

# Learning & Teaching

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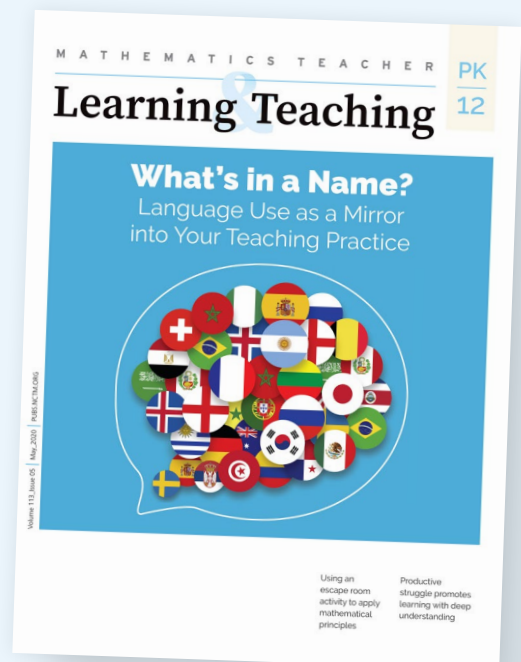
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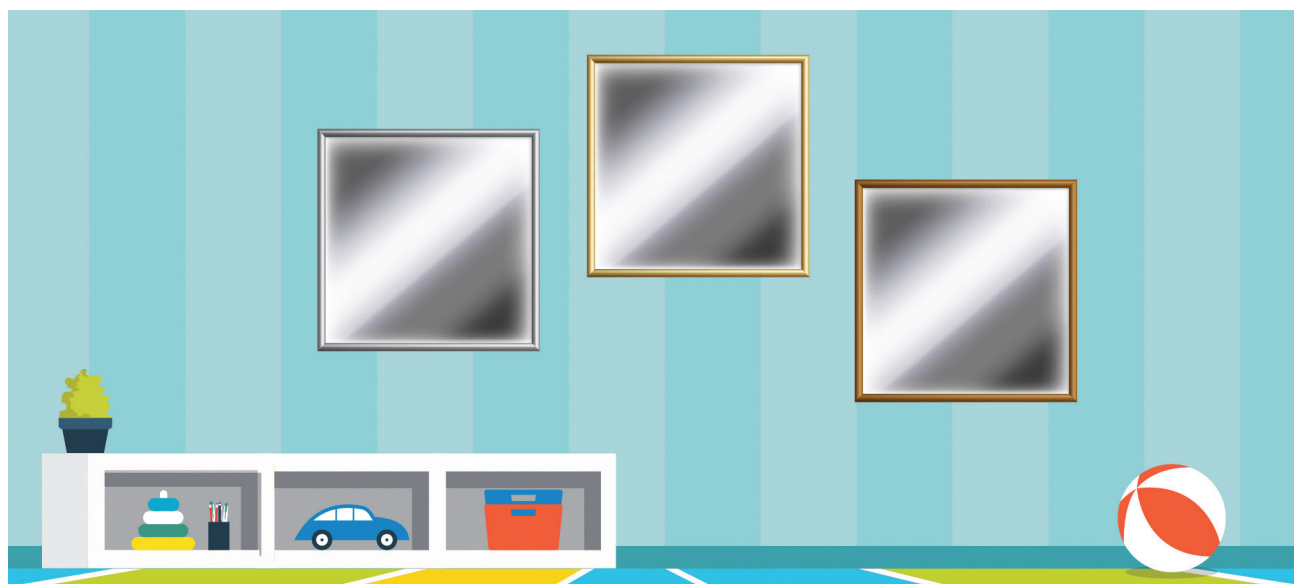
## Mission Statement

The National Council of Teachers of Mathematics advocates for high-quality mathematics teaching and learning for each and every student.

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# Identity Making in Kindergarten: Diego's Story

Read about Diego, a kindergarten student, as he develops his mathematical identity and competency.

Jody Guarino and Sara Manseau

**At what age do** you think students begin to identify as capable at mathematics? In this article, we share the story of Diego, a kindergarten student, navigating issues of mathematical identity and competence—his own and those of his kindergarten classmates. We, the authors, are a team of educators, including a kindergarten teacher (Sara) and a math teacher educator (Jody) who worked together on a quality improvement initiative associated with year-long, district-wide professional development for K-5 teachers around the topic of mathematical argumentation. The story of Diego

emerged within a lesson we co-taught in Sara's classroom. We want to share what we learned in the experience of this specific lesson and what it looks like to form a mathematical identity and then zoom out and reflect on what it might mean for our classrooms.

## TEACHER VISION AND BELIEFS

The role of classroom teachers is complex. Teachers support students in learning content, learning about themselves, and learning how to interact with others. They

keep students safe, attend to their motivation, and work to influence the future generation in productive ways. In this work, we make thousands of decisions every day, decisions Ball (2018) refers to as “discretionary spaces.” These moments are not dictated by policies or curriculum but are places where we make countless decisions. We decide which students to call on; what ideas to linger on; and if, when, and how to address student interactions. Similar to Ball, we view teaching as complex work in which we attend to the mathematics, our students, and their developing identities as learners and knowers. We think about social emotional learning, including agency, identity, and belonging, as being affected by everything we say and do as teachers, by the environments we create, and by interactions that take place.

### CLASSROOM CONTEXT

The classroom is in the southwestern United States at a Title 1 school with a majority of students and families identifying as Latinx. In addition, most students begin school learning English because it is not the language spoken at home. We had an opportunity to witness these kinds of discretionary spaces emerge in a kindergarten classroom as we explored subtraction strategies through the instructional strategy of mathematical argumentation. Mathematical argumentation can be messy (Rumsey et al., 2022) and has a lot to consider beyond mathematics content. For example, there are issues of equity and identity and who has the opportunity to share and be seen as a knower of mathematics. Whose voice is frequently heard, and what spaces are there to participate? As knowledge is built, who has ownership of that knowledge, and what pieces do students bring to the conversation? These questions emerged in a lesson involving argumentation and led to deep reflection.

### DIEGO'S STORY

One spring morning, sitting on the carpet in his kindergarten classroom, Diego and his peers were subtracting

10 from teen numbers and using ten-frames to represent their thinking (see Figure 1).

Jason noticed, “When you take 10 away, you can just cross out one ten-frame, you don’t even need to count.” Jason’s use of the language “take away” and “cross out” likely emerged from the students’ recent work with take away from story problems (National Governors Association for Best Practices & Council of Chief State School Officers, 2010) in which they mostly followed the action in the story. They had yet to explore subtraction as finding difference or thinking about distance. The teacher and students engaged in Jason’s idea, exploring with each of the teen numbers on the activity sheet. Together, they tried Jason’s method, testing

**Figure 1** Student Activity Sheet

Name: \_\_\_\_\_

Try more problems using the ten-frame strategy.  
What do you notice?

$$15 - 10$$



$$16 - 10$$



$$17 - 10$$



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his conjecture (see Figure 2). Noticing this conjecture worked with  $15 - 10$ ,  $16 - 10$ , and  $17 - 10$ , the teacher encouraged students to consider whether this conjecture would work for other numbers.

As he considered the teacher's question, Diego leaned over to Jody and whispered, "Jason's strategy works with other numbers too. You could subtract two 10s or more." On the back of his paper, he wrote "21, 22, and 23" (see Figure 3), explaining that a 10 can be removed from each of these numbers too. He added, "I told Jason, and he said it won't work. So, I agree with him; it won't work."

Jody responded, "Is there a way to test it out? How can you figure out if it will work or not?" In the moment, she nudged him to explore his conjecture and see for himself that indeed, his idea did work. He had done some important mathematical work: He noticed a pattern that 10 (or multiple 10s) can be taken away from other numbers too; he had made sense of and

extended Jason's conjecture; and he had provided specific cases of numbers this would work with. He communicated his thinking with a peer, engaged in a short discussion with Jason, and came to the conclusion that he was incorrect.

Students then transitioned from this mathematical experience to another activity. There was no time for Diego to test his theory at this time or share with other peers. In an attempt to celebrate Diego's thinking and position him as a competent sense maker, Jody asked Diego to share his idea with Sara, his kindergarten teacher. Diego showed Sara the paper, explained that he thought this could work with other numbers, and then shared how he no longer thought this was possible because Jason told him it would not work. Diego evidently saw Jason's perspective as true and his own as incorrect, perhaps seeing Jason as the authority. He mentioned the entire exchange to Sara, adding that he checked with Jason and that Jason said no. Upon hearing Diego's description, Sara's initial response to Jody was, "How have I positioned Jason? Do I call on him all the time?" The teacher's immediate response reflected her belief that teachers are identity workers (Gutierrez, 2013), that she plays a critical role in shaping each student's mathematical identity. Her questions were an attempt to understand how Jason was positioned in her classroom and why Diego might see Jason as a mathematical authority and himself as not as competent.

The next day we invited Diego to the front of the class to share his conjecture. How could we position him and other students in the class as competent thinkers of mathematics? "Attending to issues of identity and competence in relation to and through mathematics" (Aguirre et al., 2013, p. 6) was on all of our minds. His idea was recorded, and we asked him to share a number we could test. He offered  $30 - 10$ . We added a representation of 30, building on the ten-frame representations used the previous day. Students were invited to turn and talk, engaging in Diego's conjecture, sharing thoughts with a partner before working together as a whole group on the expression. A student noticed that the number 20 is two 10s and crossed off two 10s saying, "Thirty minus 20 makes 10." Knowing other students had ideas too, we asked, "When does it work to cross out two or more 10s?" Students called out a range of numbers, from 16 to 10 billion, which we added to the chart (see Figure 4). After investigating the suggested numbers to 100 (numbers familiar to students from daily counting), students concluded, "You can take

Figure 2 Charting From Class Exploration

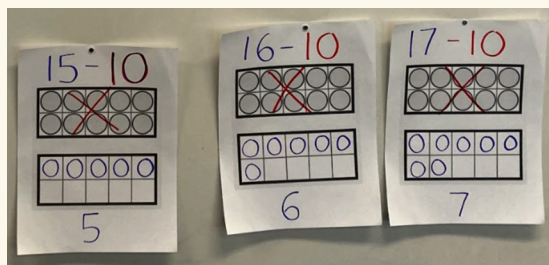


Figure 3 Back Side of Diego's Activity Sheet



away one 10, or lots of 10s, depending on the size of the number you're subtracting and the number you're subtracting from." By bringing Diego's conjecture to the class discussion, we attempted to shape his identity as a knower of mathematics while inviting other students to grapple with his conjecture.

Diego's story highlights a possible student exchange within a classroom that is incorporating mathematical argumentation or other discussions. Although many aspects of a lesson can be anticipated, the discretionary spaces that Ball (2018) shares are a component of teaching that requires attention and reflection. It is impossible to plan for and anticipate all the things that might emerge inside or outside of the classroom walls on a daily basis; however, noticing and attending to the instances that emerge are critical. In the case of Diego, we point to intentional moves, both in the moment and planned for the next day. In the moment, Jody shared her interest in Diego's work and nudged him to test his conjecture, showing that what he said mattered and that his idea was worth thinking about. Other moves take a bit more planning, such as bringing Diego's idea

back to the class the next day, positioning him as a competent sense maker within the community. Part of the work of teaching is understanding our role in supporting students to see themselves and one another as knowers and doers of mathematics. We can have "in the moment" moves or phrases that immediately show our interest in the student's idea and allow them to be heard, and we can have more intentional planned responses that can occur the next day.

### CLASSROOM TEACHER'S REFLECTION

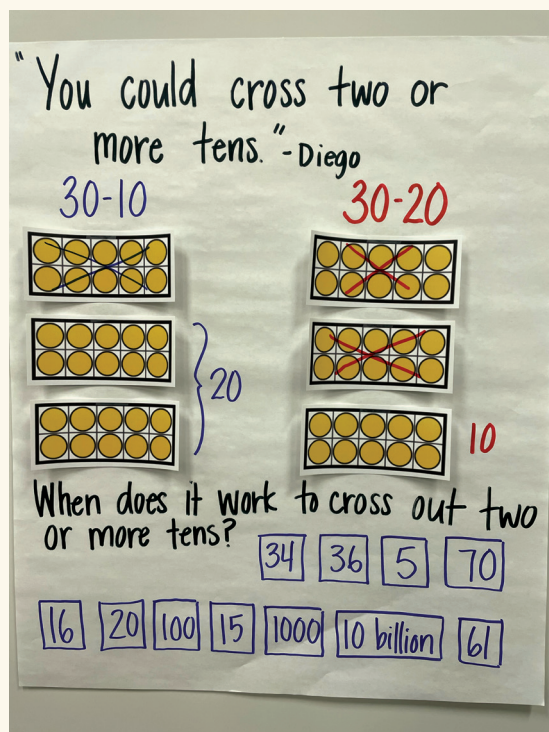
A month later Sara was still reflecting on this exchange, writing:

I started thinking about my decisions throughout the year, even throughout the day. It's interesting to note that Diego and Jason don't sit next to each other, so Diego had to intentionally seek Jason out for his opinion. Why did he appeal to Jason? I continue to think about this, now a month later, thinking about other instances where there were signs of this. Each day there's a star student that calls on peers to help with daily tasks, respond to questions and share ideas. As I think about this, it's frequent that Jason is one of the first students called on by his peers. Why is this? I had to have been positioning Jason as a sense-maker or authority, so moving forward, I'm going to be very aware of who I'm calling on, when, and what is happening between my students. I want to better understand what led Diego to see Jason as a sense-maker and not himself. In the moment I thought about how I positioned Diego, and how I could intentionally position him, and other students. I could make explicit some of the moves Diego and other students made as we continue our conjecture work.

### CONCLUSION

In addition to teaching mathematics, we teach humans, and what we do as teachers matters. The ways students see themselves and each other unfold in part from their experiences in our classrooms. We believe that as teachers, the environment we create and everything we do and say affects student identity in one way or another. As the teacher reflected on this experience, she wondered if situations like this were frequent in her classroom and she had failed to notice them. In

**Figure 4** Co-Constructed Anchor Chart From Diego's Conjecture



this case, an additional mathematics teacher educator was in the classroom, and that offered an additional lens. Had Diego not shared with Jody, this interaction would likely have gone unnoticed. Having an additional teacher in a classroom is not a typical experience, so what can we do as teachers to intentionally attend to student identity? We do not have an exhaustive list, but we offer a few ideas:

1. Be aware of how we evaluate our students on formative assessments and what we do with that information. How do we talk about the students with colleagues? Are we using asset or deficit language (Guarino et al., 2022)? Be intentional in the language we use. If we see our students and the assets they bring, does that shift our beliefs and the narratives and experiences we create for them?
2. Be purposeful about how we group students and what the purpose of small-group work is. Are

students being set up to listen to peers, or are they being set up for one leader to emerge?

3. Intentionally look for ways and spaces to leverage the assets of our students and position them as competent sense makers. When noticing student brilliance, consider ways to bring that brilliance to the group, as we did with Diego's idea.
4. Reflect on your practice individually or invite a colleague interested in doing this work to join you. Record and watch lessons, listening carefully to notice interactions, and consider how those interactions contribute to student identity.

Teaching is complex work, and we can always learn and reflect on more. Although we cannot always capture our students' brilliance, we can be intentional about looking for it in each and every one. We hope that the story of Diego (and Jason) offers insights on how to attend to discretionary spaces wherein positive mathematics identities can develop. —

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