

Cultivating Collaboration and Responsive Practices in UCLA Math Labs

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About EdPrepLab

EdPrepLab, an initiative of the Learning Policy Institute and Bank Street Graduate School of Education, aims to strengthen educator preparation by supporting learning and sharing research and practices among programs, school districts, and policymakers. EdPrepLab supports programs and informs policies that incorporate the science of learning and development to enable deeper learning and equity, working to expand these approaches nationally and internationally.

About This Brief

This brief describes how the UCLA-LAUSD Community of Practice (CoP) initiative serves as a model for leveraging research-based approaches from the science of learning and development to inform professional development for educators. The initiative utilizes math labs as a collaborative, classroomembedded model that promotes asset-based instructional practices and supports teachers in understanding and addressing students' mathematical thinking. Whether implemented in physical or virtual spaces, CoP math labs highlight the power of working together to enrich math teaching and learning experiences.

Introduction

New developments in neuroscience provide important insights into how educators can be prepared and developed to create vibrant learning environments where all children and adolescents thrive. The science of learning and development (SoLD) shows that when teachers hold the mindset of an equitable educator, use their curriculum knowledge to engage students in deeper learning, and build positive relationships with students to support the whole child, teachers will be equipped to provide rich learning experiences for learners.¹ To learn and practice the skills necessary for deeper learning and whole child education, educators themselves need to experience active, applied, and collaborative learning opportunities.

Using this research-based framing, UCLA incorporates SoLD program design elements into its educator development efforts through two graduate credential programs and a range of professional development initiatives. One such initiative is the Community of Practice (CoP),² a partnership between UCLA and schools in LAUSD. The CoP focuses on supporting teachers in aligning math teaching practices with students' needs. This brief examines the CoP's math labs—a collaborative, classroomembedded professional development model that enhances teaching and learning, adapts to virtual spaces, and promotes asset-based instructional practices.

UCLA-LAUSD Community of Practice Partnership

Housed in UCLA's Center X, the UCLA Community Programs Office oversees subject matter professional development and partners with LAUSD to provide support and resources to schools near the university's campus. One of these supports is the Community of Practice (CoP) initiative, launched in 2020 as a project designed to improve math outcomes in secondary schools. The CoP embeds professional learning directly into classrooms, providing teachers and their preservice student teachers with a collaborative framework to strengthen effective teaching practices. The initiative is guided by three primary goals: (1) support teaching practices that focus on understanding and responding to students' mathematical thinking, (2) create spaces for teachers to collaborate, and (3) work alongside teachers to cultivate asset-based perspectives of teaching and learning math.

The CoP began with the director of math instruction and learning at UCLA connecting the math departments of five middle and high schools to form 10 teams of teachers grouped by school or course area. Teams included math teachers from the same school across different content areas (e.g., 7th-grade algebra and 10th-grade geometry) or math teachers from different schools teaching similar content (e.g., Algebra I and Algebra II). Both configurations created a collaborative space for teachers to observe one another's teaching; reflect on practices; give and receive feedback; and refine pedagogical approaches to better elicit, understand, and extend students' mathematical thinking. Each of the initial 10 CoP teams also included a UCLA partner. CoP leaders from the university engaged with teacher participants as colearners in a collective inquiry into the teaching and learning of math³ rather than acting as external experts who demonstrated "how to do it right." This approach reinforced the collaborative intent of the CoP and equipped teachers to continue using math labs even beyond UCLA's involvement.

The Math Lab Protocol

A UCLA partner coordinated a rotating schedule of host and visiting schools for each team's monthly math lab. Most commonly, labs included the entire math department of a host school, one or two teachers from several predetermined visiting schools, and a UCLA partner, as well as any teacher candidates with math placements in the schools. Typically, substitute teachers cover the host teachers' classes, and the team meets on site in the morning to begin planning their lesson and rehearsing the lesson's activities. A host teacher volunteers a class for the lab, and the team decides on two teachers to cofacilitate the lesson. The remaining teachers and UCLA partner position themselves in the classroom to listen and observe student engagement and learning. After the lesson, the team debriefs and repeats the math lab cycle for the remainder of the school day. Using this model, visiting teachers then take the learning experience back to their schools and replicate the math lab with their teachers and students.

1-Day Math Lab Cycle

The team includes a UCLA partner, host teachers, and visiting teachers. A 1-day math lab cycle includes the following steps:

- Team begins the day by reading an article or research to set the stage for the lab.
- Team collaboratively plans a math lesson.
- Team rehearses a math activity designed to promote mathematical thinking.
- Two teachers volunteer to coteach the lesson in a classroom setting. The remaining host and visiting teachers and the UCLA partner observe students during the lesson.
- Team debriefs to reflect on outcomes and insights.
- Team repeats the coteaching, observing, and debriefing cycle for the remainder of the day.

Source: Provided by authors. (2025).

A typical CoP team-teaching lesson consists of the following:

- Warm-Up: Two teachers, who could be from either the host school or visiting schools, facilitate a math routine, or warm-up, such as a "number talk," in which one teacher poses a math expression (e.g., 15 x 12) and the other encourages students to consider a variety of ways to arrive at the solution. During the warm-up, teachers seek to build collective efficacy among the students by encouraging them to share their thinking with each other and make sense of shared strategies in a whole-group discussion. By highlighting multiple approaches to solving problems, teachers emphasize that there are often many valid ways to think about and approach math. Teachers also practice strategies such as restating and building on student ideas to deepen understanding and ensure that all voices are included. These SoLD-aligned practices not only nurture a sense of confidence in students but also help teachers learn to encourage participation by affirming how students think about math. As one CoP team member shared, "Students are a lot more engaged when we're focusing on their strengths."
- Lesson: The two facilitating teachers then introduce a math task (e.g., a word problem). The other teachers assume the supporting roles of interacting with students by sprinkling themselves around the classroom to oversee groups of four to six students. By focusing on small groups, teachers can better observe students' mathematical understanding. This provides a unique perspective, and participating teachers often

share that they hear "a lot of great math ideas" that they usually do not hear when they teach by themselves. One CoP participant explained:

You have some kids who are just more reserved, quieter. They might talk to their elbow partner, but not necessarily raise their hand, but they bring up an awesome idea in a small group. When that happens, the teacher with the group might say, "Hey, I heard Jimmy say something today that's really awesome. Can we bring up Jimmy's idea as part of the whole-group discussion?" And Jimmy doesn't really talk in class, but we position Jimmy as competent.

Teacher Time-Outs

Throughout the lesson, the CoP teachers actively seek opportunities to initiate teacher time-outs (TTOs). These intentional pauses, lasting approximately 30 seconds, occur during the lesson, in front of students, and allow the teachers to engage in collective thinking and consider instructional moves that are then implemented in real time. The TTOs are a responsive and reflective teaching approach, enabling educators to adapt their instruction in the moment based on students' thinking processes as they unfold.⁴ TTOs create authentic spaces for educators to make their pedagogical reasoning transparent to both students and their colleagues, sharing the rationale behind their instructional decisions and receiving immediate feedback from colleagues. One team member noted that students chime in too:

At first, [students] don't recognize that it's the teachers huddling. I might say, "Hey, teacher time-out. We said that we would only give ourselves 15 minutes for the number talk. This is a time where we could call on maybe a couple more students, because there's a lot of ideas that haven't been brought up yet, especially with the kids here in the back. Or do we transition to the next part of the lesson?" The kids themselves will answer, thinking it's for them. They'll say, "Oh yeah, let's get some more of those ideas. We haven't heard from Jimmy yet." It's hilarious.

Allowing students to witness these TTOs gives teachers opportunities to model practices such as collaboration, giving and receiving feedback, making thinking public, and willingness to take risks.

Deep Experiential Teaching and Learning Through Math Labs

The CoP supports teacher development in math pedagogy by centering student learning and providing teacher participants with opportunities to observe, examine, and reflect on effective instruction. Through these inquiry cycles, participating teachers work together to analyze student products, plan instructional activities, and enact and reflect on lessons. This process makes teachers' thinking and instructional decision-making visible to one another and to their student teachers, creating opportunities for growth and professional learning. Because math labs are classroom-embedded, they provide rich, real-world, real-time opportunities for teachers, no matter what their experience level, to support one another and grow effective teaching practices that result in deep learning for students.⁵ This SoLDaligned structure encourages collaborative communities of practice that attend to the social aspects of learning and provide space for educators to engage in interactive, constructive, and iterative professional development.⁶

One advantage of math labs as professional development is that they routinize the debriefing process. Research shows that while post-instruction reflection and collective debriefing is a powerful learning tool for teachers, many teachers have limited opportunities to engage in them due to time and capacity constraints.⁷ During a math lab, the CoP collects student work samples from the lesson and convenes to review and discuss the artifacts. This provides dedicated time to debrief and collaboratively make sense of students' mathematical thinking. Teachers are asked to talk about what was exciting for them, what surprised them, what math they saw, and what they might do to build on what students did and learned that day. This reflective process of debriefing strengthens the team's shared knowledge and promotes a culture of continuous improvement. It provides a space for teachers to be generative, and by examining the work together, teachers gain a deeper understanding of how students are interpreting and applying mathematical concepts. This component of the lab is often stimulating for participants. One CoP member said:

Sometimes folks get so excited that before the school day ends we iterate a second time. They immediately say, "We've got to go into my class right after lunch" or "No, wait now, we've got to try it in my very last period. I want to do the choral counting in my class for the last 30 minutes at the end of the day." An idea excites them, so we decide in the moment to do it again.

This generative excitement demonstrates the power of experiential learning for teachers– not only for improving their practice and deepening student learning but also for reigniting participants' passion for teaching.

The Virtue of Virtual

During the 2020-21 academic year, the CoP transitioned its math labs to a virtual space in response to school closures triggered by the COVID-19 pandemic. Because the labs had gained momentum and were supporting student and teacher learning in physical classrooms, educators were eager to try this model in online teaching. The CoP leveraged the opportunity and found that virtual learning spaces opened a way to facilitate increased collaboration and professional learning across classroom boundaries. In some cases, teachers at the same school who were interested in engaging their students in similar warm-ups or problem-solving activities combined their Zoom classes during the same period. More often, teachers from different schools who taught similar periods and content areas (e.g., algebra and 8th-grade math) collaborated. Similar to the prepandemic protocol used for in-person labs, virtual math labs consisted of host and visiting school teachers and often a UCLA partner who worked as a team to plan a lesson, rehearse the plan, enact the warm-up and lesson, and debrief to analyze student thinking and guide next instructional steps. (See Dot Talk: Team Teaching in a Virtual Math Lab for how one CoP team supported students.)

Teachers embraced the virtual environment's features–chat, unmute button, breakout rooms, and various applications–using them to promote inclusive and supportive learning experiences. Students had opportunities to share their thinking in multiple ways and had the agency to choose the modes of participation that felt most comfortable for them. By integrating virtual tools, teachers cultivated environments that celebrated diverse learning styles and modalities, ensuring that each student had a meaningful way to engage. For example, students who preferred to express their ideas through typing or other nonverbal means were given equal opportunities to participate and contribute. The inclusive ways in which the CoP used virtual tools not only promoted a sense of belonging and empowerment for all students but also provided teachers with a more comprehensive understanding of their students' mathematical thinking and abilities.

The virtual math labs, regardless of the ratio of student to adult participants, proved beneficial for surfacing and making sense of students' verbal ideas in real time, as well as the numerous nonverbal ideas typed in the chat or added to applications (e.g., Padlet, Google Docs). Even when many students had their cameras off, teachers were still able to notice and engage with them by asking them about their mathematical thinking in the main Zoom room and in breakout groups. This approach provided teachers with valuable opportunities to recognize that students off camera, who might have been misjudged as "lacking energy" or "disengaged," were attending to the lesson and had mathematical strategies to contribute.

Dot Talk: Team Teaching in a Virtual Math Lab

Thirty-nine middle school Algebra I students from two different schools joined the virtual meeting along with two teachers from the host school and one teacher from a visiting school. Some students joined the virtual room with their cameras on, revealing sleepy eyes, a fluffy pillow, or an oversize sweatshirt. Others had uploaded images to reveal a little about themselves: Lakers fan, dog owner, anime enthusiast, taco devotee.

The math lab session opened with a series of cheerful "Good mornings" as Janet Lee-Ortiz, the host teacher, and Jennifer Camacho, a teacher candidate, welcomed Arbin Lubiano, the visiting teacher, along with his class of students as they logged in from across the city. During an earlier lesson planning time, the team decided Camacho would facilitate the warm-up with support from Lee-Ortiz, and Lubiano would monitor the chat.

Camacho began by explaining the structure of the math lab and introduced a "dot talk" warm-up, which is an interactive math activity in which students view a pattern of dots for a few moments, promoting quick visualization of arrangements, and then discuss how many dots they saw and the visual strategy they used to count them. Dot talks are often used to strengthen students' understanding of quantity, grouping, and relationships between numbers.

Camacho shared her screen to reveal an image of groups of 12 small red figures resembling robots. The students immediately recognized the images as crewmates from *Among Us* (a popular video game)—an engaging theme the teachers discovered the prior week by listening closely to students talk about their interests.

Camacho asked, "How many *Among Us* dots are there?" After a brief pause, she stopped her screen share and solicited student ideas.

Eduardo unmuted himself and said, "There's 12. I counted by 2s."

Camacho asked, "Do you want me to circle two at a time?"

"Which 'two' did you see?" Lee-Ortiz prompted.

As Eduardo explained, Camacho notated on the shared screen so that all participants could see the visual representation of Eduardo's thinking. The following dialogue and typed chat ensued.

Line	Participant	Verbal	Typed into chat
1	Ms. Camacho	How would you write that in an expression to figure out the total? If you group them by 2?	
2	Emilio	Multiplied by 2s and that's how I got 2. You could get it by counting 2s.	

Line	Participant	Verbal	Typed into chat
3	Ms. Camacho	But then you said multiplication. How did you multiply?	
4	Alicia		Can I try?
5	Ines	I was thinking that maybe he meant it, 2, 4, 6, 8, 10, 12.	
6	Ms. Camacho	Is there another way of writing this?	
7	Lola, Nigel		2 x 6
8	Ms. Camacho	How do we know it's 2 x 6? Writes 6(2) on the screen.	
9	Mr. Lubiano		Students in line to participate: Maria, Arleen, Michael
10	Nigel		There are 2 crewmates in 6 boxes
11	Ms. Camacho	So many people want to share.	
12	Ms. Lee-Ortiz	Alicia has a good idea to share.	
13	Alicia	I did 11, but that didn't count. I counted again to get 12. I grouped them by 3s. 3 at the top, 3 in the middle.	
14	Ms. Camacho	Like this? Circles four groups of three.	
15	Alicia	Yes, in the middle.	
16	Ms. Camacho	How would we write that expression?	
17	Alicia	6 + 6. That equals 12. Or 3 x 6. 3 + 6–my bad. I meant 3 + 3 + 3 + 3.	
18	Ms. Camacho	You did addition. Look at the [earlier model]. What is another way we can write that? Silence	
19	Alma		3 x 4 3 x 4 = 12
20	Ms. Camacho	Our chat is blowing up with how you want to share. Some people are getting compliments in the chat. I want to be a part of that.	
21	Oliver	Explains idea in Spanish.	
22	Ms. Camacho	 Annotates and repeats Oliver's idea in Spanish. Translates to English. First, he saw a group of 3, then 2 more: 5. Then he saw 4 right there and 3 below that, which gave him 7. Layer by layer and then grouped it together: 5 + 7; 3 + 2 + 4 + 3. 	

Line	Participant	Verbal	Typed into chat			
23	DIRECT MESSAGE					
	Ms. Lee-Ortiz D	Ms. Lee-Ortiz DMs Ms. Camacho: Do you mind if I build on Oliver's idea?				
	Ms. Camacho to	Ms. Camacho to Ms. Lee-Ortiz: Sure!				
24	Ms. Lee-Ortiz	Highlights 2(3) + 6.				
		Is there another way we can write this expression?				
25	Ali		6 + 6			
26	Felipe		8 + 4			
27	Lola		6(2)			
28	Mr. Lubiano		Love the groupings!			
29	Ines	There was 8 + 4 in the chat.				
30	Ms. Lee-Ortiz	Where's the 8? We want to respect how this person saw it. Are these the same things? 6(2) 2(6). A lot of you are saying yes.				

Source: Provided by authors. (2025).

The Dot Talk vignette highlights the value of teacher collaboration in creating responsive and effective instructional practices that center students. By actively engaging with student ideas and leveraging multiple representation strategies, the teachers created a dynamic learning environment in which instructional decisions were informed by students' unique perspectives and mathematical reasoning. While the teachers planned the warm-up and subsequent lesson beforehand, their pedagogical moves were responsive, adapting organically to the ideas students shared. In-the-moment adjustments centered students' mathematical thinking and promoted active participation within the remote learning structure. When schools resumed meeting in person after the pandemic, the CoP chose to maintain a mix of in-person and virtual math labs.

Developing Asset-Based Perspectives and Responsive Teaching

In both modalities, the CoP engages teachers in cultivating asset-based perspectives around teaching and learning. It seeks to encourage math teachers to take a student-centered perspective and focus on students' strengths, such as what they know and the experiences they bring to the classroom. This can be a challenge in a culture that perpetuates deficit perspectives toward students of color, students experiencing poverty, and multilingual learners.⁸ Deficit perspectives can seep into classrooms, and, consequently, instructional practices may unintentionally reinforce limiting beliefs about students' learning and potential, particularly in subjects like math and science.⁹

To disrupt deficit notions about who is a learner and doer of math, the CoP promotes teaching practices that surface, focus, and build on the strengths of students. These interactive labs encourage teachers to adopt a strengths-based mindset, intentionally focusing on students' capabilities, assets, and mathematical thinking processes. Through their language and focus during class, teachers model for each other ways to leverage students' unique perspectives; they celebrate and build upon what students can accomplish. The CoP helps teachers learn how to engage in responsive teaching–focusing teachers' attention on the ways that students' ideas are valued, attended to, and taken up¹⁰ and basing instruction on the substance of students' mathematical thinking.¹¹

The Dot Talk vignette shows how, through their collaborative efforts, the teachers transformed what could have been perceived as an isolated and impersonal space into a safe, supportive environment–one in which students would be comfortable taking risks, sharing their mathematical ideas, and communicating in their first languages (e.g., line 21) without hesitation. For example, once Emilio shared his idea about the number of crewmates, other students were able to engage with and build on his thinking using ideas specific to quantity, equivalence, and numerical expressions. Students were also able to take risks and revise their thinking; for example, Alicia initially counted 11 but then recognized the quantity as 12. Here, the math lab approach served to create a learning environment in which students had a sense of belonging and were willing to revise their thinking as they interacted and deeply engaged with math strategies.

Furthermore, math labs support teachers in taking an asset-based perspective on student thinking–using student ideas, perspectives, math strategies, and reasoning–as the basis for making instructional decisions. Camacho enacted a series of strategies to elicit and center students' mathematical ideas. She invited students to explain (line 1), asked follow-up questions (line 3), invited students to engage with others' ideas (lines 6, 8, 18), focused on the accuracy of the representation (line 14), pressed a student to extend an idea (line 16), centered participation (lines 11, 20), and revoiced and translated (line 22). As Lubiano monitored the chat, he positioned students as competent (line 28) and supported students to participate (line 9). These collaborative strategies demonstrate how math labs empower teachers to build on students' strengths, positioning their thinking as a valuable foundation for deeper mathematical exploration and instructional decision-making.

Through the collective sharing of practices, teachers in the CoP gain insights into students' mathematical funds of knowledge. This creates a collaborative environment where teachers can analyze and reflect on students' ideas, strategies, and reasoning. This process helps teachers shift from focusing on what students lack to recognizing the value in students' thinking. By observing and discussing real classroom examples, teachers learn to view

students' diverse perspectives and mathematical approaches as assets, which then informs their instructional decisions in a way that builds on students' strengths. This asset-based perspective empowers teachers to design lessons that are more responsive and inclusive of students' unique ways of understanding math.

Conclusion

As of 2024, more than 30 teachers from 13 LAUSD middle and high schools had participated in CoP math labs. The program's success stems from the strong, meaningful connections teachers form with their colleagues, united by a shared commitment to create math learning experiences in which each student's mathematical ability is recognized and celebrated through an asset-based approach. These labs, in both physical and virtual settings, provide responsive and equitable learning opportunities for students while serving as an innovative model for job-embedded professional development. Educators learn from one another by modeling and practicing strategies to tap into and analyze student thinking, enabling informed instructional decisions. Grounded in the principles of SoLD, the CoP creates active, applied, and collaborative learning experiences for teachers that reflect the rich, whole child educational environments they aim to create for their students.

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Endnotes

- 1 Learning Policy Institute & Turnaround for Children. (2021). *Design principles for schools: Putting the science of learning and development into action.*
- 2 The CoP is a derivative of a Carnegie Corporation of New York grant.
- 3 NCSM-TODOS. (2016). Mathematics education through the lens of social justice: Acknowledgment, actions, and accountability.
- 4 Gibbons, L. K., Kazemi, E., Hintz, A., & Hartmann, E. (2017). Teacher time out: Educators learning together in and through practice. *Journal of Mathematics Education Leadership*, *18*(2), 28-46.
- 5 Kazemi, E., Gibbons, L., Lewis, R., Fox, A., Hintz, A., Kelley-Petersen, M., Cunard, A., Lomax, K., Lenges, A., & Balf, R. (2018). Math labs: Teachers, teacher educators, and school leaders learning together with and from their own students. *Journal of Mathematics Education Leadership*, 19(1), 23-36.
- 6 Darling-Hammond, L., Hyler, M. E., & Wojcikiewicz, S. (with Rushing, J.) (Forthcoming). *Design principles for teacher preparation: Enacting the science of learning and development*. Learning Policy Institute.
- 7 Mohd Nor, N., Mohd Zain, N., & Ab Rahman, S. N. (2024). Teachers' knowledge of the debriefing process: The nominal group technique approach. International Journal of Education, Psychology, and Counseling, 9(56), 911-923.
- 8 NCSM-TODOS. (2016). Mathematics education through the lens of social justice: Acknowledgment, actions, and accountability.
- 9 Jilk, L. M. (2016). Supporting teacher noticing of students' mathematical strengths. *Mathematics Teacher Educator*, 4(2), 188-199.
- 10 Bishop, J. P., Hardison, H. L., & Przybyla-Kuchek, J. (2022). Responsiveness to students' mathematical thinking in middle-grades classrooms. *Journal for Research in Mathematics Education*, 53(1), 10-40.
- 11 Dyer, E. B., & Sherin, M. G. (2016). Instructional reasoning about interpretations of student thinking that supports responsive teaching in secondary mathematics. *ZDM*, *48*(1), 69-82.

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