MARSAL EDUCATION

(How) Can Teaching Support Students' Positive Identity Development In and Through Mathematics?

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2nd Annual Tri-County Culturally Responsive Leadership Fall Conference

Leading to Liberate • September 21, 2023

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Reflect

- How do you feel about yourself in relation to mathematics?
  - How skillful do you feel at mathematical activity?
  - How likely are you to engage mathematics to achieve your goals?
  - How would others describe you as a knower and doer of mathematics?
- Where does this feeling come from?
- How has your relationship with mathematics shaped your life trajectory?
- How have your other identities (racial, gender, etc.) influenced your sense of self as a mathematics knower and doer?

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Our work together today

What is a "mathematics identity" — and why is it so important?

How do goals of developing mathematics identity and mathematical competence intersect in practice? What is the work of teaching?

How can teachers develop capacity to do this work?

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1. What is a “mathematics identity” — and why is it so important?

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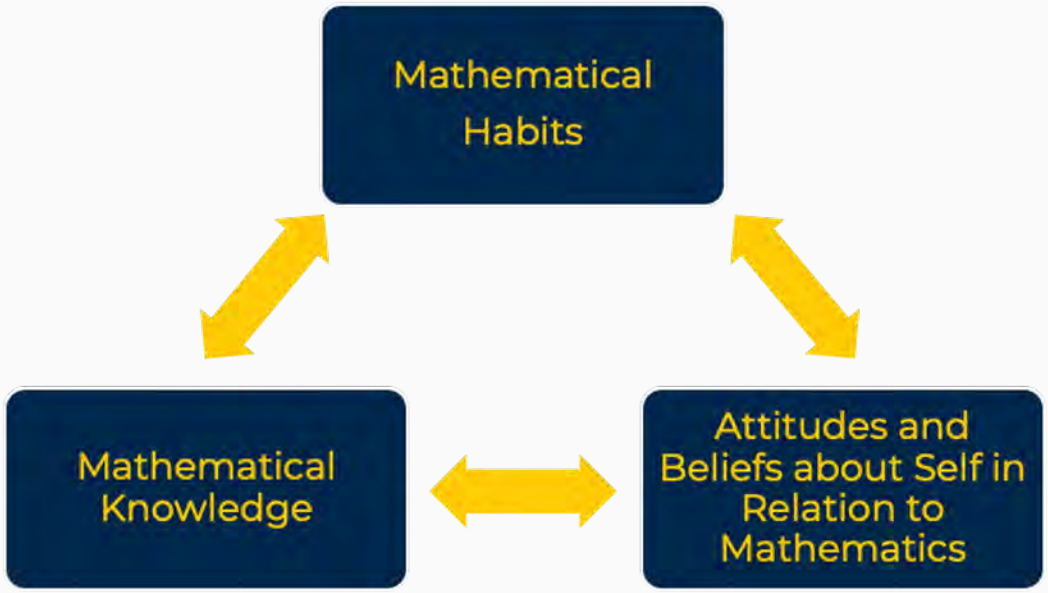
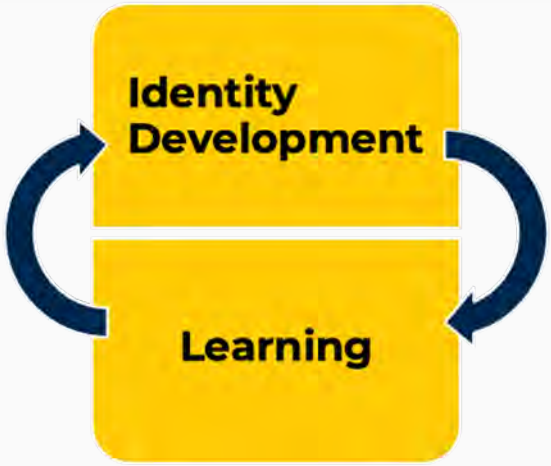
What is a "mathematics identity"?

The emerging and constantly developing ways that students understand themselves as knowers and doers of mathematics



Why are mathematics identities important?



- The processes of learning and identity development are intertwined

- A student with a positive mathematics identity is more likely to engage in classroom activity in ways that promote learning
- A student with a less than positive mathematics identity is more likely to engage in classroom activity in ways that stifle learning

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How are mathematics identities developed?

- **The interactions that students have in mathematics classrooms** are the building blocks of their mathematics identities
- **As students engage with others around mathematics they refine:**
  - their understandings of what it means to know and do mathematics
  - Their beliefs about their own ability and potential in mathematics

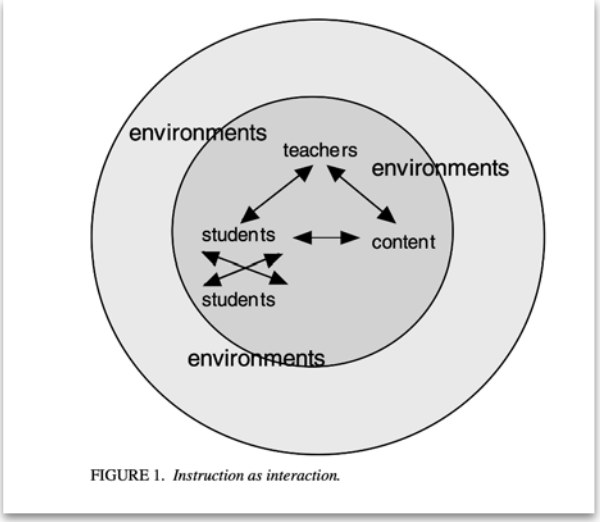
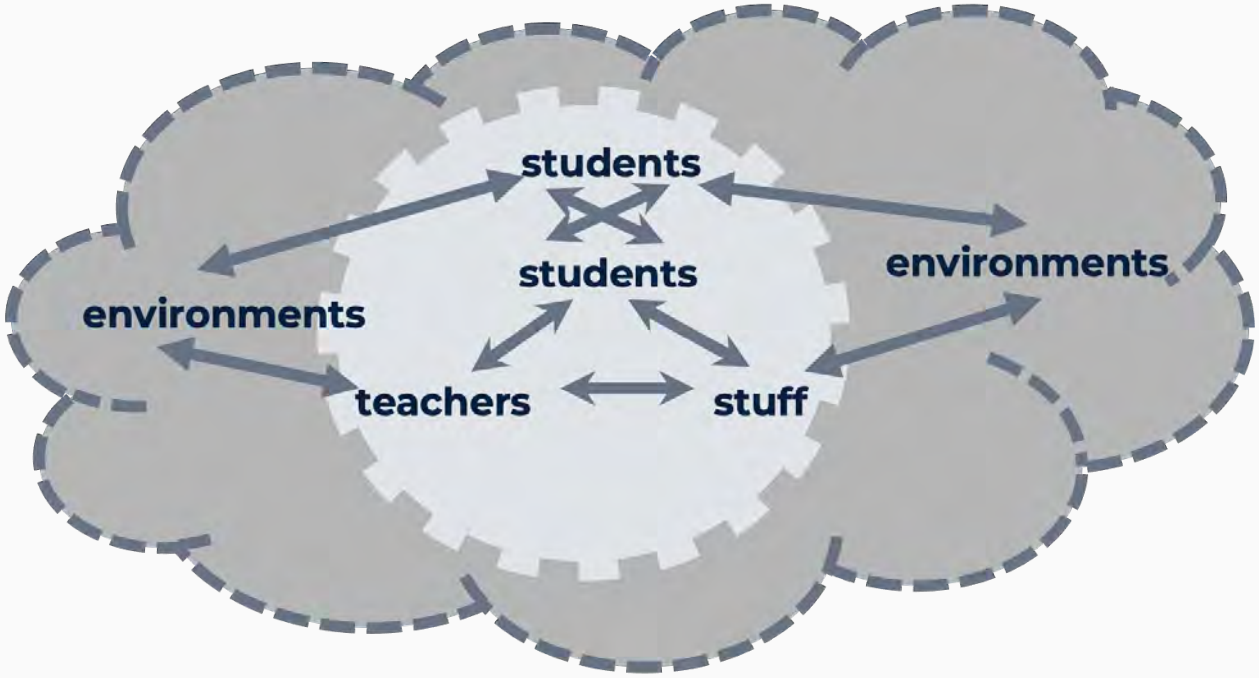


FIGURE 1. *Instruction as interaction.*

1. Teaching and learning are constructed interactively and are interpretive.
2. They take place within broad historical and socio-political environments.



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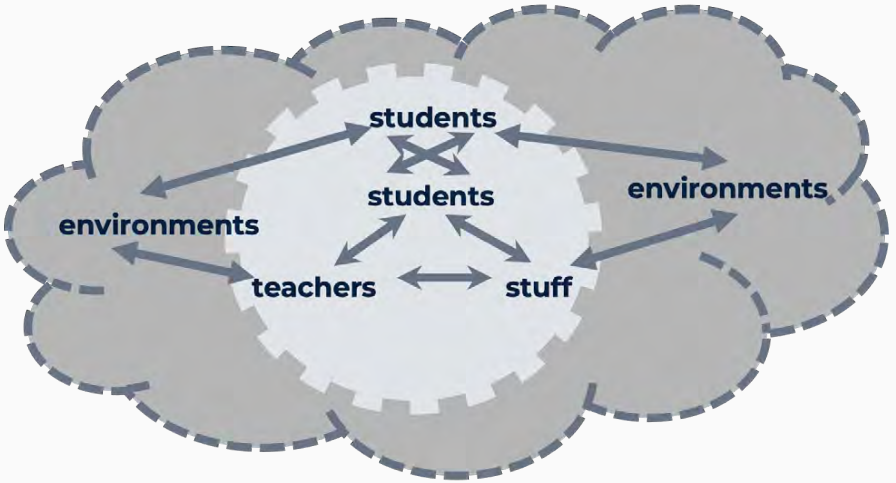
The development of mathematics identities impacts and is impacted by the development of students other identities

Cultural notions about mathematics and the intellectual capacities of members of various social groups shape the opportunities made available to students and the sense they make of those opportunities



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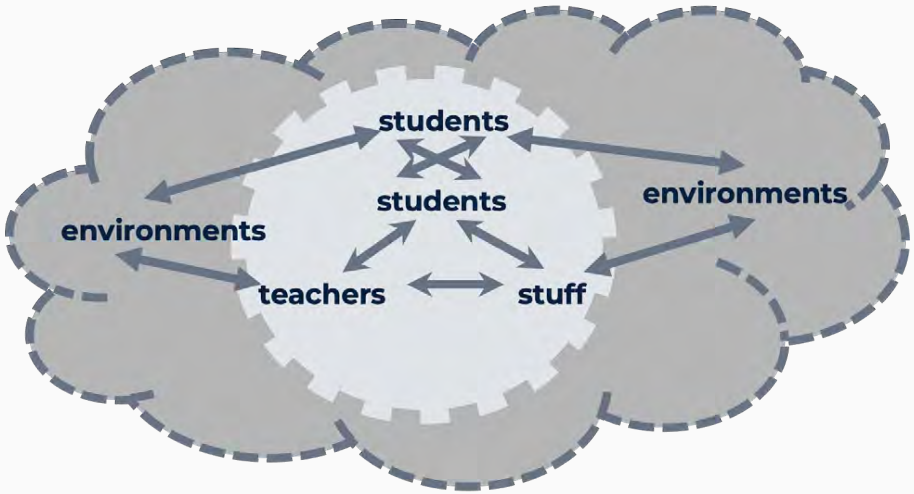
2. How do the goals of developing mathematics identity and mathematical competence intersect in practice? What is the work of teaching?



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The work of teaching involves managing the interactions within the classroom to achieve instructional goals.

Doing so involves navigating the “Discretionary Spaces” inherent in teaching.

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Case #1: Aniyah and Toni

Developing positive identities *through* mathematics

Aniyah

Toni

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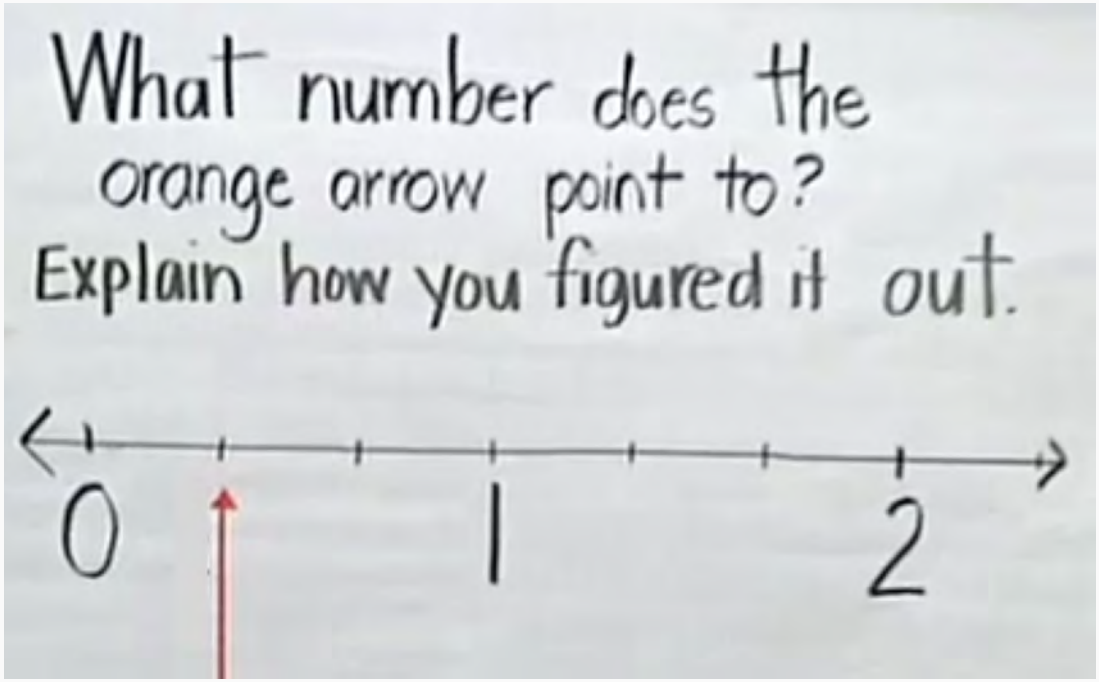
Context for the video

- 30 students, 22 Black, 4 Latine, 4 white
- 10 years old

- Class has worked on area models for fractions; are just beginning to work on identifying fractions as numbers on the line
- Have jointly developed a class compact with agreements for the work of students and the teacher and the collective and individual work of learning



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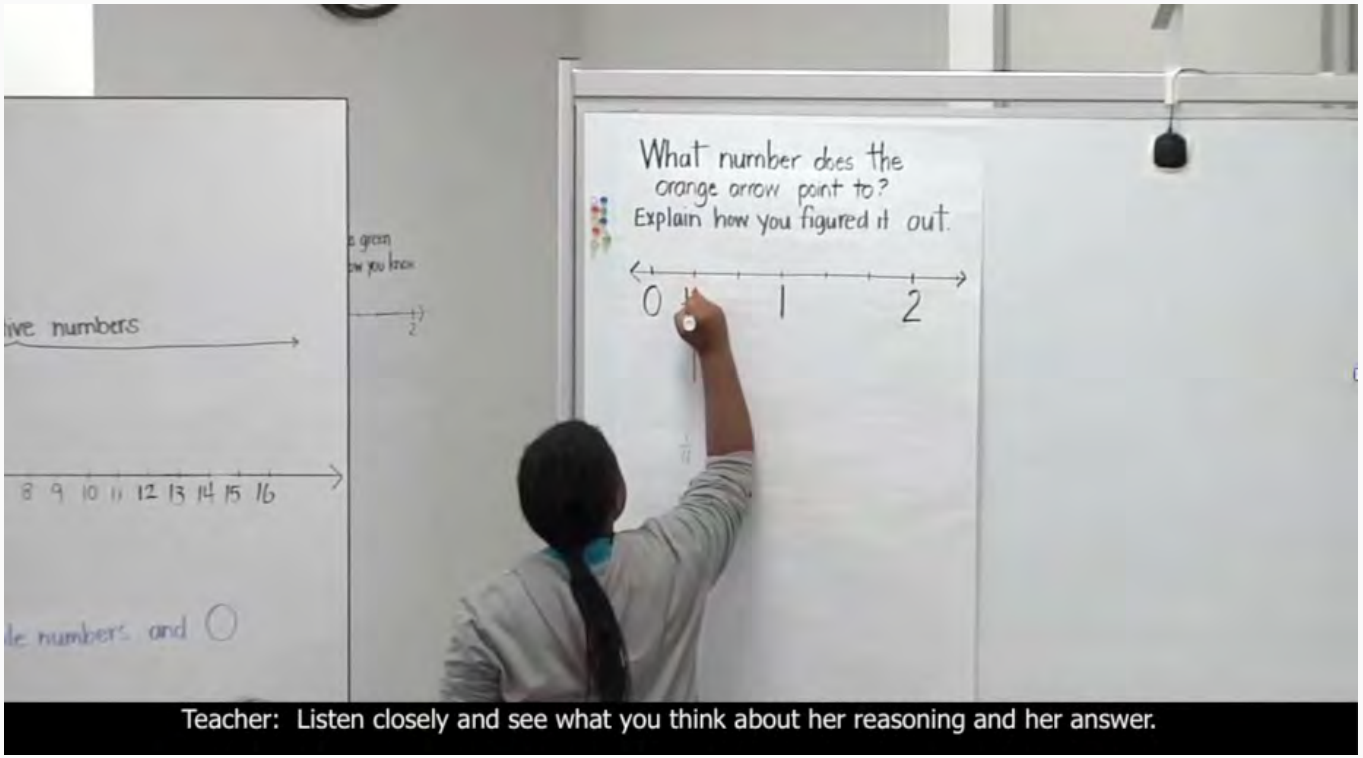
Viewing focus

What do you see about each girl's mathematical knowledge and skill?

Video: Aniyah and Toni



This video and additional supporting materials are available online here.

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Viewing focus

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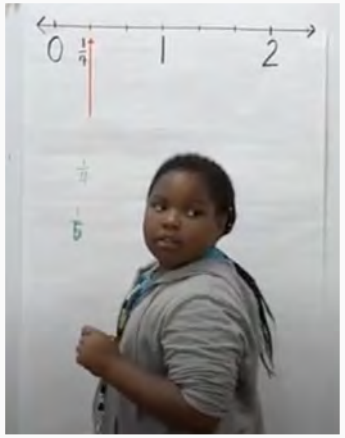
Aniyah's and Toni's mathematical knowledge and skill

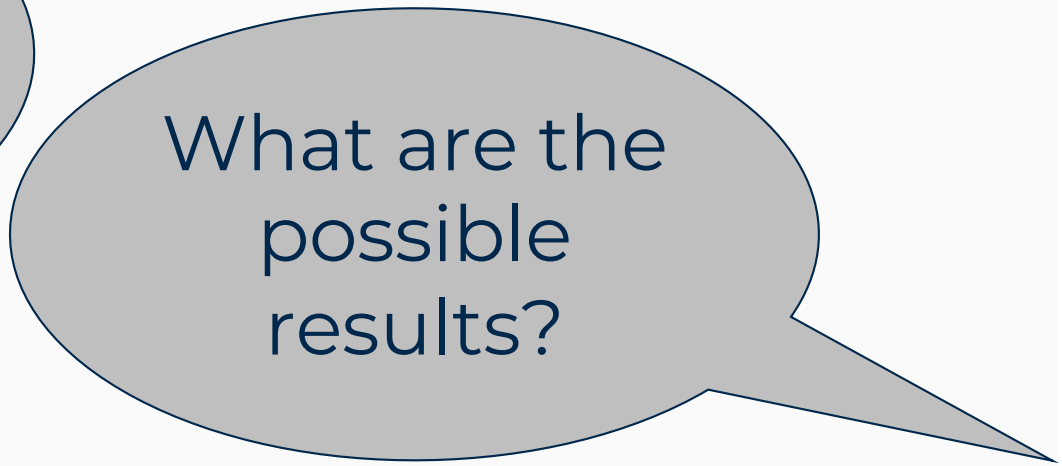


Aniyah

- Carefully counts equal intervals on the line
- Gives a coherent and complete mathematical explanation
- Confidently presents at the board

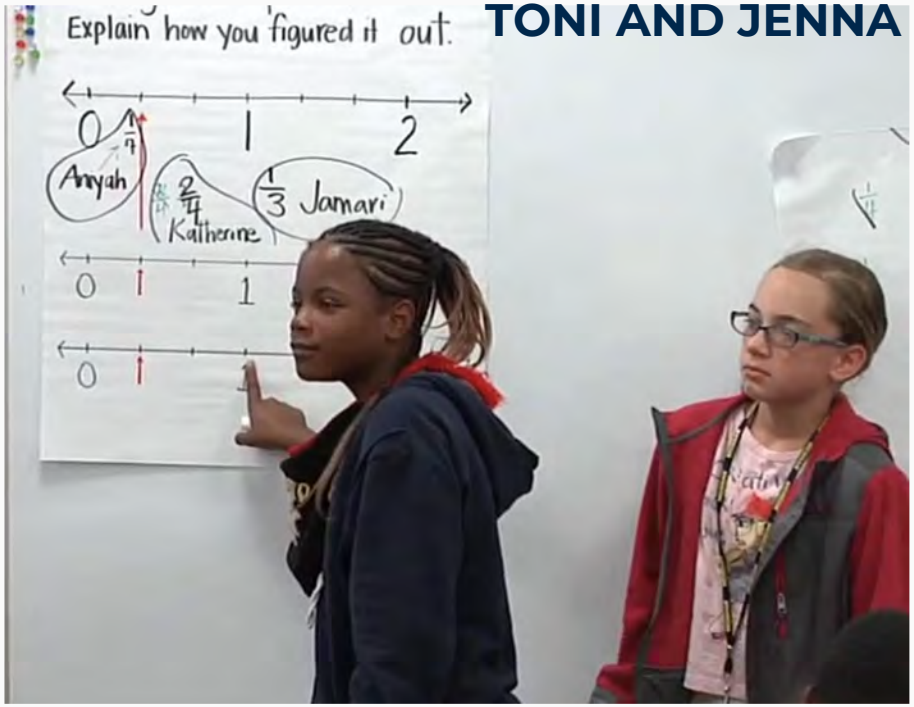
Toni

- Listens closely to Aniyah's explanation
- Asks the key mathematical question to advance the class's work

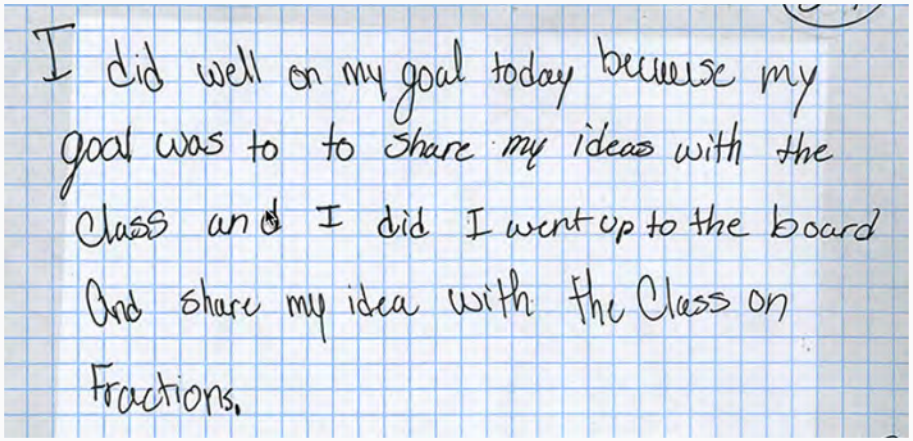


14 minutes after where we stopped

TONI AND JENNA



ANIYAH



AND: On an "exit ticket," 28 of the children were able to correctly identify a different fraction (2/5) on the number line.

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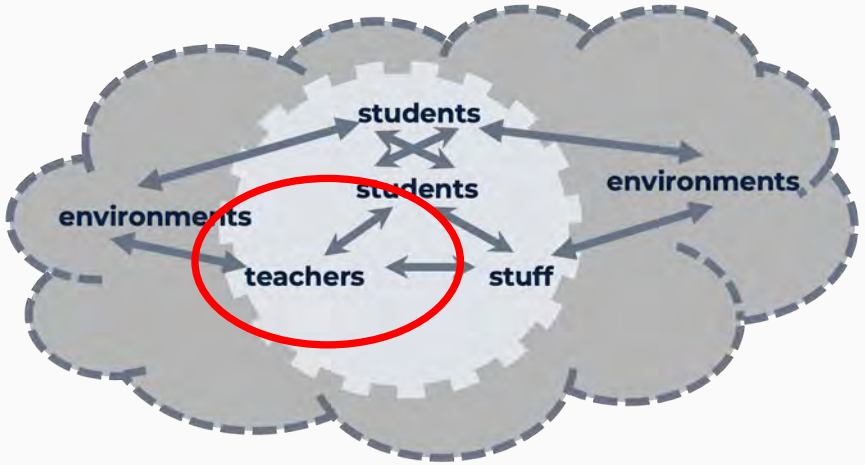

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Speaker	Talk	Discretionary space
Teacher	Who would like to try to explain what you think the answer is? And show us your reasoning by coming up to the board? Who'd like to come up to the board and try to tell- And you know, it might not be right. That's okay because we're learning something new. I'd like someone to come up and sort of be the teacher and explain how you are thinking about it. Who'd like to try that this morning?	1. Deciding when to open whole-group discussion 2. Deciding what to do to launch discussion 3. Framing the expectation for presenting 4. Framing of what it "coming to the board" entails
Teacher	Okay, Aniyah?	5. Selecting a student to present
Toni Other children	*Playing with hair* *Laying on arms*	6. Deciding whether to comment 7. Deciding whether to comment
Teacher	When someone's presenting at the board, what should you be doing?	8. Setting norms for what to do when a student is presenting
Students in chorus	Looking at them.	
Teacher	Looking at that person-	9. Responding to students
Teacher	Uh-huh?	10. Taking up an individual student question
Aniyah	You want me to write it?	
Teacher	You're trying to mark what you think this number is and explain how you figured it out.	11. Clarifying task
Teacher	Listen closely and see what you think about her reasoning and her answer. (*Aniyah writes ⅐ by the orange line*).	12. Setting task for the other students
Aniyah	I put one-seventh because there's-	
Toni	Did she say one-seventh?	13. Responding to student
Aniyah	(*turns to Toni*) Yeah. (*continues to class*) Because there's seven equal parts, like one, two, three, four, five, six, and then seven. (*Uses her fingers to count the parts on the number line*).	
Teacher	Before you agree or disagree, I want you to ask questions if there's something you don't understand about what she did. No agreeing and disagreeing. Just- All you can do right now is ask Aniyah questions. Who has a question for her?	14. Setting task for responding to student explanation
Teacher	Okay, Toni, what's your question for her?	15. Selecting student to speak
Dante	You did not!	16. Responding to student speaking across room
Toni	Why did- (*laughs at another student who says something to her from across the room*)	17. Responding to student laughing
Teacher	Go ahead, it's your turn.	17. Responding to student laughing
Toni	Why did you pick one-seventh?	
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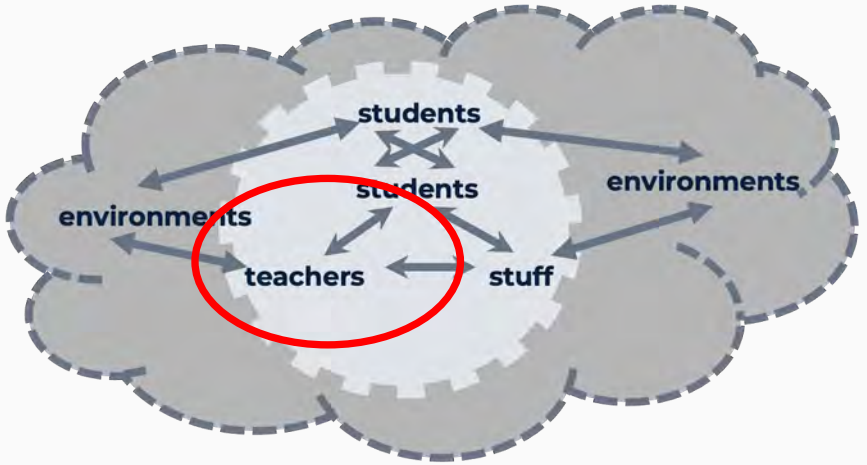

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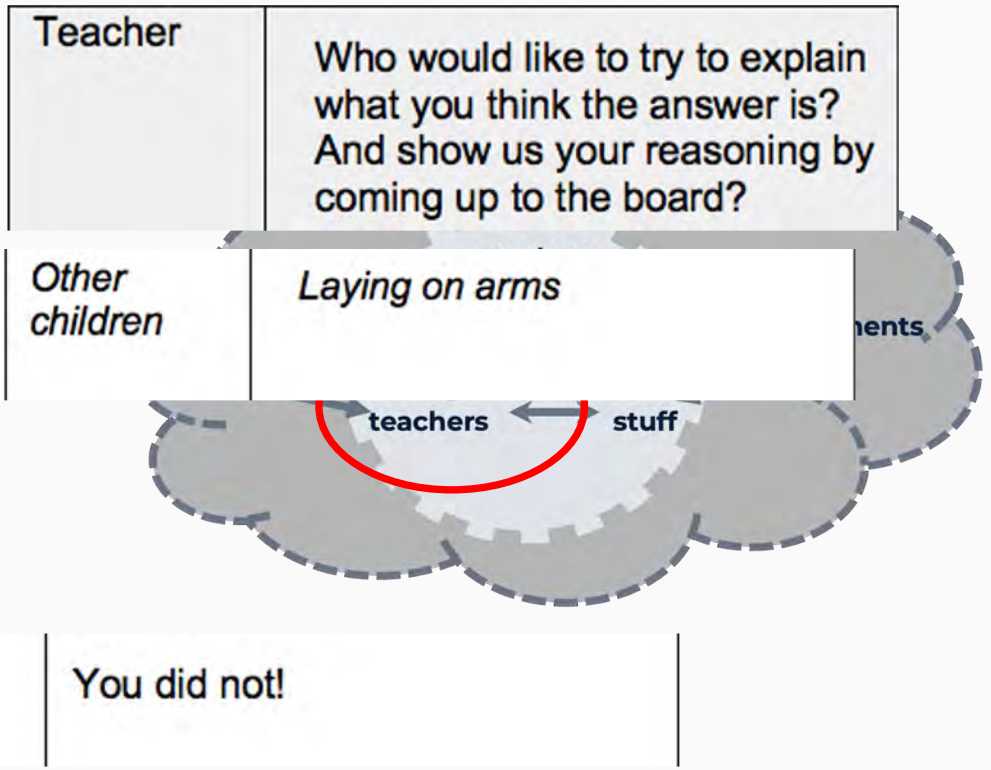

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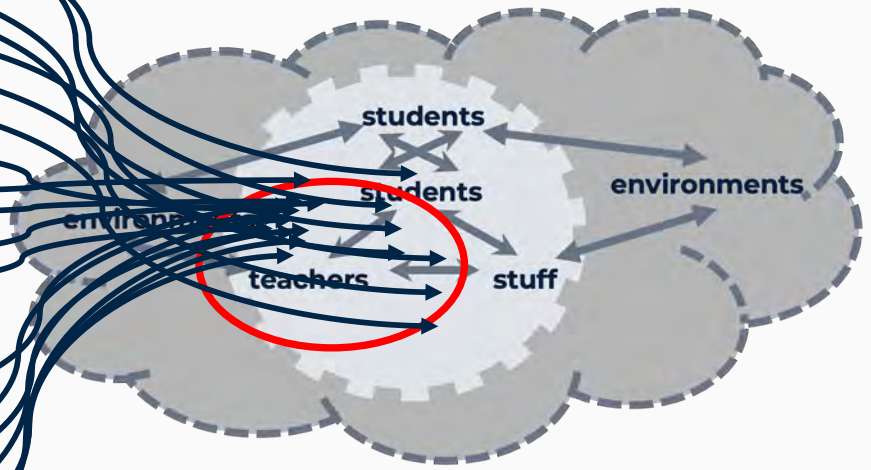

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Teaching is dense with “discretionary spaces”

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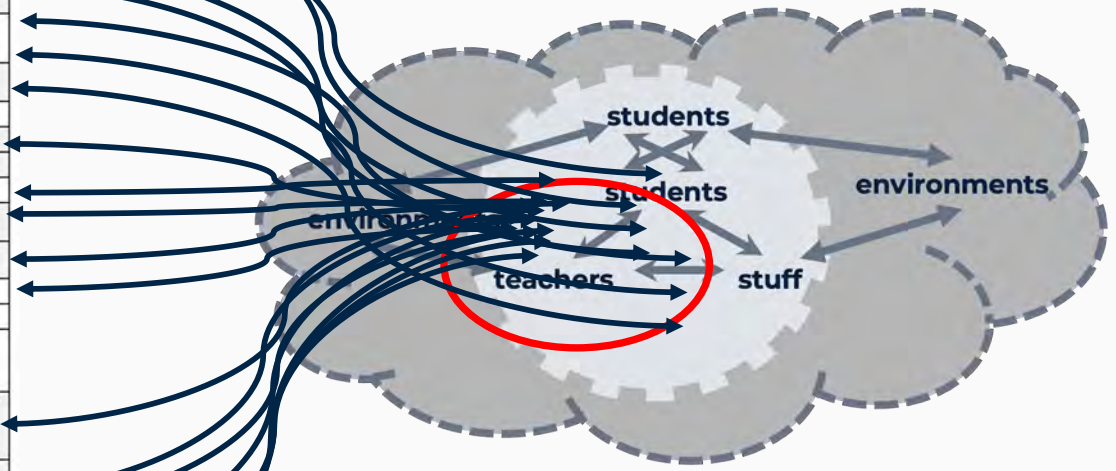

20 in 1:28

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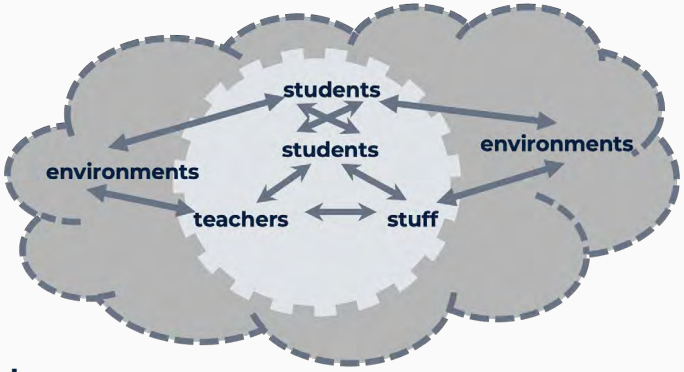
“Discretionary Spaces” are inherent in teaching

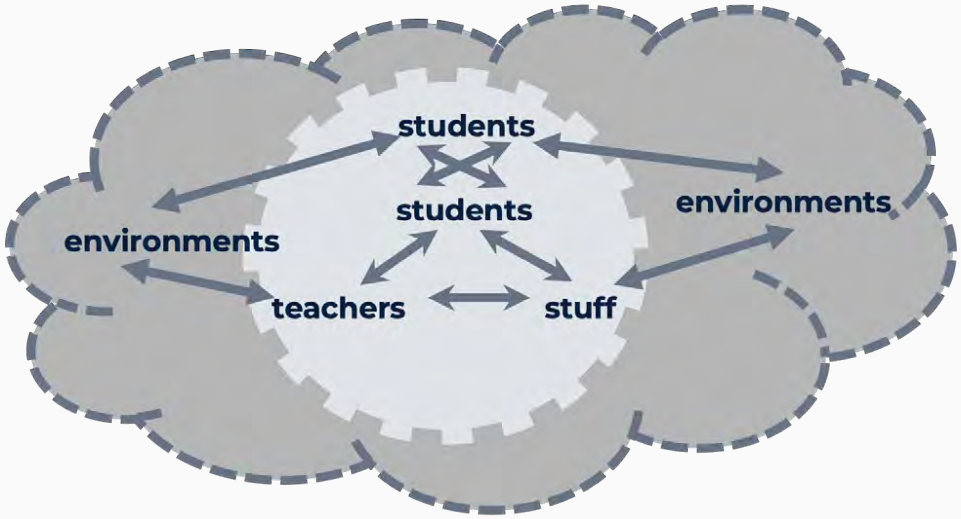


Teaching is constrained by policies, curriculum, testing regimes, institutionalized norms, structures, and routines.

Teaching is highly idiosyncratic and individual.

Lipsky (1980), Shulman (1983)

What regularly fills the discretionary spaces in teaching?



Lortie (1975), Banks, Grant and Koskela, Moll
Anyon (1981), Bullock, Heath, Martin, Tuck

1. Teachers' experiences in a society filled with anti-Black racism, other forms of racism, and white supremacy.

2. Normalized practices in schools that institutionalize dominant values and habits.

How can we take advantage of the “Discretionary Spaces” in teaching to build students’ mathematical identities in and through mathematics?

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Types of identity building experiences

	Identity-affirming experiences	Identity-denying experiences
Stand out experiences	"In fifth grade I had a teacher who encouraged me to share my mathematical thinking. It really made me feel like I was capable."	"I was made fun of for solving a problem incorrectly. I was told this class was too advanced for me."
Recurring experiences	"I was always the person my teachers and peers looked towards when there was a difficult problem to solve."	"I always felt ignored in math class. No one ever seemed to value my mathematical thinking."

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Teachers have the power to support students to develop positive identities in mathematics by working intentionally to increase identity-affirming experiences and eliminate identity-denying experiences

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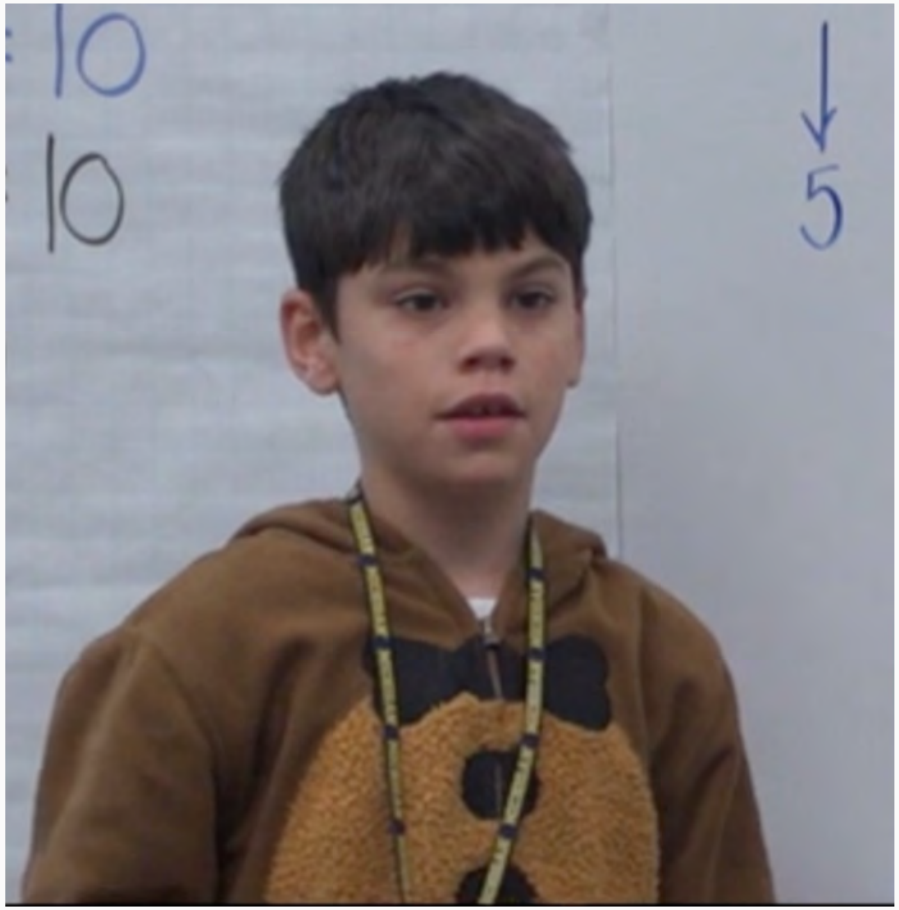
Case #2: Felipe

Developing positive identities *in* mathematics

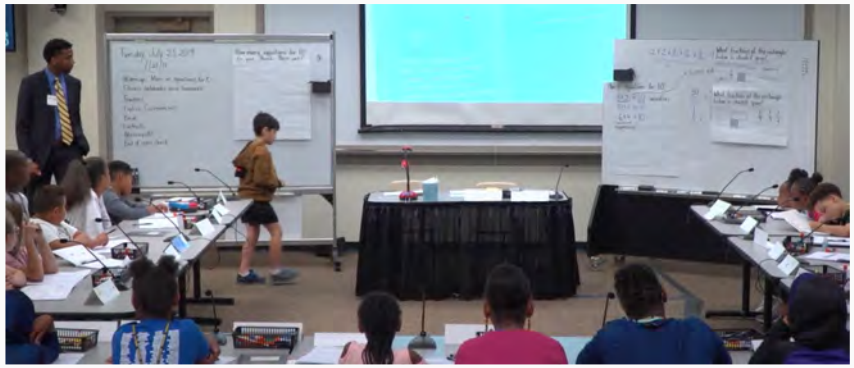


Felipe

Context for the video

27 students, 11 Black, 5 biracial, 2 Indigenous, 5 white, 1 Asian-American

10 years old



- Class is working on area models for fractions; focus now is on identifying the whole and considering the importance of equal parts
- Have jointly developed a class compact with agreements for the work of students and the teacher and the collective and individual work of learning

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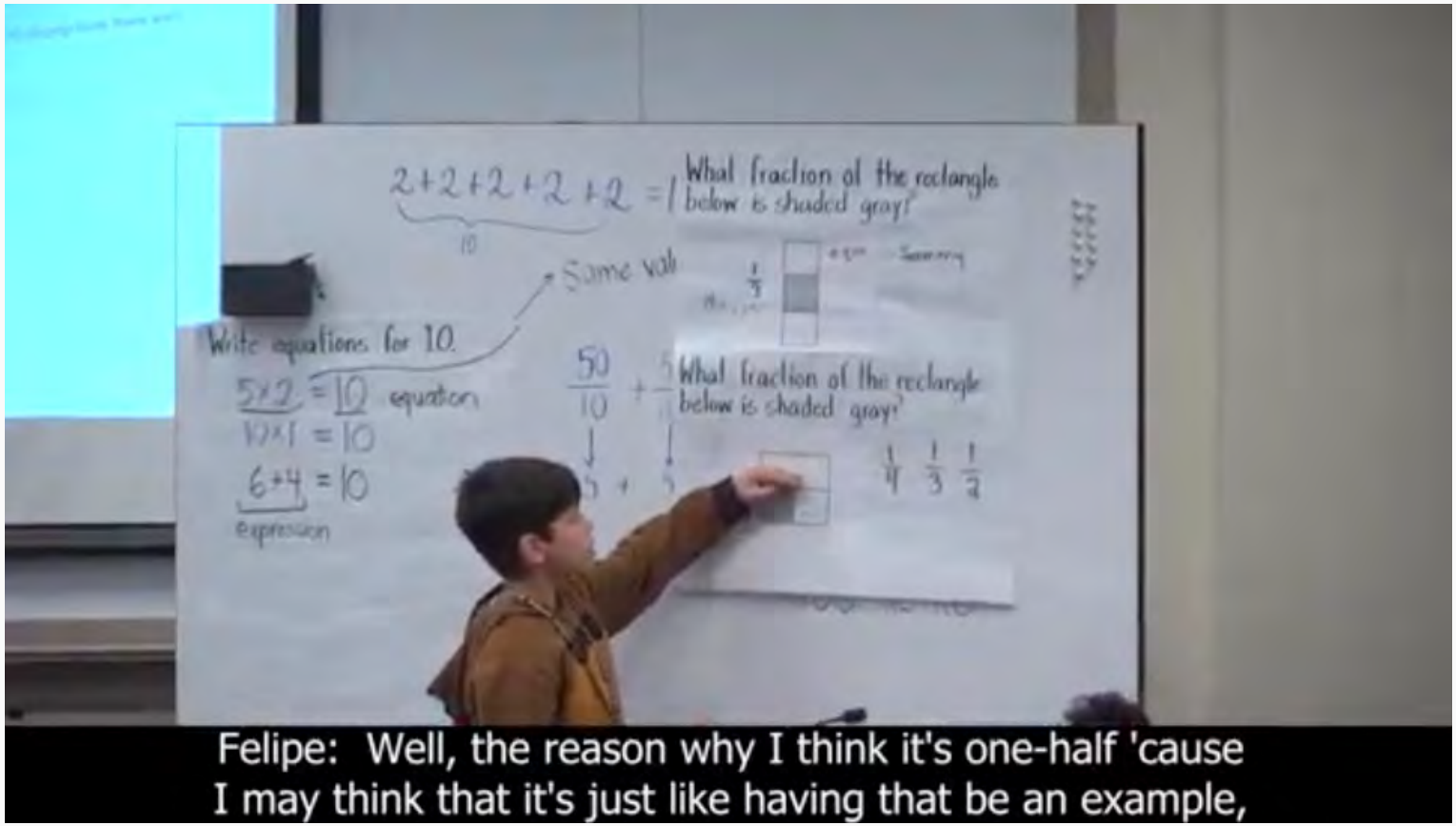
Viewing focus

Where and how do you see the teacher using their discretion in ways that differ from typical practice?

Video: Felipe



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Viewing focus

- **Where and how do you see the teacher using their discretion in ways that differ from typical practice?**
- **What are the potential impacts on Felipe's mathematics identity?**

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Types of identity building experiences

	Identity-affirming experiences	Identity-denying experiences
Stand out experiences	"In fifth grade I had a teacher who encouraged me to share my mathematical thinking. It really made me feel like I was capable."	"I was made fun of for solving a problem incorrectly. I was told this class was too advanced for me."
Recurring experiences	"I was always the person my teachers and peers looked towards when there was a difficult problem to solve."	"I always felt ignored in math class. No one ever seemed to value my mathematical thinking."

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Case #3: Ayana

Developing positive identities *in* mathematics

Ayana's Sense of Self

"I don't do that"

Ayana's Participation

- Across the first two days of the program, Ayana never volunteered to contribute during the mathematical discussion
- She did make two contributions across this time period, including one at the board. In both instances her contribution was spurred by a direct request from one of the teachers and Ayana appeared to make her contribution reluctantly
- Ayana declined a request from Mr. R to share her thinking

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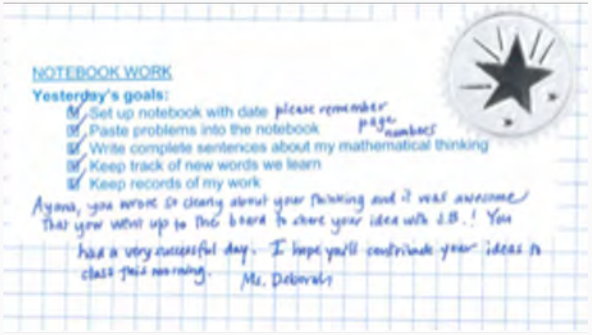
Case #3: Ayana

Teacher's efforts to nudge Ayana towards a more positive identity

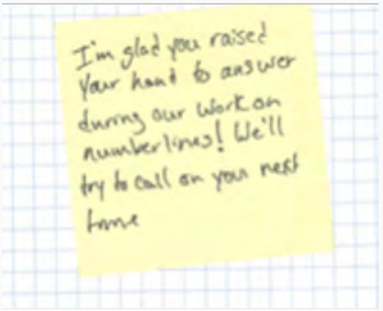

NOTEBOOK WORK

Yesterday's goals:

- Set up notebook with date *please remember page numbers*
- Paste problems into the notebook
- Write complete sentences about my mathematical thinking
- Keep track of new words we learn
- Keep records of my work

Ayana, you were so clearly about your thinking and it was awesome that you went up to the board to share your idea with J.B.! You had a very successful day. I hope you'll continue your ideas in class this morning. Ms. Deborah

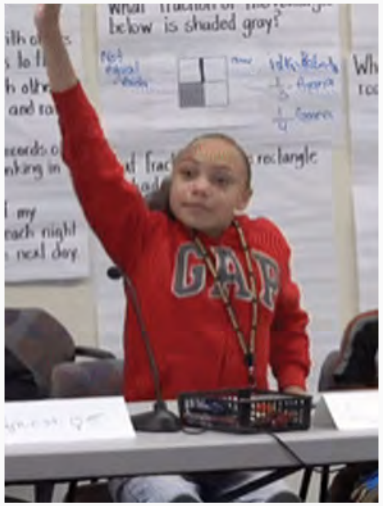
- Persistently positioned Ayana as a contributor to classroom discussions
- Respected Ayana's agency to decide not to contribute
- Utilized various material and relational resources to encourage Ayana's participation in discussions
  - Ayana's notebook
  - Ayana's prior relationships with J.B.


I'm glad you raised your hand to answer during our work on number lines! We'll try to call on you next time

“But Now I Am”

Ayana’s Participation

- On the last day Ayana raised her hand to volunteer 5 times during class
- She volunteers to and presented her thinking at the board



Video: Ayana’s Sense of Self

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3. How can teachers develop capacity to do this work?

What is needed to support teachers in advancing this critical work of developing students' mathematical identities?

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What kinds of learning are needed?

- Understanding **one's own identity** and how it plays in one's resources as a person and as a teacher
- Opportunities to understand **the role of mathematical identities** in students' development as people, and to see this as a priority
- Seeing and learning to make the **connections between mathematical identity development and learning**
- **Continuing to deepen Mathematical Knowledge for Teaching** to be able to hear students' thinking

Practicing:

- **Seeing and naming** students' enactment of their identities in classroom video cases and in their own classrooms
- **Noticing normalized habits** of interpretation and response and their impact

	Identity-affirming experiences	Identity-denying experiences
Stand out experiences	"In fifth grade I had a teacher who encouraged me to share my mathematical thinking. It really made me feel like I was capable."	"I was made fun of for solving a problem incorrectly. I was told this class was too advanced for me."
Recurring experiences	"I was always the person my teachers and peers looked towards when there was a difficult problem to solve."	"I always felt ignored in math class. No one ever seemed to value my mathematical thinking."

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In addition to knowing and believing: What does developing one's practice require?

- **Breaking habits** of interpretation and response that are identity-denying
- **Developing a repertoire** of alternative practices that are identity-affirming
- Exploring and trying out the role of **kinds of mathematical tasks** that open space for identity-affirming engagement in the mathematics learning goals
- **Recording one's own practice** to see what one is interpreting, saying, and doing and how students are responding
- **Deliberately attending jointly to students' identity development and learning** and that of the classroom, and journaling or keeping notes

This is all of our work.

We have power in our collective efforts to leverage the power of teaching to advance justice in our everyday practice, and to learn, to grow, to share, and to push forward with the fight.

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THANK YOU!

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Credits

Image on slide 30:
Guinness World Record-holder Owen Morse joggling during a training session at University of California, Irvine, in 1988.
Retrieved from https://en.wikipedia.org/wiki/Juggling_competition

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