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Developing Principals' Instructional Leadership Systems of Support in Two Math in Common Districts

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Table of Contents

WestEd's Evaluation of the Math in Common Initiative	i
Executive Summary	ii
Introduction	1
Case 1: Mathematics Principal Professional Development in Long Beach Unified	3
Background and need for principal professional development	3
Principal professional development structures in Long Beach Unified.....	4
What principals are saying about their learning opportunities.....	9
Next steps and supports still needed	10
Case 2: Mathematics Principal Professional Development in Santa Ana Unified	12
Background and need for principal professional development	12
Principal professional development structures in Santa Ana Unified	12
Next steps and supports still needed	15
Highlights of Mathematics Principal Professional Development in Long Beach and Santa Ana.....	17
1. Math professional development is built into regular principals' meetings	17
2. Math professional development is aligned across stakeholder groups	17
3. Math professional development is designed as a safe collegial learning environment, while reinforcing districtwide and cross-role relationship- and community-building	18
4. Math professional development highlights and centers around classroom instruction.....	18
5. District observation tools offer teachers and principals a clear picture of the district's math vision and focus	19
6. Math professional development creates opportunities to practice observing instruction and gathering evidence.....	19
7. Principal professional development, tied closely to classroom practice, emphasizes support for improving instruction.....	20
Conclusion.....	21
Appendix A. Long Beach Instructional Practices Reflection Tool (taken from <i>Principles to Actions</i>).....	22
Appendix B. Long Beach Administrators Training in Math Agenda	24
Appendix C. Santa Ana Mathematical Rigor Poster.....	25
Appendix D. Santa Ana Math Reflection Tool	26
Appendix E. Methodology.....	27
References.....	28



Figures

Figure 1. Long Beach Unified School District's Path to Improved Instruction 4
Figure 2. Principles to Actions Mathematics Teaching Practices and Long Beach's Four Focal Areas 5

WestEd's Evaluation of the Math in Common Initiative

Math in Common® is a five-year initiative, funded by the S. D. Bechtel, Jr. Foundation, that supports a formal network of 10 California school districts as they are implementing the Common Core State Standards in Mathematics (CCSS-M) across grades K–8. Math in Common grants have been awarded to the school districts of Dinuba, Elk Grove, Garden Grove, Long Beach, Oakland, Oceanside, Sacramento City, San Francisco, Sanger, and Santa Ana.

WestEd is providing developmental evaluation services over the course of the initiative. The evaluation plan is designed principally to provide relevant and timely information to help each of the Math in Common districts meet their implementation objectives. The overall evaluation centers around four central themes, which attempt to capture the major areas of work and focus in the districts as well as the primary indicators of change and growth. These themes are:

- » Shifts in teachers' instructional approaches related to the CCSS-M in grades K–8.
- » Changes in students' proficiency in mathematics, measured against the CCSS-M.
- » Change management-processes at the school district level, including district leadership, organizational design, and management systems that specifically support and/or maintain investments in CCSS-M implementation.
- » Development and sustainability of the Math in Common Community of Practice.

Together, the Math in Common districts are part of a community of practice in which they share their progress and successes, as well as their challenges and lessons learned about supports needed for CCSS-M implementation. Learning for district representatives is supported by WestEd team members who provide technical assistance related to goal-setting and gathering evidence of implementation progress (e.g., by advising on data collection instruments, conducting independent data analyses, participating in team meetings to support leadership reflection). An additional organizational partner, California Education Partners, works with the community of practice by offering time, tools, and expertise for education leaders to work together to advance student success in mathematics. California Education Partners organizes Leadership Convenings three times per year, summer Principal Institutes, "opt-in" conferences on high-interest topics (e.g., formative assessment), and cross-district visitation opportunities.

Executive Summary

Faced with the need to support deep shifts in instructional practice required for the Common Core State Standards in Mathematics, the Math in Common districts have been reminded that effective site-based teacher professional learning requires strong site-level mathematics instructional leadership. In order to support meaningful change, principals need to understand what teachers are being asked to shift about their instruction and need to prioritize mathematics at their sites. Accordingly, districts must invest deeply in principals' learning around the mathematics standards.

In this report, we share details about how two California districts are approaching professional development to help their principals become instructional leaders in mathematics. We spoke to district leaders and principals to understand how these professional learning programs are affecting principals and the schools and stakeholders with which they work.

Looking across the two districts' evolving programs, we identified seven common elements of their professional learning systems that seem to matter most for building administrators' instructional leadership capacity in math:

1. Math professional development is built into regular principals' meetings.
2. Math professional development is aligned across stakeholder groups.
3. Math professional development is designed as a safe collegial learning environment, while reinforcing districtwide and cross-role relationship- and community-building.

4. Math professional development highlights and centers around classroom instruction, increasing principals' exposure to specifics of enacted mathematics.
5. District observation tools offer principals and teachers a clear picture of the district's math vision and focus.
6. Math professional development creates opportunities to practice observing instruction and gathering evidence.
7. Principal professional development tied closely to classroom practice emphasizes support to teachers for improving their instruction.

While further research is required to understand the results of these professional development programs, we encourage stakeholders to consider offering similarly coherent and targeted support for principals to help them become effective site leaders in standards-aligned mathematics instruction.

Introduction

“There are so many challenges that we have to face, it’s almost impossible for us to do a really, really good job . . . to be that sole instructional leader. I have to take care of the operations, the instructional leadership, parent engagement. . . . You know, I’m the custodian if my custodian is out. I could be the nurse.”

— *Elementary school principal*

“I think the really important part of the story is that it’s not just the principal — you can’t do it by yourself. . . . It’s really about sharing leadership with the people who are at your site. I just happen to be really lucky to have an excellent math department head and . . . our core values about kids and education are really aligned. Having her as a leadership partner in this is really what has helped to improve our school’s achievement in math.”

— *Middle school principal*

Over the four years of the Math in Common (MiC) initiative, the paths of the 10 MiC districts in implementing the Common Core State Standards in Mathematics have had twists, turns, and course corrections as the districts learned how to support educators to enact new ways of teaching and learning mathematics. For many districts in the MiC community, one major change in their implementation journey has been a shift in the balance of how teacher professional development is provided. Teacher learning experiences are being offered less frequently at central district locations. Instead, districts are more frequently providing learning experiences embedded in teachers’ everyday practice at their school site.¹

In moving toward more site-located professional learning, MiC districts have been reminded that effective site-based learning for math teachers requires strong site-level mathematics instructional leadership. Accordingly, districts must invest as deeply in principals’ learning around the mathematics standards as they do in teachers’ learning. In order to support meaningful change, principals need to prioritize mathematics at their sites and understand what changes teachers are being asked to make to align their instruction with the Common Core State Standards in Mathematics (CCSS-M).

¹ For more on this shift, see MiC evaluation report #5, *Bringing the Common Core State Standards to life through site-located teacher learning structures* (Seago, Perry, Reade, & Carroll [2016]).



More broadly across California, the policy landscape has shifted toward giving principals a wider and more demanding range of responsibilities to juggle as they are also supporting standards implementation and continuous improvement. For example, in 2014, the California Commission on Teacher Credentialing finalized a set of standards and sub-standards for principal leadership, covering topics ranging from maintaining the physical grounds of the school site to leading instructional reform efforts. State law SB 1292 (2012) now references these highly complex and disparate standards as key areas for districts to use in evaluating their principals (Commission on Teacher Credentialing, 2014). More recently, the state's 2017 Every Student Succeeds Act plan included a request to "strengthen school leaders' abilities to identify areas of need and to implement and sustain local actions that result in improvements while addressing inequities" (California State Board of Education and California Department of Education, 2017, p. 73).²

In short, a lot is being asked of principals. They are expected to provide leadership in multiple areas every day and to manage an increasingly complex environment – which includes implementing new assessments, rolling out new curriculum and instructional materials, and understanding new funding formulas – to set the right priorities for their sites. If, as research has shown, outcomes of standards implementation depend upon a strategic balance of support for and pressure on those responsible for implementing changes (e.g., Coburn, 2003; McLaughlin, 1987; Bryk et al., 2015), then

standards implementation will require pairing all these competing demands weighing upon principals with thoughtful supports for principals' own development and capacity.

Knowing that principals are crucial for the success of the CCSS-M, and that so much is being asked of them, we wanted to explore the ways districts are moving to systematically support principals. In this report, we expand upon descriptions of work provided by leaders from two MiC districts (Long Beach Unified School District and Santa Ana Unified School District) at the 2016 and 2017 California STEM/STEAM symposia, about professional development their districts provide to principals in support of CCSS-M implementation. We present two case studies describing the districts' contexts and an overview of the principal professional development opportunities provided in each district, including principals' reactions to these opportunities. The two districts provide similar structures for principal professional development, but the training structure we highlight in Santa Ana is more recently emerging than Long Beach's longer-standing and more layered approach. After describing the district contexts, we highlight the common features of these districts' principal professional learning programs that seem to matter most for building administrators' instructional leadership capacity specifically in math. These common elements can serve as guidelines for other districts considering how to prepare their own administrators to support standards implementation.

² Section 8302 of the Elementary and Secondary Education Act of 1965 (ESEA), as amended by the 2015 Every Student Succeeds Act (ESSA), requires each state educational agency (SEA) to submit a consolidated state plan describing how the state will meet all ESEA requirements for each included program.

Case 1: Mathematics Principal Professional Development in Long Beach Unified

Background and need for principal professional development

With the first release of statewide math Smarter Balanced assessment scores in 2015, Long Beach Unified School District (Long Beach) leadership realized something needed to change in classrooms, and that principals had to play an important role in leading that change. The baseline year of Smarter Balanced assessment scores revealed that all schools in the district performed more poorly in mathematics than in English language arts (ELA). A district math office leader told us that “at every school, English outsourced math.” When the Smarter Balanced assessment scores were distributed to staff, she told us, they came in a spreadsheet with a column labeled only “difference.”

“It was the ‘difference’ between math and ELA,” she continued. “The numbers were all positive.... The fact that it was a difference column and they didn’t even tell you which one [it was understood that it was always ELA that was higher] was phenomenal to me.” The way this difference in assessment scores was presented to staff — as though it were a given that math scores would always be lower — highlighted for district leaders the need to bring math to the forefront of the district’s work.

At the same time, while the district had provided “lots of teacher professional development” to every teacher in the district to support their new math curriculum adoption and standards implementation, district math office staff reported that their anecdotal evidence did not reveal instructional shifts in classrooms to the degree they wanted or felt necessary to achieve the standards. District leaders felt all teachers needed support in improving math instruction and that site administrators

had an especially important role to play in encouraging teachers to make instructional changes.

A district leader explained the somewhat delicate position the district’s math office staff can find themselves in if they work in isolation from principals: their mandate is to support teachers only, not to evaluate or supervise teachers. While being a coach in a non-evaluative support role is great for building relationships with teachers, it does not necessarily result in changes in classroom practice unless a principal is involved.

“When a math coach or math curriculum leader provides a suggestion to a teacher to improve instruction,” a district math leader told us, “the teacher may or may not make any change because the curriculum office doesn’t supervise them. So it’s critical that the teachers’ supervisors are able to make a suggestion to improve instruction because they are the ones who ... can hold teachers accountable for making change.”

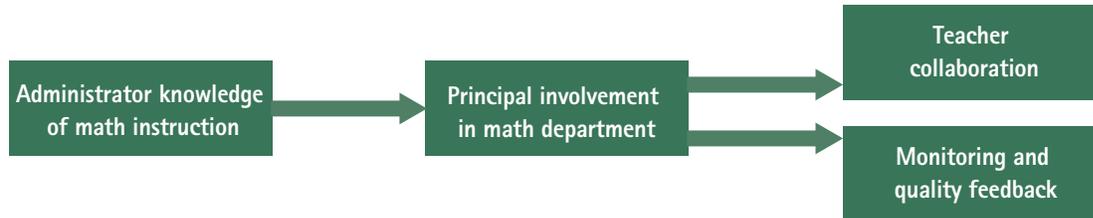
But administrators may be challenged to lead in instruction if they are unfamiliar with math content or with the demands of the new standards. Even principals that were formerly district math teachers and coaches in the district reported feeling uncomfortable in a math leadership role because the CCSS-M were so different from the way they themselves had formerly experienced and taught math. Vanessa,³ a secondary school principal, told us, “It was really humbling.”

Principals were feeling lost, especially regarding the idea of how to give instructional feedback to teachers. District leaders, recounting their trajectory of changing their principal professional learning opportunities, indicated that a starting point for them was Vanessa’s comment that, “I don’t know what I’m looking for [when I go into a math classroom].” District leaders concluded

³ Names have been changed to preserve participant anonymity.



Figure 1. Long Beach Unified School District’s Path to Improved Instruction



Source: Kahl & Perry, 2017

that, despite their best intentions, “the principals were really left behind with knowing how to supervise math and what changes we expected of teachers.”

To build systemwide and site-specific plans for math improvement that included both teachers and principals, district leaders knew they needed to draw on multiple district departments and organizational units and a range of staff from different levels of the system, including principals, principal supervisors, and staff in the math office. District leaders felt that, at least for the middle school principals, the path to improvement started with developing administrators’ knowledge of math instruction and then involving the principal with more regularity in math department activities. They posited that building this capacity and site-level collaboration would, in turn, help principals better collaborate with teachers and teacher groups, monitor classroom instruction, and provide high-quality feedback to teachers (see Figure 1).

Not everyone we spoke with in the district agreed about how much math is important for principals to know or understand to be a good math instructional leader. Regardless of their own prior math-specific teaching and/or coaching experiences, each principal registered their own personal hesitations and “inadequacies” about providing instructional leadership for math. For example, Vanessa felt that her instructional leadership was dependent on her own expertise in math instruction. She commented, “I don’t see our school improving without me being an expert in [instruction].” Roberta and Anita, K–8 and elementary principals respectively, were less concerned about their own understanding

of math content. They were more concerned about making sure they understood the standards for the grade levels in their schools, the resources available for teachers of those grade levels, and the instructional practices appropriate for students to reach grade-level learning objectives.

All Long Beach principals we spoke with mentioned that the supports and resources provided by the district have improved their comfort level with various elements of instructional leadership. As Anita, an elementary school principal, told us:

Originally, especially as I was coming out of the classroom, I felt like I needed to know it all, and so I was hesitant to go in and give feedback as much as I should have or could have because I didn’t know what the third grade curriculum content should be... Now, focusing on good math practices that translate across content, I’m more comfortable going in and doing what I’m asking the teachers to do – just asking them those probing questions and modeling what I want them to do with kids.

Principal professional development structures in Long Beach Unified

Principal professional development structures in the district vary by grade level, with some common and some unique opportunities offered to administrators at the elementary and secondary levels. At both levels,

Figure 2. *Principles to Actions* Mathematics Teaching Practices and Long Beach's Four Focal Areas

Long Beach models its four focal areas for teacher professional learning on selections from the National Council of Teachers of Mathematics resource *Principles to Actions*. Below are the eight teaching practices from *Principles*, with asterisks indicating which practices are currently Long Beach's four focal areas.

****Establish mathematics goals to focus learning.** Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

****Facilitate meaningful mathematical discourse.** Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

****Build procedural fluency from conceptual understanding.** Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures *flexibly* as they solve contextual and mathematical problems.

****Elicit and use evidence of student thinking.** Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.

Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

**Long Beach's four focal areas

Source: National Council of Teachers of Mathematics, 2014

professional development uses a common resource — the National Council of Teachers of Mathematics' (NCTM) *Principles to Actions* (2014; see Figure 2) — to ground administrators' learning about key mathematics teaching practices and the ways in which these instructional elements can be identified in the classroom.

Drawing from this resource and others, Long Beach's principal professional development is organized into four interlocking structures: regular principals' meetings, side-by-side professional development with teachers, opportunities to practice observation and feedback, and leadership training in mathematics.

Regular principals' meetings

- » **Math content-focused presentations (about math instruction, standards, and instructional shifts) from the district math team are integrated into principals' monthly meetings.**

In Long Beach, the assistant superintendents at each level (elementary school and middle/K–8 school) hold separate monthly principal meetings to explore grade-appropriate topics around teaching and learning. The district's Curriculum and Instruction math staff also offer math-specific training during these meetings. One strategic goal of the training at both levels is to help principals become more familiar with what mathematics instruction should, and should not, look like — so that when they are back at their school sites walking into classrooms, they are more aware of what to look for and more able to provide specific, targeted feedback to teachers about instruction. Monthly principals' meetings have included opportunities for principals to view classroom video of mathematics instruction, gather evidence of teaching practices the district is encouraging, and compare and calibrate their evidence alongside peers from other schools and staff from the district's Supervision and Curriculum (math) departments.

In response to principals' feedback from the 2016–17 school year, the district is helping K–8 and middle school principals focus their feedback to teachers more effectively on mathematics content in the 2017–18 school year. To do so, they have provided all principals with online access to scope, sequence, and curriculum materials. These online materials include two resources that principals find especially useful: a high-level look at the math unit pacing for the year and detailed unit guides that indicate the related standards, learning goals for students, and assessment results (from the Smarter Balanced test and from the district's unit assessments). By digging into these online resources both during the meetings and on their own, principals become more aware of the specific math content they should see in a math classroom back at their school site. As one district administrator noted, "This [resource] is forcing our

administrators to get down into the standards," although she acknowledges how important it was to first build administrators' comfort with observing and gathering evidence in math classrooms.

In addition to the monthly grade-level principals' meetings, the district has organized two additional meeting structures to support all principals. There are three meetings per year that include all K–12 principals, with breakout sessions by grade level during the day. The grade-level offices create the agendas, which include a variety of topics such as content, learning from each other, and progress monitoring/data analysis. In addition, each site in Long Beach has an Instructional Leadership Team composed of site leaders, including the principal and a team of teachers (e.g., at the elementary school level, this team might include a K–2 representative, a 3–5 representative, and a special education representative; at the middle school level, the team would include chairs from multiple departments).

Twice a year, the district gathers all the Instructional Leadership Teams to ensure that site leaders receive aligned training on addressing schoolwide instructional leadership concerns that cross content areas and on developing the school site's theory of improvement. For example, the most recent such meeting focused on the idea of "collective efficacy" (Donohoo, 2016), which encourages fostering a strong collective belief that staff at a site can work to meaningfully affect and improve student achievement. The day also included support for instructional teams at sites to work together on unit design, which involved building collaboration and learning to use data to attain greater efficacy. At the meeting, each site leadership team did an efficacy self-assessment using a common rubric and thought about next steps to achieve higher efficacy levels. Subsequently, each Instructional Leadership Team returned to their school site to have similar discussions within their own departments to support efficacy both within specific content areas and across the entire school.

Side-by-side professional development with teachers

- » Principals join teacher professional development offerings in order to stay on the same page as their teachers about instructional shifts, standards, and math content.

At the elementary level, principals are often included side-by-side in site-based training opportunities provided to teachers. In the 2016–17 school year, elementary schools were selected for coaching support using a tiered model based on the school's average math achievement. Schools that received coaching support were organized into cohorts of three to four school sites, with a math coach facilitating two grade-alike professional learning experiences for teachers (and principals) called unit study and lesson study (see sidebar). In grades 3–5, coaches facilitated two to three unit studies, each followed by a lesson study. In grades K–2, coaches facilitated one unit study followed by a lesson study.

Learning opportunities for both grade bands emphasize school staff learning together about the math standards, instructional goals, and elements of classroom instruction to help students achieve particular goals. School staff also learn how to use classroom data to understand the extent to which students achieved the goals set out for them. In the 2016–17 school year, principals were encouraged to come to these unit-study and lesson-study sessions so that they could return to their schools and facilitate additional similar training opportunities.

In the 2017–18 school year, district math coaching time at the elementary level has also been allocated to support the district's lower-performing Title I schools. At these current coach-supported sites, principals are expected (rather than only encouraged) to attend lesson study and unit study training opportunities alongside their teachers.

Unit study and lesson study in Long Beach Unified

In unit study activities, teachers work with a math coach and grade-alike teachers (sometimes from other schools) to deepen their understanding of essential learning standards for the upcoming unit, and to plan the sequence, pacing, learning targets, and assignments for lessons in a unit of instruction. In 2016–17, participating teachers received a copy of the *California Mathematics Framework* and a book, *The Common Core Mathematics Companion: The Standards Decoded*. They used these resources to build their understanding of the math content and instructional strategies for teaching the content within the unit. Additionally, teachers read about, discussed, and watched videos featuring the math teaching practices (from *Principles to Actions*) to better understand how they will be used throughout the unit to build student content understanding.

During lesson study, grade-alike teachers observe and implement selected teaching practices during live classroom instruction. In the district's elementary school version of lesson study, the site team plans a lesson around a task that they selected during the unit study. The team watches a site teacher facilitate the task and then participates in "teacher huddles" to discuss how to respond to student progress as evidenced in student work and observations. Later in the day (or sometimes on another day), pairs of teachers share roles to teach the lesson/task with one class of students. At the end of the day, guided by the observations and evidence gathered during the lesson, the group of teachers collaboratively reflect on the effective teaching practices that they've observed and how they relate to the lesson/task and its outcomes. (Middle school lesson study follows a very similar process, with modifications on the basis of middle school class periods and course availability.)



Opportunities to practice classroom observation and feedback

- » **Half-day training sessions are organized for diverse groups of principals and district staff to collaboratively observe and discuss live classroom math instruction.**

At the secondary level, district administrators have developed the Administrator Training in Mathematics (ATM) program to provide additional opportunities for principals to observe live instruction, gather evidence of the teaching practices, and discuss this evidence with other site- and district-level administrators. Using additional exposure to live classroom instruction as a “practice” opportunity, the primary goals of these sessions are to help principals calibrate their understandings of good math instruction and learn how to use evidence from instruction to provide targeted feedback to teachers. Secondary principals and assistant principals are encouraged to attend at least one ATM session during the year, although many have chosen to attend more than one. During the 2016–17 school year, five ATM sessions were organized for principal and assistant principals to observe instruction in two middle school math classrooms; 84 percent of eligible principals and assistant principals participated in at least one ATM session during the 2016–17 school year.

The ATM agenda is grounded in the NCTM publication *Principles to Actions* and tools that the district has developed from this resource (see Appendix B for a typical agenda). Figure 2 lists the eight mathematical teaching practices in *Principles to Actions* and highlights the four focal areas Long Beach has been practicing so far.⁴ A district leader pointed out that two critical features of the ATM structure make it different from principals’ other observation experiences: lengthier observations and a diverse group of participants. First, ATM participants observe math instruction in the selected classrooms for 30 minutes, which is longer than the 10–15 minute observations principals typically do in

a formal district site-visit protocol. This is strategic, providing more extensive opportunities for them to look for and cite evidence of each of the four focal areas of the observation instrument. Principals are given a recording sheet to use when they observe instruction, identifying teacher and student actions that might demonstrate the focal areas. Principals are expected to observe and cite their own evidence of these actions on the recording sheet and asked to determine, based on the evidence they gather, if the focal mathematical teaching practice is “adequately implemented.”

Another critical feature of the ATM is the collaborative observation that principals engage in with others, which includes district math coaches, principals from other schools, principal supervisors or other district administrators, and assistant principals. As a district administrator told us, this diverse group of participants together gets the opportunity to have a “safe place” to “practice looking for effective math teaching experiences in classrooms.” During the collaborative observation, each participant uses a recording sheet to gather and cite evidence of the four focal areas based on their own knowledge and experience, and afterwards the group has another 20 minutes to jointly discuss the evidence gathered from these multiple perspectives. Sharing these observations enables each participant to learn from others’ perspectives on the observed lesson, and gives them an opportunity to “test out ideas and use the language of the practices.” Once the evidence is gathered and shared during the debrief, and the evidence has been considered and calibrated, the group together develops a rating and some suggestions for feedback that might be useful to the teacher. To ease the pressure on principals in the first year of the ATM, the teacher feedback generated by the group was fine-tuned and delivered via email by one of the district math specialists rather than by the site principal. As such, the data from the ATM become actionable and useful, creating opportunities for learning both by the ATM participants and by the teacher whose class they observed.

4 The four focal areas were chosen in part because some prior district professional learning opportunities for teachers and for leaders (in both literacy and mathematics) had focused on similar understandings.

Leadership training in mathematics

- » A principal and math department chair from a school that had success with instructional shifts and student achievement gains presented their lessons learned at a one-day mandatory math leadership institute attended by other principal/math chair teams.

At the end of the 2016–17 school year, district staff identified one middle school that had made particularly strong math achievement gains over the year, and invited the site's principal and math department chair to present at a mandatory training session for all secondary principals and their math department chairs. This was an opportunity to widely share promising leadership practices and instructional strategies. The math department's "back-to-back" meeting structure (see sidebar: Math Leadership at Washington Middle School) was described and the school leaders shared sample meeting agendas and resources. Other school teams then had the opportunity to reflect on the presentation and materials and do some strategic planning for their own site's 2017–18 math department meetings. The middle school/K–8 level office has followed up with principals and department chairs to understand how they are using information and resources from this training session to structure their site collaboration this year. The office found that the majority of middle/K–8 schools have also moved to a structure of back-to-back department meetings to better support collaboration.

What principals are saying about their learning opportunities

Principals in Long Beach tended to view their mathematics work as being embedded in a system of supportive education professionals, including their own supervisors, their peers, and the district math staff and coaches.

Reflecting on their work aimed at building more mathematically powerful classrooms, both elementary and middle school principals highlighted the vital support

Math Leadership at Washington Middle School

In the 2016–17 school year, unlike at other middle schools in the district, Washington Middle School's four staff meetings per month were organized into two "back-to-back" (in consecutive weeks) department meetings to facilitate the department's professional learning, strategic work, and joint reflection. These meetings have a professional learning community structure focused on "high-leverage team actions." The goal is to build a stronger team for math improvement by focusing efforts on shared ideas at three points in time: before a unit of instruction, during the unit, and after the unit (see Kanold & Larson, 2015). Before a unit of study, the math department works together examining standards, identifying tasks to use during the unit, building and scoring common assessments, and examining homework. During the unit, they use a lesson study structure to design the lesson and examine how the chosen tasks are used and how to incorporate formative assessment. After the unit, they focus their discussions on goals and actions to be taken for students and teachers.

role played by their own principal supervisors. "The accountability of the director that supervises you [is important]," said Anita, an elementary school principal. Anita considers her supervisor to be a math expert, and for her that translates into meaningful expectations around math achievement — and an intrinsic motivation to learn more.

"With other directors and supervisors," she says, "it's not [a priority]. You can tell they're uncomfortable with [math], so they are just fine with you kind of just skating by. With her, you know there is just no way that you are getting out of direct questioning ... and you then start to learn things on your own because you know that that's the expectation."



While principals in other schools were introduced to ideas like unit and lesson studies by district math coaches in site-based teacher training opportunities, elementary principal Kumar heard first about these ideas, and *Principles to Actions* and their application to mathematics, directly from his supervisor and in district-level training opportunities. Kumar mentioned that one of his challenges with hearing about information in these centralized principals' meetings (where math coaches were invited to briefly present information during a cross-content meeting that covered many other topics) was knowing how to prioritize and integrate information he heard there with his specific site plan:

You go and you get something and take something away, and it may or may not fit with where you are right now in your professional development plan or your action plan for your school. You know, if it's something good, "okay, I'll hold onto that and I'll find a way that I can get that to my staff." Sometimes those things don't always work that way.

While exposure to new ideas at principals' meetings was very important for Kumar because "I have to know something ... in order to be able to ask the right questions," he reported that his move to a Title I school this year has changed access to math coach-supported professional learning for both his staff and himself. He mentioned that, for him, having access to math expertise as the coaches work with his teaching staff at his site is like a "night and day" difference in his own learning. Previously he'd heard good ideas mentioned in meetings, but until he had the support of a math coach, he was not able to deeply understand and support the development of new math practices at his site.

Anita's elementary site had the opportunity to work with a coach from the math department and a cohort of four sites working together on unit and lesson study. For her, cross-site collaboration has become an integral part of her own learning and improvement. "If I want to be able to give powerful math feedback," she said, "then I want to meet with colleagues that are giving powerful math feedback, and I want them to come watch me, and

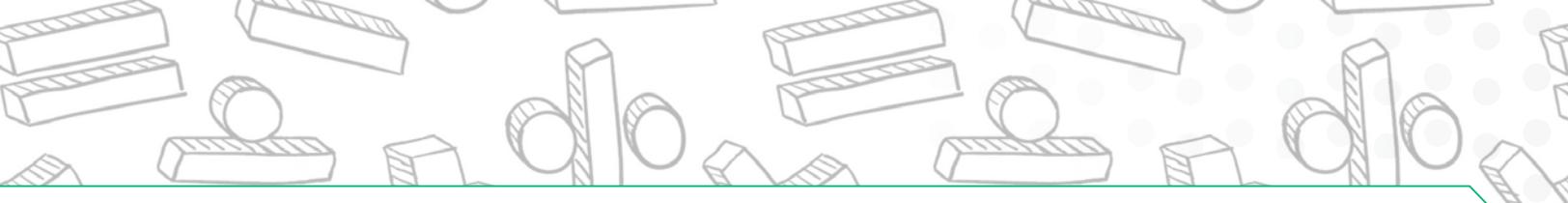
I want to go watch them. For me, learning from each other is the safest, most valuable [way to support our learning as principals]."

Vanessa and Roberta, middle school and K-8 principals respectively, greatly appreciate the centralized principal professional development they have received. Both commented on the applied opportunities they have had to make sense of and move math instruction. Roberta described her own learning through a principals' book study on the *Principles*, the ATM process, and then a close look at an upcoming math unit. She described principals meeting in pairs to discuss the unit and what they thought they should see in classrooms ahead of doing observations using a rubric. "And then," Roberta said, "we had to come back together and have conversations about what did we notice, what did we see, what feedback we gave to those specific teachers related to what we observed. [This is] to ensure that when we go into classrooms that ... we actually go in with some knowledge. You are supposed to be researching before you go in."

"Yes," Vanessa continued, "and they taught us how to do that [research]. I'm sure [we] could figure out how to do that, but what was nice is that they give us the time to do it. So they pull us off the site where all the fires are going off all the time, showed us how to do this, showed us exactly how to resource all the information and ... [then] made us do it and come back and talk about what we did and the feedback we gave. So it was really just a beautiful process of learning for us."

Next steps and supports still needed

Long Beach is gathering data from principals and department chairs to understand the impact of these professional learning experiences and how to improve their principal training opportunities. One area of continuing need identified by the district administrators and principals we spoke with is teacher feedback. This school year, district administrators organized additional time at

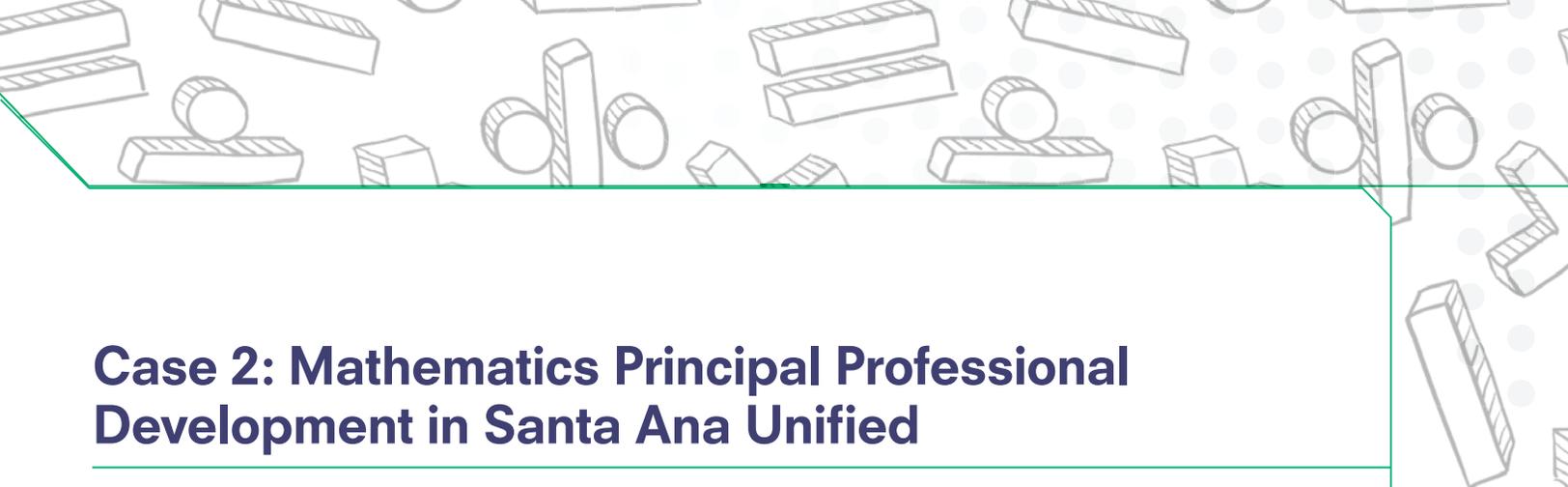


middle school principals' meetings focused on helping principals give specific written feedback in response to a written scenario describing a math lesson, and on familiarizing principals with the online curriculum resources to support their observations and feedback.

Principals' desires for further support also seem to stem from areas of district focus that have piqued their particular interests. For example, in Long Beach we heard from principals about their interest in learning more about particular instructional strategies, such as how to use number talks. One principal told us that while he knows number talks are important and he hears and reads about them frequently, he doesn't feel prepared to monitor them because he's not sure exactly what to look for in a successful number talk, or how to understand

the way number talks relate to the larger math lesson for the day or the unit. He wants time with an "expert," such as a math coach, "to be able to go to pick their brain about what I saw, why it's there, and where does it fit within the scheme of things."

Principals are also interested in receiving additional support on giving actionable teacher feedback "to change the course of instruction in the moment," and on using online content and assessments resources to inform their observations of and feedback to teachers. These are ideas that they might not have encountered if not for Long Beach's system of principal professional learning, and now the principals can see how they could leverage these ideas to make improvements at their sites.



Case 2: Mathematics Principal Professional Development in Santa Ana Unified

Background and need for principal professional development

In the 2017–18 school year, Santa Ana Unified School District (Santa Ana) is in the first year of a new principal professional development program aimed at responding both to shifts in district policy and principals' stated needs for support.

As they implement the new standards, Santa Ana district administrators know that instructional leadership starts at the site leader level; administrators need to help carry the district's math vision to teachers. A district director described their principals as "the lynchpins ... at their school sites. Without principal support, participation, and buy-in, movement or improvement in teaching and learning wouldn't happen in our district."

Devon, an elementary school principal, agreed: "We play an important role because we are the ... leaders on our campuses. Teachers look to us for that support and that guidance. If we are to move the school forward, then we need to have some knowledge and some experience with the curriculum and instruction."

At the same time, many principals still need a lot of support to understand what math should look like under the CCSS-M. "The reality is that our principals are instructional leaders," a district instructional specialist said, "but many of them may not have had experience actually teaching with Common Core math. They haven't taught in those kinds of ways, but they are expected to coach in those ways. So it's challenging for them and they have a lot of pressure on them."

Tracy, a district math curriculum specialist, told us that the district's recent math instructional materials adoption added an additional pressure for principals to learn, kindling a "sense of urgency that we really need the

principal support ... for understanding the shifts" necessary to implement the new materials.

As the individuals overseeing teaching and learning at the school sites, Santa Ana principals have two primary ways that they monitor teaching and learning. The first, begun in the last seven to eight years, involves principals organizing "data chats" with grade-level teams and/or individual teachers (depending on specific school structures) to discuss multiple sources of data, including math achievement scores and social-emotional assessments, and "focus attention on different content areas and student success in those content areas." These data chats are modeled after the process that district supervisors use with principals to monitor progress at their school sites, called "principal summits" (see sidebar: Santa Ana's Principal Summit). Discussions focus on support systems and differentiation to move particular students along an improvement continuum. Additionally, district leaders say, "principals know full well that the only way to make sure students are improving is if they have done face-to-face time in the classrooms on a daily basis as well as during these data chats." Thus, the second way that principals monitor teaching and learning is via classroom visits. Principal professional development has begun to include more of a focus on mathematics to support principals' leadership specifically in that content area.

Principal professional development structures in Santa Ana Unified

Regular principals' meetings

- » Principals already attend monthly principal meetings; this year, the math department was granted

time during these meetings to help every principal think and learn about math together.

Santa Ana has long held principals' meetings, which are organized by the assistant superintendent and the elementary and secondary directors of teaching and learning. The meetings are meant to support principals in meeting accountability demands alongside other aspects of their work. Recently, after principals asked for quality professional development, the meetings have shifted so that one day each month is devoted to principal learning across content areas. As one district administrator told us, on these content-area learning days, "everything we do is truly geared toward helping them become more reflective practitioners and better

instructional leaders.... Trainings are given by a variety of experts from a variety of departments and partners," including, now, the district mathematics specialists.

Devon, an elementary school principal who identified herself as "not a strong math person," told us that the monthly session "helps us to get to know our math reflection tool better and helps us get to know the standards better." Furthermore, she said, "It was a time that I could take out of my busy day and get that information, be informed so that I can better support my teachers as well as network with other principals and really have that collegial time around [math]. That helped me to focus more on math."

Santa Ana's Principal Summit

At the beginning of each school year, Santa Ana principals participate in a "summit" to develop and share their instructional focus for the year with district directors, assistant superintendents, and the superintendent. (Math coaches noted that the majority of school principals have not recently chosen mathematics for their site's instructional focus.) Principals reflect on how students performed in the prior year on various measures and, based on that data, what their goals are for the current school year.

A Santa Ana education director described the summits as follows:

"The summits are so helpful for us because it gives me a true picture of what's going on at the school, so I can better support the school. For instance, the principal I was with this morning, we actually reviewed her goals and her summit from the previous year, which is all based on data, to make sure her instructional focus and what she was going to do for teaching and learning at her school site were aligned and on track.... [Data] will be presented in next year's summit. We are continually tying it back to

what the school needs to do and tying it back to the district vision, but also making it part of [principals'] evaluation so they get credit for all the hard work they are doing. [The data helps demonstrate] 'Wow, look at everything you've done to make sure your schools are moving forward.'"

Principals in the district closely track student progress by grade, subgroup, course (at the middle school level), and teacher; this progress-tracking process begins with, and is framed by, data conversations at the principal summits. A Santa Ana elementary school principal added:

"We are constantly using data, and we are constantly going back to the data to determine where we need to work on things ... [District math assessment is] given three times a year. We have conferences ... about [the data] at the midway point with the teachers to talk about where the growth is and what things they can still be working on.... We've had some pretty good success with having those conversations and talking about it and making everybody aware of where they're at and where they need to go."



Math vision modules

- » District math curriculum specialists develop modules to present to principals at their monthly meetings.
- » Modules cover crucial elements of the district's math vision and the California Math Framework, with a focus on how these will look in practice in classrooms.
- » Principals are given a slide deck to use at their site to present the information to teachers.

In the current school year (2017–18), at the behest of and with support from upper district administration, math-specific principal professional development is incorporated into the monthly meetings using “math vision modules.” These modules enable all principals to receive training on the district’s conceptualization of math instruction under the new standards.

Previously, the coaches reached principals most reliably through a voluntary, twice-yearly math-specific training called Principals Math Academy. According to a district math specialist, they found that just as with teacher learning, principal learning is less effective when only some principals access the training — it needs to touch everyone. The best way for them to gain broad, sustained access to principals was to add math content to an existing structure, in this case the monthly principals’ meeting.

At these meetings, the three district math curriculum specialists facilitate the presentation of math modules to principals with a focus on helping them understand “general shifts in math and what it is that school sites need to know,” based on the California Math Framework. (We detailed some of the elements of coaching provided to principals in Santa Ana and other districts in our recent Math in Common evaluation report, *Sense-Makers, Messengers, and Mediators of the New Mathematics Standards: Coaching in the Math in Common Community of Practice* [Reade and Carroll, 2018]).

Principals appreciate the chance to dig in to math in a safe environment. Angela, a middle school principal,

told us she appreciates the work the district curriculum specialists are able to do in this new “math vision modules” format. “This year,” she said, “they’ve finally been given some time at our principal meetings, and they’ve been doing a good job of having us go through [math-focused] professional development that is very hands-on, where we get to see what the new curriculum is really like. It’s really important because not everyone was a math teacher, so it helps those people that have that fear of math to see that it really isn’t so scary and they can do it too.”

In Santa Ana, principal professional development emphasizes building capacity for principals to understand and identify high-quality mathematics instruction, with the development of specific mathematical content knowledge being a secondary outcome. Both principals and curriculum specialists told us that they are converging on an understanding of what instructional leadership looks like in mathematics, and that understanding frees principals to focus on what instruction should look like, instead of worrying about their content knowledge. “[Principals] don’t actually need to know that much math,” a math curriculum specialist told us. “They need to understand the purpose behind the [instructional] shifts, not the actual mathematics. And if [they] can pass on what it should look like [to teachers], what the kids should be doing, then [they] can support the instruction that needs to be going on.”

A middle school principal agreed that focusing on instruction helps alleviate her math anxiety so she can help teachers: “It’s more about listening and learning right alongside your staff, rather than, ‘Oh ... [I] have to be the one that is the expert.’” Devon, an elementary school principal, found the classroom videos that are part of the modules to be especially useful for her own classroom observations: “[The videos] show what it looks like in a classroom — what is a teacher doing and what are the students doing. It gives us a reference so that when we are going in to look at math, we kind of have some points to draw upon.”

Once principals receive training on the math vision modules, they are expected to share the learning during

staff meeting time at their sites, with a slight difference in the delivery expectation for elementary and middle grade principals. In the middle grades, department chairs who have received similar training in their own dedicated meetings provide training to the math department teachers; principals are there to provide additional support. (Teachers on special assignment also have their own dedicated meetings where they learn about the math modules.) The module training for these middle school principals is "mainly for them to have a clear understanding of the [math] vision, so that way they can support [it]." Elementary school principals are expected to present the math vision module information directly to their staff, and the curriculum specialists have prepared a slide deck for principals to use with their staff.

At the time of the interviews for this report, math specialists had developed two modules, with the first focused on mathematical rigor and curriculum maps for the purpose of familiarizing teachers with the "[new] instructional resources and tools they had at their fingertips." Specifically, the district developed a poster (see Appendix C) describing important elements of mathematical rigor that educators should attend to in order to support rich student discourse in mathematics, including conceptual understanding, problem solving, and procedural skill. The intention of the poster was to help administrators see mathematics as requiring more than procedural skill. The second module focused on the district goal of student discourse — "what does it look like, feel like, smell like" in the classroom — and emphasized the importance of this discourse focus.

Both modules have incorporated additional professional development about the district's math reflection tool (see Appendix D). This tool focuses on four instructional elements and provides a continuum of what student actions under each of those instructional elements would look like at the "emerging," "proficient," and "highly developed" levels as well as some of the evidence that could be gathered at each level.

Although the team of three district math specialists is building the modules as they go this year, they report that the next few modules will focus on "the mindset

that is required to move forward with problem solving and perseverance, and then move into the feedback loop. And after that will be our English learner needs."

Other sources of principal training

- » Principals can voluntarily attend teacher professional development offerings with external assistant providers like the Irvine Math Project and publisher trainings on new instructional materials.

The district provides other professional learning opportunities for principals. Especially at the elementary level, principals often choose to attend the same training opportunities provided to teachers, including those offered by the Irvine Math Project, Silicon Valley Mathematics Initiative, or training on the district's newly adopted instructional tool, Math Expressions.

Next steps and supports still needed

Principals told us their primary wish is more opportunities to observe and reflect with teachers about their instruction, so that they could better understand "where their teachers are" and what supports they could provide. Although union tensions a few years back limited principals' ability to go into classrooms for walkthroughs or instructional rounds, principals we spoke with mentioned that after much relationship-building, staff at their sites were beginning to find ways to visit each others' classrooms and observe instruction. They reported that this access to classrooms for observations "sparks dialogue and conversation around the instructional practices and what our students are doing" and helps them as principals know where their teachers are in their instructional shifts toward the standards.

Elementary school principal Devon said providing personalized reflection and support for math instruction is particularly important in the elementary school context, where teachers cover every content area and each has different strengths. "As elementary teachers,



they are responsible not just for math," she said, "but for other content areas. So getting in there observing [is important], and having conversations with them around specific content areas to try to see where they are and what their needs are — because they are all different, in all different places."

The district's math reflection tool was created to support the kind of conversations about instruction between site principals and teachers that Devon is referencing. The district math team has worked hard to make sure the tool isn't seen as evaluative, and that its use educates both principals and teachers. "I'm not using it to go in and do a look-for and check a box," Devon said, "[or] to say, 'You didn't do this and you didn't do that.' It

helps us to see that evidence [of instructional shifts] — are students doing this in the classroom? So it does help us to reflect on what we saw in the classroom."

While use of the reflection tool has been uneven, after their most recent training with the reflection tool and video, Santa Ana principals have been assigned by their supervisors to gather observation data using the tool to understand student discourse in at least five classrooms at two points during the year, and again in the following year. District leaders report that as their principal professional development continues, they expect the math reflection tool to be one of the ways principals triangulate with other sources of data presented during their principal summit.

Highlights of Mathematics Principal Professional Development in Long Beach and Santa Ana

The case studies of Long Beach Unified School District and Santa Ana Unified School District highlight the progress that district administrators are making toward developing and supporting principals' instructional leadership in mathematics, specifically by working to build administrators' capacity with and understanding of curriculum and instruction. Below, we identify key common elements of these training opportunities in order to provide some guidance for other districts considering how to support their own administrators in guiding standards implementation.

1. Math professional development is built into regular principals' meetings

Principals are extraordinarily busy people, with long lists of varying responsibilities and expectations that often exceed what a single person could accomplish in a day. These leaders want and need learning opportunities that are both efficient and immediately relevant to their work. Both MiC districts we reported on use the existing structure of their monthly principals' meetings to include dedicated time to talk about mathematics instruction. For example, during the 2016–17 school year in Long Beach, 10 middle school principal meetings included an agenda section (1–2 hours) focused on math. Incorporating math-specific learning opportunities seems to be helping in four primary ways:

- » Earmarking valuable meeting time to include math content sends an important message about this subject as a district priority.
- » The district can take advantage of an existing structure for principal learning and collaboration rather than adding on another activity to principals' already busy schedules.

- » Meetings occur regularly, so that principals can continue learning across the school year.
- » While other parts of these meetings are focused on more general or cross-subject change ideas, there is a specific time allocated for a focus on mathematics.

Incorporating math professional learning into existing principal meetings helps principals gain both the content-specific and the cross-content knowledge they need to be instructional leaders at their school sites. It also helps principals begin to make connections and see coherence among initiatives as they make decisions about instruction for their site.

2. Math professional development is aligned across stakeholder groups

In both districts, other stakeholder groups receive training aligned to what principals learn, so everyone is on the same page with respect to goals and strategies for improvement. For example, in Santa Ana Unified, teachers on special assignment (coaches) and department chairs receive the same training as principals on "math vision modules" (opportunities to learn about discrete elements of the districts' goals for math implementation). In Long Beach Unified, department chairs have their own dedicated and aligned professional development time, but, as the June 2017 Leadership Training in Math event demonstrated, department chairs and principals met together to do planning for math improvement at their sites. Long Beach's all-level principal meetings and Instructional Leadership Team meetings bring together principals from both elementary and secondary levels with other site leaders for common learning and idea sharing several times a year.



3. Math professional development is designed as a safe collegial learning environment, while reinforcing districtwide and cross-role relationship- and community-building

Leaders in both districts represented the math professional development opportunities for principals as a "safe place to ask dumb questions" about math instruction and content, **allowing principals to be learners**. Principals may not have the same level of content training as teachers. But in their job-alike meetings without teachers present, they can work through and make sense of mathematics ideas that are presented.

In both districts, principals are asked to engage in mathematics problem solving themselves to make it clear exactly what kinds of thinking students and teachers will have to be doing in response to the math standards. For example, Santa Ana math specialists have been helping principals understand both mathematical rigor and benefits of "productive struggle" for helping students persevere in their mathematical problem solving (consistent with the first CCSS-M Standard for Mathematical Practice). Such collaborative meetings, where everyone is put in the position of being a learner, are intended to counterbalance the traditional culture of competition among principals, which can stymie districtwide reform efforts.

Training events in both districts bring together principals, assistant principals, district math department staff, and principal supervisors to discuss instruction and learning with each other. Principal supervisors and mathematics coaches are there providing guidance and helping to flesh out specific ideas. Principal supervisors

we spoke with in both districts emphasized that the majority of their work with principals focuses on mentoring, supporting, coaching, and inspiring principal leadership — all in the service of clear expectations for principal "evaluation" and "accountability" checks necessary within a system of improvement.

4. Math professional development highlights and centers around classroom instruction

Both districts aim to **cultivate principals' exposure to and understanding of classroom instruction** to reinforce and build their capacity for instructional leadership. Accordingly, part of the administrator training in both districts includes a strong classroom component to develop principals' expertise in "noticing" and gathering evidence on the specifics of classroom instruction.⁵

In Long Beach, principals might attend the Administrator Training in Mathematics (at the middle school level) or perhaps a unit or lesson study with teachers, and also work directly with their own supervisor on other elements of classroom observation as they walk classrooms together. In Santa Ana, where one principal reports a "very difficult union situation," principals generally have more limited access to classrooms and there are limitations on what district administrators can ask of principals in terms of their classroom observations and walkthroughs. However, in their training this year, Santa Ana administrators have begun to ask principals to focus more on classroom instruction and gathering evidence of what's happening for students in mathematics. Two Santa Ana principals we spoke with indicated that their hard work to build a culture of openness at their sites has helped them gain classroom access at their schools and helped their teachers feel more comfortable with their appearance in the classroom.

⁵ See Sherin, Jacobs, & Philipp (2011) for more information on the idea of educator "noticing" as a mechanism for improving classroom instruction.



5. District observation tools offer teachers and principals a clear picture of the district's math vision and focus

In both districts, **math-focused observation tools** do not just exist to gather data for evaluation; they offer principals valuable opportunities to learn deeply about instructional shifts, build relationships with teachers, and reflect with their peers. In Long Beach, the district has for several years been using a set of four "understandings" (different than, but aligned with, the current four focal areas from *Principles to Actions*) that are intended to guide teacher practice across grade levels and content areas. However, more recently, in addition to these cross-content understandings, principal professional development has transitioned into helping principals understand more about the specific mathematics they should be seeing in classrooms as they observe instruction. Long Beach uses the eight mathematical teaching practices from *Principles to Actions*, which can also help guide principals' math observations and evidence gathering. Similarly, the Santa Ana math reflection tool incorporated into principal training sessions describes the district's focal instructional elements and what students should be doing in the classroom to exemplify those elements of instruction.

To avoid overwhelming principals, leaders in both districts focus principals' attention on only a few instructional elements at a time. In Santa Ana, this year the focus has been on student discourse and "honoring in on the details of student discourse and what it looks like when it's highly developed versus emerging." Long Beach's focus on four of the district's eight math teaching practices provides similar guidance on which elements of classroom instruction to consider first. With these tools, both districts have codified important math instructional ideas and provided narrow guidance to focus principals' attention.

Santa Ana leaders emphasize that their reflection tool is specifically that — a tool to promote internal reflection

on an element of instruction that's either selected by the teachers themselves or is an instructional practice of interest to the district or school. They contend that when the intention is for teacher reflection and change, "these tools ... cannot be evaluative in any way... The language of the tool and the messaging that principals receive ... is that this is a tool for reflective practices."

6. Math professional development creates opportunities to practice observing instruction and gathering evidence

The professional development opportunities in both districts support the ideas that learning is continual, expertise is not developed overnight, and learning improves with opportunities to practice. Training in both districts builds in important opportunities for principals to practice observing instruction and gathering evidence. Principals also get the chance to discuss their observations and evidence with diverse educators from other parts of the district with different knowledge and expertise.

To simplify matters and provide exposure to authentic instruction, both districts use classroom video in training prior to having principals use their observation tool during live classroom instruction. A benefit of video is being able to stop the recording to discuss particular instructional moments, which is not possible during live instruction. District leaders in Long Beach emphasize the idea of using video to calibrate principals' understanding of the four focal areas prior to observations.



7. Principal professional development, tied closely to classroom practice, emphasizes support for improving instruction

Long Beach's Administrator Training in Mathematics (ATM) structure incorporates live (not videotaped) and extended (30 minutes, as opposed to 10–15 minutes) classroom observations, as well as the opportunity for participants to collaboratively devise feedback to observed teachers – all of which tie principals' learning closely to the world of the districts' actual classrooms and mimic the real-time observations principals conduct at their sites. Coupled with the debriefing structure of the ATM, these classroom observations focus attention on instruction, with the goal of developing shared understanding of how to look at and think about instruction, as well as how to provide feedback to teachers.

In other words, principals are supported with this and other training opportunities⁶ to understand in the

moment how to identify important evidence from classroom instruction that is worthy of further discussion with their teachers. In meetings for all K–12 principals, Long Beach has provided professional development on the specified structure they are to use for giving either verbal or written feedback,⁷ but training with the ATM and guidance that principals receive from their supervisors provide additional support. Increased comfort with feedback seems to also encourage some principals to think differently about how they define and enact the idea of feedback. A Long Beach principal told us that her professional development has shifted her emphasis away from formal evaluations to more co-teaching opportunities with her staff, so that they can see and talk together about how students are encountering math.

In Santa Ana, vision modules created by district math staff for principal professional development include specific instructional recommendations that principals can pass on to their teachers to influence instruction, such as directing teachers to online professional development courses about the district's vision for using collaborative conversations in mathematics.

6 Other district teacher training opportunities, such as lesson study, also reinforce the idea of instructional improvement. Principals who participate in these activities can also learn a great deal not only about mathematics and instruction, but also about how to provide support for instructional improvement.

7 The district uses the McGrath Training Systems SUCCEED System for teacher feedback, which focuses on both principles ("soft skills," such as building and fostering trust and respect) and practices ("hard skills," such as being "fact- and data-driven while using a standard method of measurement for accountability").



Conclusion

In this report, we shared two California districts' approaches to principal professional development in support of mathematics instructional leadership, as well as some of the factors that the districts have considered when designing the principal professional development.

In our interviews for the report, one of the ideas on which we heard differing perspectives was the extent to which principals need to understand mathematics content to provide effective instructional leadership in math. As both of these districts continue to refine their principal professional development structures and systems to better support instructional shifts in math, the question of how much content knowledge principals need is still unresolved, as is the question of how the principal professional development opportunities described in this report will contribute to site and classroom improvements in mathematics in these districts.

However, at present, both districts see important benefits from these training opportunities – from encouraging a focus on mathematics to building principals' capacity to lead site-wide standards implementation efforts.

In Long Beach, which has had its current principal training configuration slightly longer than Santa Ana, surveys and student achievement data at sample schools indicate some preliminary positive impact on principals' reported understanding of the math practices, participation in math department meetings, and specific content-focused feedback to teachers, as well as positive impact on student math achievement. As this principal professional development work continues in these districts, we hope to gather additional evidence about how such administrator learning builds the individual capacity of site leaders to guide standards implementation.

Appendix A. Long Beach Instructional Practices Reflection Tool (taken from *Principles to Actions*)

Long Beach Unified School District has adapted the Mathematics Teaching Practices Administrator Observation Tool from *Principles to Actions: Ensuring Mathematics Success for All* (National Council of Teachers of Mathematics, 2014) for principals to use to observe and reflect on teachers' classroom practice.

Mathematics Teaching Practices		Teacher Actions	Student Actions			
<p>Administrator Observation Tool</p> <p>Write notes to describe actions that are observed and not observed.</p>						
<p>1. Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.</p> <table border="1"> <tr> <td colspan="2">Is the practice adequately implemented?</td> </tr> <tr> <td>Yes</td> <td>Not Yet</td> </tr> </table>	Is the practice adequately implemented?		Yes	Not Yet	<ul style="list-style-type: none"> Establishing clear goals that articulate the mathematics students are learning as a result of instruction in a lesson, series of lessons, or unit. Identifying how the goals fit within a mathematics learning progression. Discussing and referring to the mathematical purpose and goal of a lesson during instruction to ensure that students understand how the current work contributes to their learning. Using the mathematics goals to guide lesson planning and reflection and to make in-the-moment decisions during instruction. 	<ul style="list-style-type: none"> Engaging in discussions of the mathematical purpose and goals related to their current work in the mathematics classroom (e.g., What are we learning? Why are we learning it?) Using the learning goals to stay focused on their progress in improving their understanding of mathematics content and proficiency in using mathematical practices. Connecting their current work with the mathematics that they studied previously and seeing where the math is going. Assessing and monitoring their own understanding and progress toward the mathematical goals.
Is the practice adequately implemented?						
Yes	Not Yet					
<p>4. Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.</p> <table border="1"> <tr> <td colspan="2">Is the practice adequately implemented?</td> </tr> <tr> <td>Yes</td> <td>Not Yet</td> </tr> </table>	Is the practice adequately implemented?		Yes	Not Yet	<ul style="list-style-type: none"> Engaging students in purposeful sharing of mathematical ideas, reasoning, and approaches, using varied representations. Selecting and sequencing student approaches and solution strategies for whole-class analysis and discussion. Facilitating discourse among students by positioning them as authors of ideas, who explain and defend their approaches. Ensuring progress toward mathematical goals by making explicit connections to student approaches and reasoning. 	<ul style="list-style-type: none"> Presenting and explaining ideas, reasoning, and representations to one another in pair, small-group, and whole-class discourse. Listening carefully to and critiquing the reasoning of peers, using examples to support or counterexamples to refute arguments. Seeking to understand the approaches used by peers by asking clarifying questions, trying out others' strategies, and describing the approaches used by others. Identifying how different approaches to solving a task are the same and how they are different.
Is the practice adequately implemented?						
Yes	Not Yet					

Leinwand, S., Brahler, D.J., Huinker, D., et. al. (2014). *Principles to Actions: Ensuring Mathematical Success for All*. Reston, VA: NCTM.

Mathematics Teaching Practice	Teacher Actions	Student Actions						
<p>6. Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.</p> <table border="1"> <tr> <td colspan="2">Is the practice adequately implemented?</td> </tr> <tr> <td>Yes</td> <td>Not Yet</td> </tr> <tr> <td></td> <td></td> </tr> </table>	Is the practice adequately implemented?		Yes	Not Yet			<ul style="list-style-type: none"> • Providing students with opportunities to use their own reasoning strategies and methods for solving problems. • Asking students to discuss and explain why the procedures that they are using work to solve particular problems. • Connecting student-generated strategies and methods to more efficient procedures as appropriate. • Using visual models to support students' understanding of general methods. • Providing students with opportunities for distributed practice of procedures. 	<ul style="list-style-type: none"> • Making sure that they understand and can explain the mathematical basis for the procedures that they are using. • Demonstrating flexible use of strategies and methods while reflecting on which procedures seem to work best for specific types of problems. • Determining whether specific approaches generalize to a broad class of problems. • Striving to use procedures appropriately and efficiently.
Is the practice adequately implemented?								
Yes	Not Yet							
<p>8. Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.</p> <table border="1"> <tr> <td colspan="2">Is the practice adequately implemented?</td> </tr> <tr> <td>Yes</td> <td>Not Yet</td> </tr> <tr> <td></td> <td></td> </tr> </table>	Is the practice adequately implemented?		Yes	Not Yet			<ul style="list-style-type: none"> • Identifying what counts as evidence of student progress toward mathematics learning goals. • Eliciting and gathering evidence of student understanding at strategic points during instruction. • Interpreting student thinking to assess mathematical understanding, reasoning, and methods. • Making in-the-moment decisions on how to respond to students with questions and prompts that probe, scaffold, and extend. • Reflecting on evidence of student learning to inform the planning of next instructional steps. 	<ul style="list-style-type: none"> • Revealing their mathematical understanding, reasoning, and methods in written work and classroom discourse. • Reflecting on mistakes and misconceptions to improve their mathematical understanding. • Asking questions, responding to, and giving suggestions to support the learning of their classmates. • Assessing and monitoring their own progress toward mathematics learning goals and identifying areas in which they need to improve.
Is the practice adequately implemented?								
Yes	Not Yet							

Leinwand, S., Brahier, D.J., Huinker, D., et. al. (2014). *Principles to Actions: Ensuring Mathematical Success for All*. Reston, VA: NCTM.

Appendix B. Long Beach Administrators Training in Math Agenda

TIME ALLOCATION	ACTIVITIES
5 min	Introductions/Welcome Goals and rationale for the session
5 min	Discuss norms
30 min	Review Math Teaching Practices (especially Focal Areas) [Read each, highlight and share what is important, ask clarifying questions] Discuss sample evidence
Varies 30 min in classroom; 15–20 min debrief after each	Classroom observations in small teams. [Each principal selects or is assigned one practice; Each practice discussed separately and in order.]
40 min	Whole group debrief [Each principal shares one piece of evidence for one teaching practice. Each principal shares one opportunity for improvement. Group reads all 8 practices and identifies one to focus on for a discussion with the teacher; group discusses how to frame the discussion. Group discusses valuable aspects of training.]

Source: Kahl & Perry, 2017

Appendix C. Santa Ana Mathematical Rigor Poster

RICH STUDENT DISCOURSE

WHAT DO YOU NOTICE?

WHAT DO YOU WONDER?

WHY? HOW DO YOU KNOW?

CAN YOU EXPLAIN THAT?

CONCEPTUAL UNDERSTANDING

PROBLEM SOLVING

PROCEDURAL SKILL

MATHEMATICAL RIGOR

Bethany's Kittens
Bethany's Cat had 8 kittens. 2 are black, 2 are white and 4 are gray.

1. What fraction of the kittens is gray?
What fraction of the kittens is white?

Fractured Numbers
Rosita has made a puzzle. She takes a whole rectangle like the one below.

She cuts the whole into half.

She takes the half and cuts it in half.

HOW ARE SOME METHODS OR APPROACHES THE SAME / DIFFERENT?

CAN YOU SHOW / DRAW WHAT YOU ARE THINKING?

HOW DID YOU PICTURE THAT?

CONVINCE ME / US

DID ANYONE DO IT DIFFERENTLY?

$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$

Visuals include: a bar model with 4 red and 4 white blocks; a pie chart with 4 blue and 4 white slices; a 2x2 grid of blue rectangles; and a central circle with math icons and glasses.

Source: Santa Ana Unified School District (2017)

Appendix D. Santa Ana Math Reflection Tool

SAUSD Math Reflection Tool

Theory of Action: Through high quality, personalized instruction that is focused on conceptual understanding, procedural fluency and applied knowledge, student learning will prepare students for college and career.



Instructional Element	Highly Developed	Proficient	Emerging
Formative Assessment to Support Higher Level Thinking	<p>Students are <u>consistently</u> interacting with <u>immediate, specific, and actionable feedback</u> provided by their teacher and peers in order to build on prior learning or address emerging misunderstandings. This responsive interaction is part of the culture of the classroom.</p> <p>Evidence: Students identify their conceptual and procedural misunderstandings (based on questioning that is <u>dynamic</u> and responsive to student needs) to amplify <u>accessibility</u> of content. Students are adjusting their <u>thinking</u> as evidenced by their conversations and work/explanations with teacher and peers.</p>	<p>There are <u>moments</u> when students are interacting with <u>actionable feedback</u> to build on prior learning or address emerging misunderstandings provided by their teacher and/or peers.</p> <p>Evidence: Students may periodically identify their conceptual or procedural misunderstandings based on teacher or peer feedback. Students periodically adjust their thinking as evidenced by their work/explanations and conversations.</p>	<p>Students seldom interact with feedback which focuses on prior learning topics. This feedback is static, and not specific to each student, but provides general guidelines of the content/concept.</p> <p>Evidence: Students are reviewing and discussing results from a prior assessment/activity in order to address misunderstandings. Students rarely adjust their thinking as evidenced by their minimal adjustments to their work/explanations and conversations.</p>
Construct Viable Arguments and Critique the Reasoning of Others	<p>Students consistently and fluently use academic language to construct viable arguments and critique the reasoning of others. It is apparent that these arguments and critiques are part of the class culture.</p> <p>Evidence: Students use written strategies (visuals, models, quick-writes, etc.) and verbal strategies to <u>express, interpret, expand and refine ideas</u> in meaningful conversations using appropriate academic language. Students <u>critique the reasoning of others and ask clarifying questions</u>.</p>	<p>There are moments when students use academic language to construct viable arguments and critique the reasoning of others.</p> <p>Evidence: Students use written and verbal strategies with one another about math in limited ways (often to verify procedures and solutions). Students use <u>limited academic language to convey these arguments</u>.</p>	<p>Students seldom use academic language to construct viable arguments and critique the reasoning of others. They may be engaged in conversation but are unable to provide an explanation. Students' conversation is focused on the answer or procedure, but not on providing a rationale.</p> <p>Evidence: Students talk about math by responding to teacher or peer questions with <u>minimal explanations</u>.</p>
Make Sense of Problems and Persevere in Solving Them	<p>Students consistently persevere in making sense of problems. Students use a variety of tools to productively struggle through problems. It is apparent that these behaviors are characteristic of the classroom culture.</p> <p>Evidence: Students <u>persist in efforts</u> to solve and make sense of challenging problems. Students <u>revise their strategies and explanations as their understandings change</u>.</p>	<p>There are moments when students make sense of problems. Students use limited tools to persevere in solving problems.</p> <p>Evidence: Students sometimes <u>persist</u> in efforts to solve and make sense of challenging problems. Students may <u>revise their explanations as their understandings change</u>.</p>	<p>Students seldom make sense of problems and persevere in solving them.</p> <p>Evidence: Students seldom <u>persist</u> in efforts to solve or make sense of challenging problems. Students <u>do not revise their explanations</u> as their understandings change.</p>
Mixture of Procedural and Conceptual Understanding	<p>Students' work shows the connection of <u>procedural and conceptual understanding</u>.</p> <p>Evidence: Students are adept at explaining clear connections between concepts and mathematical procedures through written (visuals, models, quick-writes, etc.) or verbal descriptions.</p>	<p>Student's work shows evidence of both <u>procedural and conceptual understanding</u>, but there is not a clear connection between the two.</p> <p>Evidence: Students attempt to explain connections between concepts and mathematical procedures through written (visuals, models, quick-writes, etc.) or verbal descriptions, but their explanations are <u>unclear or undeveloped</u>.</p>	<p>Students' work shows a focus on <u>procedural understanding</u>.</p> <p>Evidence: Students are able to explain the steps in their mathematical procedures.</p>

Source: Santa Ana Unified School District (2017)



Appendix E. Methodology

This report focuses on two districts that volunteered to represent the Math in Common community at the 2016 California STEM Symposium and the 2017 California STEAM Symposium on the topic of principals as instructional leaders. Representatives from these two districts volunteered to present at these conferences to share existing information about their principal professional development programs for other districts to learn from; the report elaborates and describes further evolutions in their principal support systems. The report also draws on semi-structured focus groups and interviews conducted

by WestEd staff with district and site administrators in both districts. In Long Beach, we interviewed three district administrators and four principals. In Santa Ana, we interviewed four district administrators and two principals.

Drafts of the paper were sent for review to each district-based focus group or interview participant (and they were asked to forward to other district leaders for their review). Their feedback was used to correct descriptions of district training efforts and validate report conclusions.

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