Collectively, these leaders provide professional learning to over 80,000 classroom teachers in their home districts. Millions of California students receive increased access to standards-aligned, phenomena-based science education.

The Exploratorium has worked with over 800 K–12 science leaders, representing every region in the state. By 2026, thousands of teachers will receive continuous support by the K–12 Science Leader Network.

A Trusted Resource with Enduring Value

98% of participants recommend the Exploratorium as a go-to resource for teaching science. 97% say the Exploratorium is the best resource for NGSS.

During training: 93% say experience will contribute to their ability to support NGSS locally. One year later: 99% say their experience has made them a better provider of science professional learning.

(Inverness Research, 2018)
Leading in Equity-Oriented Science Learning in San Diego County

**Eric Cross** serves in three formal science leadership roles; therefore, the scope of his influence is both deep and wide. For the last five years, he has been teaching 7th grade science to 200 students in a charter middle school in San Diego, where he is also on the leadership team. He is also an adjunct professor in the credential program at the University of San Diego, influencing dozens of future educators. He also works as a consultant, speaking at conferences and presenting to educators around the world on using technology in the classroom and the power of mentors, particularly for addressing equity issues. His most popular session is entitled **Techquity**.

Eric appreciates that the Exploratorium educators model how to effectively engage students in the science and engineering practices through observing, predicting, using evidence to respond to open-ended prompts, and mentoring.

“Being at the Exploratorium means watching what we think modern science teaching should look like in a classroom. The most useful thing is the modeling and the mentorship. The questions that are being asked, the questions that are being answered, the questions that are not being answered, the responses. All of those things are things that I get a lot of value out of seeing what it looks like to teach that. As teacher leaders we don’t get a lot of opportunities for that.”

Eric is passionate about the urgent need to address equity issues in education and make science culturally relevant to students, while aligning instruction to NGSS. The Exploratorium adds value to Eric’s leadership by modeling inspiring and culturally relevant pedagogy. One of the things that really stands out for Eric is how proactive and progressive the Exploratorium is in facing issues of equity and representation in science, by talking about skin color, gender diversity, socioeconomic constraints, indigenous peoples, and contextualizing them in the history of science:

“And you only have that when you have people from multiple backgrounds having these conversations. If you’re trying to draw a picture and you only have red, green, and yellow crayons, you’re not going to get the best picture . . . . I don’t think this happens in a lot of other places.”

While at Exploratorium, he experienced the Decolonizing Science activities, through which learners explore the Eurocentric nature of maps and the physics of blowdarts. In turn, Eric collaborated with a colleague who works at the Juvenile Court Schools in the San Diego County Office of Education, and together, they engaged learners who are in juvenile hall in the Decolonizing Science activities.

For Eric, the Exploratorium’s approach to NGSS and its high-quality resources coupled with the strong, inclusive relationships he has built with staff and other teacher leaders has helped tremendously:

“Nothing has created as much value as actually knowing what ‘teaching along NGSS standards’ looks like. I haven’t got as much value out of anything outside the Exploratorium. Nothing’s come close. It’s one of the reasons why I keep coming back, not only because of the relationships, but also it makes me better for my kids and for my students. There isn’t a training that’s come close to it.”

Since 2016, the Exploratorium has worked with science education leaders in every California county to support the implementation of the Next Generation Science Standards and the phenomena-based practices that engage student interest, elicit scientific thinking, and deepen student learning. Through the sponsorship of the **Exploratorium K–12 Science Leader Network**, the Exploratorium serves the state by equipping science leaders with resources, first-hand learning experiences, and ongoing connections that enable them to lead NGSS implementation in their local schools, districts, and counties.

exploratorium.edu/CAeducator/workshops

Prepared by Inverness Research, developmental evaluation partner for the Exploratorium K–12 Science Leader Network.
Leveraging Exploratorium Resources to Lead Science Leaders Statewide

Maria Simani is Executive Director of the California Science Project (CSP), a network of 18 university-based sites that provide an infrastructure for quality professional science learning for Pre-K through 12th grade inservice and preservice teachers throughout the state. Each year, scholars and teachers from these sites work collaboratively to design, implement, evaluate, and refine professional learning programs, in an effort to enhance K–12 teacher's content knowledge and instructional strategies, with a special emphasis on English learners and high-needs schools. Experienced with a wide range of professional learning options, Maria says:

“The Exploratorium matches our view of how the best professional development should be done.”

Maria is a leader of leaders in K–12 science in California, and is able to see how different county offices and regions tailor and disseminate the Exploratorium offerings for their own contexts. Forty-five professional learning providers attend an Exploratorium workshop at a time, engaging in the activities as learners, reflecting on their roles and practice as leaders, and then recreating the experience for the teachers who work in their own contexts. Regional science leaders are amplifying the magnitude of the Exploratorium’s pedagogy and resources. For example, the Dissolving with Lifesavers activity, a hands-on investigation that helps teachers understand how the NGSS science practice of modeling supports the development of science concepts, has been used in every region that has participated in an Exploratorium workshop through the CSP, and one region took it a step further and developed a module for administrators.

The CSP retains a special focus on improving literacy among English learners as well as native speakers in high-needs schools; therefore, Maria appreciates the Exploratorium’s approach, which encourages participants to analyze, reflect, discuss, and write about their observations and their models, thereby strengthening mathematics and literacy skills, while simultaneously addressing the Next Generation Science Standards (NGSS).

“With the Exploratorium activities, the engagement in the Science and Engineering Practices is really high. The activities really showcase the entire pathway from ‘I’m engaging with a phenomenon’ until ‘I’m developing an explanation for this phenomenon’ and in between you do all the talk, all the writing, all the math, and all the reading. Science requires a lot of talking and if your focus is language development, just giving people vocabulary doesn’t really help. You have to have people talk.”

Maria considers the Exploratorium educators to be leaders in professional learning for science teachers due to their early innovations and expertise in hands-on inquiry and investigation of phenomena, which are highly aligned to the Science and Engineering Practices of the NGSS.

“The Exploratorium educators have been pioneers and we have taken advantage of that. The California Science Project is always looking for other educators who are willing to engage in thinking critically about our practice and how to make it better.”

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exploratorium.edu/CAeducator/workshops
Building a Long-Term Partnership to Support Regional Leadership

“If you could pick the best folks in the world to help you build skills around student-centered inquiry, well, oh my gosh, we are just so lucky that we live within striking distance of the Exploratorium.”

—Kirk Brown

Kirk Brown is Division Director for STEM programs in the San Joaquin County Office of Education (SJCOE) and recognized as a leader in the region. He brought 22 professional learning providers from San Joaquin and Stanislaus counties to the Exploratorium K–12 Science Leader Network to increase support programming for Next Generation Science Standards (NGSS) in the region’s 39 school districts.

Kirk and his team collaborated with the Exploratorium to develop an integrated science and math workshop for a 3-day summer institute for 50 cross-regional teacher leaders charged with supporting teachers in their districts.

A common NGSS starting point for many K–5 leaders across the state is the Exploratorium’s Parachute activity involving force and motion. This activity was adapted to include the mathematical elements of ratio between weight and drop time, and was also successful in searching for patterns in data.

“Because NGSS and Common Core mathematics are all about student-centered sense-making, what better group to get involved with in the world really [than the Exploratorium], as they are experts in student-centered inquiry,” according to Kirk.

SJCOE is responsible for supporting NGSS implementation across the county’s 14 districts. Lissa Gilmore, a SJCOE science coordinator, delivers much of the NGSS early implementer professional development. She anchors the professional learning to the Exploratorium’s Dissolving with Lifesavers activity because it helps teachers apply the science practice of modeling to explain how temperature, size of particles, and movement influence the rate of the Lifesavers dissolving.

Lissa explains, “I do a lot of work with elementary teachers, and there’s a disconnect [in how science used to be taught and what is being expected now] . . . . Helping teachers identify practices and using those to teach their kids science is the focus.”

Kirk sees the Exploratorium partnership as a win-win that helps the county promote equity across the region. “The kids in the Central Valley are some of the most needy in the country. A lot of kids here are English language learners . . . whatever we can do to help support those kids . . . things that engage them, things that cross over so they can learn math and science at the same time . . . . We have just really enjoyed working with the Exploratorium. It is a true partnership.”
Leading a District in Life Sciences: Teacher-In-Residence to Teacher Leader

“I feel so fortunate to have found a professional home at the Exploratorium that has supported me throughout every stage of my career.”

During Daisy Yeung’s first two years in the biology classroom, she turned to the Exploratorium’s Teacher Induction Program for one-on-one coaching and mentorship. Daisy returned often for workshops, and in 2017–2018 she served as the Exploratorium’s teacher-in-residence. That experience gave her the confidence to take on a new role: instructional coach in the Sequoia Union High School District, where she is responsible for the design and implementation of professional development for all science teachers in the district.

Daisy’s work with the Exploratorium helped her plan potential sequences of activities that engage learners in the Science and Engineering Practices (SEPs) inspired by their own observations of and interest in a phenomenon, and driven by learners’ own questions.

“[Learners] are no longer learning about something, they are trying to figure out something. It is no longer a list of facts or ‘Here is a hands-on activity.' It is, ‘Which practice is each activity providing for the students to engage in?' And ‘How is that activity going to help learners address something they are figuring out and prompt another step?’”

The NGSS are also language intensive; students must read, write, and visually represent their models and explanations of scientific phenomena, which can pose access issues for students:

“There are a lot of issues about equity, because this new model has the students talking to each other to figure something out. You have to create a classroom environment where the kids are comfortable not knowing something and they want to take academic risks. That is something even [native speaking] students are not comfortable with yet.”

Daisy helps teachers address these issues by planning with them, observing their instruction, and debriefing with them. This approach is in line with the Exploratorium’s discovery that teachers need tools and processes for changing their instruction.

To develop a professional learning program for the teachers she works with, Daisy drew on the Exploratorium’s models and tools for providing phenomena-based, hands-on inquiry activities, for sequencing lessons, and for providing access to science with attention to equity.

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exploratorium.edu/CAeducator/workshops

Prepared by Inverness Research, developmental evaluation partner for the Exploratorium K–12 Science Leader Network.
A Science Leader Supports Novice, Non-Credentialed Teachers with Implementing NGSS

“Being a part of all of the workshops at the Exploratorium definitely has increased my confidence.”

Katherine (Katie) Burns serves as a coordinator at the Teachers College of San Joaquin (TCSJ), an accredited institution of higher education within the San Joaquin County Office of Education. Katie brings more than 10 years of science teaching experience to her role as a teacher leader.

When Katie was assigned responsibility for teaching science content and pedagogy to 40 novice 6th–12th grade teachers hired on emergency permits, her greatest concern was the new teachers’ lack of professional development:

“As brand new teachers, they have felt safest with old textbook lessons, which are not aligned with the NGSS.”

Faced with the challenge of supporting underprepared teachers, Katie joined the Exploratorium K–12 Science Leader Network in March 2017. The Exploratorium equipped Katie with the professional development and resources she needed to help novice teachers incorporate phenomenon-based inquiry strategies of NGSS.

“Through what I have learned with the Exploratorium and shared, the new teachers have experienced subtle, very accessible changes in their practice that make science much more engaging for students.”

The Exploratorium’s pedagogy and resources drive Katie’s leadership practice. She now invites teachers into science inquiry and discourse by engaging them with phenomena and asking, “What do you notice?” and “What do you wonder?” In a local summer professional learning program, Katie used Exploratorium resources to deepen teacher NGSS knowledge around sequencing student activities; graphing, modeling and incorporating visualizations; and designing experiences with phenomena in their schoolyards. She has also created professional learning modules based on local phenomena that other TCSJ faculty use to teach environmental literacy.

Through her work at the Exploratorium, Katie gained knowledge and confidence to lead others; as a result, her colleagues seek out her leadership.

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Prepared by Inverness Research, developmental evaluation partner for the Exploratorium K–12 Science Leader Network.
Leading Next Generation Science Standards Implementation for Rural Educators

Rural leaders are expected to support improvement in multiple subject areas and across grade levels. Yet they have access to fewer high-quality resources for their leadership. The Exploratorium K–12 Science Leader Network equips rural leaders with science knowledge, first-hand learning experiences, professional connections around the state, and practical materials they can use in their local science leadership.

Mark Lewin is the Instructional Technology Coach for the Enterprise Elementary School District in Shasta County. With 20+ years of teaching under his belt, he leads the adoption process for the next generation science standards (NGSS) in his district and supports all of Shasta County.

The Exploratorium institute connected him with other science leaders: “I have a rich network of people to rely on and ways I can continue my own professional learning.”

The Exploratorium provided Mark with core science activities that he has helped teachers use in classrooms and he has adapted for his own professional development workshops across Shasta County. Mark has also shared Exploratorium resources at statewide meetings of the California League of Schools.

Exploratorium activities are especially effective, according to Mark, because they embody the three-dimensional learning the NGSS calls for, and they are practical for classrooms: “[A core Exploratorium activity] has a good anchoring phenomenon, clear cross-cutting concept, and an engaging practice—with inexpensive supplies and low material set-up.”

Liza Butler is an educational Renaissance woman, having taught high school English and served on the Modoc County instructional leadership team, where she led professional development in math, science, and language arts. Liza now serves as the elementary school principal in Tulelake Joint Unified District.

To help Modoc educators shift to NGSS, Liza sought out professional development for herself. Ultimately, it was the Exploratorium’s leadership workshop that equipped her to help teachers grasp NGSS and begin to change their practice: “Seeing how the team at the Exploratorium used an activity with parachutes as the anchor phenomenon to build a common base of knowledge among the participants in the workshop was something I’d never seen before. It was incredibly valuable.”

Liza adapted the parachutes activity and other Exploratorium resources to work with every K–6 teacher in Modoc county. Follow-up Exploratorium online workshops gave Liza additional ideas to share with teachers.

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Prepared by Inverness Research, developmental evaluation partner for the Exploratorium K–12 Science Leader Network.
Summary Findings from the External Evaluation

The Exploratorium aims to strengthen leadership for science improvement in diverse local contexts across the state. Evidence gathered to date\(^1\) affirms the consistent excellence of the Exploratorium’s programs for developing K-12 science educators’ leadership capacities. Over time, local science leaders are seeing positive results of their efforts to support teachers in implement NGSS. Still, large numbers of administrators and teachers lack the knowledge and resources they need to realize their goals of implementing NGSS. The combination of promising results and ongoing need suggests that the Exploratorium should continue—an even expand—its efforts to develop K-12 science leaders and support their local efforts to improve science.

1. The Exploratorium’s institutes for K-12 science leaders earn consistently high ratings for quality and value.

<table>
<thead>
<tr>
<th>Exploratorium leadership institutes are—</th>
<th>2020</th>
<th>2019</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>High in quality</td>
<td>98%</td>
<td>97%</td>
<td>100%</td>
</tr>
<tr>
<td>Higher in quality than other science professional development</td>
<td>95%</td>
<td>92%</td>
<td>93%</td>
</tr>
<tr>
<td>High in value</td>
<td>99%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Higher in value than other science professional development</td>
<td>95%</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>

2. The Exploratorium leadership network helps K-12 science educators build multiple capacities for leadership.

<table>
<thead>
<tr>
<th>Being part of the Exploratorium K-12 leadership network—</th>
<th>2020</th>
<th>2019</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has made me a better provider of professional development</td>
<td>98%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Increases my confidence as a leader</td>
<td>94%</td>
<td>91%</td>
<td>91%</td>
</tr>
<tr>
<td>Provides an important professional community for me</td>
<td>91%</td>
<td>91%</td>
<td>95%</td>
</tr>
<tr>
<td>Gives me stronger ties to local science educators</td>
<td>89%</td>
<td>87%</td>
<td>91%</td>
</tr>
<tr>
<td>Increases access to opportunities for leadership</td>
<td>86%</td>
<td>85%</td>
<td>87%</td>
</tr>
</tbody>
</table>

3. Local improvements in classrooms are becoming more visible over time.

![Changes in key areas*](image)

4. The majority of administrators and teachers still require support to implement NGSS.

California’s adoption of NGSS placed a heavy burden on under-equipped districts, schools and teachers. There are disparities between educators’ goals and their capacities to meet them.

- While 60% of local administrators value science, only 26% understand NGSS\(^*\)
- While 44% of teachers want to implement NGSS, only 36% are familiar with the standards.\(^*\)

\(^*\)Reported by K-12 science leaders May 2020.

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\(^1\) Sources of data. Inverness Research (https://inverness-research.org/) has served as the external evaluator of the Exploratorium’s initiative to contribute to science improvement statewide. Over four years, IR has conducted in-person observations and collected participants’ ratings of leadership institutes, on-line workshops, and other core activities; engaged over 100 K-12 leaders in in-depth interviews; and measured network members’ leadership activity and impact across the state through annual surveys.