CALIFORNIA**COLLABORATIVE**
on District Reform

Meeting 26 Summary
Implementing the Common Core in Mathematics: Designing, Supporting, and Monitoring High Quality Instruction

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Sanger, California

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

The Common Core State Standards in mathematics pose particular challenges for districts as they continue the transition to a new set of student expectations. Among these are developing an understanding of what instruction should look like in a Common Core environment and finding ways to monitor progress toward that goal, building teacher content knowledge to create quality student learning environments, designing course pathways that enable all students to access and master mathematics content, and navigating the wide array of available instructional materials to most effectively support classroom instruction. The 26th meeting of the California Collaborative on District Reform, which took place in Sanger Unified School District (USD), examined these problems of practice and explored ways for central office staff, school administrators, and teachers to support student learning opportunities that maximize the potential of the Common Core.

Understanding the Sanger Context

Because it shares many of the challenges identified by other district leaders in the Collaborative, host district Sanger USD provided a lens through which Collaborative members and guests could explore many of the key issues confronting K–12 systems as they make the transition to the Common Core in mathematics.

A History of District Growth

The recent history of Sanger USD is one of impressive turnaround. Just a decade ago, Sanger's culture was one of adversarial educator relations (one district leader recalled a billboard that once greeted visitors with the message "Welcome to Sanger: Home of 400

Unhappy Teachers"), and the district was among the first in the state to be identified for improvement under the Elementary and Secondary Education Act, as reauthorized by the No Child Left Behind Act (2002). District leadership responded by embracing professional learning communities (PLCs), explicit direct instruction (EDI), and response to intervention as key vehicles for transforming relationships and instructional practice.[1] In subsequent years, Sanger has far surpassed statewide performance on the California Standards Test (CST) in mathematics and English language arts (ELA), despite serving higher percentages of English learners and low-income students than the state as a whole. The turnaround process has built on and contributed to a culture that values personal relationships and emphasizes an orientation toward continuous improvement.

Early Efforts to Introduce the Common Core

Sanger's Common Core implementation efforts remain in their early stages. The district did not begin to use the new standards fully until 2013–14, when Assembly Bill 484 ended CST administration by suspending state standardized assessments during the transition to the Common Core. Since that time, educators in the district have moved rapidly to adapt to the new set of student expectations by developing and adopting new report cards and benchmark assessments aligned to the Common Core. District leaders also have sought to build teacher capacity in both mathematics and ELA by providing more than 50 days of professional development for Sanger teachers.

Key Challenges in Implementation Efforts

Among the issues confronting Sanger district leaders are the need to monitor progress toward new instructional expectations and ensure that teachers have sufficient mathematics content knowledge to maximize student learning opportunities. The district context shapes the approach that district leaders take towards addressing these problems of practice. Because most Sanger teachers see the Common Core as the right set of knowledge and skills for students to master, they embrace the transition to the new standards. Because teachers in the district have a track record of success, they also take a great deal of pride in their work and maintain high expectations for themselves and their colleagues. These strengths, however, also create the temptation to do too much at once, and can create problems when teachers struggle to evolve at the same speed or with the same success to which they are accustomed.

Establishing a Vision for Mathematics Instruction and Monitoring Progress Toward That Goal

The Common Core introduces important changes in student expectations from the previous California standards. Those changes, in turn, have implications for classroom instructional practices. If central office and school leaders hope to support teachers through those shifts,

[1] For a more detailed story of Sanger's dramatic turnaround, see the book *Turning Around a High-Poverty District: Lessons from Sanger,* coauthored by Jane David and Collaborative member Joan Talbert: http://shcowell.org/docs/LearningFromSanger.pdf.

it is important both to establish clarity on what instruction should look like in this new era and to understand the degree to which the expected changes are taking place.

Priorities for Mathematics Instruction Under the Common Core

Kimberly Seashore, a graduate student researcher at the University of California at Berkeley and a middle school mathematics teacher, began the meeting with an exercise designed to establish a shared understanding of what high-quality mathematics instruction looks like in a Common Core world—and how this differs from previous standards. Participants worked in pairs or triads on a task designed by the Shell Centre for Mathematical Education for an 8th grade math class.[2] Participants first examined a set of eight problems and constructed equations to identify the unknown quantity in each problem. Next, they took out a second set of eight cards with equations already printed on them and had to match the equations to the eight problems. The productive struggle—the process of experiencing and working through challenges in a way that builds insight and understanding—to carry out these tasks created the foundation for a subsequent conversation about how mathematics learning takes place.

Shifting from Solving Problems to Understanding Mathematics

One of the group's first observations about the activities was that the Common Core deliberately shifts the focus from "answer getting" to doing and understanding mathematics. This transition is evident in the language of the standards themselves, which focus on words such as "understanding" more than "solving." As one participant explained, "Doing the math is the thinking and the reasoning and the arguing and the thinking it out, not just getting an answer." This orientation is a departure from the traditional approach to learning mathematics in the United States but represents an important priority within the Common Core.

Consistent with a focus on understanding, the conversation at the meeting also highlighted the power of wrong answers as a means of learning the mathematics. By asking students to explain their thinking and unpacking the flaws in their reasoning, teachers can address directly the areas of conceptual or procedural misunderstanding. Although traditional classroom practice focuses on the past (i.e., who got this problem wrong), an explicit exploration of incorrect responses turns the classroom attention to future help (i.e., who might get this problem wrong in the future). When teachers expose common flaws in reasoning to students, they can help students anticipate, avoid, or overcome them when they emerge in future work. At the same time, teachers can deepen and reinforce students' understanding of the mathematics.

Encouraging Student Engagement and Interaction

The standards also call for expanded levels of student engagement and interaction around mathematics. In their reflections on the exercise that began the meeting, participants

[2] For access to this and other related mathematics tasks, visit http://map.mathshell.org.

described the value of struggling with a partner, working through a shared challenge, and leveraging someone else's perspectives to navigate a mathematics task. In subsequent conversations, meeting participants highlighted the importance of giving students similar opportunities for active engagement, for directing their own learning, and for drawing on the insights of their peers to foster a productive learning environment.

Meeting participants also emphasized that opportunities for engagement and interaction will not happen by themselves. Teachers play an important role in modeling and structuring student conversations. They also have a responsibility to attend to issues of access. Students who struggle with building comfort and confidence in mathematics easily can assume passive roles in traditional classrooms and even in group work where a subset of students can dominate the conversation. Learning to facilitate productive peer-to-peer learning experiences represents an area of growth for many teachers as they make the transition to the Common Core.

Attending to Access and Formative Assessment

The meeting conversation also highlighted additional components of effective mathematics instruction. Although teachers need to be attentive to the engagement and access points for all students, English learners face particular challenges. The teacher role includes recognizing and addressing the language barriers that can prevent access to content, as well as helping students develop the academic language needed for conversational and computational fluency with mathematics.

Participants also recognized the importance of formative assessment practices in classrooms. Student interaction plays an important role not only for students' learning, but also for providing teachers with actionable information about where students are experiencing success and struggles. By exposing student thinking in multiple ways on an ongoing basis, teachers can adapt their instruction to address the learning gaps within the classroom.

Exploring the TRU Mathematics Framework

Seashore introduced the group to the Teaching for Robust Understanding (TRU) of Mathematics Framework[3] as a means of identifying and creating a common language around the key components of mathematics instruction. The framework draws on the literature about effective instruction in mathematics. It also focuses educators' and researchers' attention deliberately on a limited number of dimensions so that the framework can inform improvement without overwhelming users. The five components:

- *Dimension 1: The Mathematics*. The teacher understands and delivers mathematics content accurately and thoroughly while making connections between procedures and concepts.

[3] For more information about the TRU Mathematics Framework, see http://map.mathshell.org/materials/trumath.php.

- *Dimension 2: Cognitive Demand.* Expectations for student behavior and performance in the classroom align to students' levels of preparation while establishing high expectations for students to master grade level content.
- *Dimension 3: Access to Mathematical Content.* All students have opportunities for engaging in classroom learning opportunities and receive appropriate supports, interventions, and opportunities to work through any struggles they encounter.
- *Dimension 4: Agency, Authority, Identity.* Students actively drive and participate in their classroom learning opportunities in ways that build positive identities as doers of mathematics.
- *Dimension 5: Use of Assessment.* Teachers use assessment not simply for evaluative purposes, but to drive instruction forward by addressing emerging misunderstandings and meeting students at their current developmental stage.

Tools for Monitoring the Instructional Shifts

Even when a common understanding exists about their expectations for classroom instruction, district leaders need to know whether the desired growth actually is taking place.

Quality Instruction as a Developmental Process

For monitoring improvement, the meeting conversation first emphasized the importance of viewing instructional improvement as a developmental process. Teachers are not "good" or "bad," but rather move along a continuum of knowledge and skills. This orientation is especially important in mathematics, where comments like "I'm not a math person" can reflect teachers' or their supervisors' beliefs that some teachers are unsuited for teaching mathematics.

To help illustrate the importance of a developmental orientation to changes in teaching, the group viewed two videos of "Mr. J." teaching an eighth-grade Algebra I class. Mr. J. had used new formative assessment lessons from the Shell Centre in his classroom and had received coaching aligned to those lessons. Two video clips of the same lesson, taken one year apart, demonstrated some of the teacher's areas of focus and growth over time. The second video shows evidence of progress: The physical organization of the classroom is more conducive to student interaction, and students have more opportunities to explain their thinking. Nevertheless, opportunities for improvement remain: Meeting participants observed that students did not discuss the mathematics with each other, and the teacher exhibited a lack of responsiveness to struggling students. Seashore argued that this teacher, however, exhibited the kind of reflectiveness and commitment to ongoing improvement that we want to see as teachers make the transition to the Common Core: "What we're looking for is teachers in motion."

Meeting participants suggested that a developmental mindset for the district overall can facilitate the process of creating teachers in motion. In such organizations, administrators and teachers not only appreciate the growth process, but they also expect continued

improvement. One individual described this mindset: "Comfort is your enemy…. This is where we are on our journey, and there is no place on our journey called good enough." Expectations for growth create the conditions for improvement not only during times of transition, but as part of the way educators understand their roles.

Districts nevertheless must be attentive to speed and growth at the right pace. This often means navigating tension between moving quickly to meet pressing student needs and operating within reasonable expectations for adult learning. District leaders play a critical role in managing growth and expectations at an appropriate level. Reflecting on the pace of improvement, one individual shared, "We know we have to walk a mile. How are we going to get them to move an inch first?" Another participant offered a guiding question that can help administrators manage the growth process: "What can I say to my teacher today so that tomorrow they'll be a little bit better?"

Exploring Two Classroom Observation Tools

As a window into some of the issues that emerge when monitoring classroom instruction, the group explored two tools.[4] The first is *The 5x8 Card*, which district leaders in Oakland USD have developed collaboratively with the Strategic Education Research Partnership (SERP). The card has two sides: One identifies the eight standards for mathematical practice outlined in the Common Core, and the other lists seven student vital actions that should take place in the classroom.[5] One primary goal of the tool is to focus the observer's eye on the student actions within the classroom to better understand the mathematical learning taking place, rather than on teacher behavior that sometimes can drive a more compliance-oriented understanding of classroom activity.

The second tool, developed by Student Achievement Partners, builds on key instructional shifts that should take place in mathematics classrooms transitioning to the Common Core.[6] In Sanger, administrators use an adapted version of the tool to collect data on an iPad, where they complete an online form after classroom observations lasting between seven and 10 minutes. Sanger district leaders have elected to begin using the tool by collecting data only on Core Action 2 ("Employ instructional practices that allow all students to master the content of the lesson"). Administrators have the ability to score teacher performance according to the rubric within the tool, but the only administrator comments (and not scores) now go back to the teachers themselves.

[4] Developers of the TRU Mathematics Framework have also designed an evaluation rubric for researchers and a conversation guide for observers to talk with teachers about their instruction, both tied to the five dimensions of the framework. The group did not use either of these tools, however, during this piece of the meeting.
[5] A version of *The 5x8 Card* is available on the SERP website at http://math.serpmedia.org/5x8card/.
[6] The classroom observation tool is available on the Student Achievement Partners website at http://achievethecore.org/content/upload/IPG_Coaching_PrintGuide_Math_K-8_07.14.pdf.

To better understand the tools and how they help observers monitor what happens in classrooms, participants split into two groups—one with each tool—and watched a video of classroom instruction from a Sanger first-grade teachers.

Identifying the Purpose of a Tool

In discussions about the two observation tools, meeting participants identified multiple purposes that a tool can serve. It can inform approaches to coaching with individual teachers. In addition, districtwide trends identified through use of the tool across classrooms can guide decisions about professional development, school or classroom interventions, and resource allocation. A tool also can serve an accountability purpose by providing information about progress to funders. However, meeting participants emphasized that districts need to consider carefully the extent to which a given tool is appropriate for all of its intended purposes.

The meeting dialogue emphasized several key lessons about the use of observation tools:

- *Start simple.* High levels of complexity may be overwhelming in the early stages of implementation; this increased level of detail may be more useful to administrators and teachers further along the developmental continuum.
- *Communicate about purpose.* If districts are taking a developmental approach, do the tool and its use reflect that perspective? District leaders should be careful about (sometimes unanticipated) signs that can give administrators and teachers the impression that an instrument is being used to evaluate performance.
- *Communicate about results and next steps.* A tool by itself will not lead to improvement. As one individual remarked, "A fool with a tool is still a fool." Therefore, participants argued that any tool should lead to actionable feedback for teachers. Moreover, if the tool uses ratings to score elements of classroom instruction, teachers should know in advance what the ratings mean. Even with a rating, the score will not provide as much value as the conversation surrounding it. Finally, meeting participants suggested that teachers need guidance about the resources they can draw on (e.g., readings, strategies, trainings, and even access to peers) to work on the areas of improvement identified through the tool.
- *Integrate observation tools with other improvement efforts.* Power exists in using a tool grounded in the same language and areas of focus that also drive professional development, coaching, collaboration, and teaching. For example, Sanger's decision to center its early observation efforts on Core Action 2 of the instructional shifts seeks to build on other capacity-building efforts with teachers that also focus on Core Action 2. In addition, a tool should not be the only mechanism for communicating with teachers; rather, it should be one of several avenues for conversations about instruction. Coaching, PLCs, and other peer-to-peer interactions also can inform improvements in teacher performance.

Designing Tools Effectively

Some considerations for designing tools emerged during the meeting dialogue. First, the language in the tool itself can lead to teachers and administrators acting in unintended ways. For example, *The 5x8 Card* calls for observers to note cases in which "students say a second sentence (spontaneously or prompted by the teacher or another student) to explain their thinking and connect it to their first sentence." The guideline seeks to encourage depth in observations, such that students build on their ideas and contribute beyond cursory, right-and-wrong answers. However, when used by teachers and administrators who do not understand the intent of the described classroom behavior, such a sentence could inspire compliance-oriented dialogue. Students, for example, merely might repeat the same thought if they know the expectation is to speak a second sentence, and not move toward more productive dialogue. This example illustrates how important it is for teachers and administrators to understand the principles of effective instruction upon which a tool is based.

A second consideration is the grain size of a particular tool. An instrument may ask observers to reflect on a classroom practice that cannot be captured in a 10- to 15-minute observation. For example, one component of Core Action 2 that the Sanger tool asks observers to monitor reads, "The teacher strengthens all students' understanding of the content by sharing a variety of students' representations and solution methods." In order to merit the highest rating for this dimension, the rubric states that "a variety of student solution methods are shared and examined together to support mathematical understanding for all students." Yet Sanger administrators use the district's iPad tool to record observations during classroom walkthroughs that last seven to 10 minutes, which may not be sufficient for teachers to demonstrate behaviors at the high end of the rubric. Just as district leaders need to select tools that are well aligned with their intended purpose, the tool itself should be well positioned for the way in which observers will use it.

Building Teacher Content Knowledge

A second problem of practice explored during the meeting was ensuring that teachers have sufficient mathematical content knowledge to create quality classroom learning opportunities for students. Because the Common Core encourages student understanding, and not just "answer getting," teachers need a stronger conceptual foundation for the content they teach. If teachers are to lead students through productive struggle, and if (as suggested earlier in the meeting) teachers are to address the root of student misunderstanding by unpacking the ways in which students come to *wrong* answers, they may not currently have a strong enough handle on the mathematics themselves. This may be especially true at the elementary level, where participants indicated that many teachers enter the profession with the expectation of teaching all subjects and levels and may not have a strong mathematics background. It may also be true at the secondary level, where teachers accustomed to teaching a specific course (e.g., Algebra I or Geometry) may need to cover and connect more content in new integrated courses.

Current Strategies in Sanger

Sanger district leaders shared their strategies to date for building teacher content knowledge in mathematics. One aspect of the approach has been to create training opportunities. The district has contracted with the Tulare County Office of Education (TCOE) to develop a four-year plan, which includes seven days of TCOE-provided professional development for every teacher in the district in the first two years, supplemented by district-led after-school workshops. In addition, Sanger district leaders are encouraging PLCs to collaborate around mathematical content.

Opportunities for Improving Teacher Content Knowledge

To address the problem of building teacher content knowledge, Phil Daro, coauthor of the Common Core in mathematics, joined the group via videoconference for a conversation with Sanger district leaders. Daro first emphasized that workshops (like those offered to Sanger teachers through TCOE) can be valuable, but will not be sufficient for preparing teachers to improve their mathematical understanding. If districts hope for new knowledge to inform classroom behavior, they need to integrate what happens in workshops into instruction through direct connections to coaching, PLC conversations, classroom observations, and other improvement efforts.

Daro also discussed strategies employed in other countries that emphasize "shoulder-to-shoulder" and "over-the-shoulder" learning. Shoulder-to-shoulder learning refers to opportunities that take place between and among teachers. Sometimes, these take place through planning and debriefing conversations in structures like PLCs. Creating opportunities for teachers to observe one another and provide feedback also can be powerful. Districts can enable this kind of learning by creating the schedules, supports, and expectations that allow teachers to engage in these activities on a regular basis.

Over-the-shoulder learning refers to situations in which teachers build their mathematical knowledge by examining student thinking. The instructional approaches described earlier, in which teachers strategically create opportunities for students to explain their thought processes, then use students' own explanations to drive student learning, expose for teachers the common mistakes that students make. In the process, teachers develop a stronger conceptual understanding of the mathematics itself. In other words, content knowledge often develops through high-quality classroom instruction. As Seashore commented while the group observed Mr. J.'s teaching, "He was learning the math by doing math with his students."

New approaches to lesson design can create opportunities for students to explore mathematics while teachers simultaneously deepen their own content knowledge. Daro described the Japanese approach to organizing mathematics lessons as one vehicle for creating a more powerful student learning environment. The typical lesson unfolds as follows:

- *Opening:* The lesson begins with the teacher posing a problem to the students in order to introduce the lesson and ensure that students' reading comprehension enables them to access the lesson content.
- *Work Time:* Students then work to solve the problem. As students work, the teacher monitors their progress to see what prior knowledge the students bring to bear and identify solutions and struggles that the students encounter. The teacher assigns students the responsibility of producing not only an answer, but an explanation of their answer that their *peers* will understand. Those who struggle with their explanation will stop writing first, allowing the teacher to identify those students most in need of support.
- *Explain to Class:* Next, the teacher selects students to present their findings; there are no volunteers, and no one knows who will be selected, meaning that each student needs to be prepared. Students revise these explanations as they receive feedback. In cases where students get the answer to a problem wrong, the teacher can use the mistake to have the student or the class identify and correct the misunderstanding. Daro argued that this piece of the lesson also plays a critical role in building teachers' mathematical understanding: "The explaining is how teachers learn mathematics…by trying to understand the thinking and reasoning to the students. The math will be in the students' reasoning."
- *Summary:* After students have had a chance to wrestle with the problem and explain their thinking, the teacher then summarizes the key concepts of the lesson. It is in this portion of the lesson where approaches like EDI—which was the foundation for instructional practice in Sanger prior to the Common Core—are most appropriate.
- *Apply Learning:* The lesson concludes with opportunities for students to apply their learning to novel situations.

Such a lesson design enables teachers to deepen their own understanding because it also creates opportunities for productive struggle and student interaction that meeting participants had earlier identified as important for mathematics classrooms. Nevertheless, no lesson plan is a magic pill. Daro argued that teachers should seek opportunities constantly to provide one-on-one attention to students. They also should approach any lesson with attention to other elements of positive instruction. For example, as they structure independent and group work and select students to explain their thinking to the class, teachers need to seek opportunities to distribute opportunity equitably and ensure that all students have strong learning experiences.

Systemic Barriers to Ensuring Teachers are Prepared

In their discussion of opportunities for expanding teacher content knowledge, meeting participants also identified some systemic barriers to preparing teachers fully.

Credentialing

Given the practice in the United States of multisubject teacher credentialing at the elementary level, teachers often enter the profession without a strong mathematics

background. This approach also can lead to unfocused professional development, since teachers need to develop knowledge and skills in multiple content areas simultaneously. Other countries use mathematics specialists beginning in third grade, enabling them to focus teachers' attention on mathematics without diverting it to other subjects.

Hiring Timelines

Many districts wait to make hiring decisions until the budget office finishes analyzing enrollment and employment data and determines the number of teachers the district budget can support. As a consequence, the short supply of teachers with a strong mathematics background often have found jobs already by the time some districts are prepared to hire. As a strategy to address this challenge, one district leader described an exemption that enables the district to hire up to 40 mathematics teachers before the final hiring numbers come out of the budget office. Approaches like this can enable districts to be more proactive in attracting high-quality teachers.

Preservice Training

Meeting observations suggested that the level of preparation currently required in mathematics content is limited, which contributes to the problem of teachers—especially at the elementary level—entering the classroom with insufficient content mastery. Just as previous Collaborative meetings have highlighted the need for teacher preparation programs to prepare teachers for the expectations of teaching in a Common Core environment, the content needs for teachers also merit attention before teachers arrive in districts.

Time

Workshops, PLCs, classroom observations, and other strategies for building teacher content knowledge all require time, a commodity in short supply. The meeting conversation suggested that district leaders obviously must operate within the realities of time demands on administrators and teachers, yet also seek opportunities to be strategic and efficient in building teacher capacity.

Delivering Mathematics Content Across Grades: Sequencing and Acceleration

A third problem of practice relates to the ways students access mathematical content across grades, especially at the secondary level. One decision point facing districts is a choice between traditional course sequences (e.g., Algebra I, Geometry, Algebra II) and new integrated courses that combine content that previously has been isolated within courses.[7]

[7] The Common Core in mathematics lays out two regular course pathways as models for states and districts to design courses at the high school level. One (the traditional pathway) "consists of two algebra courses and a geometry course, with some data, probability and statistics included in each course." The other (the integrated pathway) builds on an approach typically seen internationally and "consists of a sequence of three courses, each of which includes number, algebra, geometry, probability and statistics." For more information, see http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf.

The meeting also, however, addressed broader considerations for how students can access content in a way that enables them to succeed academically.

The Common Core represents a departure from the previous California standards in important ways. Under the previous standards, some students took eighth grade mathematics in eighth grade and others took Algebra I, but eighth grade mathematics added nothing substantive to the content students accessed in seventh grade and Algebra I. The eighth-grade Common Core standards, in contrast, are more challenging and provide critical content that students will need for success in Algebra I (including much of the content that used to be taught in Algebra I in California). Consequently, students no longer can skip mathematics courses and be adequately prepared for higher level mathematics. Decisions for districts therefore center on compaction—teaching the full content of the standards in a shorter period of time—and other means of acceleration rather than skipping.

The group also addressed some considerations about how to ensure rigor for all and what expectations for students are appropriate. Although not all districts make the state's a-g requirements (the high school courses required for entrance to the University of California and the California State University systems) mandatory for graduation, the Common Core seeks to develop students who are college- and career-ready. Meeting participants therefore argued that all students need opportunities to access and succeed in higher level mathematics courses. The group acknowledged that not every student will take Calculus; that level of mathematics preparation may be appropriate for a subset of students depending on their postsecondary plans. There must, however, be a baseline of rigor for all students (for example, passing Algebra II), with an opportunity to excel also open to all students. This may involve taking a calculus course for some students, but a more job-relevant course with content like statistics for others.

Three district approaches revealed some of the key decision points, opportunities, and tensions that exist in navigating sequencing and placement decisions.

San Francisco USD: Disrupting Existing Patterns with an Equity Lens

As district leaders in San Francisco USD explored their course-sequencing options, they did so within a set of previously established requirements. First, they had to implement the Common Core at all grade levels. Second, they had to enable students to meet the district's graduation expectations, which mandate that all students meet the state's a-g requirements to receive a diploma.

To inform their decisions, district leaders also examined their existing course-taking patterns. Previously, the district had enrolled all students in Algebra I in eighth grade (with on-track students progressing to Geometry in ninth grade and Algebra II in tenth grade), and had some advanced students beginning Algebra I even earlier. Yet district leaders found that at the end of the traditional Algebra I-Geometry-Algebra II sequence, only 21 percent of students in the district were on track and passing those classes. Moreover, the results were substantially worse for African-American and Latino students; only three

African-American students in the entire district had demonstrated proficiency in Algebra II at the end of the sequence. District leaders concluded that their existing approach was harming students and perpetuating inequitable learning opportunities. They also realized that their approach to ensuring rigor for students had nothing to do with the depth of student learning opportunities, but simply tried to introduce the exact same content at a faster rate.

In response to the trends in San Francisco student performance, the district eliminated honors tracking in middle school. Instead, drawing on the advice of mathematics experts like Daro and Jo Boaler, the district now features heterogeneous grouping for all students in ninth and 10th grades. All students take the Common Core eighth-grade mathematics course in eighth grade, Algebra I in ninth grade, and Geometry in 10th grade. A decision about course compression then is made as students enter 11th grade. Those students who wish to pursue calculus can take a compressed Algebra II course to begin 11th grade and then move on to Precalculus and Calculus in 11th and 12th grade.

District leaders acted strategically to navigate the political environment in making the course-sequencing decision. Rather than change course from within its Department of Curriculum and Instruction, the district passed the policy through a unanimous board resolution in February 2014. The presentation to the board drew heavily on the data about student performance under the previous course-sequencing system. In addition, middle school and high school teachers testified in front of the board about their belief in the new approach, describing it as equity in action.

San Francisco is midway through its first year of implementing the new policy. So far, support from the board and from teachers has been strong. The primary pushback has come from parents who maintain traditional views about acceleration and how opportunities for acceleration reflect their child's preparation and performance levels. Nevertheless, district leaders remain committed to a strategy that they believe reflects their responsibility to ensuring that all students have opportunities for success.

San Jose USD: Bridging Gaps to Provide the Appropriate Level of Challenge

San Jose USD has elected to continue providing the traditional sequential courses at the secondary level rather than integrated courses under the Common Core. The district previously transitioned to integrated courses in the 1990s, a decision that became contentious and produces tensions even today. District leaders also surveyed the landscape of instructional materials and concluded that an insufficient supply of quality materials was available to support teachers' transition to a transitional strand, much less the Math I, II and III courses outlined in the Common Core. For both political and curricular reasons, district leaders determined that any move to integrated courses would be too much to take on at once and elected to retain the Algebra I-Geometry-Algebra II sequence during the Common Core transition. However, the district took steps to address other challenges related to designing and accessing mathematics at the secondary level.

First, district leaders sought to address the gap between expectations in the previous California standards and the Common Core. Not only do differences exist between the standards within a particular grade, but the Common Core assumes that students have acquired prior knowledge through previous grade-level courses under the Common Core. Current sixth-graders, for example, progressed through school according to the expectations of the previous California standards and may not have learned some of the knowledge and skills now expected under the Common Core. In response, San Jose double-blocked accelerated mathematics courses in sixth grade during the 2013–14 school year to ensure that students who otherwise might miss key content during the standards transition received all the content and support they needed for the new sixth-grade expectations. In addition, middle schools used a structured seventh period support allowing students flexible entry and exit. The district also provided "gap charts" to teachers to help them understand the differences in expectations for students as they moved to the Common Core.

Second, San Jose has adopted new approaches to placing students in middle school mathematics courses that align with students' levels of preparation. The district now features two course pathways in middle school. One follows the standard Common Core sequence for sixth-, seventh-, and eighth-grade mathematics. The other includes accelerated courses that compress the academic timeline by incorporating additional mathematics content. Students on this pathway take Accelerated Math 6, Accelerated Math 7, and then Algebra I in eighth grade. To guard against the danger of tracking students early in school into patterns they cannot escape, however, San Jose also has established decision points at the end of sixth and seventh grade that respond to a student's academic progress. Students who take Math 6 in sixth grade but demonstrate the potential to succeed on the accelerated pathway can take an accelerated summer school course that enables them to make up the additional content they otherwise would have received in Accelerated Math 6, then begin Accelerated Math 7 at the beginning of seventh grade. A similar opportunity exists for a transition between Math 7 and beginning Algebra I in eighth grade. District leaders use a set of benchmarks, including one measuring academic tenacity, to guide placement decisions for students.

Through the transition, San Jose continues to explore ways to help middle school teachers develop a strong mathematics content foundation—a challenge compounded by a teacher shortage in mathematics, science, and special education. Nevertheless, a San Jose district leader reported that an expanded district focus on blended instruction has led to teachers asking the right questions about grouping students, facilitating group work, and using instructional materials that can support problem-based conversations, suggesting that teachers are focusing in a direction that can produce the kinds of instruction to which the district aspires.

Sacramento City USD: Navigating the Transition to Integrated Courses

In contrast to San Francisco and San Jose, Sacramento City USD has elected to pursue integrated courses at the secondary level. District leaders, in collaboration with classroom teachers, spent six months researching and evaluating the new approach before deciding

unanimously to move in a new direction. The district is beginning to serve students in Math I in 2014–15 and will phase out the traditional geometry and Algebra II classes as it adds Math II in 2015–16 and Math III in 2016–17. In the meantime, principals are seeking ways to maximize the quality of the new integrated courses by strategically selecting teachers to teach them.

To address issues of access and fit, Sacramento City is introducing compacted courses beginning in seventh grade. Students who enter this pathway will take a compacted course in seventh grade that combines the seventh-grade Common Core standards with some of the eighth-grade standards, followed by an eighth-grade course that completes the eighth-grade standards and includes all Math I content. In recognition of the fact that compaction under the Common Core is different than approaches to acceleration under the previous California standards—in which students often simply skipped content, rather than cover more content in a limited timeframe—the district has taken steps to prepare parents and students for the challenge. Among these, district staff require a signed letter from parents indicating that they understand and are prepared for the challenge of a compacted course.

The district continues to address remaining challenges. Pushback from parents and students—especially at one high-performing middle school—reflects expectations for acceleration that grew out of district approaches under previous state standards. Although some parents now understand that the level of rigor in eighth-grade mathematics is much higher, others nevertheless have pushed for a different pathway for their children; the accelerated courses requiring a signed letter are a response to this pressure. The district also continues to wrestle with the best ways to support struggling students. Stretching course content over a longer period of time may represent one way to give students the extended support they need to succeed.

Key Issues Across District Contexts

Across the three district examples and subsequent discussion, several consistent ideas emerged regarding course sequencing, design, and access. The first is that district strategies are context dependent. In designing approaches to curriculum and instruction, district leaders respond to their political history, board and community dynamics, existing structures and supports, and priorities for instruction and student learning.

Beyond course design and acceleration decisions, districts continue to grapple with how to serve struggling students. Conversation around course design often addresses acceleration and compaction, yet many students already fail to navigate the higher levels of mathematics that lead to a-g eligibility. Course repetition remains the typical approach for many districts, yet research and district experience indicate that repeating courses does not increase the chances for students to pass courses and advance academically. Interventions and supports are therefore an important focus for districts as they design their approaches to mathematics at the secondary level under the Common Core.

Meeting participants also raised the challenge of cumulative preparation. The Common Core asks for students to demonstrate their thinking in mathematics, and to build on skills

that have deliberately built across grade levels through elementary and middle school. Now, however, as schools begin to navigate the expectations of the new standards, what happens to students who have not been developing those skills for eight years? For English learners in particular, who may not have the academic language necessary to communicate about the mathematics, districts face a challenge of ensuring that students develop the knowledge and skills required at their grade level, regardless of their preparation.

All of these observations raised questions about whether traditions regarding seat time and grading practices meet student needs effectively. Models of instruction that reward and respond to content mastery, rather than the seat time that current courses require, may merit further attention as districts seek to create the conditions for student success.

Navigating the Sea of Instructional Materials

The landscape of instructional materials in California has changed with the transition to the Common Core. The state list of instructional materials is now an advisory list; districts may select from outside sources if they choose. In addition, open-source educational materials from a variety of providers have emerged with the potential to inform and improve classroom instruction. Comments during the meeting suggested that in today's K–12 education world, with new standards and opportunities created through technology, no one resource will meet all classroom needs. The conditions within California and across the country create the opportunity to use better materials to support high-quality learning than in the past.

Despite the possibilities created through wider availability, districts face the challenge in today's world of navigating an overwhelming morass of materials. As more resources become available, educators at all levels struggle to assess their usefulness and ensure quality in what enters classrooms. Even when administrators are well equipped to make these kinds of judgments, they struggle to find time to do so in the face of many other competing demands. For small districts in particular, the personnel simply may not exist to take on this added responsibility.

To help address the instructional materials challenges, meeting participants made several suggestions. First, educators should be clear about their vision for the kinds of materials that need to be in front of students. Clarity around vision can enable teachers to do some of the lifting themselves. Many teachers already contribute to designing units of study, for example, and selecting appropriate instructional materials represents a natural extension of that role in cases where they have the understanding to select appropriate resources. Clarity also creates the conditions for districts to do right by students. Requirements like those of the *Williams* settlement[8] create clear expectations for districts, but constrain what they can do in terms of budgetary and curricular decisions. If a clear vision for what

[8] For more information about *Eliezer Williams, et al., vs. State of California, et al.,* see http://www.cde.ca.gov/eo/ce/wc/wmslawsuit.asp.

instructional materials *should* include guides local behavior, it can help districts meet their obligations to students in a more loosely defined environment.

Thinking outside the box can help districts put the right resources in front of teachers and students. For example, annotating the materials with descriptors of how specific lessons, tasks, and other resources connect to specific standards, as well as how they can support quality learning experiences, can help district administrators charged with evaluating the materials make informed decisions. Districts also can negotiate directly with publishers. One district leader, for example, described a negotiating process between the district and a publisher in which the district agreed to purchase only the materials it needs, not the entire textbook suite offered by the publisher. Because the publisher wanted the district's business and saw an advantage to contracting with a high-profile school system, it was willing to accommodate the district's requests. The district leader advised, "I would encourage districts to go in and say, 'This is the way I want to buy it,' not 'This is the way they're going to sell it.'" Other meeting participants acknowledged that larger districts may have more clout to approach publishers in this way, but also suggested that a collection of smaller districts working together could have the same effect.

Finally, because the state has shifted away from mandatory materials lists and compliance checking, the state role in this new era is largely undefined. The meeting conversation did not address the new state role in detail, but participants argued that an opportunity exists to redefine and improve the ways in which the state supports districts in identifying and incorporating new materials into classroom instruction.

Creating the Conditions for Effective Implementation

Throughout the meeting, participants identified several factors that will influence the success of Common Core implementation efforts in districts.

Create a Culture of Trust and Growth

Participants repeatedly highlighted the importance of a district culture that builds trust and creates the conditions for growth. Change creates vulnerability and fear, and the move to new standards is a big change. One district leader described the recent reaction from a pair of fourth-grade teachers who asked, "How can I teach something I don't understand?" As the leader explained, "They're scared of being exposed to their students, parents, and the administration of not having that knowledge." In some ways, this fear may be stronger in contexts where teachers have achieved success and received recognition under a previous set of standards and assessments, because struggles under new expectations could call into question whether previous success was even valid.

To counteract this fear and help teachers work through it, a growth mindset and culture of trust are important to foster ongoing improvement. As Daro observed, the orientation of fear reflects the traditional disposition toward knowing mathematics in the United States, one that ties success to knowing the right answer. In other countries, the education system does not view the teacher as a person who knows everything. Rather, the teacher is a

model learner. Meeting participants therefore argued that districts who value model learners may navigate better the transition to the Common Core. To do this, making teaching and learning visible at the organizational level, where everyone positions themselves in a state of ongoing reflection and improvement, can be an effective lever for district change.

Develop and Leverage Structures to Support Collaboration and Focus

The structures and processes that support instructional improvement in Sanger, for example, also position it to manage the move to the Common Core. A common language around instruction, developed over many years of shared work around EDI, enables educators to communicate with one another about what they see in classrooms, what they seek in classrooms, and how to go about improving what happens in classrooms. The intense presence of school leaders in classrooms also provides a lever for instructional improvement with the new standards because teachers are accustomed to exposing their practice to and having regular conversations about teaching with coaches and administrators. The district's commitment to PLCs and other capacity building strategies also provides a vehicle for conversations and actions geared toward adapting to change.

Of course, not all districts walk into the Common Core with systems and expectations in place to the same degree as Sanger. For districts at earlier stages in their improvement trajectory, then, meeting participants suggested that the transition to the new standards offers an opportunity to develop those systems.[9]

Generate and Maintain Stakeholder Support

Meeting discussion highlighted the need to communicate with important stakeholders—including teachers, parents, and students—to help them understand what the Common Core entails and to generate good will toward the change.

Working with Teachers

Because they represent the most direct line to student learning, teachers play an instrumental role in sustaining positive momentum toward new standards. Indeed, comments throughout the meeting indicated that most teachers want to move toward the kind of learning experiences that the Common Core promotes, but districts need to acknowledge and address the struggle to get there. As a Sanger instructional coach shared, "They [the teachers in Sanger] are all exhausted. It is difficult. They will all say that. But not a single one will say [the Common Core] isn't a good option or not the right choice." A high school mathematics teacher expressed a similar sentiment about the motivation behind the move to the Common Core and the challenge associated with that move: "Most teachers

[9] For example, the Collaborative's November 2013 meeting in Sacramento City USD explored the ways in which the district's approach to developing units of study also has served as a vehicle for encouraging teacher collaboration and creating the conditions for teachers to embrace the kind of high-quality instruction that district leaders want to see in classrooms. For resources from this meeting, including a summary of the two-day conversation, please visit http://www.cacollaborative.org/meetings/meeting23.

would say this has been the most difficult year of their career. I'm embracing these challenges because I believe it's [sic] producing students who are eventually going to be better critical thinkers." District leaders, then, play a critical role in supporting teachers so they can experience success in making a transition they believe in. As another meeting participant observed, "Teachers generally want to make the switches that we're asking them to make…. What they're looking for is the opportunities to have tools to support that."

In addition to providing support, districts play an important role by celebrating teacher growth. This may be especially important in environments where teachers have experienced success in the past and need validation for the skills and contributions they already bring to the classroom. As one individual observed, "It can be demoralizing to everyone if we just focus on how far we have to go without focusing on how far we've come." Another meeting participant made a similar point, arguing that praise can help districts highlight positive classroom practice while building morale: "We need to celebrate the small changes and shifts in practice we see and elevate those."

Working with Students

The Common Core introduces shifts for students as well as teachers. The traditional mindset regarding mathematics in the United States prizes right answers. In the evolution toward understanding mathematics better, educators should strive to give students permission to engage in productive struggle. Part of the shift in teaching is helping students understand that the struggle and subsequent connections they make are part of the learning process.

Productive struggle may be an especially important transition for students who have experienced success in more traditional mathematics environments. Many of these students thrived because they could do computation with skill and accuracy. They may encounter challenge and frustration when it comes to problem solving, and teacher-student interactions will create the conditions for an evolution in mindset and expectations. Describing her classroom experience so far, one middle school teacher explained, "Those kids that are used to struggling, they're willing to have that productive struggle, whereas the more advanced kids, they throw up their hands…. You tell the parents they're going to have to work, but it's good for them."

Working with Parents

The Common Core is also new to parents. Meeting participants noted that districts need to proactively address the adult learning of individuals who will help students at home and provide a base of support for implementation efforts in the district. Pushback may come from parents when kids who have succeeded in the past do not achieve the same degree of immediate success. It also may come when students do not receive the same levels of public recognition through advanced course placement that they did under previous standards and course sequences. Parents also may resist change when they see academic challenges that look different from the mathematics they experienced as children, especially when they do not understand how to do the work or how to help their children

do it. Districts therefore should be proactive in educating parents along with their efforts to move teachers and students forward with the Common Core.

Anticipate and Address Tensions Around Accountability

If a growth mindset represents one important factor supporting Common Core implementation, as the meeting conversation suggested, the implications of high-stakes accountability merit careful attention. Participants suggested that California's decisions to date not to tie the Common Core to high-stakes accountability (e.g., resource allocation, teacher employment, teacher compensation) have helped create the conditions for a healthy standards transition. They also cautioned, however, that educators need to prepare for the consequences if circumstances change.

A strong tension exists between high-stakes accountability and the developmental progress toward quality instruction for which participants advocated during the meeting. As one individual argued, "There's a problem when we're going to pass judgment at the same time that teachers are in a developmental stage. *And* we're doing that with administrators who haven't been trained in the Common Core." In other words, teachers may be less willing to take risks and seek feedback if they know negative consequences will result from their imperfection. Moreover, questions emerge about whether those individuals holding teachers accountable—district and school administrators—have themselves learned enough about the Common Core to evaluate teacher practice fairly.

Despite the pushback from the group about high-stakes accountability, some participants clarified that accountability itself is not bad. Indeed, maintaining high expectations for teachers and students is critical to their ongoing growth and development. One individual made a distinction, however, between the culture in an environment like Sanger and the kinds of punitive external pressure that could be unhealthy at this stage: "There is a wonderful level of professional accountability among these teachers [in Sanger]. They have accountability to the profession. They are proud teachers…. You need to be supportive of internal accountability. Then, only then, can the external accountability be achieved." Just as district leaders need to tailor tools for monitoring instruction to teachers' developmental levels, so too do policymakers and administrators need to roll out accountability decisions in a way that supports, and does not undermine, the ongoing growth in districts.

Recognize Persistent Challenges

The meeting conversation revealed several key challenges that can complicate implementation efforts.

Successful implementation of the Common Core requires learning at multiple levels of the system. Teachers benefit from opportunities to build content knowledge and a repertoire of strategies for improved classroom instruction. Schools need mechanisms for recognizing teachers' learning and addressing instructional growth in classrooms. Districts have a responsibility to attend to broader challenges of capacity building and how to structure

students' learning across time. And the state, especially in a new world of increased local control, needs to learn how it can best support improvement at the local level.

Implementation takes time. Relationships take time. Capacity building takes time. Trainings, lesson planning, classroom observation, data analysis, and reflection take time. Yet district leaders and school-level educators rarely have the luxury of time to do the work. As school systems continue to move forward with Common Core implementation, members of the education community should acknowledge the time that progress will take as they look for opportunities to build efficiency and accelerate learning.

Exploring the Role of Networks and Support Providers

As districts embrace the ongoing transition to the Common Core, a broader education community has invested deeply in supporting the student learning. Networks and support organizations can help districts to leverage best practices and build capacity for growth; representatives from four of these groups shared some of their approaches to supporting Common Core implementation in mathematics. The California Mathematics Project partners with 18 institutions of higher education to provide training and direct services to K–12 teachers and administrators. The California Office to Reform Education brings together 10 districts to engage in the process of district improvement; the Common Core has provided an anchor for their work together. Massive open online courses (MOOCs) offered through Understanding Language at Stanford University seek to leverage the online course-taking platform to provide professional development to teachers by leveraging expertise from higher education and the teamwork and peer evaluation of participants. Pivot Learning Partners provides assistance to 95 districts statewide; its work in two thirds of the districts deals directly with the Common Core.

Representatives from these organizations and other participants contributed their perspectives on how support providers can help districts address some of the problems of practice identified in the meeting.

First, district leaders must navigate decisions about when and how to bring in external partners. This requires district leaders to strike a balance between the desire to build things from within (which can leverage local expertise, generate buy-in for new ideas, and keep financial resources within the district) and tapping outside expertise, which can be helpful in cases where districts lack the time, knowledge, or skills to navigate their most pressing challenges. When districts do choose to work with other organizations, they also need to find ways to assess the impact of that support, either to refine the working relationship or to pursue other avenues for improvement.

Local context matters, but customized support is expensive. As participants discussed earlier in the meeting, districts might position themselves best when they can leverage their own political history and existing strategies for improvement and design approaches that are appropriate to their teachers and students. Districts therefore often seek supports tailored to their individual needs. However, customized approaches are more expensive, and personalized supports from individuals and teams who deeply understand the local

context require more resources. Consequently, meeting participants suggested that both districts and support providers must navigate the balance between high-quality support and affordability.

Competition among support providers can make collaboration and cooperation challenging. Conversations throughout the Collaborative's meetings related to the Common Core have promoted the use of collaboration to accelerate system learning. The same principle can apply to a wide range of educational organizations, where support providers can improve their services by sharing and learning together. The reality, however, is that many organizations compete with one another; working together would represent a major shift in the world of external support.

Higher education can help introduce useful expertise. The California Mathematics Project, for example, uses university partners to develop training sessions and design supports for individual districts. Likewise, the growing body of MOOCs use university professors to deliver content. Indeed, the involvement of higher education represents one opportunity to leveraging mathematics experts to build teacher content knowledge. It can also give K–12 educators access to the most current body of knowledge on teaching strategies that can breed student success under the Common Core.

Next Steps for the Collaborative

The Collaborative will reconvene in Fresno in March 2015 to explore issues of alignment and coherence in establishing district goals, creating metrics for measuring improvement, and aligning resources and supports to meet those goals. In the meantime, the Collaborative staff will continue to generate publications that share key lessons from our core meetings with the broader field of California educators. As always, resources from this and previous meetings, updates about Collaborative members, and information about upcoming events are available on our website at www.cacollaborative.org.