



Science is at the center of educational equity. CRS has built relationships with teachers, and collectively, we are communicating to students that they deserve high quality science education regardless of their zip code. Thank you, CRS, for the transformative change you are leading. – Richmond teacher

Community Resources for Science

Empowering educators & scientists to engage young learners in wonder, exploration & discovery

2019-2020 Impact Report: Meeting Unprecedented Challenges for STEM Education

We are fighting a war now, not with weapons but with science. We can see more than ever that our lives depend on scientists, and even on non-scientists understanding the need to take certain precautions. Science education can't wait until we are in the middle of another crisis. ---Berkeley elementary science teacher

For more than two decades, CRS has been working to strengthen science teaching and learning for elementary and middle school children, particularly in schools serving underrepresented minority and low-income communities. The tremendous progress that has been made in recent years in many East Bay schools is in jeopardy due to impacts of the coronavirus pandemic. This report highlights CRS efforts during the 2019-20 school year, prior to school closures as well as during the Spring to sustain learning at a distance during the shelter in place orders.

The challenges

Our society is missing out on potential innovations, discoveries, and solutions because too few children are prepared and inspired to pursue STEM degrees and jobs

Low-income children, underrepresented minorities, and girls are missing critical early learning experiences that can put them on pathways to high-earning STEM jobs

Teachers need more training, support, and resources to teach science & engineering well

Scientists and engineers need training to become powerful partners for teachers

Current practices lead to lack of diversity in STEM fields and too many unfilled jobs

Our Solution:

Empower teachers to gain skill, knowledge, confidence, and access to resources by providing long-term partnership, support, information, and professional development

Engage scientists and engineers to effectively lead inquiry-learning experiences for children and teachers, and serve as diverse, enthusiastic STEM role models

Facilitate collaboration among a vast network of STEM education organizations to support excellent science teaching

Ensure children have opportunities to wonder, explore, and discover in school

Connect kids & teachers with STEM role models



School closure has been detrimental to the teaching of science. – Oakland 4th grade teacher

Getting scientists to interact with students allows those students to see themselves as scientists! –
Richmond elementary teacher

Empowering Teachers: Information, Connections, Support & Training



As a result of CRS support, teachers report they are more informed, skilled, motivated, and successful in increasing both the quantity and the quality of science learning experiences for students in their classrooms. Their students are engaged, curious, and inspired.

During the Spring school closures, teachers indicated CRS was their trusted go-to source for resources and support as they transitioned to teaching at a distance.

During the 2019-20 school year, CRS served 1,800 educators, impacting learning for over 45,000 students across more than 140 East Bay schools

Nearly 90 teachers earned recognition for Excellence in Elementary Science Teaching

Educators Reflect on the Impact of CRS Support and Partnership in Strengthening their Science Teaching

I am a better science teacher thanks to CRS. They have provided amazing PDs over the past several years. They have worked hard for our district and I feel so lucky to have had their guidance as well as their help in lessons. The lessons with Cal scientists have been priceless for my kids.

CRS has been an incredible science resource to me for many years. I first heard about CRS with their teacher field trips that they host. It was incredible! The laidback atmosphere and resources were amazing. Having real scientists visit my students and present engaging concepts is a memorable, valuable experience for each of my students.

CRS has been instrumental in encouraging me to teach science on a regular basis. Science is too often pushed to the side because it is not tested like English/Language Arts and Math. However, a good science curriculum helps students learn how to use evidence and facts to draw reasonable conclusions. This is an ability that will be useful across all disciplines.

I use the resources of CRS to support my most vulnerable students: those without access to high speed internet, students on the autism spectrum, students with ADHD, students with learning disabilities and students who have not previously been successful in reading, writing and mathematical analysis. I would find it much more difficult to meet the needs of these special students without the support of CRS.

Program assessment data

As a result of CRS support and services, teachers indicated they:

- 97%** Taught more science after having BASIS in-class lesson
- 95%** Discovered new strategies for engaging struggling learners & became more confident
- 92%** Increased time & added new lessons, field trips, learning experiences
- 85%** Became more aware of the importance of early science learning
- 88%** Discovered resources for teaching students about issues they care about such as recycling and climate change
- 85%** Effectively connected science with math & language arts
- 85%** Included student action projects in science lessons

Your organization is such an important and appreciated resource for teachers, especially during this COVID crisis. Thank you for all you do! -- Oakland TK teacher

Engaging Scientists & Engineers to Inspire Kids and Lead Explorations

As a result of CRS support, scientists and engineers are well-prepared and confident as they head into classrooms – or, online through Zoom -- to lead young learners in science and engineering investigations. We coach volunteers to develop skills in communicating their research and their passion for STEM, and prepare them to effectively teach while serving as role models. They inspire students to imagine their own futures and discover their own talents as they investigate magnets, circuits, plants, space, and more. Teachers are able to observe their students as active learners, motivating them to do more science.

Interactions with Real Scientists Have Lasting Impact

Thank you so much for giving our students the opportunity to study with local scientists! It left a strong impression on the students, and many of them left school thinking about what they would want to study in the future! It makes the job of scientist connect to real life and become an attainable goal.

The presenters were amazing with the kids. I am so thankful for this program and for the graduate students willing to come to our school to present these lessons to the kids.

Thank you for sending a diverse group of people into the room to work with a diverse student population!

It is important for my students to meet scientists because by interacting with scientists, they are exposed to new ideas & possibilities.

Greater awareness of the world and exposure to people of differing backgrounds and jobs is invaluable.

The enriching experience of learning directly from someone researching in the topic of focus provides students with an expanded schema of what scientists do, while debunking existing stereotypes.

The Zoom-online BASIS presentation was excellent. The kids really enjoyed it and learned a lot. It was a perfect lesson for today, the fiftieth anniversary of Earth Day, and for the current covid 19 crisis we are going through. The learning that they did with you today is hands down some of the best learning they have done this year. I really liked your slides and how you asked students to make observations and ask questions. Since the students were learning from home, families had a chance to observe as well. The parents are very happy. I feel so privileged to be able to have this partnership with BASIS.

Prior to school closures, more than 10,000 K-8 students in more than 325 classrooms explored science and engineering with 700+ scientists, engineers through our Bay Area Scientists in Schools (BASIS) K-6 program, and our 7th grade Be A Scientist mentoring program

In mid-March, CRS outreach programs moved online and reached 74 elementary and 9 middle school classes – more than 2,500 students.

88% of teachers reported discovering at least one student engaged and demonstrating skills above their typical classroom level – showing the power of interactive, inquiry learning



Transitioning to virtual lesson presentations was a challenge many BASIS and Be a Scientist volunteers embraced.

One scientist told us:

I was scared to do it at first, how do I manage a classroom via online!? But once I got some coaching & jumped in, it was fun! I could tell the kids really enjoyed it and started thinking about science at home.

Impact on Student Learning and Science Exploration Opportunities

Thousands of TK-6 children in Oakland, Berkeley, Richmond, and other East Bay communities have more opportunities to explore, make meaning, and build understanding of the world around them, because of the services that CRS provides for teachers and the in-class programs that directly engage young learners in science and engineering learning. Quantitative and qualitative data confirm that CRS programs and services continue to move the needle, increasing opportunities for young learners.

BASIS Program Assessment Data

Teachers who had BASIS lessons observed the following about their students:

- 99% Engaged in hands-on experiences
- 99% Learned new science concepts
- 96% Grew more interested in science
- 96% Discussed their own ideas & observations
- 95% Asked thoughtful questions
- 95% Connected learning to experiences in their lives, real world



on their own. Find out what they are interested in learning, and let that be the foundation for the experiments.

We asked Science Super Star teachers to reflect on how their efforts to strengthen their science teaching have impacted their students. Many shared about the effectiveness of hands-on activities on student engagement, especially seen in students who otherwise may have difficulty understanding, processing, or paying attention to lessons.

Some teachers say their class is 'out of control' and think their students would go crazy if they had any hands-on materials. In my experience, nothing is further from the truth. As soon as a student begins making their own discoveries, the classroom becomes a community of learners and that is a great feeling for both teachers and students alike. I start my students out with eyedroppers, water, and a penny. Those 3 materials have been the launching point of curiosity, questions, and sharing information, from which a foundation can begin to be built.

One student, who struggles to stay focused during the day, is often off-task in small quiet ways and can easily slip through the cracks. During hands-on science activities she is 100% engaged, actively doing, talking, and questioning.

Let your students lead the way! Children, no matter how young, have ideas about the world. They have questions, and we can either provide them answers or give them an opportunity to discover them

Teachers reflected on the importance of failure in science, and in creating lessons that relate to students every-day real lives, is a powerful method that leaves long-lasting tangible takeaways for students.

One of my students looked forward every week to our hands-on science investigation. She would eagerly sketch and take notes about what she observed. Writing did not come easy to this student, but when it came to science, she did not see it as a struggle to write about what she learned, because she was so excited to talk about it and write or sketch in her notebook. Science with the hands-on investigation is a wonderful way to engage students who otherwise struggle with reading and writing.

My students have gained the skill of curiosity through the lens of science, which has transferred over to their ELA and Math skills. It has ignited the love of reading nonfiction books and asking questions. In math, it has taught my students to think more about the process than just getting the answer correct.

7th Grade Mentoring Fosters Confidence, Engagement, and Resilience

The Be a Scientist 7th grade mentoring program provides all Berkeley Unified School District students with UC Berkeley scientists to guide students through the process of designing and conducting independent science or engineering investigations, during science class. Most classes completed the program before the coronavirus school closures in mid-March, but the final several classes participated in a shortened virtual mentoring program.

Teachers who had the full Be a Scientist program in their classrooms, indicated that “all or nearly all” of their 7th grade students:

- Successfully completed an independent investigation using authentic, standards-aligned science and engineering practices.
- Gained confidence in their ability to engage in science, use evidence to explain their reasoning, and effectively communicated their findings
- Gained a greater understanding of the process of science
- Benefitted from the individual attention from their Cal mentor



After participating in the program, students reflected on science in their own lives:

Science means testing multiple questions to find the mysteries in life.

Experiments give you a feeling of accomplishment.

I discovered that you have to be patient and take time to test hypotheses and do experiments. It takes time!

Science is amazing, cool and useful because there are new and exciting things to learn every day.

I see myself as a scientist when I do science in class.

In my life, science is always present even if I'm not aware of. You can challenge yourself through science. What you learn might surprise you! Science is creative.

Teachers' reflections:

I have a student, who I didn't think could or would string more than a few words together in a conversation, have animated conversations about his project with peers and mentors.

I witnessed a student struggle with the logistics of an ambitious experiment to examine which materials would most rapidly conduct heat. With the help of their mentor - and their own mental fortitude - they made needed revisions to their procedure and collected very precise data. I saw the student's confidence visibly grow, and this confidence has extended to their next, even more ambitious project. I feel privileged to watch a young scientist in the making.

The BAS program provides me with materials, personnel, and expertise that I could never replicate. This frees me up to go deep with kids in conversations about their science project.

Working with professionals who are conducting ongoing research invigorates me as a teacher and helps the students see the vast scope and excitement of scientific ideas and practices. It is highly validating for students to have their independent work supported.

Connecting Teachers with a Wide Network of Partners & Resources

In ordinary times, CRS collaborates with a network of over 200 science education organizations, informal education institutions, science centers, and academic research programs to connect teachers to best-in-class local, regional and national resources to help them strengthen their science teaching skills. During the coronavirus pandemic, CRS swiftly activated a rapid response plan to curate resources to support the sudden shift to distance teaching and learning. Some teachers needed lesson plans for printed packets, while others searched for video resources for students to access on their own time, and still others needed assistance planning lessons for live online (Zoom, Google Meet) teaching.

At the same time, our resource partner organizations – place-based science centers, museums, and environmental education programs, and our business and university scientists who lead in-class lessons – were all facing their own COVID-related challenges.

Our rapid response actions included:

- Curating, and keeping up to date, a webpage featuring trusted, high-quality distance learning science and engineering resources for teachers. Feedback and real-time web analytics indicate this was a highly accessed and valued resource for the Bay Area science education community
- Curating and keeping up to date a webpage featuring trusted, high-quality ‘science-at-home’ resources for families looking to extend science and engineering learning during shelter in place
- Provided weekly email updates, and on-call support, to keep teachers informed of resources & opportunities for student learning experiences, teacher training, technology tools, and more.
- Presenting, leading, facilitating, and supporting a range of online teacher professional development and STEM network professional collaboration efforts (30+ professional development sessions presented, reaching more than 300 educators)
- Mobilizing the CRS Advisory Council and other STEM networks to keep a spotlight on science as state and school district policy makers devise plans for addressing school reopening plans, to ensure elementary science is not once again deprioritized and underfunded

It is comforting to know there are organizations committed to delivering quality and robust science education as well as resources. CRS has been an important variable in my teaching practice over the last 11 years. CRS provides a wealth of information but also hands-on support, like the BASIS and Science Super Star programs. I look forward to the newsletters and learning about all the upcoming science opportunities and sharing with school colleagues. – Oakland teacher leader

CRS & BASIS scientists developed and presented lessons aligned to standards for grades K-8, on more than 75 topics, including:

Adapting to Survive: Predators & Prey
 All About Volcanoes!
 Balloon Rocket Cars

Finding the Perfect Fit! An Introduction to Enzymes
 Germs and Your Body
 Glow in the Dark Science

Materials and Structures
 Microbes in Action!
 Microorganisms: Good or Evil?
 Ocean Ecosystems & You!
 Oceans Are For Everyone!
 Our Brains Sensing Our World
 Paper Circuits
 Plants Adapt to their Environments
 Play With Your Food
 Properties of Gak!
 Renewable Energy & Climate Change
 Robots that Run
 Secret Formulas
 Sensing the World Around Us
 Soils are Diverse!
 Squishy Circuits
 States of Matter: Sublime Suds/ Ice Cream Science
 The Brain in Our Daily Lives
 The Spice of Life: Variation Within Species
 The Wonderful World of Water
 How Diet Shapes Teeth!
 Water in our Atmosphere: Make It Rain!
 Wildland Fire



Go With The Flow!
 Good to the Bone
 Graph Paper
 Programming Green
 Polymers
 Green Roofs
 Head!
 Shoulders!
 Knees! & (more) Bones!
 Hear All About It! Sound
 Hidden Colors

BioEngineering: Design A Pill Coating
 Bioengineering: Unblock My Heart!
 Birds: Evolution and Tools
 Buoyancy: Who Sank the Boat?
 Can We See Your DNA?
 Catapult Challenge!
 Cells and Microscopes
 Chemical Reactions
 Chemistry of Water and Carbon Dioxide
 Clouds Clouds Everywhere
 CSI: Chromatography Science
 Designing a Polymer
 Dry Ice Explorations
 Earthquake Engineering
 Earthquakes in your Backyard!
 Electricity, Magnetism and the Wall Socket
 Exploring Magnets
 Exploring States of Matter
 Eye See It: Understanding How Eyes See
 Feel Dead Brains

Honey I Engineered Our Food
 How Do My Lungs Work?
 Involving Dissolving
 It came from a single cell
 It's just a phase!
 Let's Get Brainy!
 Magnet Mania!
 Magnetic Mystery Planets



