

# Perspectives on California's Statewide Math and Science Communities of Practice

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# Contents

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|  |           |
|--|-----------|
| <b>California’s Math and Science Standards</b> | <b>ii</b> |
|--|-----------|

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|                                      |          |
|--------------------------------------|----------|
| <b>Introduction</b>                  | <b>1</b> |
| Who is involved                      | 2        |
| How the CPs operate                  | 2        |
| Focus and methodology of this report | 4        |

---

|   |          |
|---|----------|
| <b>Key Learning</b>   | <b>5</b> |
| CPs promote relationship building, the foundation for successful collaboration  | 5        |
| CPs connect members with experts who can enhance local work                     | 6        |
| CPs have advanced approaches to equity and access in math and science education | 8        |
| CPs have helped advance and prioritize science standards implementation         | 9        |
| Diverse CP structures create opportunities for rising leaders                   | 10       |

---

|  |           |
|--|-----------|
| <b>Challenges</b>  | <b>12</b> |
| CP members disseminate knowledge, but their methods and reach vary greatly   | 12        |
| Participants wonder how to sustain the connections and learning from the CPs | 14        |

---

|  |           |
|--|-----------|
| <b>Considerations for strengthening impact going forward</b> | <b>15</b> |
|--|-----------|

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|                   |           |
|-------------------|-----------|
| <b>References</b> | <b>17</b> |
|-------------------|-----------|

# California's Math and Science Standards

Along with most other states, California transitioned to the Common Core State Standards for mathematics in 2010. In 2013, the State Board of Education adopted a math framework to help teachers transition to the new standards. But even with the framework's guidance, implementation is complex. The approach to math has been fundamentally changed. Students are expected to apply and defend their ideas about math concepts, focus more deeply on a smaller number of grade-specific and complementary topics, and build on procedural skills across grade levels.

In 2013, along with nearly half the states, California adopted the Next Generation Science Standards (NGSS). The NGSS emphasize science and engineering practices and strongly emphasize student inquiry, disciplinary core ideas (i.e., ideas that are necessary for understanding a science discipline), and cross-cutting concepts — concepts that resonate across scientific disciplines and bridge the gap between science and engineering.

*Note: NGSS Lead States. (2013). Next Generation Science Standards: For states, by states. Washington, DC: The National Academies Press.*

# Introduction

In 2015, the California County Superintendents Educational Services Association (CCSESA), a membership organization representing the state’s 58 county offices of education, focused its ongoing collaboration with the California Department of Education and the California State Board of Education into an initiative called The California Partnership for Math and Science Education (The Partnership). The Partnership is designed to improve teaching and learning by advancing the way educational standards are implemented across the state of California. To do so, the initiative takes a multi-pronged approach to deepening statewide standards implementation support and coordinating across content areas.

Fundamental to standards implementation success is capacity building — especially in terms of helping educators build the content knowledge and pedagogical skills they need to ensure high-quality math and science education for all students. The Partnership wanted to support educators across the state to work collaboratively, rather than in isolation, to build capacity and implement the state’s new, rigorous math and science standards. (See page ii.) To provide a structure to help educators across the state, key math and science educators organized into mathematics and science Collaboration Committees (CCs) to collaboratively develop and guide two new statewide Communities of Practice (CPs) — one for science, and one for mathematics.<sup>1</sup>

The idea of a CP is that by working together in a joint enterprise — in this case, math and science standards implementation — participants will develop shared knowledge and expertise about how to improve implementation processes and outcomes. This is consistent with researcher Etienne Wenger’s conception of a community of practice, where learning is a social activity that occurs in the context of “lived experience” through “mutual engagement, joint enterprise, and shared repertoire.”<sup>2</sup>

The primary goal of the Partnership in creating the CPs was to develop capacity in the state’s county offices of education (COEs) and empower COE staff to better support their districts to implement standards. The Partnership hoped to enable educators from across the state to share the best resources,

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<sup>1</sup> Establishment of the CPs was the first of two flagship efforts of the Partnership. The second was the creation of 22 grant-funded collaboratives as smaller, more localized CPs across the state. For more information, see LeFevre et al., *Implementing California’s Mathematics and Science Standards: Lessons Learned from Regional and County Collaboration*, WestEd, 2019.

<sup>2</sup> Wenger, E. (1999). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

policies, and practices, and to approach improving the quality and equity of math and science education with statewide consistency and a common language.

The expectation was that by collaborating through the CP, participants could start to develop a system of support for statewide implementation. The Partnership anticipated that the CPs in math and science can serve as models for organizing CPs in other subject areas, and this idea is being borne out, as California social studies and health standards implementation efforts are being organized that mirror the CC and CP model.

## Who is involved

The concept of organized communities of educators working together to support education improvement is not new.<sup>3</sup> But the Partnership CPs differ from earlier, similar communities<sup>4</sup> in terms of the number and diversity of organizations and individuals invited to participate, and the focus on systemic, rather than individual, improvement.

All of California's 58 county offices of education (COEs) are invited to participate alongside a broad and diverse range of knowledgeable mathematics and science educators representing many other types of organizations, such as the State Department of Education, institutions of higher education, and math-science support providers. Partners include the Lawrence Hall of Science, the Exploratorium, alliances such as the NGSS Collaborative and K–12 Alliance, and organizations such as Children Now and the California Action Network for Mathematics Excellence and Equity.

## How the CPs operate

Under Wenger's theory, communities of practice develop through five stages: potential, coalescing, maturing, stewardship, and legacy.<sup>5,6</sup> In other words, communities may begin with a period of exploration, then eventually settle on a more focused set of concerns (often called "problems of practice") to examine together.

The Partnership CPs have been experiencing this developmental journey as they coalesce around how to support standards implementation. At the outset, mathematics and science CCs were organized to

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<sup>3</sup> For example, the National Writing Project (NWP) is a community of practice that has been in continuous operation since 1974. NWP began in 1974 in Berkeley, California as the Bay Area Writing Project, with the goal of providing a range of professional development services for teachers and schools interested in improving the teaching of writing and the use of writing as a learning tool across the curriculum. (See <https://www.nwp.org/>)

<sup>4</sup> See Lieberman & McLaughlin (1992) for information about similar communities organized in the 1980s and 1990s.

<sup>5</sup> Wenger, 1999.

<sup>6</sup> Elsewhere, the last three stages of development have been called: "active," "dispersed," and "memorable."

include an influential group of COE leaders. These CC members established subject-specific focus areas to guide the CPs' early exploration.

The four areas of focus determined by the Math CP are access and equity, content knowledge and pedagogy, administrator support, and communication. The four areas of focus of the Science CP are professional learning, support and training for administrators, district-level policy development, and communication.

Guided by these focus areas, the CPs meet three times annually — twice as separate subject CPs, and once as a joint CP focused on areas of convergence between math and science education (e.g., support for English learners). Prior to each meeting, the CCs convene to test ideas and provide input on content for upcoming CP meetings.

While the specific content focus varies by CP meeting, the sessions typically include: information sharing, so that all attendees have access to similar information; a presentation that shares relevant research, tools, or a framework for standards implementation; chances to engage in hands-on learning; and role-alike and cross-role opportunities to collaborate with both local colleagues (i.e., colleagues within the same COE or CCSESA region<sup>7</sup>) and with colleagues from other areas of the state.

Presentations in the Math CP have included such topics as supports for students with disabilities, instructional routines that support mathematical reasoning, techniques to support knowledge development for administrators, and creating a cohesive mathematics program. These presentations have focused on strengthening knowledge of equity issues while concurrently developing knowledge about pedagogy and/or math standards.

The Science CP has featured presentations on best practices for communicating with families about the benefits of science testing, developing an understanding of how the California data dashboard affects science instruction, models of teaching and learning science, and the positive impact of science classes on English language learners' outcomes. During these sessions, participants gained professional knowledge and also deepened their understanding of how to communicate with relevant stakeholders about developments in science instruction.

CP organizers strove to maintain an emphasis on each CP's focus areas as they planned programs to deepen participant capabilities. Moreover, CP meetings increasingly provided opportunities for regional subgroups to build and test their own region's math and science approaches over time. Participants have cited this region-specific collaboration time as an "incredibly productive" highlight of the meetings.

A key element of CPs is the relationships built through the shared work. These relationships strengthen the community's ability to create shared meaning and resources in support of quality teaching and learning. As the CPs have continued to convene participants, members have become a community of

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<sup>7</sup> CCSESA divides California's 58 counties into 11 regions. As another part of the Partnership, these regional groups collaborate on grant-funded, regionally defined math and/or science standards work.

math and science leaders who share expertise and have moved beyond planning as they use the products of their collaboration to advocate in support of standards implementation efforts statewide.

## Focus and methodology of this report

WestEd has documented the development of the Partnership CPs to provide formative feedback in support of the CPs and to help others across the state and nation understand the ways in which such complex communities develop and grow over time. To do this work, WestEd team members attended all of the math, science, and joint CP meetings held since the inception of the Partnership. The team also attended CC meetings, conducted eight focus groups (with 32 of the roughly 250 members of both Math and Science CPs), and surveyed Math and Science CP members (receiving responses from 114 members).<sup>8</sup>

Through these efforts, WestEd ascertained the ways the CPs advanced participants' understanding of math and science standards, equity, and strategies to support local implementation. The team also learned about the value that participants felt the CPs added and gained an understanding of extant needs that members hope the CPs will address in the 2019–20 academic year, its final year of operation under the Bechtel grant.

This report identifies and discusses the following promising developments emerging from the Partnership CPs:

- CPs promote relationship building, the foundation for successful collaboration
- CPs connect members with experts who can enhance local work
- CPs have advanced approaches to equity and access in math and science education
- CPs have helped advance and prioritize science standards implementation
- Diverse CP structures create opportunities for rising leaders

The report then conveys challenges and potential solutions and offers considerations for strengthening the impact of the work going forward — considerations that apply as well to other standards implementation efforts.

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<sup>8</sup> The focus groups and survey focused on what CP members learned from the CPs, the meetings' impact on their local work to support standards implementation, and what they still hoped to gain from the CPs. Survey and focus group respondents hold a wide range of professional responsibilities — they include teachers, principals, teachers on special assignment, and county superintendents. While some have attended all of the CP meetings, others were new members of the community.



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# Key Learning

## CPs promote relationship building, the foundation for successful collaboration

Given California’s geographic diversity, most regions and many counties encompass a mixture of urban, suburban, and rural areas. Similarly, there is wide variation in terms of the number and characteristics of students they educate. Reflecting these differences, each COE has distinct strengths — e.g., high-quality resources or innovative staffing models — that others might tap into to increase their own math-science capacity.

Sharing best practices that have developed locally requires building cross-county relationships, something the CPs have provided the time and structure to do. CP participants from large and small counties agreed that the CPs prompted new relationships, helped solidify existing relationships, and allowed people from less populous or more remote regions to collaborate with and get assistance from COEs with more resources or larger staffs. Larger COEs welcomed the chance to share their knowledge and resources with colleagues.

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*“The CP meetings helped us build relationships and work together. When we work together — in our regions, across regions, with math and science together — that’s when it seems most productive to me.”*

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CP meetings are intentionally structured to include time for regional teams to convene — to work on their grant-funded initiatives, discuss strategies, and share learning.<sup>9</sup> Members commonly cite this regional collaboration time as one of the most valuable aspects of the CP. They speak glowingly about their new regional connections and how much they appreciate time to collaborate with colleagues from neighboring counties, some of whom they had not known or worked with before. They report that this regular networking is enormously beneficial for multiple reasons. It allows participants to feel comfortable asking for help from a regional colleague they would not have reached out to in the past,

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<sup>9</sup> These grant-funded initiatives are described in another report in this series: *Implementing California’s mathematics and science standards: Lessons learned from regional and county collaboration*.

(Le Fevre et al., 2019) discusses lessons learned as new collaboratives implemented projects across California to build and sustain capacity for high-quality math-science education.

and it enables them to learn about and use other regions' resources. Most importantly, it allows new acquaintances to become collaborators — not just for the Partnership work, but for a host of other standards implementation initiatives.

Besides promoting new relationships, the CPs built on the strengths of pre-existing relationships, notably those developed by way of subject matter networks. For example, participants reported that the CPs gained a head start by being very inclusive of prior and existing math organizations, which enabled them to tap into and build on those already established collegial relationships. Said one, "In the absence of the old Algebra Forum, which had become the California Math Network, there really wasn't any major forum bringing all of the major [math] players together in the state. So I felt like this was kind of a substitute for that." The CPs filled a void for state math leaders and tapped into the value of prior structures.

Though many Science CP members had collaborated previously (e.g., via a series of NGSS rollout events<sup>10</sup>), some reported that the CP meetings were the first statewide gatherings that brought them all together in the same place to discuss opportunities to collaborate. Through the Science CP, CCSESA has also launched the Fostering NGSS Implementation Project (FNIP), which has convened cross-regional teams of science leaders together to work on shared projects and address anticipated problems of NGSS implementation. (See more on the FNIP below.)

## CPs connect members with experts who can enhance local work

The collaboration facilitated by the CPs is not just among K–12 educators. Partnership members include universities and nonprofit organizations with math and science standards implementation expertise, such as the California Science Project, California Mathematics Project, and Exploratorium.<sup>11</sup> Representatives from these organizations attend CP meetings, present research, and offer thought partnership. Some of these representatives attend a single meeting to offer support, but many are members of the Partnership who are consistently and deeply engaged in the CCs and CPs. The fact that standards implementation experts are an integral part of the CPs means that COE leaders have regular opportunities to connect with people who have deep, relevant knowledge about subject matter. Through interaction with these experts, members of the Partnership engage in discussions about content that are likely to build their subject-matter expertise.

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<sup>10</sup> A series of NGSS professional learning rollout events were organized as a collaboration between the California Department of Education, CCSESA, California Science Project, K–12 Alliance, and California Science Teachers Association.

<sup>11</sup> These organizations have been lauded for their contributions by groups including the California Science Teachers Association and the National Science Boards.

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*“Everybody needs a thought partner. Organizations and districts can’t do this by themselves.”*

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CP members value the opportunity to make these connections, and some regions and counties have been able to collaborate further with these practitioners. For example, COE leaders from Region 8, an area northwest of Los Angeles, leveraged connections made at CP meetings to partner with the Exploratorium and the California Science Project to support professional learning in their region. Because the Exploratorium provided the training using its own program grant funds, Region 8 was able to offer NGSS training from this prestigious organization at no cost. The region was then able to form an additional partnership with the Executive Director of the California Science Project, who co-presented with the region’s Core NGSS Leadership team on an adapted Exploratorium lesson during a training offered to county administrators.

A CP member from Marin County learned about the TRU Framework<sup>12</sup> from its creator, Dr. Alan Schoenfeld, at a Math CP meeting. She felt that the framework could help bring coherence to the array of disconnected but important work the Marin COE was doing (TRU provides five dimensions of classroom activity designed to help educators create “powerful learning environments”). After discussing the idea with county colleagues, she applied for and received a CCSESA county implementation grant to use TRU to guide their work. Dr. Schoenfeld agreed to help develop the project and participate in its teacher professional development sessions.

At another Math CP meeting, Monterey COE leaders met Dr. Kyndall Brown, Executive Director of the California Mathematics Project, whose work builds mathematical understanding through an equity lens. Because his expertise fit nicely with Monterey’s plan to build teachers’ and administrators’ understanding of teaching math from a social justice perspective, they recruited him to lead activities for all four Monterey County social justice mathematics sessions.

Grace Kelemanik and Amy Lucenta, two of the creators of Routines for Reasoning,<sup>13</sup> presented their work on math routines at a Math CP meeting. Members across the state noted that they found this work incredibly compelling and well designed. Following Kelemanik’s first presentation to the Math CP, Region 3 COE leaders brought Kelemanik and Lucenta in to lead a full-day workshop with their teachers.

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<sup>12</sup> TRU is “a framework for characterizing powerful learning environments in actionable ways (Schoenfeld, 2016). It provides a straightforward and accessible language for discussing what happens (and should happen) in classrooms, in professional preparation and professional development (PD).” Source: <https://www.map.mathshell.org/trumath.php>

<sup>13</sup> Routines for Reasoning are instructional routines, created by Grace Kelemanik, Amy Lucenta, and Susan Creighton. They are “specific and repeatable designs for learning that support both the teacher and students in the classroom.” Source: <http://www.fosteringmathpractices.com/routinesforreasoning/>

Science CP members indicated that the information shared at the CPs, along with networking opportunities and burgeoning leadership skills acquired through participation, have helped them advocate for science back home. Numerous science COE staff from across the state reported that science is not yet perceived to be as high a priority as mathematics and English language arts. This is partly because the science standards were released several years after standards for other subjects, with a corresponding lag in aligned assessments. Tested subjects are typically prioritized, but the delay in statewide science assessments meant that districts were not held accountable for science progress for years after the launch of the NGSS. As a result, science education often gets less instructional time than other core subjects, particularly in elementary schools. The CPs have provided an opportunity for educators to discuss this issue and make plans to elevate the importance of science across grade levels through projects that focus on both math and science.

## CPs have advanced approaches to equity and access in math and science education

In keeping with the stated focus on access and equity, agendas for both CPs have included multiple speakers and activities to help develop participants' understanding of these issues and capacity to provide equitable math and science education. Science CP members heard Dr. Susan Gomez-Zwiep present concrete strategies for supporting English learners — strategies useful to support math and science education for all learners. Math educators appreciated a presentation by Dr. Julia Aguirre, alerting them to the prevalence of deficit language that creates personal and institutional barriers for equitable instruction.

Another Math CP meeting brought in a San Francisco Unified School District (SFUSD) educator to talk about the district's policy that increases students' access to mathematics classes, and the session offered CP participants the opportunity to discuss their own policies about students' mathematics course pathways in middle and high school. The conversation made the issue more prominent in participants' minds, and Region 8 even adopted it as the focus of their 2019–20 Partnership-funded work in mathematics.

Survey respondents indicate that the CPs' continuing work on equity and access is paying off. CP members report pushing for more equitable processes locally after gaining insights at CP meetings. One focus group participant noted that her district's plan for equity was to get to know each student's individual needs in order to effectively address them. However, as she began to absorb the examples of inequitable practices from CP presentations, she realized that by focusing on students' weaknesses instead of their strengths, the district was demonstrating institutionalized deficit thinking. She brought this realization to district leadership, and the district reframed its policy to include a focus on student assets and a plan to help educators focus on each student's strengths. That change in the plan is important, she said, because it "can change the language of the teachers and support staff."

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*“Our plan had been to know students by name and need. But in our work at the CP, institutionalized deficit thinking stood out to me like a red flag. I brought this back to our leadership team, and we changed the plan to include student assets. That can change the language of the teachers and support staff.”*

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The focus on equity in the CPs has affected how regions are thinking about their standards implementation work. After hearing SFUSD's presentation, one region decided to devote its regional improvement grant to exploring equity issues in local districts' course pathways. After Dr. Rachel Lambert spoke at the Math CP about best practices for educating students with disabilities, a focus on students with disabilities made its way into several regions' proposals for funding in 2019–20.

## **CPs have helped advance and prioritize science standards implementation**

Since the math standards pre-dated the NGSS, math educators have had more time to understand the standards, surmount implementation barriers, and build local implementation supports. For example, math educators learned ways to adapt when aligned instructional materials were not ready in time for the standards rollout. They have also learned what types of professional development experiences are most useful in helping teachers shift their instructional practices. Those experiences, shared with science educators via the CPs, have helped science educators enact a smoother rollout of science standards. The NGSS implementation process has been informed by what math educators learned about actions, strategies, and practices that are, or are not, effective.

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*“One goal from a science standpoint for California was not to make the same mistakes they made for ELA [English language arts] and math when they rolled out the Common Core standards. They let us in science sit in on math and English meetings. Science hasn't made those mistakes.”*

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As one Science CP participant explained:

“I’m able to take my CP work back to my district, and it gives me street cred. [Colleagues] look at me as an authority because I’m speaking from this collaborative group. The math people in my district, who have been trying to do the exact same thing with math standards for a significantly longer amount of time...never had the opportunity to join this type of structure [when the math rollout occurred]. It’s been really powerful to be able to come back to my district and say, ‘here’s what we’re doing at the state level, and here’s what’s happening across the board.’”

The timing of the CPs’ launch — close to the rollout of the NGSS — gave science educators the benefit of having a statewide network of support immediately, at the critical point of standards rollout. Membership in the CP has meant that science educators are recognized locally as certified bearers of standards implementation knowledge.

The Science CP meetings have also helped members think about new ways to champion science instruction locally. Science instructional minutes are often limited, but CP meetings have provided time for COE leaders to consider how to maximize existing schedules. Science CP presenters have helped members understand high-leverage strategies to improve science instruction for special populations, including English language learners and students with disabilities. They have also provided time and structured opportunities for members to share creative strategies for integrating science with other subjects.

## Diverse CP structures create opportunities for rising leaders

The tasks of organizing the CPs, making them run smoothly as learning events, and ensuring that they provide useful information to a large group of diverse participants have created new opportunities for rising math and science leaders to make connections and take on broader leadership roles. More established math and science leaders, meanwhile, have been able to broaden their networks and connect with up-and-coming county leaders, all in the service of ensuring high-quality math and science education statewide.

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*“We said that if the goal is to leverage and understand expertise and build capacity as a group, at this table, everyone should have the same positional authority and opportunities. Be a learner and a contributor.”*

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The leadership-building benefit of CPs is particularly apparent in the meetings’ regional planning time. As COE teams work together to implement what they have been learning in the CPs, up-and-coming leaders gain face time with more experienced county and state leaders — some of whom actively take on mentoring roles. New voices are increasingly invited to join important math and science conversations. Furthermore, since both new and established leaders hear the same messages at the CPs, everyone is approaching the work of standards implementation with shared ideas about priorities and challenges.

Regional leaders are replicating these leadership opportunities locally — one region used its first Partnership grant to develop leadership capacity in teachers by asking them to develop instructional materials and train their colleagues to use them. They plan to advance this work further over the next Partnership grant cycle by asking the teacher-leaders they trained to lead the second cohort and mentor a new group of teachers. As the CPs help members develop their leadership capacity, they are also modeling a strategy for growing leadership capacity at the local level.

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## What Types of Capacity Do the CPs Develop?

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CP members include educators from all levels of California’s education system, from classroom teachers and teachers on special assignment to county superintendents, representing a broad range of knowledge, expertise, and areas of interest. Survey findings show that virtually all (96%) CP attendees believe that the CPs developed their personal capacity. Asked about types of capacity the CP helped develop, CP members responded as follows:

| Type of Capacity            | Percent of Respondents |
|-----------------------------|------------------------|
| Networking across regions   | 39%                    |
| Gaining knowledge           | 39%                    |
| Learning tools or skills    | 24%                    |
| Leadership development      | 13%                    |
| Collaboration within region | 11%                    |
| Understanding of equity     | 10%                    |

Findings from the survey and focus groups showed that respondents held differing views on the relevance of information they heard at the CPs. A few experienced practitioners noted that CP meetings occasionally focus on grade levels that are outside of their scope, and they sometimes convene speakers they have already heard. However, overall responses suggest that even if content is not new or perfectly targeted for all participants, bringing people together and offering opportunities to collaborate, strengthen relationships, and learn from one another are, in themselves, worthwhile.

The Partnership launched two sub-grant opportunities — the Fostering Math Standards Implementation Project (FMIP), and its science counterpart, the FNIP (mentioned above). These grants have provided an opportunity for a number of emerging math and science leaders to raise their profile with colleagues across the state. All members of each grant team, including emerging and established leaders, make presentations of their pilot projects at CP meetings to get feedback from their colleagues, allowing all team members the chance to assert themselves as experts in particular areas of math and science standards implementation.

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*“[After meeting new people at the CP] I’m thinking about who the new folks are and what capabilities people bring to the table. I’ve broadened my thinking about who to go to and collaborate with.”*

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The work emerging from the FMIP is a rigorous, in-depth set of modules to help students with disabilities gain access to rigorous mathematics. It was created by COE leaders in Placer County, a small county outside of Sacramento. Although the county is small and the grant leader is an emerging state math expert, the Placer team created high-quality resources that are being piloted by math educators across the state and will be a guide for educators across California who want to provide better support for students with disabilities.

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## Challenges

### **CP members disseminate knowledge, but their methods and reach vary greatly**

CP participants are enthusiastic about the knowledge they gain. Eighty-nine percent of survey respondents reported that they share that knowledge locally in a variety of ways. Over a quarter reported conducting new local trainings on what they learned or embedding the knowledge in existing trainings. Even more said that they bring tools and resources back to colleagues in their counties and districts.

As noted above, having math and science leaders from across California in a single room means that everyone receives a common message. Because they know the information they have received straight



from the California Department of Education or CCSESA is accurate, CP members are confident about conveying it back home. They know that what they report will be consistent with the reporting of their counterparts across the region and state. With this assurance, many feel freer to assert themselves as change agents. For example, one COE participant reported that she creates a newsletter for teachers in her county and regularly populates it with information she learns at CP meetings.

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*“You have people in county offices who are 200 or 500 miles apart now calling each other, collaborating, sharing agendas for meetings or ideas for STEM conferences, saying, ‘Hey, here’s what we’re doing.’ That never would have happened before, because everybody was isolated in their own counties.”*

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Yet, while everyone hears the same messages, each educator processes the new information based on their personal experiences and expertise. This means that not everyone makes the same decisions about which pieces of information to convey back home or which audiences to convey them to. Without formalized strategies for delineating audiences, articulating messages for each audience, or disseminating materials and tools, the reach can be uneven — sometimes, but not always, making its way to site-based staff responsible for standards implementation.

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*“I have a third-grade teacher who started coming with me. He was amazed at how much information there is at the state level that’s not getting down to the teachers. We need more teachers to be aware of the information, to start being leaders. Teachers are really the ones who need the information, and they’re the last ones to get it.”*

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CP leadership recognized the challenge of spreading the messages evenly and broadly across the state, and they have begun taking steps to address it. In a recent Science CP meeting, members shared a template to help participants commit to sharing knowledge and organize their attempts to do so. The Math CP will likely emulate this practice if it proves effective. CP leaders are also developing a website that will host information about the Partnership, including work that has been done at the regional level, and which may facilitate sharing across regions.

## Participants wonder how to sustain the connections and learning from the CPs

Participants were enthusiastic about the relationships that formed or strengthened because of the CP — closer connections with regional colleagues as well as new relationships with math and science peers statewide. CP members spoke at length about a newfound tendency to share resources and to call people outside of their home counties to ask questions or offer advice.

In some cases, CP members mentioned that they had begun inviting colleagues from other counties to their professional development events. Members of the WestEd team observed this first-hand; at regional time in CP meetings, participants would talk about upcoming regional events and repeatedly extend invitations to their colleagues. Some established practitioners felt that the CPs helped them get over a critical barrier — a tendency to work in silos. They asserted they would not revert to their old habits if they stopped attending CP meetings.

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*“It wasn’t that people didn’t recognize that collaboration is helpful. It’s just that, prior to [the CPs], it didn’t rise to the top of the priority list because we didn’t have the infrastructure. And it takes resources to establish that infrastructure. Over the last several years, more people are connected and are reaching out to counterparts across counties, which has been great. But those relationships have to constantly be fostered. If we were to stop meeting, I think you would quickly see those relationships eroding.”*

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Despite the value of new relationships and more open communication, many CP members were hopeful but uncertain about the continuation of their work after the Partnership funding ends. They reported that because the Partnership is recognized as a source of critical support for statewide capacity building, CP members willingly put their daily responsibilities on hold to attend meetings, districts provide substitute teachers to allow for classroom-based members to attend, and most counties prioritize ensuring they have a representative at the meetings. Without the Partnership’s organizational structure and funding, some CP members express concern about the ability to continue putting this high level of priority on CP meetings. Without dedicated face time to keep bringing them together around common purpose, some members fear their relationships would weaken over time and regional and statewide capacity for standards implementation would suffer.

Specifically, multiple participants mentioned how valuable it has been to have CP meetings as a venue for regional collaborative teams to work together on their region’s inaugural math-science capacity-building project. It may prove difficult for those teams to invest the level of time and effort required to

continue those initial projects and start new ones without the external support of an organization that functions as the linchpin — encouraging, enabling, and uniting such efforts statewide.

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## Considerations for strengthening impact going forward

After a few years of CP work under the Partnership, a number of lessons have emerged that can inform CP efforts going forward. These include successes to replicate and pitfalls to avoid. Beyond the California CPs, they also apply to standards implementation efforts in other subject areas, states, or communities of practice.

A major finding is that the CPs constitute a capacity-building structure of immense value — professionally for participants, and strategically for the state. By allowing participants to collaborate with local and distant colleagues as well as with the state’s most knowledgeable math and science educators, the CPs build statewide improvement networks. They offer math and science leaders ample time to work collaboratively to surmount implementation challenges, including those related to math-science equity and access. And they offer collective, hands-on exposure to rich materials and strategies that participants can implement locally, thus helping to infuse improvement practices uniformly across the state.

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*“We have to look at things differently from now on. If we take nothing else from all of this, it’s that we should never be by ourselves, thinking we’re by ourselves. If one of us has a good resource, there’s no reason why leaders who aren’t tied to classrooms can’t come together and take that to the region. We need to replicate the best of what’s out there. Not only resources, but how to use them, how to integrate them into standards.”*

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Using CP experiences to date as a guide, the following considerations for strengthening the impact of the work going forward have emerged:

*Develop clear dissemination strategies and supports.* Lack of clarity about what information participants are expected to share with which audiences caused some confusion within both the Math and Science CPs. Participants were asked to share information “within their own spheres of influence,” but participants interpreted this charge differently, affecting the reach of the messages. Some participants shared the information with teachers, for example, while others did not think this was expected. Some locales, moreover, lacked structures through which CP participants could reliably share with local colleagues.

*Promote co-development of local resources by multiple counties.* It would be exciting to use up-and-coming local CPs as laboratories where counties could not only spread but also co-develop implementation ideas and strategies. While keynote speakers as disseminators of best practices have been well received, a goal of the CPs is to help COEs themselves advance standards implementation locally. Supporting multiple counties to work together on local implementation approaches would directly address that goal.

*Develop systems for evaluating regionally created resources.* CP leaders are in the process of creating an online forum to help participants continue their collaboration and resource sharing beyond the life of the grant. The forum will include an online repository for CP members' regionally created products — a promising way to support dissemination. However, these products have not yet been tested beyond the regions that developed them. Newly formed local CPs may consider creating systems wherein cross-region CP groups formatively test and evaluate locally created products, then work together with the developers on iterative improvements.

*Incorporate routine self-assessment of progress.* Local CPs may also consider administering periodic surveys to help ensure that participants are learning intended lessons and applying their new knowledge and skills in ways that support their standards implementation goals. Such regular assessments of progress can help CP leaders determine their efforts' effectiveness — notably, whether CP members have been able to use what they have learned to strengthen standards-aligned math and science practices in their schools and classrooms.

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