021)

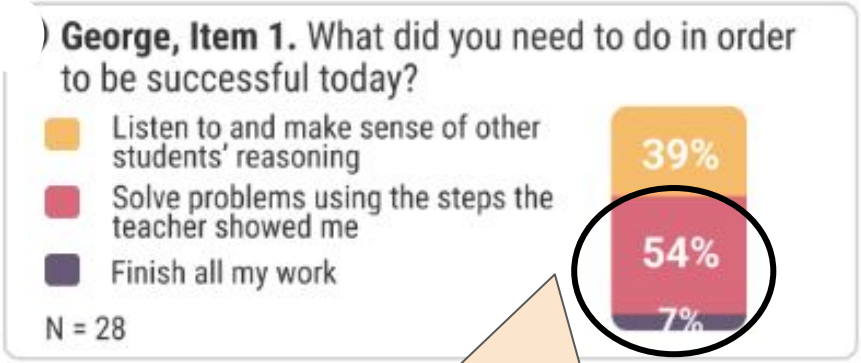




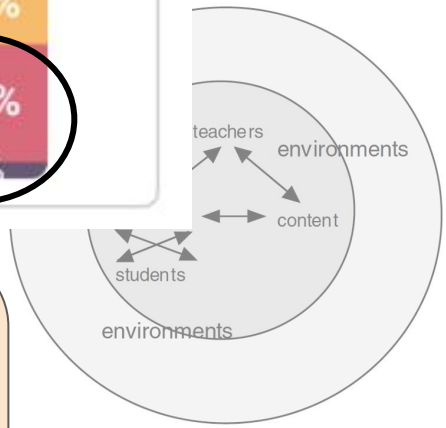
Teacher Jon: "Could [students] hear [the person sharing]? Or, maybe someone said the wrong answer, and [students did not understand]."

Figure from Cohen, Raudenbush & Ball, 2003

(1) How, if at all, do teachers' interpretations of students' survey responses **open** possibilities for teacher inquiry?



Teacher George: "...it's what they're accustomed to. Whenever we give them work that they have to talk to each other and reason things out, it takes them so long to do it ... they get so easily distracted."



Definitive Accounts

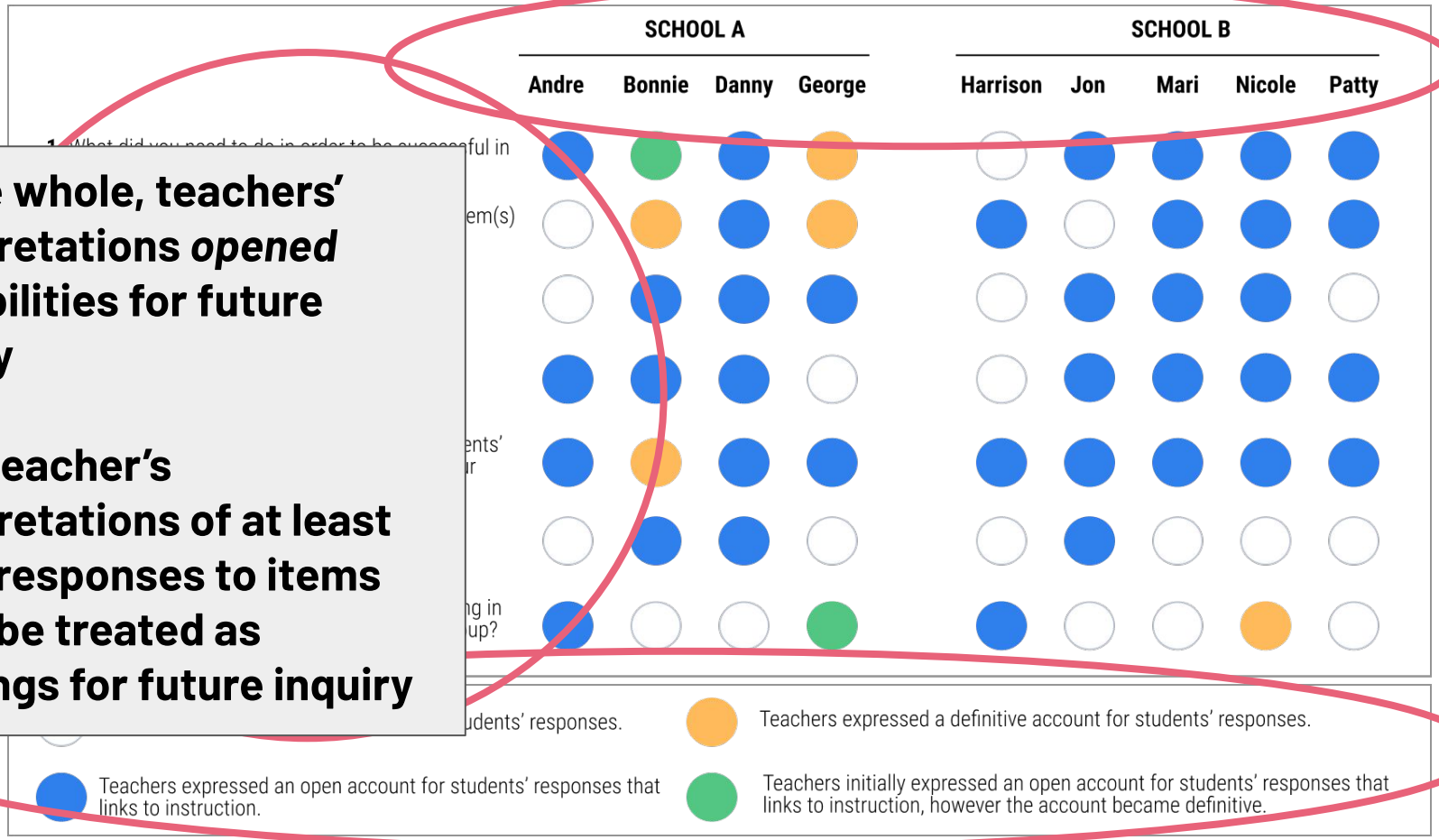
- **"explaining away" evidence that might have been used to raise important questions**

(Mason, 2011)

Figure from Cohen, Raudenbush & Ball, 2003

(1) How, if at all, do **teachers' interpretations of students' perceptions** of the classroom learning environment **open** possibilities for inquiry?

- **On the whole, teachers' interpretations *opened* possibilities for future inquiry**
- **Each teacher's interpretations of at least some responses to items could be treated as openings for future inquiry**



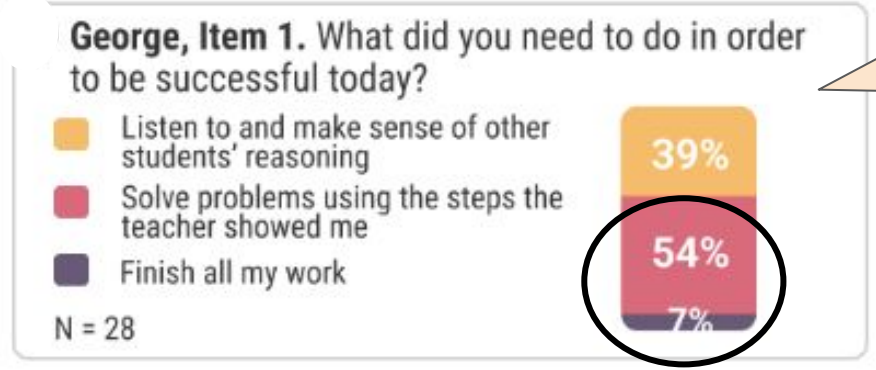
(2) How do teachers' interpretations relate to their current **pedagogical commitments**?

Regardless of whether teachers expressed an opening for inquiry OR "explained away" students' perceptions ...

teachers' interpretations of their students' perceptions often provided insight into their then-current pedagogical commitments

- instructional aspirations
- perspectives of their students' current capabilities

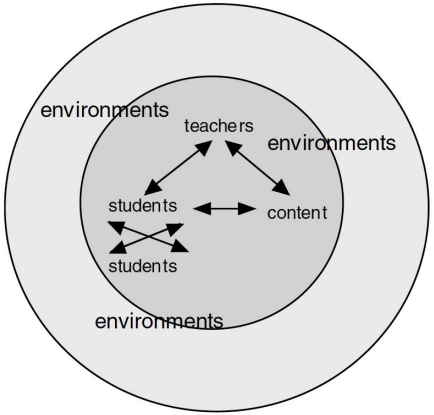
(2) How do teachers' interpretations relate to their current **pedagogical commitments**?



Teacher George: "...it's what they're accustomed to. Whenever we give them work that they have to talk to each other and reason things out, it takes them so long to do it ... they get so easily distracted."

They're coming from classes from last year where they were just told, this is how you do this. They're used to it. For this class, there's only a few of them that would look at something ... **You've got [Student A], and you've got [Student B], and you've got [Student C], [Student D] when he's here, maybe [Student E], [Student F] ... You just give them something and they'll try to figure it out... But the rest of them, they want to be spoonfed. Y**ou have to, 'this is how you do this, this is what this means.' **That's what I'm trying to get away from, but maybe I'll do it next year, because it didn't happen this year.**

takeaways & next steps



- **the value in bringing students' perceptions of instruction (alongside evidence of student reasoning) in professional learning settings**
  - opens possibilities for future inquiry into instruction
  - AND insight into teachers' current commitments

- **next step:** investigate **how PD facilitators leverage teachers' interpretations** in professional learning, especially insight into teacher's commitments

- **caution: interpreting a representation of practice can result in the reification of unproductive commitments regarding teaching and students** (Little, 2003)
  - Implications for supporting PD facilitators to respond productively

Thank you!

Practical Measures, Routines and Representations for Improving Instruction

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