What is Math in Common?

In 2013, the Math in Common (MiC) initiative was launched by the S. D. Bechtel, Jr. Foundation ("the Foundation"). The initiative provided generous funding to 10 diverse California school districts and gathered teams from each district to share strategies for implementing the Common Core State Standards for Mathematics (CCSS-M) in grades K–8, discuss successes and challenges, and collaboratively work toward improving CCSS-M implementation. The Foundation also hoped that the initiative would build knowledge and create resources that could be shared with other districts across the state.

The Foundation invited 27 California school districts to apply for funding, particularly districts that had substantial populations of underserved students, that had shown some progress in improving outcomes for students, and that had already built some internal capacity and momentum toward math standards implementation. Ten districts were selected: Dinuba, Elk Grove, Garden Grove, Long Beach, Oakland, Oceanside, Sacramento City, San Francisco, Sanger, and Santa Ana. These districts represent geographical diversity across the state, are clustered regionally to enable cross-district collaboration, and include large urban districts as well as smaller rural districts (see Table 1 on the following page). Each district had substantial leeway in how it directed funds to support CCSS-M implementation within its own system, including spending on math-focused staff, teacher professional development, and instructional materials.

The learning in MiC was about improving mathematics instruction in the era of the CCSS-M, but MiC was more than just a math initiative — it was also about understanding and addressing district systems changes required to improve classroom instruction.

Table 1. Math in Common Districts: Enrollment and Demographics

District	Total K–12 Enrollment, 2017–18	Percentage of Students on Free/Reduced-Price Lunch	Percentage of English Learner Students	Region
Dinuba	6,579	82%	33%	Central Valley, Fresno Area
Elk Grove	63,297	54%	16%	Sacramento County
Garden Grove	43,163	71%	36%	Orange County
Long Beach	74,681	67%	19%	Los Angeles County
Oakland	50,231	74%	31%	San Francisco Bay Area
Oceanside	20,459	59%	15%	San Diego County
Sacramento City	46,595	70%	19%	Sacramento County
San Francisco	60,263	61%	28%	San Francisco Bay Area
Sanger	12,102	73%	16%	Central Valley, Fresno Area
Santa Ana	53,131	80%	39%	Orange County

Source: California Department of Education (2015) DataQuest website, https://dq.cde.ca.gov/dataquest/dataquest.asp

Learning communities such as MiC have increasingly gained popularity as potential mechanisms for enacting education change. These learning communities are guided by the theory that a group of organizations or individuals can learn more quickly and effectively together than by working in isolation. Gatherings of the MiC community of practice (CoP) were led by the initiative's convening organization, California Education Partners ("Ed Partners"), and the evaluator, WestEd (the two organizations were supported through separate grants from the Foundation). Ed Partners, an education service nonprofit that specializes in building partnerships between California school districts, organized the CoP in response to direct engagement with the districts and their perceived needs over the course of the initiative. WestEd positioned its work in collegial partnership with Ed Partners and with the districts, using evaluation tools to help hone the CoP's focus, keep the work data-driven, and support capacity building rather than assessing districts' performance.

Each district sent a core leadership team to thrice-yearly CoP convenings and events held across the state. Convenings were designed to promote sharing of emerging best practices and lessons learned about implementation, and to provide the district teams with access to expert presenters on math instruction and systems change.

Were there positive impacts on student achievement and teachers' instruction?

STUDENT ACHIEVEMENT IN MATHEMATICS

Two different types of analyses show positive impact on students' mathematics achievement on the California Assessment of Student Performance and Progress (CAASPP) in MiC districts. School-level

analyses revealed that MiC districts made greater progress with their lower-performing elementary schools as their implementation progressed from 2016 to 2018, and overall, elementary schools in MiC districts made greater progress on the CAASPP than did schools in other districts across California. Findings for middle schools were much less clear. MiC districts made better progress on the CAASPP in schools that started out performing at the middle of the CAASPP achievement levels (levels 2 and 3[1]).

Student-level analyses showed substantial achievement variation among districts, but also showed that each MiC district improved its score on the CAASPP more quickly over at least a one-year period than the state average. Although achievement for English learners in MiC districts was lower than for other student groups, this group showed stronger percentage gains in most MiC districts than across the state — even though the gap between English learners and non–English learners was not closing in most MiC districts.

TEACHER INSTRUCTION

Our observations of teachers' instruction revealed that teachers were fostering classrooms with student mathematical sense-making, which is a key goal of CCSS-M teaching and learning. At the same time, lessons demonstrating the highest classroom observation ratings for two important dimensions of the CCSS-M — *access to challenging mathematics* and *student explanations that serve to support student agency* — were infrequent. The relative rarity with which we observed lessons involving strong examples of these dimensions stands out as a call for further action.

We saw both clear demonstrations of progress and significant variation in MiC districts over the five years of the initiative. There is evidence that these districts have started the long-term process of changing and improving how they organize systems and supports to enable effective standards implementation, and they will need to continue their efforts, even putting more energy toward supporting some areas, to help their students achieve the CCSS-M's goal of college and career readiness.

What lessons were learned about complex education systems and instructional change?

Although CAASPP achievement has progressed more slowly than stakeholders across the state would have hoped, the MiC initiative has provided district staff, educators, and policymakers with many valuable lessons about standards implementation.

With 10 diverse school districts pursuing unique implementation plans over five years, the story of MiC reflects the immense variation across districts and the deep complexity involved in educational change. Our goal with this series of six summative evaluation reports, as with the series of reports produced during the course of the initiative (accessible at https://www.wested.org/project/math-in-common-evaluation/), has been to produce accessible information about math standards implementation that would be useful to practitioners and policymakers.

The following sections present several key themes and lessons that emerged over the course of the initiative, as MiC participants across California worked intently to improve math teaching and learning in their districts.

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1   In our analyses of CAASPP achievement, schools at level 2 had between 20 and 40 percent of students meeting or exceeding the standard, and schools at level 3 had between 40 and 60 percent of students meeting or exceeding the standard.

TO MAKE BIG CHANGES TO TEACHING AND LEARNING, START SMALL

Implementing any new content standard requires massive change at every level of a district system, from the central office to the classroom. District staff should not try to tackle every facet — or even most facets — of systems change all at once. Instead, leaders should plan to tackle manageable elements of change with smaller groups; learn from these pilot experiments; and then scale up to include larger groups.

For example, district leaders participating in MiC learned that if they want all elementary teachers to use a new instructional routine, they can begin by gathering a core group of teachers who are excited about trying out new math instruction, and support them to try the routine themselves and observe one another doing so. Next, district leaders and the core group of teachers can debrief and provide feedback to one another, sharing the challenges and successes involved in implementing the new instructional routine. After a few rounds of this, district leaders will have access to new, grounded knowledge about whether and how the routine works in the classroom. Using that knowledge, district leaders can plan targeted professional development for larger groups. The initial core group of teachers can also help district leaders build enthusiasm for change with other teachers.

Starting small also works for teachers who might feel daunted by all of the demands of new standards. Our studies of MiC, and teachers' experience, have shown that big changes to teaching practice do not happen overnight — deep instructional change often results from the accumulation of many small changes made, adhered to, and honed over time.

USE VARIOUS SOURCES OF HIGH-QUALITY DATA TO SUPPORT INFORMED DECISIONS

By the end of MiC, participants reported that they were routinely asking "How will we know if this works?" when new ideas were proposed in their districts. Their experiences in MiC had often led them to start including measurable goals, and planning to gather evidence and monitor progress, when launching any new initiative.

As MiC participants became more sophisticated about collecting and using data, they also came to want different types of data to answer their questions and inform their decisions. For example, once multiple years of district- and school-level CAASPP math data became available, the MiC participants examined each school's annual progress on the CAASPP, to better understand the progress of CCSS-M implementation at each site. However, many participants felt that the CAASPP summative scores were not sufficiently detailed on their own to provide information about how to change instruction. Accordingly, district teams were supported to triangulate the CAASPP math data with other, more process-related data about site-based investments and conditions (e.g., data on which sites had math coaches working with professional learning communities; which were participating in lesson study; what student work revealed about coaching support for teachers; and how principals were providing feedback on math instruction). In addition to collecting and analyzing those sorts of process-related data, MiC districts gathered classroom observation data to provide further information on specific shifts in the dynamics of classroom instruction and progress toward CCSS-M implementation. With this rich collection of data, MiC participants were able to make better-informed decisions about how their districts' central offices could support each site to learn about and improve mathematics teaching and learning.

FIND AND BUILD PATHS FOR COLLABORATION ACROSS THE DISTRICT SYSTEM

Implementation of the CCSS-M requires deep changes to, and across, district systems. These changes affect many people and many processes, from planning and scheduling professional development, to deploying coaches, to choosing and supporting teachers to use instructional materials. In order to be

successful, this kind of complex, multifaceted systems change cannot be dictated from above, and the many moving parts cannot be developed in isolation — productive collaboration must be fostered among educators and staff at all levels.

MiC participants found and built new paths for collaboration across their systems. Staff from many levels had to talk and learn together so that they could all develop an ownership stake in the work of implementing the math standards. Supporting such talking and learning together meant leveraging existing collaboration spaces, building new ones, and ensuring that the right people — coaches, principals, district math office staff, and district leaders with decision-making power — met and worked together. This role-diverse, cross-system collaboration occurred in a variety of ways, including convening math- or improvement-focused professional learning communities, reformatting routine monthly meetings to facilitate conversations about change, and deploying district math coaches to school sites to work closely with principals and teachers.

DEVELOP A COMMON VISION AND COMMUNICATE IT EVERYWHERE

"Vision" was a foundational concept in the MiC initiative, and it was much more than a buzzword. Participants worked to incubate a shared vision of how the CCSS-M would come alive in classrooms in their districts — which instructional practices would be foregrounded, how materials would be used and adapted, and how teachers and students would actively engage in classroom instruction. In short, "vision" meant an evolving understanding of the specifics of how math implementation would look and feel every day in each district.

Using the previously described collaboration strategies, MiC teams were thoughtful about bringing their shared vision to all participants in their systems — from coaches to teachers to assistant superintendents — so that they could all understand and carry out the vision in their own roles. A shared vision, grounded in the dynamics of classroom instruction, enabled educators and administrators to proceed in their work in a way that brought coherence to the district system and that, ideally, improved the equity of mathematics opportunities for students.

PRINCIPLES OF CONTINUOUS IMPROVEMENT CAN ACCELERATE AND IMPROVE STANDARDS IMPLEMENTATION

MiC participants were asked to work in "cycles of continuous improvement." These cycles involved creating plans and goals for implementation, testing the plans and goals in the district system, gathering relevant implementation data, and then revisiting the plan and revising it as needed. This was a change from ways that many participants had worked in the past, in which a plan for some element of work (e.g., teacher professional development) was created in the summer and carried out throughout the year, without data-gathering, review, and revision explicitly built into the process.

Using cycles of continuous improvement, professional learning plans that were developed during the MiC initiative were often tested and measured as they happened, with changes being made more quickly, and often with a clearer plan for measuring success, than in the past. Given the large and complex changes that are required for district systems to organize in order to implement new content standards, gathering information continuously can help districts to be nimble and responsive to new information. Continual information-gathering also allows for effective ideas and practices to be spread more easily, and for less-effective practices to be discontinued, saving time and effort.

ALL ASPECTS OF STANDARDS IMPLEMENTATION SHOULD BE GROUNDED IN THE DYNAMICS OF CLASSROOM INSTRUCTION

In MiC districts, in order to move toward students being able to better work, think, and communicate about mathematics at the level of the standards, staff across each district system had to consider shifting the *dynamics of classroom instruction*. These dynamics include instructional materials; instructional routines; teacher and student classroom roles, mathematical identities, and beliefs about learning and "productive struggle"; types of tasks within a lesson; lesson structure; use of technology and manipulatives; and discourse structures.

To make the instructional shifts necessitated by the new standards, districts needed to ground improvement work for all educators and staff across the system in a solid understanding of these dynamics, so that these educators and staff could think more productively about how to achieve the standards-aligned instruction. To help staff achieve that understanding, most districts shifted their professional development from large-scale centralized professional development days to professional learning that happened at sites, in classrooms, and among close colleagues. Lesson study, unit study, and math professional learning communities were all ways for groups of teachers at a site to learn and try new instructional practices in the contexts of their own classrooms.

District staff and administrators also needed to become more familiar with the dynamics of classroom instruction, so that they could understand how changes were playing out for teachers and students in the district, and to make adjustments based on what they heard and saw. Accordingly, many administrators conducted classroom observations, using tools designed to be responsive to the specific dynamics that districts hoped to shift. The focus of these observations was not to evaluate teachers, but to collect data about the dynamics of classroom instruction, which administrators could use to improve professional development.

Student discourse, a critical element of classroom instruction under the CCSS-M, became a focus of the MiC initiative as a whole. MiC teams grounded an array of improvement work in improving student discourse, including designing discourse-focused professional development, promoting discourse-rich instructional routines (such as Math Talks) and participation structures, supporting teachers to design lessons and tasks that required rich student discourse, and designing observation tools that measured student discourse in order to evaluate the success of their supports for teachers. Having this shared instructional focus was very productive, both for the network as a whole and for improvement work within individual districts, as it allowed for targeted conversations rooted where improvement needs to happen: in classrooms.

IMPROVING INSTRUCTION FOR STRUGGLING STUDENTS CAN IMPROVE INSTRUCTION FOR EVERYONE

With the CCSS-M's increased emphasis on student discourse and rigorous real-world mathematics problems, MiC teams became especially concerned with supporting English learner students to achieve the standards. This focus contributed to improvements in classroom experiences for all students, in several ways.

For example, in order to understand the particular needs of English learner students, district staff in some MiC districts spent days in classrooms, shadowing these students and gaining up-close understanding of what their classroom experiences were like. This careful attention to the effects of the dynamics of classroom instruction on English learner students provided firsthand experience that informed districts' work with their students and teachers.

The focus on the language requirements of the CCSS-M also provided clarity and support for teachers in the work of math literacy. For elementary teachers, this focus meant leveraging literacy development, which many teachers had already invested in, to advance their own and their students' math knowledge.
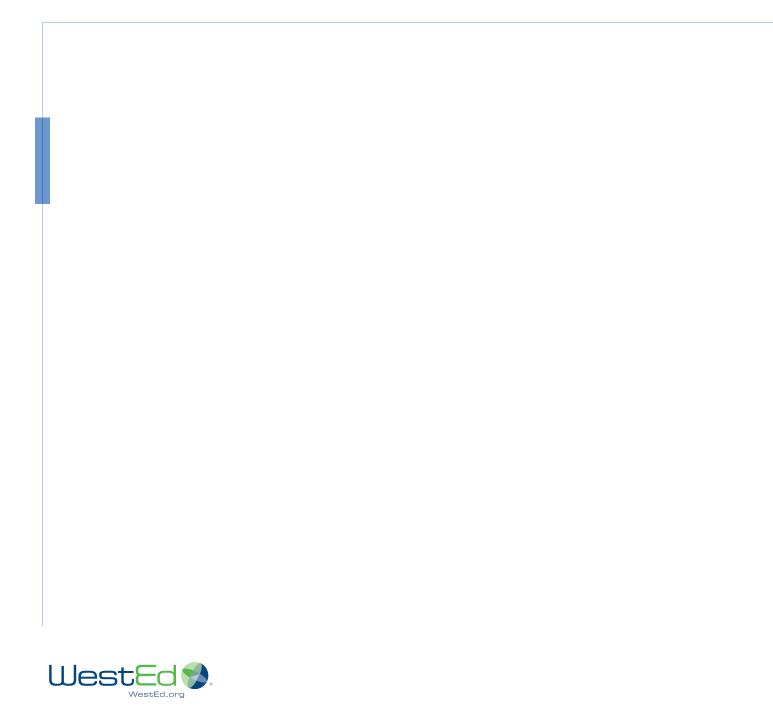
Building on their existing mathematics knowledge, single-subject teachers often developed new literacy instruction skills to support students to read and write mathematically. Without intentional focus on supporting English learner students, these supports for mathematics teachers to make changes to their instruction may not have fallen into place as comprehensively.

COLLABORATING IN A CROSS-DISTRICT LEARNING COMMUNITY WITH SHARED FOCAL AREAS AND COMMON DATA CAN CATALYZE CHANGE

Learning communities are attracting keen interest in education circles, and MiC is one of the nation's first examples of a learning community composed of cross-district leadership teams. As such, the field can learn from the trial-and-error process that the MiC CoP went through as it became a collaborative forum for developing, sharing, and spreading effective practices for improving teaching and learning at the classroom and district levels.

As more learning communities are nurtured to support educational change, the MiC experience suggests that such communities flourish when participants can focus on a few well-defined focus areas that resonate across all participants' diverse experiences and contexts. In MiC, after a period of experimentation, these focus areas were student mathematical discourse, professional development for teachers and administrators, and the use of summative data to assess and direct investments at school sites.

These lessons learned and key themes pervaded the work of the MiC districts as they focused on improving the dynamics of classroom instruction during the five years of the initiative. To learn more about the work and results of the initiative, see the six summative reports in this series.