



Leveraging Students' Mathematical
Thinking to Support Participation &
Enhance Opportunities for Equity

Megan Franke, UCLA

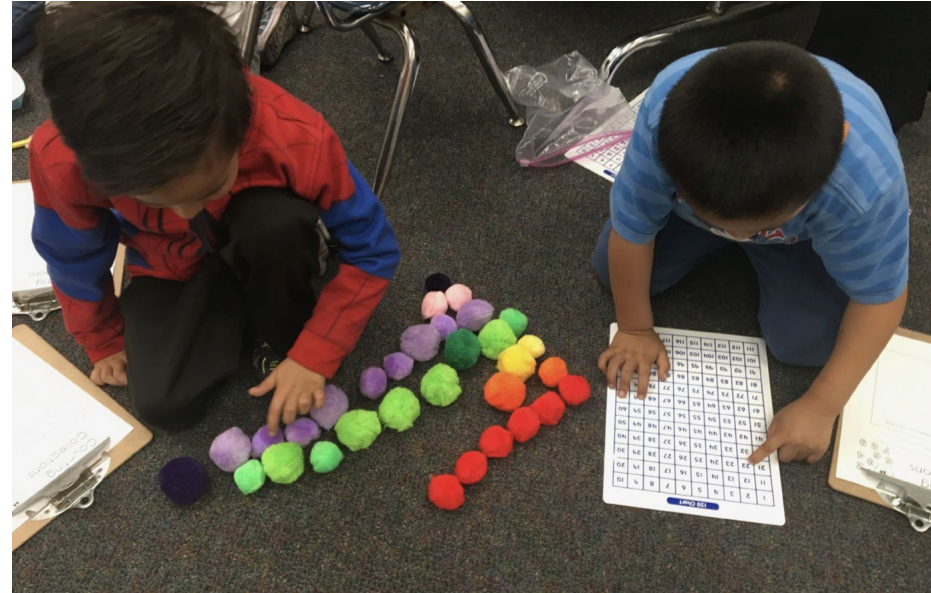
Overview

Enhancing opportunities for equity

Expect and Recognize Brilliance

Leveraging the details of students' mathematical thinking

Supporting participation



Expect and Recognize Brilliance



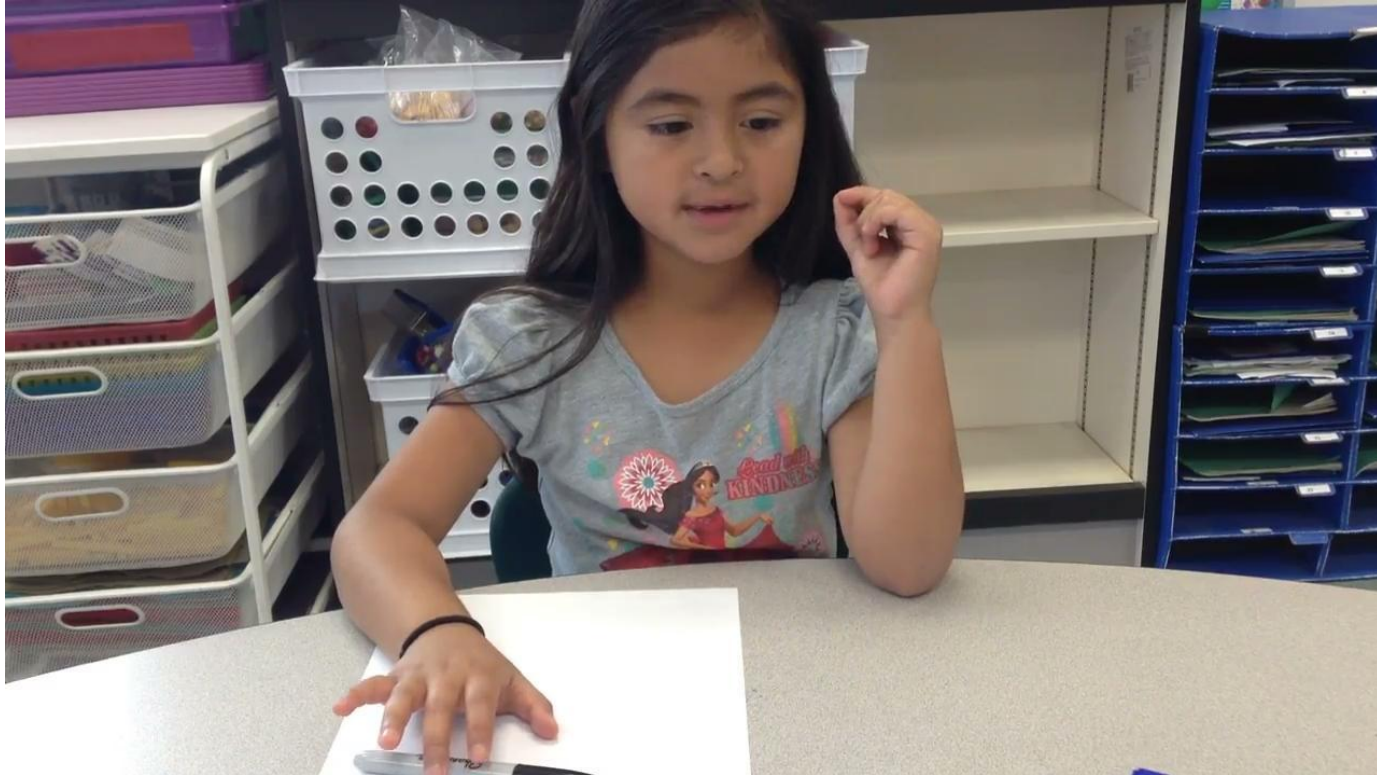
Expect and Recognize Brilliance



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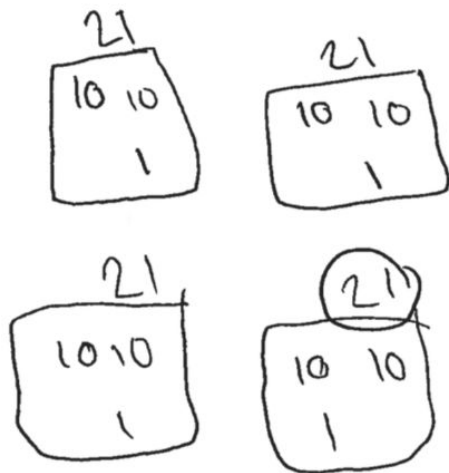
Attending To The Details Of Children's Mathematical Thinking Enables Expecting and Recognizing Brilliance



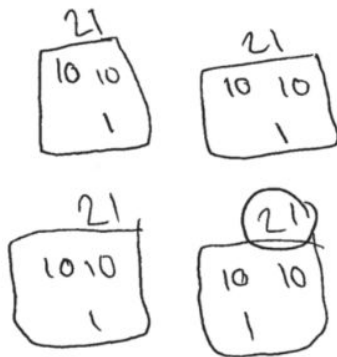
- Notice what students **can** do
- Pose tasks in ways that enable students to **use what they know**
- Create openings for **varied participation**
- Support the development of students who **think of themselves as capable of making sense of mathematics**

Getting at the Details of Students' Mathematical Ideas

The candy store has 84 lollipops. They want to put the lollipops into 4 boxes so that there are the same number in each box. How many lollipops will go into each box?



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- “I passed them out”
- “I used 10s and 1s”
- “I drew a picture of boxes and lollipops”
- “I drew four boxes and then I counted 10, 20, 30, 40, 50... 83, 84. And then I counted 10, 20, 21”
- I knew that I could make 8 tens with 80 lollipops, so I passed out the 10s first, I knew since I had 4 boxes that would be 2 for each box. Then I passed out the last 4, one for each and that was 21.

Details Matter

Details and specificity matter when it comes to explaining your ideas and engaging with the ideas of others

It's not just about getting students to talk... it's about getting into the substance of their math ideas

It's does not need to sound pretty / use formal vocabulary / happen all at once

Leveraging Partial Understanding

Focus on what children **DO** know

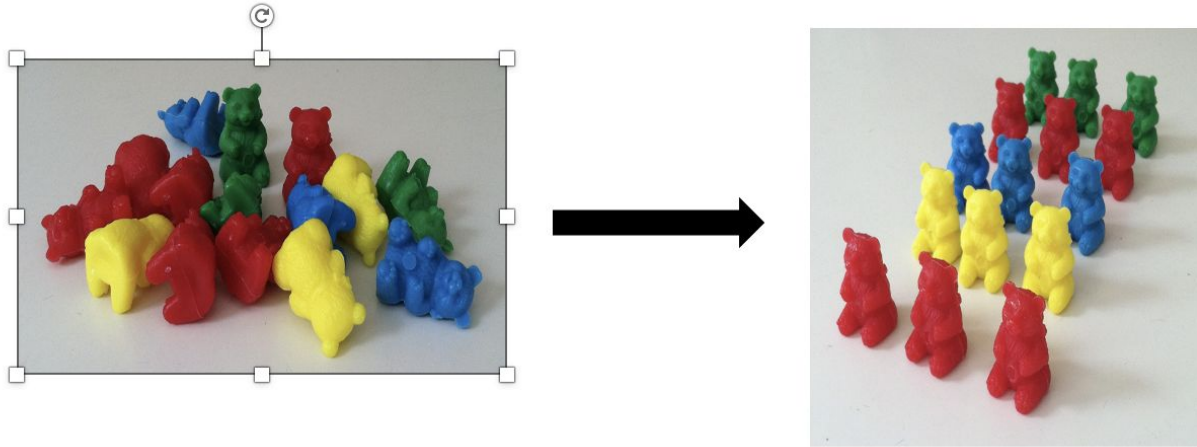
Often we consider that as correct, complete ideas

Often we consider children need to know certain mathematical ideas before others

Leads to under utilizing children's ideas



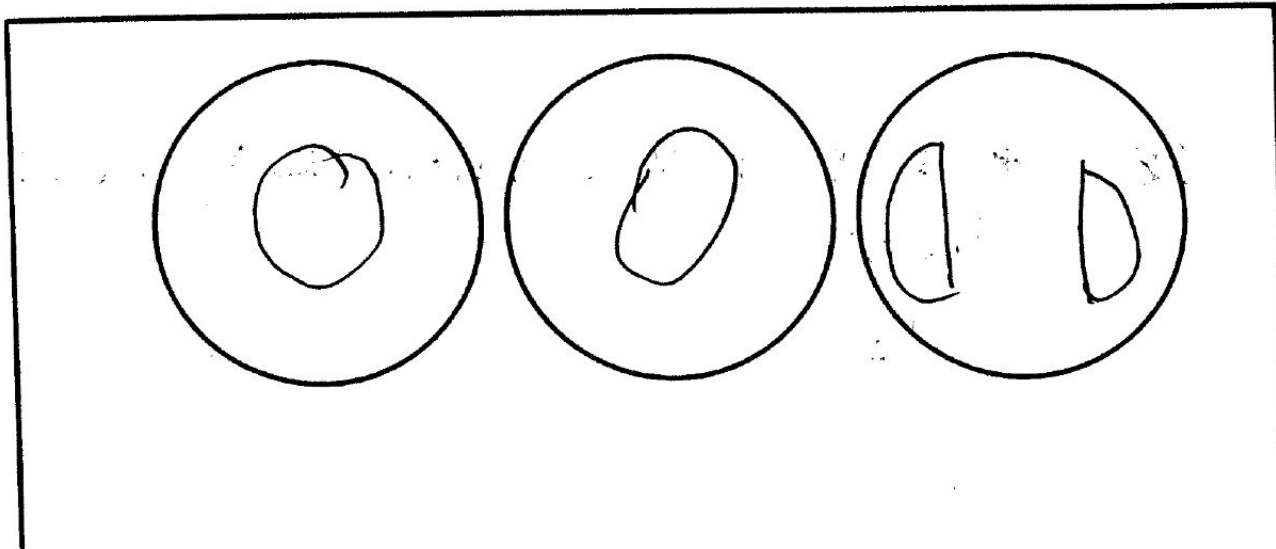
What does the student know?



“1, 2, 3. That’s 3. 1, 2, 3. There’s another 3. 1, 2, 3. Another 3...”

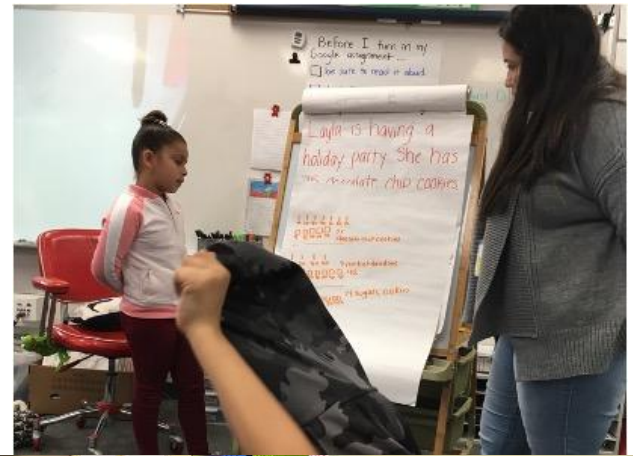
What does the student know?

3. Four children are sharing three large cookies. They are sharing so each child gets the same amount. How much cookie will one child get?

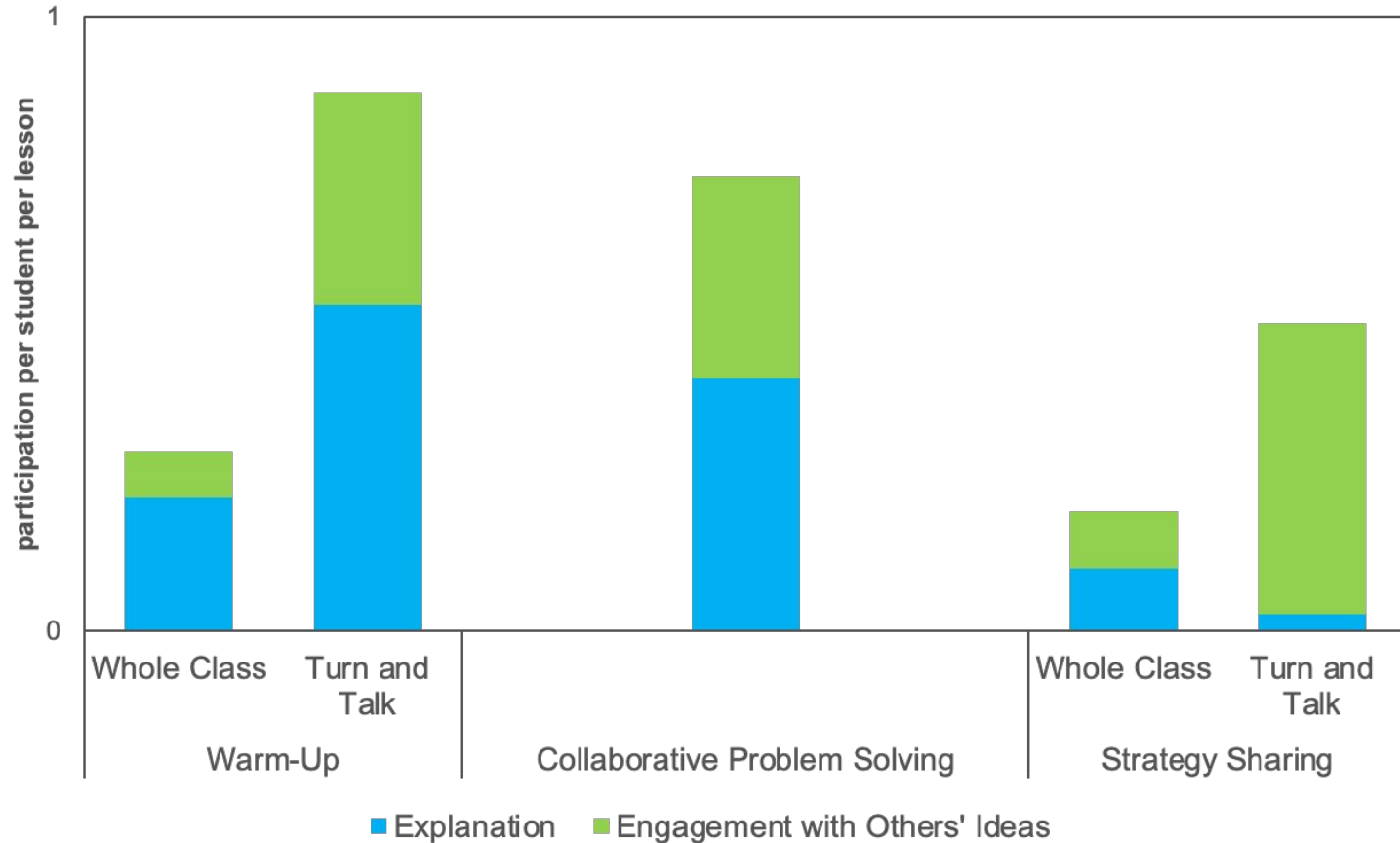




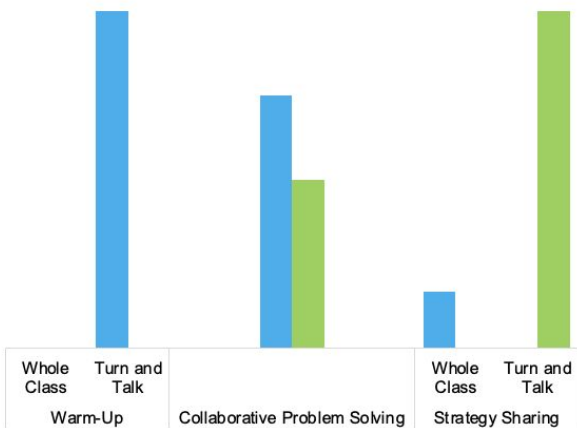
Supporting Participation



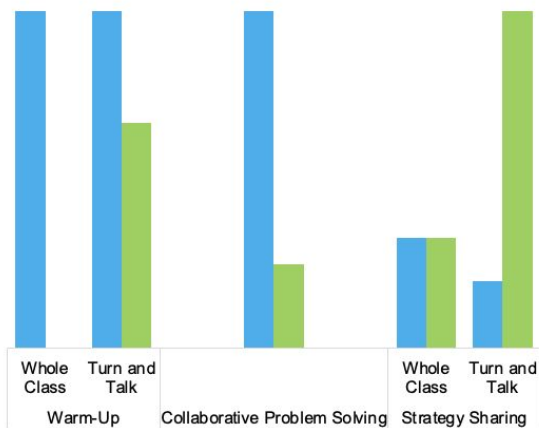
Student participation differs across lesson phases and settings



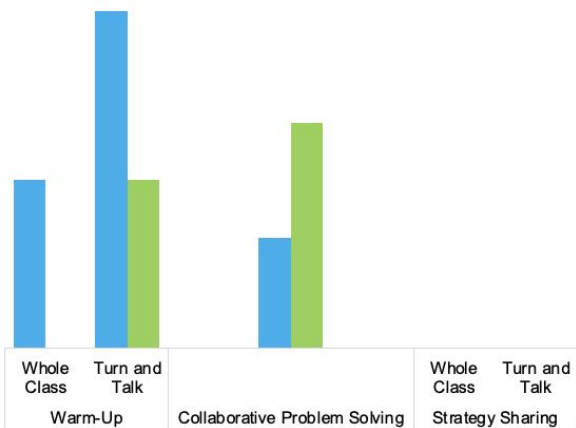
Katherine



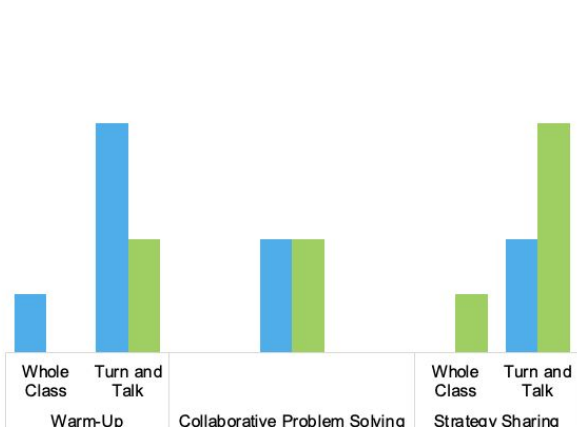
Gerardo



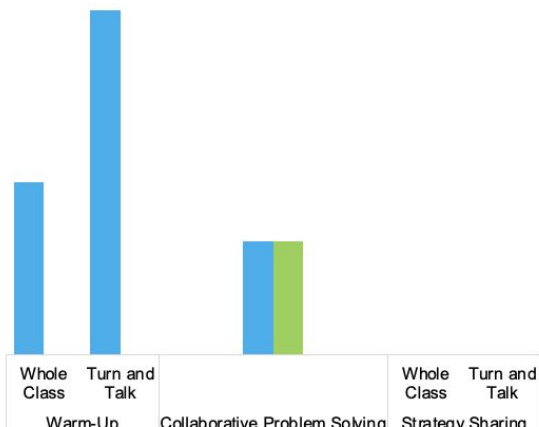
Jessica



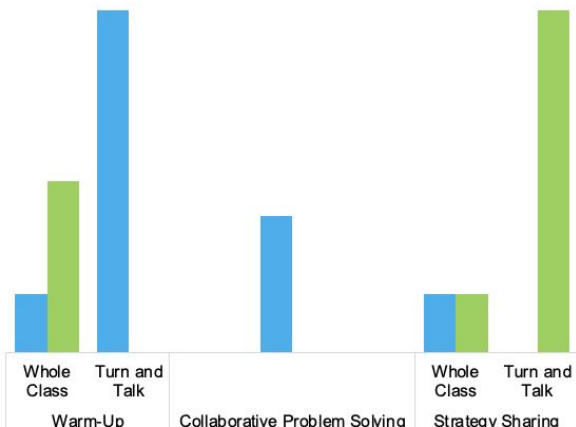
Noemi



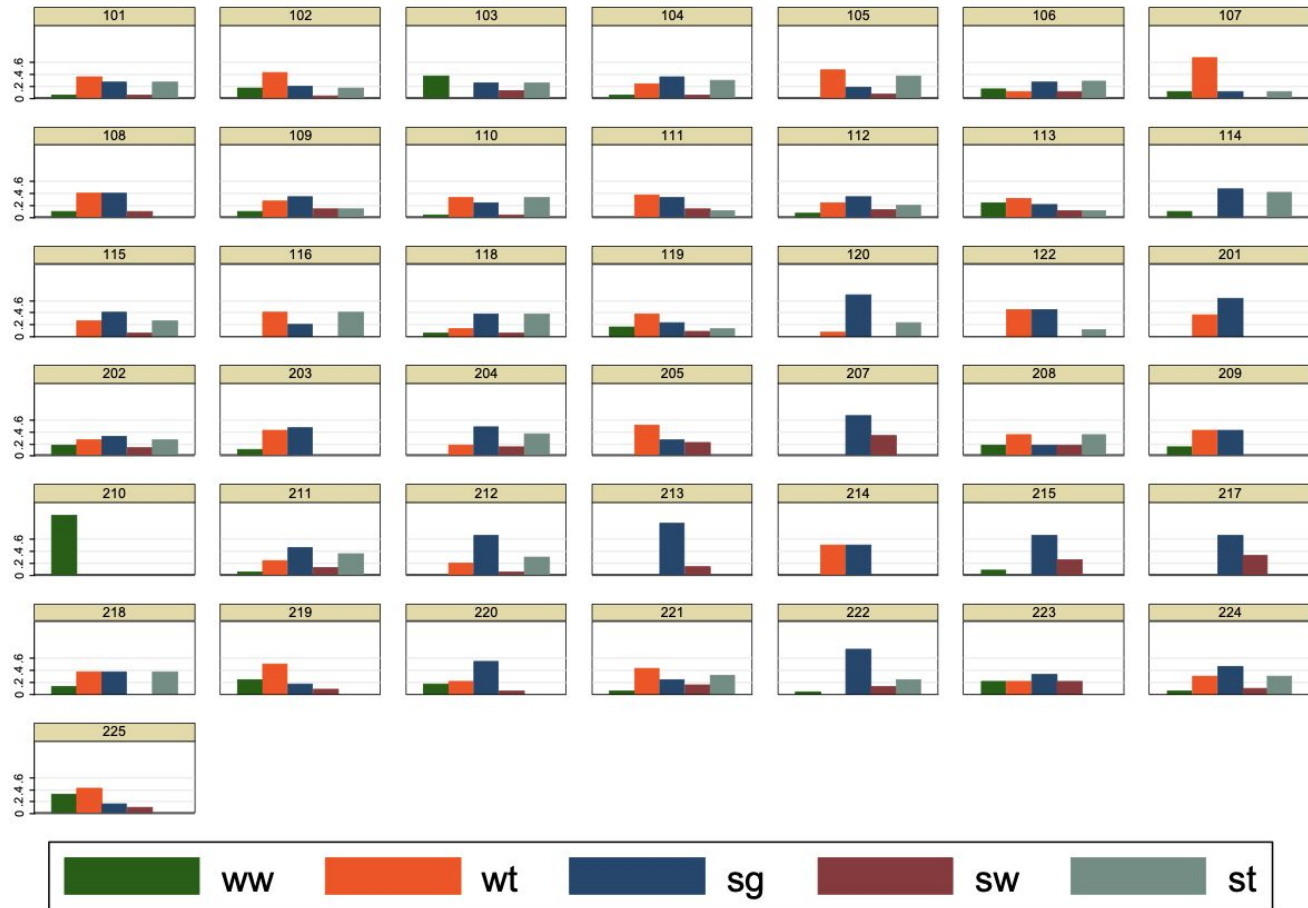
Nico



Adam



Mean



Graphs by sid

Students rarely presented the entirety of their solutions before other students engaged

Incomplete explanations and written representations that emerged over time created entry points for other students to contribute in mathematically substantive ways

How much explanation occurs before others demonstrate engagement?	
Complete	27%
Partial	63%
others engage before any explanation	10%

Participation and Teaching

“How teachers speak, listen, see, and interact with young people matters. They shape the environment and interactions that in turn shape students’ sense of themselves and their competence. Teachers can reproduce themselves and their competence. Teachers can reproduce marginalization or disrupt it. As such, they play an essential role in rehumanizing school experiences of Latinx, Black, and indigenous students.”

-Professor Imani Goffney

Supporting participation
- what would you do?

Counting Collection Recording



The child counts and says 5 buttons

Mrs. Biller had 7 pieces of candy corn. Mr. Peter gave her some more. Now she has 15 pieces of candy corn. How many pieces of candy corn did Mr. Peter give Mrs. Biller?

Strategy 1:

① ② ③ ④ ⑤ ⑥ ⑦
1 2 3 4 5 6 >
① ② ③ ④ ⑤ ⑥ ⑦ ⑧
⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮

22 candy
corn

Supporting participation
- what would you do?

[As children play] they are inventing and reinventing themselves as thinking people before the world tells them what to think... they do this as they literally play around with ideas. In effect the child says I am someone with ideas I am someone who turns ideas into actions and actions into new ideas, ... I am intended to have my own ideas. .. this why I play --to show to myself what my ideas are and how necessary I am to the community. Vivian Paley

Resources

- DREME TE website
<http://prek-math-te.stanford.edu/>

