

Meeting 37 Summary

Solving California's Mathematics Problem: Equity, Capacity, and System Improvement

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Long Beach, California

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***Note:** This meeting summary was developed as a resource for members of the California Collaborative on District Reform. We are making this document publicly available in an effort to share the work of the Collaborative more broadly to inform dialogue and decisions of educators throughout the state. This summary does not, however, contain the background and contextual information that might otherwise accompany a product created for the general public. For more information about the meeting and other Collaborative activities, please visit www.cacollaborative.org.*

California school districts have long struggled to help their students reach high levels of skill and understanding in mathematics. Yet outcomes on both state and national assessments continue to reveal a combination of low overall performance, slow growth over time, and persistently large gaps among student groups. To help understand the challenges underlying these results and explore strategies for addressing them, the California Collaborative on District Reform convened for the 37th time in December 2018. The meeting presented an opportunity to revisit mathematics as a topic of ongoing Collaborative interest: Previous convenings had examined decisions about enrolling students in Algebra 1 in eighth grade (June 2009), unpacked the content of the Common Core State Standards in mathematics (June 2010), and considered various issues related to transforming classroom instruction to align with the state's new standards (December 2014). The meeting also enabled participants to consider mathematics improvement through the lenses of the Collaborative's three priority areas identified in June 2017: turning persistent attention to issues of equity and access; building teacher, administrator, and system capacity; and embracing a culture and practice of continuous improvement. This summary highlights key details and themes that emerged during the two-day meeting.

Student Performance in Mathematics: Unpacking the Problem

Participants began the meeting by pursuing a central feature of continuous improvement strategies: problem definition. To better understand the nature and potential underlying causes for troubling student outcomes in mathematics, meeting participants examined

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several sources of evidence related to mathematics teaching and learning in Long Beach Unified School District (LBUSD):

- Measures of *mathematics achievement*—both overall performance and growth scores on the state assessment, disaggregated for various student groups
- Indicators of *social and emotional learning* from student surveys
- *Student perceptions* of their mathematics experiences in school, derived from “empathy interviews” with African-American seniors
- *Teacher feedback* on their professional development in mathematics
- *Research* on “warm demanders” and the ways in which they foster student learning

Participants first reviewed the evidence provided in small groups, with each group focused on one data source. Results of these initial conversations were then shared in a “jigsaw” format in which participants reorganized into new groupings, all of which had at least one representative from each of the five data sources.

Notable Observations About the Mathematics Problem

Among the many observations that emerged from the data, participants drew attention to several key takeaways relevant to student performance in mathematics.

Achievement

The first was that perceptions about which grades struggle shifted depending on whether individuals were reviewing achievement data (the percentage of students meeting standards) or growth data (the degree to which student performance has improved from one year to the next relative to what was predicted). The state’s accountability system has traditionally considered only achievement data, and by that measure, meeting participants observed that fourth grade compared favorably to other grade levels in terms of the percentage of students meeting standards. When group members looked at growth data, in contrast, they found that other grade levels were actually advancing student learning at a faster rate—even if overall achievement levels were lower.

Student Experiences

Small groups also called out findings from the student perspective. Meeting participants regularly commented on the importance of relationships between students and teachers in shaping student experiences in mathematics. Empathy interview responses also pointed to challenges with pacing in mathematics classes. When they had trouble with mastering content, students often wished to spend more time and receive more support, but it was at these times that they found teachers pressing forward to new content instead. As one participant observed, “Pacing guides are sometimes the death of teachers because they encourage teachers to move forward when their students are encouraging them to stay back.”

Teacher Experiences

Comments across small groups also drew attention to teacher experiences. Participants observed that teachers shared consistently positive reactions to opportunities for collaboration with their peers. However, they also expressed the desire for more follow-up. According to one participant, “Everyone appreciates time to collaborate with their colleagues, but opportunities are best when they come with coaching for facilitation. It’s not effective to just get together.”

Need for More Evidence

Participants also noted that to fully define the factors that contribute to gaps and low performance in mathematics would require additional sources and analyses of data than were available in this short exercise.

Reflections on the Process of Problem Definition

Across all the data sources, small group conversations, and full group reflection, several observations about the process of problem definition emerged.

Considering Evidence From Multiple Sources, Through Multiple Lenses

First, participants emphasized the value of looking at multiple pieces of data through multiple lenses. From an achievement standpoint, educators can reach different conclusions from proficiency and growth data; considering both contributes to a more thorough understanding of strengths and challenges. Likewise, examining performance for student subgroups helps illuminate equity concerns and the need for differentiation. School-by-school results can identify pockets of success and inspiration as well as targets for intervention and support. Beyond achievement data, however, it is critical to triangulate the findings from multiple data sources to develop a comprehensive picture of the challenges that need attention. Incorporating student voice, participants suggested, is a vital component of that process.

Understanding Measurement and Inference

Meeting discussion also highlighted the need to attend to issues of measurement and inference. As district and school leaders review data, they should take into account the questions or tasks that generate a particular finding and consider what any measure is actually capturing. Similarly, educators who review data should beware the temptation to ascribe causality to observational or even correlational pieces of evidence. Data play a critical role in helping to illuminate issues, but they might function best in initiating conversation and further exploration. As one participant advised, “Don’t make early judgments. Do a scan, but then go deeper into all the issues.”

Using Data to Inform Decision Making

Participants suggested that data might be most useful when districts and schools use them as the basis for action. This process of designing and refining approaches based on evidence is fundamental to the process of continuous improvement. For example, LBUSD leaders use the information they collect to allocate resources and differentiate supports to

schools based on need. Reviews of data can also motivate action to learn more about a problem. For example, teacher experiences with professional learning—one of the evidence sources used in the meeting’s jigsaw activity—may shed light on teacher needs, but such information can be more valuable when combined with evidence about instructional quality. When district leaders build on their analysis by combining different pieces of information, they can help to avoid jumping to conclusions or formulaic responses that have failed in the past.

Striking a Balance of the Right Amount of Information

For all that data can do to help, conversation also elevated the tension of having enough data to fully understand a problem without overwhelming the people charged with using them. Data collection and analysis require time and money, and the in-depth activities that extend beyond state-required metrics can be among the most expensive. One individual described the approach her organization uses to navigate this tension: “When we work with schools to set up data collection, we tell them to only collect what they think they’ll use. Otherwise you’ll drown in data.”

District Approaches to Addressing Local Mathematics Challenges

The exercise of reviewing evidence gave participants a basic understanding of some of the mathematics challenges in LBUSD, but the problems that exist within a given district and the strategies employed to address them can vary widely. The next session of the meeting focused on building capacity for mathematics improvement and highlighted three distinct approaches for doing so—those in Long Beach, Sacramento City, and Twin Rivers Unified School Districts.

Building Teacher Content Knowledge in Long Beach

LBUSD leaders began Common Core implementation through district-led efforts to build teacher mathematics content knowledge but eventually identified limitations to that approach. The district subsequently aimed its efforts at the school level by having coaches facilitate teachers’ unit study and lesson study activities.

How They Got Here

From the very beginning of Common Core implementation, leaders in LBUSD recognized content knowledge as an important area of attention. Despite three years of teacher training to build mathematical understanding, however, district leaders found during classroom walkthroughs that instructional quality had not sufficiently improved. Moreover, these leaders found that principals lacked the capacity to lead in the way the Common Core required. Through reflection on the district’s progress, and with the support of the book *Beyond the Common Core*, district leaders concluded that their training efforts would be more effective at the school site.

The LBUSD Approach

Beginning in 2015–16, district leaders deployed coaches to pursue a three-pronged strategy for building teacher content knowledge. The first prong is unit study undertaken

within teacher teams with the facilitation of a mathematics coach. Through this process, teachers together make sense of the standards, agree on essential standards and a lesson sequence for the unit, study the previous and upcoming assessment, and choose tasks that build understanding and problem solving. Teacher teams develop common homework, common assessments, and common scoring through the unit study.

Within a unit, teachers engage in the second prong of the strategy, lesson study. Working again within teams and with the support of a coach, teachers plan a lesson centered on a higher-level task to promote problem solving, reasoning, and discourse. Teachers observe one another teaching the lesson and then reflect on how things went and adjustments that they could make upon returning to their classrooms.

The final prong of the LBUSD approach, department- and grade-level meetings, gives teachers an opportunity to reflect together after the unit is complete.

When the district began this effort in 2015–16, schools volunteered to participate. Middle school coaches led unit study with their teachers, and elementary school coaches facilitated the lesson study process. According to district leaders, demand for the approach ballooned. In 2016–17, LBUSD combined all three components—unit study, lesson study, and grade-level meetings—in all participating schools. District leaders estimate that coaches are now working in half of the elementary and middle schools, with fewer deployed to high schools.

Results

LBUSD leaders report several improvements in teaching and learning since shifting the district's approach. For example, teacher confidence in pedagogical asks increased, and district leaders more frequently observed teachers engaging students in productive struggle. They also found that schools with strong collaborative cultures and schools with coaches experienced greater gains in mathematics achievement. These leaders shared their satisfaction with these promising developments but also emphasized that theirs is a work in progress.

Reflections on Progress

To conclude their presentation, LBUSD leaders shared some lessons learned through their work so far.

Coaching: Their first conclusion is that assigning a mathematics coach to high-need schools has helped to improve teacher content knowledge and instructional practice. District leaders have also learned to ensure dedicated time for *structured* collaboration, with sufficient guidance and supports available to make time together productive and worthwhile.

Grade-level differences: District leaders also discovered that the work takes different forms in elementary and middle schools. For example, all teachers in an elementary grade level teach the same mathematics content, but there may be fewer teachers dealing with the same content at the middle school level. The learning needs of teachers are also different:

Middle school teachers often feel that they have a stronger grasp on the mathematics, so more time and energy go to facilitating collaborative discussion.

Site leadership: LBUUSD leaders believe that principals are critical to supporting this work. They report that principals at the elementary level have the belief and expectation that they can jump in and teach any lesson at any time; principals at the middle school level are not yet at the same point. District leaders also shared an aspiration that as the work evolves and moves forward, they will build the capacity for teacher leaders to lead the work within each school site.

Moving to a Culture of Continuous Improvement in Sacramento

In Sacramento City USD (SCUSD), district leaders have transformed the principal supervisor role while also pursuing improvement science work with teachers in mathematics classrooms to embrace a culture of continuous improvement.

How They Got Here

The work in SCUSD grows from the district's equity, access, and social justice guiding principle: "All students are given an equal opportunity to graduate with the greatest number of postsecondary choices from the widest array of options." Despite this aspiration, at the end of the 2017–18 school year, district leaders found that only 28% of students were on track for this level of readiness. SCUSD representatives described the district's initial Common Core implementation efforts as traditional, with attention to five levers for improvement: leadership capacity, teacher capacity, assessment for learning, instructional materials, and community engagement. However, in a system that district leaders described as having an "opt-in culture," these levers were not sufficiently driving instructional quality and student results forward. A primary culprit, SCUSD leaders concluded, was that "our system leaders do not understand and consistently apply the district's equity, access, and social justice continuous improvement framework."

The SCUSD Approach

Through a new approach that came with the introduction of a new superintendent, SCUSD has focused on principal supervisors as a key lever for improving school-level practice. Each instructional assistant superintendent (IAS) works with about 18 principals on their improvement efforts. The team of IASs meets together on a weekly basis to plan learning sessions for principals which focus on the district's framework for continuous improvement. Principals meet collectively with their IAS on a monthly basis and site level continuous improvement efforts are the focus of the IAS's site visits. All principals are focused on impacting grade level readiness in mathematics or English language Arts. The work takes place in collaboration with the district's Improvement and Accountability Office who are responsible for developing metrics and indicators and redesigning the Single Plan for Student Achievement (SPSA) to align to the district's continuous improvement process.

Presenters from SCUSD described some of the organizational shifts that IASs are helping to lead. For example, the district historically allocated instructional support to teachers by "working with the willing." Under the new model, the district directs support based on

demonstrated need grounded in data analysis. Responsibilities formerly housed within the department of curriculum and instruction (C&I) have also shifted to align with the supports schools receive from the IAS. For example, monitoring activities that once came from the C&I team now happen through IASs who monitor specific deliverables and artifacts and then hold principals accountable for progress.

Results

The SCUSD team shared an example of the continuous improvement process in one school as an illustration of the culture shifts under way. In partnership with the CORE Districts, district leaders worked with a pair of fifth-grade teachers to unpack their challenges in mathematics by following a plan-do-study-act (PDSA) cycle. The team began with efforts to understand the problem and the system that produces it by administering mathematics tasks to students and conducting empathy interviews with students. Based on what they learned, the teachers set an aim for their work: “By the end of the school year, 51% or more of the time, students in the two fifth-grade classrooms...are engaged in academic discourse.” The teachers then tested a set of change ideas, regularly monitoring progress to determine promising practices worth expanding. One of these was an exit ticket that students had to complete before leaving the classroom, which prompted them to attend to precision by using academic language.

The teacher team has experienced positive results from their work so far. From the start of their PDSA cycle to the last day, the percentage of students using the sentence frame provide by teachers in order to write the reflections on their exit tickets increased from 40 to 64. Nevertheless, variation among teachers persisted on the state assessment in mathematics. One member of the pair, a veteran teacher, saw an increase in communicating reasoning and in the overall percentage of students meeting standards. The second member, an early career teacher trying to learn many pieces of the teaching craft, showed a decline in both measures. Much work remains, not only within this teacher team but also in expanding a structured approach to continuous improvement to the rest of the school and across the district.

Reflections on Progress

SCUSD leaders identified several lessons learned from their work so far. Some of these reflections related to the culture shift toward new roles, responsibilities, and orientations toward continuous improvement. For example, removing the traditionally transactional duties from the IAS role as the principal supervisor takes on a more supportive stance is easier said than done. For this and other positions, preexisting culture is persistent and difficult to shift. Nevertheless, one SCUSD representative explained that the district’s approach to continuous improvement offers a consistent orientation to problem solving that can adapt to a variety of contexts: “Improvement science is a framework,” she explained, “but the way you go about implementing it either feels heavy or not.... The beauty of improvement science is that everyone uses the framework, but the problems might be different.”

To help with the change process, one of the presenters also argued that early adopters are vital. When principals and teachers engage in the continuous improvement process and see value in it, it can help other principals or teachers break through an initial reluctance to participate. To that end, this individual asserted, “We must learn to practice impatient patience.” As SCUSD moves forward, district leaders will continue to navigate the tension between moving their efforts to more teachers at a faster pace and accommodating the process of changing culture and classroom practice.

Embracing Systemwide Change Through Partnership With an Outside Partner in Twin Rivers

Twin Rivers Unified School District (TRUSD) recently began working with an outside partner to pursue the districtwide adoption of an aligned set of instructional materials, expectations, and professional learning supports for teachers and administrators.

How They Got Here

TRUSD had employed a variety of efforts to improve mathematics performance for several years. For example, the district had focused on instructional materials, with the adoption of a curriculum and clearly defined scope and sequence aligned to teacher professional development sessions. It had offered supports to teachers through teachers on special assignment and professional learning communities. It had defined a specific model of lesson design. Yet when district leaders reviewed mathematics achievement in 2016–17, student performance was flat. Only 24% of students met or exceeded standards, including 10% of English learners and 6% of students with disabilities.

To better understand the challenges underlying these results, district leaders considered multiple sources of data. In addition to student results, leaders conducted classroom walkthroughs to develop a picture of classroom instruction in the district. They listened to teachers, who often shared that the shifts entailed in the transition to the Common Core were too much for them to handle. And they spoke with principals, who in turn expressed frustration that they were unable to provide the support that teachers needed.

The TRUSD Approach

In April 2017, the district decided to fully implement a new set of instructional materials, expectations, and supports through a partnership with Swun Math. The decision to pivot the entire district in a new direction grew from a sense of urgency—a recognition that overall student results and the gaps among subgroups were unacceptable—and a desire for coherence across the district in its approach to mathematics. To pull off this change, the superintendent worked closely with the school board to help create a shared sense of urgency. The district also enlisted its teachers union early on and sent out joint messaging in support of the change. District leaders described a range of communication approaches to inform and involve stakeholders, including letters to parents and staff, videos, social media posts, board presentations, and superintendent visits to schools.

The Swun Math approach as implemented in Twin Rivers derives from what TRUSD leaders describe as a “true partnership” in which the district and its vendor design and

adapt approaches to meet local needs. Swun Math fundamentally builds around a model of interactive lesson design that attends to both conceptual and procedural issues. The lessons begin with a process of group discovery and transition through stages of input and modeling, structured guided practice, revision and evaluation based on a process of error analysis and consensus building, and presentation to the class. The district's work with the vendor also entails coaching and professional development for both teachers and principals, with administrators participating side-by-side with teachers in every coaching session. Swun Math also provides curriculum and assessments, support with parent and community outreach, and assistance to the district in developing its own infrastructure to support the work moving forward. TRUSD worked closely with the vendor to organize rapid responses to concerns and issues that could hinder the effectiveness of implementation. District leaders reported that this partnering accelerated implementation and led to increased instructional shifts and student performance.

Results

The 2017–18 school year marked the first year of implementation in TRUSD, and district leaders report that an additional 3% of students met standards in mathematics relative to the prior year. Teacher voices also speak to the perceived value of the district's approach. As one testified, "I want to tell you that Swun is life changing!!! It is so great, and even the kids talk about how much they like it. I absolutely dreaded teaching math last year, and Swun makes learning much more accessible to each student regardless of level." Presenters from TRUSD explained that having someone to support them side-by-side as they implement changes in mathematics instruction has been one of the more powerful experiences for teachers.

TRUSD leaders also shared that the percentage of students meeting standards in English language arts (ELA) increased by four points between 2016–17 and 2018–19. This more than doubled growth for the county overall in both areas. Data from the CORE Districts further indicated that over 41% of TRUSD elementary school students had above average growth in mathematics relative to overall CORE Districts performance. They believe that the teaching strategies advanced through Swun Math are also translating into improved instruction across the board and will contribute to systemwide growth overall.

Reflections on Progress

Although the TRUSD work is in its early stages, district leaders shared some early takeaways from their experience so far. They emphasized the importance of communication. The district embarked on a dramatic systemwide change over a short period of time and devoted substantial time and energy to bringing a range of stakeholders on board. As one district representative explained, "We've learned you can't ever overcommunicate." She further clarified the importance of "communicating the *why* in anything we're implementing."

District leaders also highlighted efforts to build administrator capacity to support mathematics change. This means supporting school leaders so that they are equipped to support instructional shifts within their buildings. In the spirit of coherence, working

closely with administrators also helps to ensure that teachers do not receive mixed messages about expectations and supports for their work with students.

Reflections Across District Stories

A discussion of themes across the district stories revealed some commonalities.

Building Educator Capacity

All three districts revealed a fundamental focus on capacity building. In the descriptions of their work—and the ways in which it had evolved over time—presenters called out the importance of providing ongoing support after initial training that featured appropriate responsiveness and intensity. Each district effort deliberately built in supports that extended far beyond the one-time training approach of many professional development efforts. District presenters also talked about developing teacher ownership over time, so that improvement efforts can eventually transition into the hands of teacher leaders.

Leveraging Coaches for Improvement

Meeting participants observed that coaching was a key component of the approaches across districts but noted that it needs to be done well. Coaching requires funding, meaning it needs the backing of the district—the district must see the value in it. Effective coaching also needs integration with other supports so that it does not happen in isolation. Furthermore, coaches need to develop their own capacity. As one individual argued, “Coaching on coaching is often missing, and they need it as much as the teachers need it.” For teachers to see value in coaching, the right disposition may also be critical. According to one participant, “If it’s, ‘You don’t know and I’m going to show you,’ people aren’t going to participate, or it’s going to be compliance.” Finally, one person noted the alignment between the role that districts are asking coaches to play and what teachers expect of students in a Common Core environment: “We’re asking students to shift to inquiry-based learning, to collaborative learning, to project-based work...so there’s a consonance between what you’re asking students to do and what you’re asking adults to do.”

Communicating With Community Members

Examples during this session and elsewhere in the meeting called attention to communication strategies with parents and other stakeholders. As our understanding of mathematics evolves and instructional practice improves, it may take proactive steps to bring parents along by helping them see value in what districts are doing and enlist their support. In doing so, districts should pay attention to the terminology they use and ensure that people within and outside the district have a shared understanding of what it means. Community outreach can also help individual students and their families overcome preconceived notions about their capabilities in mathematics and their opportunities to grow. As one example, a district leader described personally calling the families of African-American students who qualify for the district’s competitive programs, both to recognize these students’ accomplishments and to encourage them to reach their potential. A discussion later in the meeting about course sequencing policies in San Francisco would call further attention to the importance of communication.

Capacity Building for Mathematics Improvement: Crosscutting Themes

The three district stories highlighted common challenges for capacity building that also surfaced consistently during planning calls with Collaborative members: building teacher understanding of mathematics content, developing administrator knowledge and skills to support the work in schools, and positioning school systems to design and facilitate efforts in mathematics. Participants broke into small groups to consider each of these issues.

Teacher Content Knowledge

Phil Daro, coauthor of the Common Core State Standards in mathematics, joined the first small group to facilitate a conversation about the degree to which teachers have the content they need to guide student learning in mathematics.

Defining Teacher Content Knowledge

The conversation began with an acknowledgement that in discussions of teacher content knowledge, participants need to define what they mean by the term. Daro noted that members of the education community talk about content knowledge differently in mathematics than they do in ELA: The conversation in ELA focuses on the expertise of students—things like writing expertise and skill in reading comprehension—whereas the conversation in mathematics focuses on topics. He argued that thinking about mathematics as being more like ELA and other subjects, with more attention to “expertise,” would put teachers in a better position to learn more mathematics and use their own pedagogic expertise from other disciplines. Daro also suggested that making mathematics more coherent can help teachers manage the mathematics: “Math doesn’t come in lesson-sized pieces,” he explained, “but it does come in chapter- or unit-sized pieces. So one thing that seems evident is that it’s a more... solvable problem to help teachers understand what the math of the unit is than what the math of the lesson is.” Daro contrasted middle school textbooks in Japan—where the chapter on proportionality is 14 pages long and introduces the ideas of variables, functions, proportional relationships, graphing, and equations—with those in the United States, where ideas about proportionality are spread across 100 pages and missing key information. He further explained that the Japanese mathematics books have no lessons. Rather, they feature chapters just like American books on other subjects like science or history, rather than a book about prepackaged lessons that characterize traditional American mathematics textbooks.

Improving Mindsets

The discussion also emphasized the need to change mindsets among teachers about mathematics. This means understanding and embracing mathematics as an essential component of K–12 student learning. Teachers and administrators should be able to articulate honestly why mathematics is important, both to one another and to the students they teach. Participants also noted that it is wrongly acceptable in schools for students—and sometimes even teachers—to declare that they are not good at mathematics, whereas teachers and administrators would not tolerate the same statements about reading. One individual asserted that the low skill and confidence levels that many teachers have regarding mathematics often leads them to self-select away from teaching in middle and

high school, saying, “There’s a barrier: Great teachers stick themselves in early grades because they’re afraid of upper grade math.”

Creating Time and Processes for Teachers to Learn Mathematics

Participants in the small group turned next to opportunities for teachers to learn more mathematics. Preservice training, because it allows for sustained attention to specific content that is difficult to obtain through district professional development activities, may offer the best return on investment for equipping waves of teachers with the knowledge to help students learn mathematics. Daro highlighted the challenges, however, of providing sufficient time for teachers to learn: “It takes sustained time to learn math. Teachers are at least three college math courses from what they really need. How are you going to fit three college math courses into the career of a teacher?”

Even when school districts look to build teacher content knowledge through inservice supports, they do not typically leverage models like lesson study, with shoulder-to-shoulder learning from coaches and peers, that are more prevalent in other higher performing countries. Embracing these strategies could help American teachers more effectively learn mathematics on the job. A shift in the way that teachers view mathematics can help maximize the potential of such approaches.

All these approaches, of course, take time. A persistent question for expanding both preservice and inservice mathematics learning opportunities, then, is what administrators can take off teachers’ plates in order to make space for this work.

The key, according to Daro, is to frame the problem around this question: “How can we set up a culture and a system for teachers to learn a little more math every week they teach?” Educators should not try to reach the goal in one impossible step. Rather, he argued, “If there’s a process where teachers learn math every week, there’s a culture of interest. When your kid does something you don’t understand, it’s interesting. Then if you ask other teachers about that, you’re going to learn math.”

Administrator Capacity

To help explore the challenge of developing administrator capacity, a team from LBUSD shared their experiences in developing and implementing an approach they call Administrator Training in Math (ATM).

Motivation for a Focus on Administrator Capacity

Just as district leader observations about classroom instruction motivated a shift in the district’s approach to building teacher capacity, they also drove a reconsideration about how best to prepare administrators to lead mathematics work. LBUSD presenters described a moment in a principals meeting when a respected principal, a leader who had been a former mathematics teacher and coach, shared his struggle in a room full of peers by saying, “I don’t know what I am looking for [in mathematics classrooms].” A Long Beach representative recalled, “That was such a relief,” because it broke the seal and helped principals feel comfortable acknowledging their struggles with the Common Core in

mathematics. Explaining the district’s decision to focus on principal capacity, one person observed, “It’s tough to coach on something you don’t know much about.”

The ATM Approach

Initial training for administrators started with a book study in principals meetings using *Principles to Action*, which outlines eight practices comprising quality mathematics instruction. In these meetings, principals would respond to questions about the evidence they had that a given practice was happening at their school. The district supplemented the book study with videos and exemplars of high-quality lessons to help administrators understand what a particular practice looked like in action; unit guides also helped principals determine what they should expect to see in classrooms. Ultimately, district leaders chose to focus on four of the book’s eight practices:

- Establish mathematics goals to focus learning.
- Facilitate meaningful mathematical discourse.
- Build procedural fluency from conceptual understanding.
- Elicit and use evidence of student thinking.

The district’s work now centers on its ATM approach, where 12 administrators come together with two mathematics coaches for a half day of collaborative work. The activity begins with what district leaders call an “upbrief,” an orienting conversation in which participants go over the four mathematics teaching practices. Administrators then break into smaller groups and observe classrooms for 30 minutes at a time, with each member of the group focusing on one of the four practices. After each classroom visit, participants debrief about what they see and practice the coaching conversations they might have with teachers based on their instructional practice.

Collaborative meeting participants briefly practiced the exercise by using a transcript from a LBUSD lesson, identifying where they saw (or did not see) evidence of the practices in the sample lesson.

Evidence of Progress

LBUSD leaders gather feedback from teachers through monthly meetings with department chairs, and these conversations suggest that teachers have been receptive to the feedback they receive from principals since ATM began. District leaders have also seen gains in student performance in schools where the practice is employed. For example, the district’s highest poverty middle school improved student achievement from 22nd place of the district’s 24 middle schools in 2014–15 to 10th in 2017–18, with an average scale score gain of 40 over three years.²

² According to the Smarter Balanced Assessment Consortium website, scaled scores fall on a continuous scale from approximately 2,000 to 3,000. In the middle grades, approximately 150 points separate students at Level 1 and Level 4 performance levels. For example, students with a score below 2,504 in eighth grade qualify as Level 1 (in California, standard not met) and students with a score above 2,652 qualify as Level 4 (standard exceeded). For more details, see <http://www.smarterbalanced.org/assessments/scores/>.

Reflections on the Long Beach Experience

In the small group discussion, participants observed that the LBUSD process helps to facilitate coherence. By using the four teaching practices to orient the work of administrators, the district creates shared expectations around quality mathematics instruction. By bringing administrators together to observe classrooms, a norming process also occurs that helps create consistency in the feedback delivered across schools.

Meeting participants also considered the role of a principal versus that of a coach in supporting classroom instruction. Although many districts (including LBUSD) charge coaches with doing direct capacity-building work with teachers, the ATM process has important benefits for principals. First, it helps them understand what is happening in classrooms. Armed with a stronger command of classroom practice and areas of need, principals are in a better position to deploy resources for improvement. Participants also noted that principals introduce a layer of accountability and that teachers may be more likely to listen to feedback from an administrator than from that of a coach. Finally, small group members acknowledged that the principal role is important but emphasized that it is most useful as a supplement to other opportunities for discussion and learning among teachers (for example, those that take place within grade level or department teams).

Finally, the small group discussion highlighted a takeaway that also emerged from the teacher content conversation and from earlier district presentations: Opportunities to talk about mathematics are opportunities to learn mathematics. Protected and structured times for conversation allow educators to voice and address their misunderstandings. They also enable educators to build confidence as they confront and overcome their own confusion with the mathematics learning they are charged with leading.

School Systems That Support Capacity Building

A third small group explored the steps that school districts can take to support and create the conditions for teachers and administrators to build their knowledge and skills in mathematics instruction.

Vision and Culture

One theme that emerged from this small group was the importance of establishing a strong vision and culture. Especially against the historical practice of students, teachers, and administrators writing themselves off as “not good at math,” a vision and culture is needed that advances a belief in achieving success for all students. Participants also described the ways in which a strong vision can help set a direction for all work around mathematics. Without a clear vision, some argued, the systems that a district create will not come together. Furthermore, as one participant expressed, a compelling vision can help enlist support for improvement: “It’s a lot easier to get them to change behaviors if they believe in the vision.” Building on this point, another talked about trust as an essential element of a district’s culture. “Trust is especially important when you’re asking people to change in big ways,” she explained.

Opportunities for Professional Learning

The three district stories shared earlier in the meeting presented examples of opportunities for professional learning for teachers and administrators. Creating these opportunities, participants suggested, is a key responsibility of school districts. This can include providing coaching, an example of support present in the LBUSD, SCUSD, and TRUSD stories. It also means creating time and structures in the day for teacher learning. Small group members also discussed leadership pipelines that give educators opportunities for career growth. These pipelines can also facilitate the sustainability of initiatives in mathematics by equipping teachers and leaders to carry on the work even if formal supports (like coaches) fade away because of decreased resources or natural transitions of responsibility.

Balancing Loose and Tight

As school districts develop their strategies and support structures, small group participants suggested that they need to find an appropriate balance between loose—those aspects of the work where administrators and teachers have discretion to make decisions appropriate to their context—and tight—those elements with clear expectations designed to create consistency and ensure quality across the district. Others in the group described this same balance as one between autonomy and accountability. The loose/tight line may look different from district to district, but leaders need to be thoughtful and deliberate about how it operates.

The Role of Networks: System Learning From Deeply Contextualized Work

The first day of the meeting concluded with a discussion of networks. Groups like the Collaborative, the CORE Districts, and Math in Common have been leveraging the power of cross-system collaboration for several years, and organizations from state government to philanthropy are increasingly turning to networks as a vehicle for building system capacity. As networks gain momentum as a strategy, an important question emerges: What needs to be different and what needs to be similar across various contexts in order to maximize learning? A panel of network organizers, facilitators, and members shared their insights.

Benefits of Networks

Panelists began by highlighting some of the advantages that networks offer. Individuals talked about the benefit of exposure to new ideas that would not have been possible from working exclusively within their organizations. They also described the ways in which networks had helped them to build relationships through which they now share ideas even outside their network's activities. Referring to a connection formed between two districts, one panelist explained that the "trusted relationship" has "expanded our capacity to be supported and to support."

Ongoing Reflection and Refinement

All members of the panel described an evolution in their philosophy and approach over time. Approaches have shifted in response to feedback about the work, the context in which the networks operate, and the priorities of participants. In this way, the networks

represented on the panel have been models of continuous improvement and of ongoing reflection and adaptation in response to lessons learned.

Common Ground Across Contexts

In their reflections about experiences with cross-district collaboration, panelists echoed the discussion from the small group on system capacity by discussing the balance between tight and loose. Networks need to find shared work that is sufficiently tight to bring and keep them together. According to the panelists, grouping districts according to a shared focus may help; a fundamental commitment to equity, for example, has anchored the CORE Districts since the group's inception. Remarks from panelists also suggested that fidelity to process—rather than uniformity of strategy—may be most helpful in leveraging the power of a network. Specific approaches will necessarily respond to each district's areas of strength and need, demographic characteristics, political context, and other local factors. Focusing instead on a shared approach to identifying goals, collecting and analyzing data, and sharing learning can help districts support one another despite their differences.

Conditions That Enable Success

Throughout the conversation, panelists identified conditions that may help enable network success. A community of practice needs to be well designed and well facilitated. The work of networks also must embrace and address the core work of classroom instruction. The participants in a network matter; the representatives from a district need to have control over making changes in the areas relevant to the network's activities. Finally, panelists shared the idea that change packages—for example, those that document the strategies and results of schools and districts engaged in an improvement science approach—are a potential vehicle for sharing learning at the local level with a broader audience.

Course Sequencing and Placement

On the second day, the meeting turned to an issue that very explicitly explored issues of equity and access, that of sequencing mathematics courses at the middle and high school levels and placing students into these courses.

New Mathematics Sequencing in San Francisco

In 2014, San Francisco Unified School District (SFUSD) adopted a policy that significantly changed its sequence of mathematics courses at the secondary level.

How They Got Here

SFUSD grounds its work in five core values: The district is student centered, fearless, united, diversity driven, and rooted in social justice. Driven by a commitment to promote success for all students, the district had previously chosen to enroll all eighth-grade students in Algebra 1 in keeping with California's "Algebra for all" recommendations. By ensuring access to higher level mathematics at an early age, instructional leaders reasoned, it would combat historically inequitable practices and give all students exposure to the coursework they would need for success in high school and access to a range of postsecondary options.

Student results, however, revealed that the strategy was not achieving its desired outcomes. By the end of eighth grade, fewer than half of SFUSD students achieved proficiency on the Algebra 1 California Standards Test (CST). By their sophomore year, only a third of students enrolled in Algebra 2 and took the CST, and by the end of that year, fewer than one fourth of those students tested proficient. These troubling results were even more pronounced for the district’s African-American and Latino students.

In the face of strong evidence that the existing approach was ineffective, district leaders consulted with experts, reviewed research, and explored the Common Core in mathematics to consider an alternative approach.

The SFUSD Approach

The district now places every middle school student in the same mathematics class: Common Core Math 6 in sixth grade, Common Core Math 7 in seventh grade, and Common Core Math 8 in eighth grade. That policy, passed unanimously by the SFUSD school board in 2014, aligns with the vision statement guiding the work of the mathematics department: “All students will make sense of rigorous mathematics in ways that are creative, interactive, and relevant in heterogeneous classrooms.” These middle school mathematics courses are deliberately designed to articulate algebraic concepts across multiple years and position students for success in higher level mathematics. That is, there is no tracking at middle school and no opportunity for acceleration until high school, when there are multiple acceleration options. All students are heterogeneously enrolled in the same course with an emphasis on deeper conceptual learning through a task-based curriculum.

SFUSD has adopted a traditional course pathway, meaning that students progress from Algebra 1 to Geometry to Algebra 2—as opposed to Integrated Math 1, 2, and 3. During their high school careers, students interested in more advanced coursework have opportunities for compression or acceleration. After taking Common Core Algebra 1 in ninth grade and Common Core Geometry in 10th grade, students can choose to take a compressed course that covers Common Core Algebra 2 and precalculus content in 11th grade; these students can then take either Advanced Placement (AP) Calculus or AP Statistics in 12th grade. Alternatively, students can progress into Common Core Algebra 2 in 11th grade and then choose between AP Statistics or Precalculus in 12th grade. As yet another option, students can double up coursework or take classes over the summer while in high school if they wish to progress further or more rapidly in mathematics content.

Results

Since SFUSD began implementing the new policy in 2014–15, enough students have progressed through the course sequence to examine preliminary student outcomes. Improvement on several metrics provides evidence of success. Looking specifically at the middle school experience, for example, the district has seen a jump in the percentage of students earning the highest score possible on eighth-grade tasks from the Mathematics Assessment Resource Service. The Algebra 1 repeat rate also dropped from 40% for the

class of 2018—the last class to pass through the previous course sequence approach—to 8% for the class of 2019.

Promising results are also emerging beyond the eighth-grade year. Ten percent more students are taking courses beyond Algebra 2 in 2018–19 than in 2017–18, or 456 students total. These gains are even larger for African-American (35%), Filipino (33%), and Latinx (20%) students. The district has also seen an increase in the number of mathematics credits earned by the end of 11th grade between 2017 and 2018; this increase happened for students of all racial/ethnic backgrounds. In addition, SFUSD saw an increase of 6% in AP mathematics course enrollment between 2016–17 and 2018–19, including an increase of 79% for Filipino students and 27% for Latino students. AP statistics enrollment increased by 48% over a two-year period, and AP computer science enrollment by 31% during the same period.

Finally, SFUSD has experienced growth in postsecondary outcomes. The percentage of high school graduates enrolling in college in the fall immediately after high school is now 80%, up 2% from 2017 to 2018. Those increases were larger for Hispanic/Latino students (72.2% of graduates enrolling, an increase of 3.4%) and African-American students (56.5% of graduates enrolling, an increase of 2.4%). Fifty percent of SFUSD graduates overall are attending four-year postsecondary institutions in the fall immediately after high school, an increase of 3% from 2017 to 2018.

Taken together, these findings offer a preponderance of evidence to suggest that the new course-sequencing policy is not only yielding stronger student outcomes overall but also helping the district to address the disparities in student access and performance that undermined equity goals.

Considerations for Sequencing and Placement Changes

The case of SFUSD raises questions and considerations for districts across the state about course sequencing and placement policies. Among them, tension exists between doing the right things for student learning in mathematics and addressing the pressures of high-stakes decisions in higher education. Districts may seek to build conceptual understanding in students through deeper and more methodical exploration of mathematical content and to avoid the negative outcomes associated with tracking. In doing so, however, they confront the perception that students must take higher level mathematics courses as early as possible for college admissions. Navigating this tension requires attention to both pedagogy and politics. In doing so, several meeting participants argued that districts need to drive their decisions from what they believe about student learning and their commitment to students.

Changes in Both Policy and Practice

The SFUSD presenter emphasized that for an approach like the one in San Francisco to succeed, any change in policy must go hand-in-hand with changes in practice. When the district changed its course sequencing, it aligned that decision with changes in curriculum, professional development, and coaching in an effort to ensure that new practices were not

merely adjustments in scheduling, but improvements in quality. Meeting participants also pointed out that success in higher level mathematics requires a strong foundation in elementary mathematics. Preparing students for success in high school and beyond does not begin with Algebra 1. It is a process that extends throughout the K–12 experience. To that end, unified school districts like SFUSD are well-equipped to think across a student’s mathematical career.

Communication With Local Stakeholders

Policies like the one passed in SFUSD can prompt anxiety and backlash among parents, especially if they believe that their children are being disadvantaged by practices that strip them of opportunity. This kind of unrest can undercut the confidence and satisfaction that any district leader hopes for parents to have in their schools. In some contexts, it poses a bigger threat if dissatisfied parents take their students out of the traditional public school system to enroll them in private or charter schools.

In promoting changes to longstanding practices, meeting participants argued that communication based on evidence is essential. Several individuals recommended using data and research as evidence for supporting new directions. In SFUSD, for example, district leaders focused on research and on the differences between expectations in the previous California standards and the Common Core. Although many parents focused on the loss of the course title “Algebra 1” at Grade 8, much of the content from the old Algebra 1 course is actually covered in Common Core Math 8—as is content from the old Geometry and Algebra 2 courses. Moreover, some content that was not previously taught at all has been added. Building a critical mass of support among teachers and enlisting their help in communication can be an important component of managing change with the public.

Participants also considered communication strategies for working with families on policy changes. Even in 2017–18, four years after SFUSD passed its new policy, the district held 15 family and public events and delivered 22 presentations at conferences or within community partnerships. Highlighting the message that district leaders need to deliver in this kind of outreach activity, one participant asked, “How do we help families see that there’s nothing being taken away, that it’s actually an enhancement and an enrichment?” In working with families, participants advocated for equipping principals to answer questions, as schools are the first place most families will turn. In all these efforts, having cultural competence is key so that district leaders can engage members of their community with understanding and respect, taking into consideration their priorities and perspectives as well as those of the district.

Despite ongoing communication efforts, recent SFUSD school board elections highlighted persistent criticisms of the sequencing and placement policy. Multiple candidates ran on a platform of “restoring Algebra 1” to the district. Although these candidates lost their elections, their perspectives reminded district leaders of the need for ongoing communication with stakeholders, even years into the implementation of a new approach.

Policies and Messaging From Higher Education

The SFUSD presentation and subsequent conversation also emphasized the essential role of policies and messaging from higher education. Developments within California help to support course sequencing changes by shifting the focus away from accelerated access to advanced content. According to an April 2016 statement, the University of California Board of Admissions and Relations “strongly urges students not to race to calculus at the cost of full mastery of the earlier math curriculum.... Choosing an individually appropriate course of study is far more important than rushing into advanced classes without first solidifying conceptual knowledge.” Commentary from Stanford University reflects a similar shift. Whereas the school until 2017–18 recommended four years of mathematics, including calculus, it still recommends four years, but instead with significant emphasis on fundamental mathematics skills. Updated admissions language says, “The students who thrive at Stanford are those who are genuinely excited about learning, not necessarily those who take every single AP or IB, Honors or Accelerated class just because it has that designation.”

Despite this messaging, skepticism about whether practices have actually changed may remain. Evidence from SFUSD presents a compelling case about the effectiveness of its approach for the district overall. Evidence of success for high-achieving students, especially in college admissions, may be key to assuaging parent fears about change.

Attention to Equity

One of the fundamental drivers of the SFUSD policy change was a desire to address inequities in student experiences and outcomes. Participants emphasized that although course sequencing approaches can help to address equity issues, they cannot supplant attention to them. Conversations about sequencing and placement, especially when a policy departs from traditional approaches to tracking, can reveal differences in opinion among community members about who is entitled to learn mathematics and who parents want their children to learn with. One meeting participant cautioned against ignoring these critical equity issues:

“I’m concerned that no matter what we do, without confronting the root cause of student performance as it relates to efficacy and expectations, we are not going to fix the problem.... If a car has a flat tire, but you’re changing the oil, that’s good for the car, but you’re not fixing the problem. Teachers make assumptions about students who come into the classroom dirty or hungry or have a different language; they automatically think these kids aren’t smart.”

In light of persistent issues of equity, access, and bias, some participants recommended trainings and policies about bias for both the teachers who instruct students in classrooms and the counselors who serve as gatekeepers in course placement decisions.

Other Opportunities and Challenges

The conversation about sequencing and placement also revealed additional issues for districts to address. SFUSD’s middle and high school course offerings connect naturally

with one another because the district oversees student experiences from kindergarten to 12th grade. Many students elsewhere change districts after eighth grade, moving from a K–8 district to a high school district that pulls students from multiple elementary districts, often with nonaligned mathematics policies. The challenges in these contexts are potentially more complex than those in SFUSD and may require a different approach.

One meeting participant connected the discussion to the statewide teacher shortage, which is especially pronounced in areas like special education and mathematics. Referring to a former role in a school district, this individual recalled that the number of Algebra 1 teaching positions was larger than that of any other teaching role in the district. If policies like the one in SFUSD can dramatically reduce the failure rate in Algebra 1, districts can then reduce the number of Algebra 1 course sections they offer, and therefore reduce their need for additional mathematics teachers at a time when the supply is low.

Finally, respected voices in the mathematics field are also contributing to the ongoing conversations about course placement and sequencing. The National Council of Teachers of Mathematics has taken a strong stand against tracking in their book *Catalyzing Change* and associated resources. The National Council of Supervisors of Mathematics is taking a similar stand, with a position paper expected to be released in spring 2019.

Opportunities for State Policies and Supports

The meeting concluded with reflections on the role that state policy can play in supporting mathematics improvement at the local level.

Articulation of Mathematics Needs Throughout PK–16

Picking up on an observation from earlier in the meeting about differences between educators’ approaches to ELA and mathematics, participants advocated for increased attention to early numeracy. Given the incoming governor’s stated intention to improve the state’s early childhood education system, there could be an opportunity to make this numeracy emphasis a part of his efforts. Even beyond preschool needs, participants also spoke about the importance articulating the mathematics learning needs for students throughout their elementary, middle, high school, and postsecondary experiences.

Stronger Models for Teacher Preparation

Conversation about teacher content knowledge earlier in the meeting had already pointed to the need for greater emphasis on mathematics in teacher preparation programs. Meeting participants suggested further ways in which improvements in preservice training could help to address the state’s mathematics needs. Some of these—like additional mathematics requirements for prospective elementary teachers or a numeracy certification for early education teachers—echoed the earlier discussion. Other ideas addressed the California’s teacher shortage in mathematics, like a loan forgiveness program that would make it easier for new teachers to enter the profession.

Capacity for Districts to Support Teachers

District examples and discussion throughout the meeting highlighted the need to build teacher and administrator capacity in mathematics. Meeting participants considered ways in which the state could help districts do this work more effectively. For rural districts with limited resources and access to networks, some suggested that county offices of education could play an important role. Other participants responded, however, that counties have many of the same capacity limitations that districts do. The wide variation in capacity and quality across the state, and the challenges in finding leaders with requisite knowledge and skills in mathematics, suggest that county offices are likely to be a great asset in some contexts but insufficient to address district needs statewide.

Statewide Education Campaign About Mathematics

Comments during the meeting drew attention to the persistent—and still widely accepted—perspective that some people are simply “not good at math.” Conversations also talked about the importance of outreach and engagement with community members to help them understand and support new developments in district mathematics work. In this vein, one meeting participant proposed a set of 30-second television vignettes that could serve as public service announcements to help the public better understand the value and the opportunities of mathematics teaching and learning. This person pointed to an example of similar capsules designed in Peru in the mid-1970s to help fight the stigma against native languages in the country’s education system, noting that the effort was remarkably successful in shifting public opinion in a more supportive direction.

Possibilities for Title 2 Set-Asides

Finally, the group explicitly explored possibilities for using Title 2 funds from the Every Student Succeeds Act, from which states can allocate up to 3% of funds for site leadership development. Among participant suggestions, the state’s subject matter projects could expand their scope to include leadership support. The state could also use the resources to support peer-to-peer networks; providing money for district time and for facilitation could lower the barriers for many districts to access these kinds of opportunities. The state could also organize support from effective districts to help their peers, leveraging the knowledge, skills, and promising practices already present within school systems to help other districts improve. Financial support could give higher performing districts the support they need to act as a resource without sacrificing attention to their own work.

Next Steps for the Collaborative

The Collaborative will convene again in Elk Grove in March 2019 to examine the growing financial constraints that districts face and strategies for addressing them. In the meantime, the Collaborative staff will continue to pursue publications and activities that share key lessons from our core meetings with the broader field of California educators. As always, resources from this and previous meetings, updates regarding Collaborative members, and information concerning upcoming events are available on our website at www.cacollaborative.org.