



CAL-MSCS Science Steering Team

From Belief to Action: A Framework Matrix to Guide the Design and Implementation of Equity-Driven Science Professional Learning Experiences and the Re-envisioning of Professional Learning Systems

Background Information

When funding for the [California Partnership for Math & Science Education's](#) statewide science community of practice (SCOP) ceased due to its philanthropic partner's sunset in December 2020, a group of SCOP leaders continued working to develop and deliver professional learning for statewide science educators with in-kind contributions from partner organizations. In October 2021, this group convened a coalition of science leaders, educators, and thought partners from across California at the Exploratorium to identify priorities for equitable science education. In particular, the coalition discussed features of professional learning that disrupt harmful instructional practices for students often marginalized from science learning. Leveraging the themes from the National Academies report [Call to Action for Science Education](#), this coalition co-authored the [Blueprint for Action for Equitable K-12 Science Education in California: Initial Steps for Coordinated, Systemic Reform](#). The *California Blueprint* emphasizes the importance of: 1) ongoing statewide investments in science professional learning; 2) capacity building for local science leadership teams; and 3) advocacy for state funding dedicated for science teaching and learning. Throughout fall and winter 2021, the coalition continued to collaborate to draft language that resulted in Assembly Bill 185, Chapter 571, Statutes of 2022, Section 53 of the Education Omnibus Budget Trailer Bill for the 2022–23 California State Budget. The Bill appropriated \$85 million to provide professional learning and support family engagement in mathematics, science, and computer science. In June 2023, the California Department of Education granted \$50 million of this appropriation to the San Joaquin County Office of Education to launch the [California Mathematics, Science and Computer Science Partnership](#) (CAL-MSCS) to support statewide initiatives to strengthen professional learning for educators in grades 4-12.

CAL-MSCS Science Steering Team's Beliefs and Commitments

At a different convening at the Exploratorium in spring 2023, the coalition worked to distill into [two draft belief statements](#) myriad thoughts and ideas generated from personal experiences, practices, and research about the qualities of professional learning called for in the *California Blueprint*. When the CAL-MSCS Partnership funds were awarded, several of the coalition's core leaders joined the [CAL-MSCS Science Steering Team](#) (SST), which was created to lead the Partnership's science professional learning efforts.

Throughout the fall of 2023, the SST collaborated to clarify and expand the spring 2023 draft belief statements and identify specific practices, actions and features that embody them in order to ensure equity in science professional learning *experiences and systems*. They engaged in the following reflective questions:

- How will we ensure equity in science professional learning experiences?
- How will we influence professional learning systems towards equity?
- How will we employ a critical lens and expand our professional learning practices in more equitable ways?

The answers to those questions define a key set of beliefs and commitments towards equitable science teaching and learning experiences (see Table 1) that the SST consider fundamental to the work of the CAL-MSCS. Throughout the spring and summer of 2024, the SST made explicit how those beliefs and commitments should look, sound, and feel like in practice, resulting in a guiding framework for the design and delivery of equity-driven professional learning. The SST will base all support and programming provided through CAL-MSCS upon this framework, operating from the theory of action that if science educators and their partners have access to professional learning systems and experiences that ensure equity, the students they serve will excel in science.

Table 1: SST Beliefs + Commitments

1. We believe **all students** are capable of excelling in science. So, we commit to designing professional learning experiences and systems of professional learning with each student's success in mind.
2. We believe **all educators** are capable of fully serving students. So, we commit to designing with each educator's success in mind.
3. We believe the **best professional learning** shifts educators' mindsets and practice and supports them so that their students thrive. So, we commit to designing professional learning in ways that attend to identity, belonging, and empowerment.

Background Research that Informed the Science Equity Framework Matrix

High-quality professional learning for the Next Generation Science Standards (NGSS) is characterized by sustained, collaborative, and job-embedded learning experiences that support educators in deeply understanding and implementing the standards. It emphasizes inquiry-based approaches to teaching science, promoting three-dimensional learning that integrates disciplinary core ideas, science and engineering practices, and crosscutting concepts. Effective professional development also fosters continuous reflection, promotes the integration of real-world phenomena, and provides educators with the tools and strategies to create inclusive, student-centered learning environments that align with the goals of NGSS and at the same time meet the diverse needs of all students. By committing to ongoing reflection, collaboration, and examination of teaching and learning outcomes, educators can ensure their instructional practices evolve towards more just and equitable learning environments. Some of the research-base that informed the elements outlined in the Matrix include:

- [California Science Curriculum Framework](#) (Chapter 12, CDE, 2016)
- [Designing Professional Development for Teachers of Science and Mathematics](#) (Ch. 4, 2010))
- [Quality Professional Learning Standards](#) (CDE, 2015)
- [The Elements: Transforming Teaching through Curriculum-Based Professional Learning](#) (Carnegie Corporation, 2020)
- [What Educators Can Learn about NGSS Implementation in California: Highlights from the Early Implementer Initiative](#) (WestEd, 2020)
- [The Brilliance of Children and the Strengths of Educators](#) (National Academies, 2022)
- [Equity in K-12 STEM Education](#) (National Academies, 2024)

Additional resources examined by the SST are linked in [this Padlet](#).

Organization of the Science Equity Framework Matrix

The framework offered by the Matrix as a whole provides a view of how professional learning could lead to improved educators' knowledge, practices, and dispositions and, at the same time, increase equitable

learning opportunities for their students. In Table 2 below, the *Beliefs+Commitment* column (to the left) provides specificity about the beliefs that uphold the SST's commitments towards equity in professional learning. The *Specific Practices, Actions + Features* column (to the right) describes which actions should be taken to make the commitments realized in professional learning spaces. While each commitment is important on its own, they are designed to overlap and complement each other. By reflecting, adopting, and adapting the corresponding practices, actions, and features, facilitators of professional learning embrace and bring to life the shared commitments towards equity.

Table 2: Partial section of the Science Equity Framework Matrix

| CAL-MSCS Science Steering Team: Belief to Action Framework Matrix Ensuring Equity in Science Professional Learning Experiences and Systems ¹ | |
|--|---|
| Beliefs+Commitments <i>What does "ensuring equity" mean for science teaching and learning?</i> | Specific actions, features, and practices of professional learning (PL) facilitators <i>How will we ensure equity in science professional learning experiences and systems? What does it look, sound, feel like in PL experiences and in PL systems?</i> |
| 1 - We believe all students are capable of excelling in science. So, we commit to <i>designing professional learning experiences and systems of professional learning with each student's success in mind.</i> | |
| Commitments | Actions, Features, and Practices for PL Facilitators |
| 1.A We will attend to access and inclusion by providing intentional opportunities for students to make connections to their prior experiences (science or otherwise). | PL facilitators: <ul style="list-style-type: none"> • Include imagery, videos, texts, authors, etc. that display a wide variety of diverse representations of people of non-dominant identities engaging in science actions. • Intentionally select materials that can make learning accessible for participants in |

Suggestions for How to Use this Framework Matrix

Professional learning that focuses on equitable access, opportunities, and outcomes for all students is embedded in a system in which school leaders, district staff, teacher leaders, and all educators that have the responsibility to teach students are committed to creating a culture and structure for continuous learning and improvement. This Framework could be a valuable reference point in helping all members of the education community to examine and sustain a professional learning experience that builds their capacity to improve their leading, teaching, and learning through the lens of equity. In this sense, the elements of the framework should be used to reflect, inform, and adapt professional learning experiences that fits their contexts and needs. An individual might hold multiple roles at any given time in the educational system and therefore use multiple lenses.

Table 3: Suggested Partial section of the Science Equity Framework Matrix

| If you are a... | Try This |
|--|---|
| Classroom teacher or other educator | As you participate in professional learning, reflect on how your own identities, ideas, and practices are aligned with the learning experiences you engage in. |
| School or district leader | As you make space for professional learning experiences for your educators, consider which cultures and structures could be most favorable to support educators in engaging in professional learning. |
| PL facilitator | As you design, deliver, and subsequently reflect on your facilitation, consider which elements of the framework were successful and which may require further practice. |