



CRS

COMMUNITY RESOURCES FOR SCIENCE
practical support for great science teaching



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2016-17 School-Year Program Evaluation: Accomplishments and Impact

Overview

For the past 20 years, CRS has nurtured a dynamic, expanding network, connecting East Bay teachers and students with scientists, engineers, resources, and partners. CRS increases opportunities for K-8 students, particularly in low-income communities, to learn about the natural world through scientific and engineering explorations led by well-prepared teachers and enthusiastic STEM professionals, in partnership with a constellation of well-aligned community institutions and organizations. By fostering connections and communications, and through direct services and training, CRS brings about lasting changes in teacher practices, school cultures, scientist engagement, collaborations, and student inspiration and learning experiences.



Scientists shine light on explorations for students.

In the words of CRS member teachers:

"Science encompasses all subjects and encourages students to become active participants in their education. And the world can never have too many scientists! For these reasons, I have the utmost respect for CRS and their mission. I believe what they do for not only students, but also for their teachers is incredible. By educating teachers through meaningful PDs and field trips, the trickle-down effect is long lasting and will influence their students and the students of the teachers with whom that first teacher shares their new ideas!"

"CRS is an amazing organization. It has helped my students have a deeper understanding of science concepts, and it has helped me grow as a professional each year. Thank you!"

During the 2016-17 school year, we have been heartened to see a growing number of elementary school educators transforming science teaching and learning in their classrooms. With support, more teachers are embracing new ways of helping their students develop the skills to explore, think critically, and build deep understanding of natural phenomena like falling raindrops, swinging pendulums, and the amazing diversity of bugs and plants in their school yards.



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.



Honoring teachers who exemplify Excellence in Science Teaching

CRS Science Super Star Honorees Reflect on the Impact of CRS Support and Partnership, Transforming their Teaching

*CRS supports my teaching and my students learning! Just by having the SSS Challenge, I have been more motivated to do more science and integrate (science curriculum) investigations more with other content areas. And the newsletters keep my mind on science! **Aiko Keen, OUSD***

*CRS provided me with training and resources to shift my science teaching to more inquiry and exploratory based and to utilize science notebooks. My investigation questions this year (are) more student-led and inquiry-based approach in which students are actually planning some of the investigations themselves. (I)t has been inspiring to see how much my students have become the drivers of their own learning. **Jessie Welcomer, WCCUSD***

*I have relied on CRS to engage my students with University students to not only engage in science, but to talk about the education process of becoming a scientist. **Connie Zunino, OUSD***

Full Science Super Star honoree list:
<http://www.crs-science.org/educator/SSS2017>

CRS served nearly 1,700 teachers – who together educate over 40,000 students.

Membership Services include:

- Personalized, individualized on-call science planning support
- Timely information bulletins and curated online resources
- Invitations for free in-class BASIS lessons (see below)
- Free Science Field Trips for Teachers at local science centers.
- Customized training and professional development

Program assessment data

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

- Increased time on STEM: 85%**
- Added new lesson, field trip, learning experience: 80%**
(85% for those with BASIS)
- Became more confident in planning and teaching science: 75%**
- Became more enthusiastic: 88%**
- Effectively connected science lesson with math & language arts: 75%**



Preparing Scientists & Engineers to Share STEM Exploration & Inspiration

As a result of CRS support, scientists and engineers are well-prepared and confident as they head into classrooms to lead young learners in science and engineering lessons. The volunteers develop skills in communicating their research and their passion for STEM, while serving as role models. They inspire students to imagine their own futures as they explore magnets, circuits, space, and more.



STEM Professionals Reflect on Why They Volunteer & the Impact on Students

Volunteering for BASIS is an empowering experience because it allows me to break down the stereotypes of people in STEM and share the magic of science with young, growing minds.

BASIS is my way of reminding myself how I fell in love with science, and that there is lots of simple questions to be excited about. As a Latina scientist, BASIS also provides me with tools to set an example for the kids and let them know that they can accomplish their dreams, be proud of where they come from, and that we need them to have a better World to live in.

My favorite moment of this year was after a lesson was over. We had a kid come up to my team and say "Thank you" and hug us all individually before he went on to his next class.

I enjoy answering the general questions from the kids at the end. We've been asked about everything from orbits to the formation of diamonds to genetics.

In 2016-17, CRS engaged over 600 scientists, engineers, and other professionals in our education outreach programs, reaching 15,000 K-8 students.

Bay Area Scientists in Schools (BASIS)
Free in-class lessons for grades K-8, spanning life science, physical science, earth and space science, and engineering
506 BASIS presentations, 550+ volunteers
14,500 students directly engaged

Be a Scientist, 7th Grade Mentoring
Mentors guide students through 6-week session of designing and conducting independent investigations in school.
124 STEM professionals as mentors
750 students received individual support

Science Festivals & School Fairs
Pop-up science activities to engage and delight the whole family!
50+ STEM volunteers
Thousands of families participated!



Impact on Student Learning and STEM Exploration Opportunities

As a result of CRS coaching and deployment of well-prepared STEM professionals in East Bay classrooms, thousands of students have opportunities to meet “real” scientist and engineer role models. Students and scientists laugh together while exploring chromatography, ecosystems, solar winds, and much more. Teachers are able to observe their students as learners, discovering how hands-on, active learning engages a wide range of students; they become even more motivated to strengthen their own skills in science teaching. The in-class mentoring and lesson presentations also provide high levels of individual student attention, deepening student engagement & understanding.



BASIS volunteers guide students through explorations about vision (above) and DNA (left), providing connections to students’ own lives and interests.

Teachers indicate the STEM classroom lessons and mentoring have lasting impact on their students:

Teaching science opens minds. It gets students to see the world in a whole new way and to understand how it works...When science is fun and engaging, the students certainly remember what they learned.

The BASIS lessons are awesome and my kids always get so much valuable hands-on experience and information from those lessons!

Working with Cal students and career scientists allows students see the pathways that these individuals took from becoming interested in science and their current areas of study.

7th graders reflect on science mentoring:

I liked getting to design and experiment without as much stress as the science fair project, and knowing that I would have help if I needed it. I also liked getting to know the different branches of science from the mentors.

I enjoyed having the constant support and quick answers whenever I needed. It made us strong in our own learning.

Program Assessment Data

Nearly 100% of teachers were satisfied with their BASIS presentation.

Through BASIS activities, **96% or more of teachers indicated their students:**

Grew more interested in science
Effectively learned science concepts
Engaged in hands-on experiences
Discussed their observations & ideas
Connected classroom learning to experiences in their lives, real world
Asked thoughtful questions

- Nearly 90% of teachers indicated they:
- Were surprised by seeing at least one of their students demonstrating engagement above his/her typical classroom level
 - Became motivated to add more science
 - Valued the presentation for dispelling stereotypes about “who” can be scientists

Connecting Teachers with a Wide Network of Partners & Resources

As a result of CRS collaboration with a network of over 200 science education organizations, informal education institutions, science centers, and academic research programs, the teachers we serve have access to, and timely information about, resources to help them “up their game” in science. With monthly email bulletins, quarterly comprehensive resource guides, curated online resources, and planning support available on-call, CRS lets teachers know about field trips, grants, lesson plans, material, events, trainings, and much more.



Above: Teachers explore aquatic life at Lake Merritt. Below: East Bay Regional Parks' Fishmobile (photo courtesy EBRP)

Teacher Reflections on the Impact of CRS Information and Personal Planning Support

I never ignore an email or newsletter from CRS because it always has something useful: a potential field trip, a potential grant, or a class visit from scientists!

I get all my information about PD classes and opportunities that I would never know about otherwise from CRS. I can't tell you how many times I've turned to CRS for guidance. CRS knows everyone and everything!

I'm looking forward to doing more citizen science next year, based on human impacts on our climate and how we as scientists and students can push back against climate change. I know I can depend on CRS to help me access any resources I might need.

More than 75% of CRS member teachers indicate they are spending more time teaching science, increasing the use of hands-on investigations, connecting science to language arts and math, and eager for training to better implement new statewide standards.

Twice each year, CRS hosts free **Science Field Trips for Teachers** at local science centers. Teachers have a chance to network, explore a particular topic such as space or lakeside ecology, and discover resources and partners.

Events this year were held at **science centers on Lake Merritt in Oakland**, and **Chabot Space and Science Center**. Over 30 partner organizations participated in our **Spring Science Education Resource Fair**, providing teachers with one-stop access.

Additional Collaborations include:

Representatives from science centers, academia, industry, and school districts serve on the **CRS Advisory Council**, providing insights and updates. Focus this year included best practices for engaging STEM professionals in education outreach, and supporting teachers in transition to new standards.

CRS presented workshop sessions and participated in partner meetings with regional, state and national networks including 100Kin10.org, Gateways East Bay Stem Network, California STEAM Symposium and US News STEM Solutions conference.



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

BioEngineering: Design A Pill Coating

Bioengineering: Unblock My Heart!

Birds: Evolution and Tools

Buoyancy: Who Sank the Boat?

Can We See Your DNA?

Card Tower Challenge!

Catapult Challenge!

Cells and Microscopes

Chemical Reactions

Chemistry of Water and Carbon Dioxide

Clorox Day of Science

Clouds Clouds Everywhere

CSI: Chromatography Science Investigation

Designing a Polymer

Dry Ice Explorations

Dry Ice Investigations

Earthquake Engineering

Earthquakes in your Backyard!

Electricity, Magnetism and the Wall Socket

Exploring Magnets

Exploring States of Matter

Eye didn't know that

Eye See It: Understanding How

Eyes See

Feel Dead Brains

Finding the Perfect Fit! An Introduction to Enzymes

Food to Poop!

Germs and Your Body

Glow in the Dark Science

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

Honey I Engineered Our Food

How Do My Lungs Work?

Individual Resource Request

Involving Dissolving

It came from a single cell

It's just a phase!

Let's Get Brainy!

Magnet Mania!

Magnetic Mystery Planets

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

Smell Me If You Can!

Soils are Diverse!

Squishy Circuits

States of Matter

States of Matter: Sublime Suds/ Ice Cream Science

The Brain in Our Daily Lives

The Spice of Life: Variation

Within Species

The Water Cycle

The Wonderful World of Water

Tooth Detectives: How Diet

Shapes Teeth!

Water in our Atmosphere:

Make It Rain!

Wildland Fire



Customized Support for Oakland Unified School District

CRS work in Oakland is focused on supporting the district's role as an early implementer of the Next Generation Science Standards, as they pioneer new lessons and teaching strategies to bring the vision of student engagement in meaning making to life in OUSD classrooms. A key focus in recent years has been connecting science with language arts, through academic discussions, reading for information, and the use of science notebooks as tools for writing observations, and supporting claims with evidence. An increasing number of Oakland schools reached out to CRS for support with putting on events to engage families in science and engineering explorations, and to help plan for STEM labs and professional learning communities.



BASIS volunteer explores acids and bases with Oakland students

**CRS served 1,081 OUSD teachers
In 65 Oakland schools**
Includes every district elementary school and several charter schools

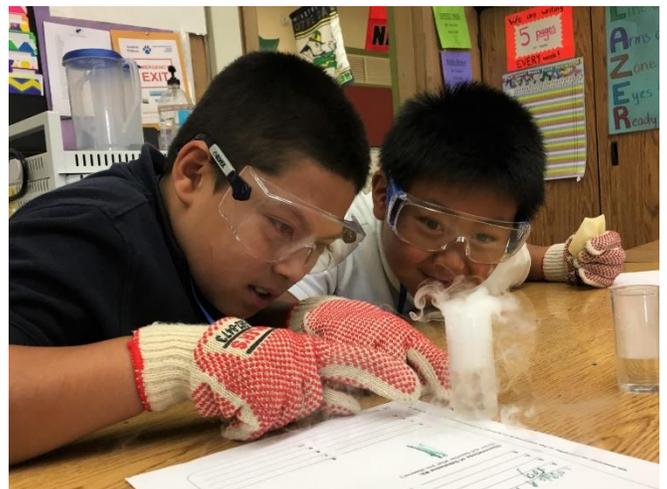
**Bay Area Scientists in Schools teams presented 290 lessons in Oakland classrooms
Directly engaging 8,200+ students**

57 Oakland teachers earned recognition for excellence in elementary science teaching through the CRS Science Super Star Challenge.
This resulted in prizes, books, and most of all great learning experiences for over 1,500 students

Oakland teachers indicate they are spending more time teaching science, connecting science effectively with language arts, and more confident in leading student inquiry and investigations. Many teachers are working together with parents to plan and run school science fairs and family science and engineering festival events. Oakland teacher feedback includes:

*The quality of student talk has improved. Students are focusing on connecting ideas and trying to bring in more evidence to support claims. They are definitely evaluating the claims of others and respectfully questioning evidence to push student thinking. **Ann Park, OUSD***

*The students are gaining more confidence and taking more risks when it comes to participating in science talks and are also writing longer. They are writing more in depth and are using more of the science vocabulary, in both their conversations and in their writing...(I've discovered) that it is all right to give students time to think and process their thoughts. They need to feel confident about what they are going to say and what they are going to write. English Language Learners still need a lot of scaffolds and visuals and it is perfectly fine to provide them with those aides. I would also say that students need to observe, talk, think, sketch, and write during every science investigation to be engaged and to make sense of their learning. **Alejandro Estrada, OUSD***



CRS supports teachers and students at the following Oakland schools:

Acorn Woodland Elementary
Allendale Elementary
Bella Vista Elementary
Bridges Academy at Melrose
Brookfield Village Elementary
Burckhalter Elementary
Carl B. Munck Elementary
Chabot Elementary
Cleveland Elementary

Coliseum College Prep Academy
Community Day School
Community United
Crocker Highlands Elementary
East Oakland Pride Elementary School
Edna Brewer Middle School
Emerson Elementary
EnCompass Academy

Esperanza Academy
Franklin Elementary
Fremont High School
Fruitvale Elementary
Futures Elementary
Garfield Elementary
Glenview Elementary
Global Family School
Grass Valley Elementary School
Greenleaf Elementary
Hillcrest Elementary
Hoover Elementary
Horace Mann Elementary
Howard Elementary
International Community School
Joaquin Miller Elementary
Kaiser Elementary
Korematsu Discovery Academy
La Escuelita Elementary
Lafayette Elementary
Laurel Elementary
Lincoln Elementary
Madison Park Academy
Manzanita Community School

Manzanita SEED
Markham Elementary
Martin Luther King Jr. Elementary
Melrose Leadership Academy
Montclair Elementary
New Highland Academy
Parker Elementary
Peralta Elementary
Piedmont Avenue Elementary
Prescott Elementary
REACH Academy
Redwood Heights Elementary
RISE Community School
Sankofa Academy
Sequoia Elementary
Street Academy
Think College Now
Thornhill Elementary
Charters:
Learning Without Limits
Lighthouse Community
Roses in Concrete
Vincent Academy



I think that the BASIS visits are important because the students feel valued. They see that someone cares enough to share their expertise and perspective. The BASIS scientists provide an experience that is unique. ..CRS has been indispensable in providing all of our students with rich science experiences.

Through the Science Super Star Challenge, every year my students get even more excited about science! The various resources, books, and prizes that CRS provides have not only helped me and my students feel recognized for being scientists but also motivates us to continue to do more science in the classroom. It's always a great program that makes my students feel happy and proud to be young scientists!



Customized Support for Berkeley Unified School District Teachers

CRS supported the teachers of Berkeley elementary and middle schools through professional development, with a focus on shifting to a phenomena-based approach to engage students in inquiry and meaning making. CRS facilitated UC Berkeley and employer-based scientists and engineers to work in a variety of ways to inform, engage, and inspire teachers and students.



CRS served 292 BUSD teachers across 14 schools

Bay Area Scientists in Schools teams presented 154 lessons in Berkeley classrooms directly engaging 4,200+ students

13 Berkeley teachers earned recognition for excellence in elementary science teaching through the Science Super Star Challenge.

CRS facilitated professional learning and collaboration for three groups of teachers:

- Elementary science specialists, who teach 4th and 5th grade students

at every elementary school in BUSD. PD sessions included scientist presentations on science sketching, water quality, pollination, earthquakes, digestive systems, chemistry, and pollinators.

- Elementary science teacher leaders, a new cohort of teachers which includes both classroom teachers and science specialists, whose role is to support science teaching and learning among the colleagues at their school site.
- Middle school science teachers, including arranging for scientist presentations.

*CRS is an amazing organization. It has helped my students have a deeper understanding of science concepts, and it has helped me grow as a professional each year...It is because of CRSs, 8 years ago, that I began to fully understand our science scope and sequence...(through the years CRS) has led the science resource teachers through the process of deepening our instruction through specific planning templates. CRS continues to support myself, and my colleagues..Thank you for making my career so fruitful. **Cherene Fillingim-Selk** - BUSD*



Berkeley “Be a Scientist” 7th Grade In-class Mentoring

In partnership with the Berkeley Schools Fund, UC Berkeley Chancellor’s Community Partnership Fund, and Professor Mary Wildermuth, CRS extended the 7th grade Be a Scientist mentoring program across all three Berkeley middle schools. Every 7th grader successfully completed a scientific or engineering investigation, with in-class mentor support (a completion rate unmatched by other science class assignments), providing equity of access and opportunity for all students, without stigma and at the appropriate level for individual success. Mentors guided students through the process of designing, conducting, and reporting out results on their own independent investigations over the course of 6 week sessions.



UC Berkeley graduate student guides 7th graders in designing and conducting experiments.

127 scientists and engineers served as mentors

Over 700 7th grade students participated

Asked to reflect on the BAS experience, most students valued the opportunity to design and conduct an experiment based on their own interests, having support of scientist mentors, and having access to “real” science equipment & material.

Students demonstrated improved performance on science-related tasks in the pre- and post- program assessments. Overall, student scores on these tasks increased:

- Identifying elements of a scientifically testable question: 28% improvement
- Understanding a scientifically constructed hypothesis: 30% improvement
- Successfully create a data table from sample experiment results: 25% improvement

After participating in BAS, student responses reflected an increase in:

I am good at science

I know how to design and run an experiment

Science is important in my daily life

I can see myself becoming a scientist or engineer

Science and engineering will be important to my

future career, whatever it is

Teacher feedback: There is a lot about the project that I could not accomplish by myself. If you tell students to share out in a discussion, only the most outgoing will do it, but with mentors there to value them and guide them, they will do it. We have had a 100% success rate in this program getting students to talk...For 7th graders particularly, giving them choice makes all the difference. They are hard-wired to push back from people telling them what to do. Allowing them to do their own experiments gets buy in that you just can’t get otherwise.”

Student feedback: *I enjoyed creating a question and testing it. It was really amazing to learn how it worked. I think that finding a question that I wanted to test was so fun. The mentors were so helpful, and assisted me with everything. It was so cool to research a question that I had no idea what the answer was going to be.*

Customized Support for West Contra Costa Unified School District

Teachers in our pilot ESCAPE collaboration (Collins, Ellerhorst, Montalvin, Shannon, and Tara Hills) reported tremendous gains in the use of hands-on investigations, time devoted to science teaching and learning, increased confidence and skill, effectiveness in addressing new standards, using outdoor spaces for science, and using science to further develop language arts skills. The collaboration is a partnership between WCCUSD, CRS, Lawrence Hall of Science, Berkeley Science Project, and the UC Berkeley Natural History Museums.



Teachers explore NGSS Cross Cutting Concepts during an ESCAPE professional development session.

CRS served 231 teachers at 31 schools

CRS teams presented 47 BASIS lessons in Richmond and other WCCUSD schools, directly engaging over 1,350 K-6 students

Four teacher professional development workshops attended by 100 WCCUSD teachers, exploring effective implementation of new science standards.

Three WCCUSD teachers earned recognition for Excellence in Science teaching through the CRS Science Super Star Challenge. These teachers received in-class lesson presentations, field trips, books, and other prizes – including books for each student.

Feedback from WCCUSD teachers:

I avoided science all through school, from high school through college. I always felt intimidated. After this training I feel so much more empowered to be a scientist and lead my students in learning!

*Absolutely (my teaching has changed)! I now actually teach science in a regular basis. I'm not afraid to teach science. Even when things go wrong (or not as expected) I'm comfortable discussing it with the students and using it as at teachable moment. I no longer worry that I don't know enough. **I don't need to provide all the answers. I just need to provide the forum.***

*I now get to **teach more science**. I am linking it more to the other subjects (more integration) and have had more freedom to exploring the students' curiosities. I've included **more hands-on experiments** and I feel more comfortable carrying out those experiments.*



CRS served teachers at these WCCUSD schools:

Chavez Elementary
Collins Elementary
Coronado Elementary
Dover Elementary
Downer Elementary
Ellerhorst Elementary
Fairmont Elementary
Ford Elementary

Grant Elementary
Harding Elementary
Kensington Hilltop Elementary
Lake Elementary
Lincoln Elementary
Lupine Hills Elementary
Madera Elementary

Mira Vista Elementary
Montalvin Elementary
Murphy Elementary
Nystrom Elementary
Ohlone Elementary
Olinda Elementary
Pinole Middle School
Riverside Elementary

Shannon Elementary
Stege Elementary
Stewart Elementary
Tara Hills Elementary
Valley View Elementary
Verde Elementary
Washington Elementary
Wilson Elementary

