CRS
COMMUNITY RESOURCES FOR SCIENCE
practical support for great science teaching

1611 San Pablo Avenue, Suite 10B
Berkeley, California 94702
(510) 527-5212 • www.crscience.org

2015-16 School-Year Overall Report & Program Evaluation: Accomplishments and Impact

Overview:

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.

Our goal is simple: help teachers give elementary and middle school students more opportunities to "do science" – to ask questions, test ideas, meet scientists and engineers, and engage in real science and engineering activities.

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.

In the words of CRS teacher members:

"CRS is an excellent resource for teachers. We are so grateful for the support you have provided to help us improve and deepen our practice teaching science to our students—especially those at schools that are under-resourced and underserved. It makes a difference to have that support readily available. Thank you!!" --WCCUSD Teacher

"CRS supports science at my school in so many ways: the BASIS program, Science Superstar program, and a plethora of information provided both monthly and quarterly. These newsletters are my lifeline to Science in the Bay Area. I personally love all the engineering resources CRS provides!" – OUSD Teacher

Highlights for 2015-16: Programs, Services & Connections

Science teaching and learning continues to blossom in many elementary schools across the East Bay. With support from CRS, teachers, principals and district leaders have embraced the importance of high-quality hands-on science (and, increasingly, engineering) experiences for students from Transitional Kindergarten through 6th grade, where for too long science has been little more than an afterthought. We are honored to partner with educators across the region, meeting them at their current level and addressing their specific priorities and needs in order to ensure all students have early and sustained exposure to science and engineering.

This program report summarizes the quantitative and qualitative highlights of the range of Community Resources for Science activities during the 2015-16 school year, across the many districts we serve. The first section highlights some key program metrics, followed by a summary of our program impact evaluation, and concludes with representative samples of feedback from participating teachers, scientists and students.

CRS continued to develop our services for, and partnerships with, Oakland, Berkeley, Emeryville, West Contra Costa, and other districts and schools during the 2015-16 school year. Our services include on-call personalized support; information and online resources; free, in-class lessons led by STEM professionals, and professional development for teachers. We also serve as a connector, linking scientists and science resources with educators and schools, through our Advisory Council, events, outreach, and consultation. While we aim to increase science learning for all students, we particularly focus on serving teachers and schools in low-income communities; 72% of the schools we serve are Title 1 schools and about three-quarters of the students are categorized as low-income and/or English language learners.

<u>By the Numbers: CRS Direct Support & Activities</u>

- **1,610 teachers at 130+ schools receive CRS membership services (detailed below).** Together, they educate **over 30,000 students**.

- CRS presented **511 free, in-class BASIS lessons** in local classrooms. *Because they generally work in teams, these classroom presentations resulted in* ***over 2,000 scientist & engineer role model interactions with more than 13,000 students and teachers in classrooms, adding up to 3,000 hours of scientist & engineer volunteer time.***

- **Customized professional development**. Included **45 professional development workshops & training sessions**; support for **all Lead Science Teachers in all Oakland elementary schools & all Science Resource Teachers in Berkeley.**

- **Recognition of 101 teachers for Excellence in Elementary Science Education** through the Science Super Star Challenge, resulting in increased science learning – and prizes – for **3,000 students**.

- CRS prepared **customized science resource reports for individual teachers,** providing personalized support for teachers' unique planning needs.

- Pilot **Be a Scientist project** brought **122 UC Berkeley graduate students and post-docs to mentor 535 7th grade students** through conducting independent research on two Berkeley middle school campuses.

- 2nd year of **ESCAPE collaboration with Lawrence Hall of Science and UC Berkeley Natural History Museums engaged 100+ West Contra Costa educators**.

CRS Membership Services for all member teachers included these elements:

- **Personalized on-call science support** to meet individual teacher requests.
- **Timely information via Monthly ScienceBlast Email newsletters** & **Quarterly Comprehensive Science Resource & Educator Opportunities Guides and Curated online resources**
- **Invitations for free in-class BASIS lessons (see below), and to Science Field Trips for Teacher** resource workshops at local science centers. Events this year were held at **The East Bay Regional Parks' Crab Cove, and Chabot Space and Science Center.** More than 30 partner organizations participated in a day-long **Science Education Resource Fair**.

BASIS (Bay Area Scientists in Schools) Program: STEM Professionals Inspiring Students

CRS teacher members are offered free in-class science presentations led by our diverse, enthusiastic BASIS scientist and engineer volunteers, on an as-available basis to supplement CRS support and to build teacher knowledge and enthusiasm for incorporating science into their classrooms by demonstrating the power of scientific activities for engaging all kinds of learners in hands-on, exciting, 'real world' science.

This year CRS recruited, trained, and placed over 550 scientists who provided 511 BASIS presentations; they engaged over 13,000 students in STEM learning.

More than 80 different BASIS lessons are currently in circulation for classroom presentations, aligned with grade level standards and spanning the fields of earth, space, physical, and life science and engineering. (See list below.)

We get hundreds of enthusiastic thank you notes from students each year, explaining how excited they were to learn with the scientists and how they want to explore even more about bugs or robots or clouds or other new wonders that they are just discovering. Teachers tell us the BASIS presentations allow them to see their students in a new light, as fully engaged and excited about learning, Teachers discover new ways to present scientific information, and tell us the role models have a lasting impact on their students.

"This was an excellent lesson that reflected a great deal of thought as well as experience with working with young children. A tremendous amount of content was covered in a very short, very engaging lesson. It was also extremely important for my children to meet scientists and students at U.C. Berkeley. Their visit sparked a very good discussion about going to college and how one becomes a scientist. Many thanks for sharing your valuable time and expertise." –OUSD Teacher

"(BASIS) allowed me to bring diverse university students to our classroom to explain the course of study they chose and why it excites them. The talked about solving real world problems and how they collaborate and work hard on a common problem. Allowing our students to act like scientists is what the NGSS is all about." –BUSD Teacher

Science Super Star Challenge Program: Recognizing Excellence

This year, **101 teachers** successfully completed the "best practices" challenge, documenting their efforts to incorporate hands on science lessons, reading and writing projects connected with science, professional development, and more. These teachers earned Science Super Star recognition for their Excellence in Science Teaching. **Over 3,000 students received prizes including science-related books for each student to take home and have for their very own**! Classroom Prizes included museum passes and class field trips, on-site assemblies, books, science activity kits, and more.

The program is intended to motivate, document, and highlight teachers and schools who make the commitment – and effectively implement – excellent science learning experiences for students. Teachers who have earned the honor for three years or more were invited to a special luncheon celebration at Chabot Space and Science Center.

In addition, several schools were honored for achieving 75% or more participation rates by their teachers, and received special "whole school" prizes in addition to classroom rewards.

- **International Community School**, OUSD, received Aquarium of the Bay presentations.
- **Think College Now**, OUSD, received a presentation from Rock Steady Juggling on environment stewardship and recycling.

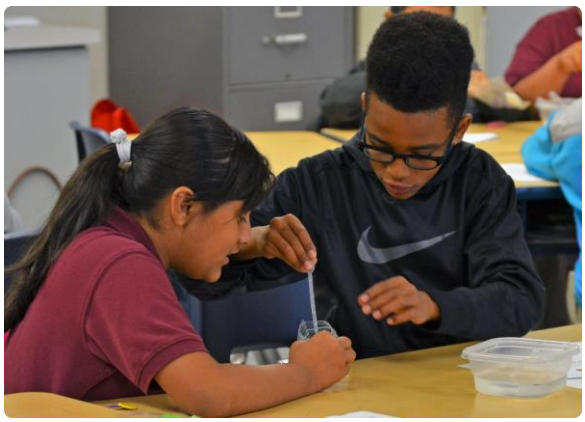
- **New Highland Academy**, OUSD, classes participated in "virtual field trip" presentations from California Academy of Sciences, featuring penguins.
- **Chabot Elementary**, OUSD, received a Day of Science, presented by Clorox and Bayer employees.

Shannon Elementary, WCCUSD, classes participated in a presentation from Kids for the Bay.

- **Cragmont Elementary**, BUSD: Every class participated in presentations from the East Bay Regional Parks "fishmobile"

The full list of Science Super Star Honorees is listed on the CRS website: http://www.crscience.org/educator/SSS2016

Additional CRS Science Support Efforts included:



- **45 customized, on-site professional development workshops**. Topics ranged from "Introduction to Elementary Engineering", "Understanding and Implementing New Science Standards" and "Discourse: From Lab Meetings to Classrooms" and more.
- Hands-on **activities for afterschool providers**, through Alameda County Office of Education, Gateways, and the STEM Power of Discovery network, and providers such as BOOST in West Oakland
- **Presentations** at California STEM Symposium, Bridging the Bay, and other conferences

- Ongoing work of the **CRS Advisory Council** on Elementary Education, Bay Area thought leaders in science, education, academia, business, and philanthropy
- **Connection requests and specialized assistance** including customized information for school staff meetings, recruiting scientists to present at district teacher professional development sessions, and facilitating requests for family science night events, science fairs, and other school site events seeking speakers, presenters, and judges
- **Hands-on outreach, science activity tables for students, families, and teachers,** including OUSD Science Fair, Chabot Space and Science Museum; OUSD Dinner with a Scientist events; Family Science & Engineering events and school science fairs; Bay Area Science Festival, Farmers Markets, Cal Day, and more, in partnership with Science@Cal

Program Evaluation Summary: Quantifying Impact on Practice

"CRS is an extraordinary organization. They have the most comprehensive information available for science PD classes, science grants, and science field trips in the greater Bay Area. They have helped me find and refine curriculum. They have provided PD to introduce our staff to NGSS. They have arranged wonderful BASIS classes that have taken our science instruction to a new level--in my class, we've analyzed forest fires, studied polymers, and built 4 story structures to withstand strong earthquakes. Every time I look at their newsletter or email, I learn more of what they provide. There is no other organization like CRS!" –OUSD Teacher Mary Loeser

During the school year, CRS conducts post-BASIS presentation surveys of participating teachers and volunteers; in addition, CRS conducts a comprehensive year-end overall program evaluation survey for teachers, along with a separate year-end program evaluation survey for volunteers. Throughout the year, and at the conclusion of the year, CRS analyzes empirical and narrative responses, adjusting program practices and making refinements as needed. Responses over the years have consistently shown this program to be a substantial success, rating very highly in areas of teacher and scientist volunteer engagement and satisfaction. More importantly, responses consistently indicate the CRS support services have a positive impact on teacher practice (and, by extension, student learning experiences). A brief summary of survey responses and narrative comments follows.

On the year-end survey, a strong majority of **teachers reported that their students respond positively to science experiences**, and **an increasing number are reporting they spent more time teaching science**. Survey responses indicated that, overall, teachers are becoming more confident and enthusiastic about including science learning experiences for their students and that **CRS services help to increase both the quality and quantity of science in their classrooms.** All responding teachers indicated that their students respond positively to science learning experiences.

As a direct result of CRS support services teachers (including those who had BASIS lessons and those who did not) indicated they:

- **Added a new field trip, lesson, or science activity** **94%**
- **Increased the overall amount of science they teach** **78%**
- **Became more enthusiastic about science teaching** **92%**
- See how effectively science activities engage all types of students 81%
- Know where to find information and science teaching resources 78%
- Feel more confident professionally 75%
- Attended a workshop/program to develop skills & knowledge 64%

Of teachers who DID have a BASIS in class presentation, even more (92%) indicated that observing their students engagement during the BASIS lesson encouraged them to include more hands-on science lessons in their classroom throughout the year.

Teachers expressed appreciation for diverse, enthusiastic scientist and engineer role models, with 90% indicating BASIS visits help dispel student stereotypes of "who" is – and can be -- a scientist.

Through BASIS activities, teachers said students:

• **Grew more interested in science**	**100%**
• Effectively learned new science concepts	98%
• Were engaged in hands-on experiences	95%
• Discussed their own science observations and ideas	95%
• Connected what we learned in the classroom with experiences in	91%
• their lives and the real world	
• Asked thoughtful questions	90%

Significantly, 95% of teachers reported being surprised by at least one of their students participating or demonstrating skills above his/her typical classroom level, showing them new ways to engage this student through hands-on activities and motivating teachers to add more hands-on science lessons. This is a figure we have seen rise each of the past several years, from just below 50% to now nearly all teachers. **This consistent result underscores the importance of "show, don't just tell" when it comes to convincing teachers that science really is an important way to engage students in learning.**

We also note the continued trend toward spending more time on science teaching and learning. About one-fourth (26%) of teachers indicated they teach science at least once per week or 3-4 hours per month, with 43% indicating they teach twice that much science, which has increased from 21% in 2014-15. And nearly 25% of teachers indicted they teach even more – 8 hours or more per month**! This represents a continuation of the gradual increase in science teaching over the past few years among the teachers CRS serves.** Likewise, principals are seen as more supportive of the importance of science teaching, with about 71% of teachers indicating that their principals support science teaching. This is an increase from last year (64%) and reflects growing awareness of the importance of science in developing elementary students' critical thinking and communication skills.

Finally, we also see a significant increase in teacher awareness of, and implementation of, NGSS. In 2014-15, 16% of teachers said they had little or no familiarity with the NGSS Science and Engineering practices, and the Disciplinary Core ideas (topics/content) – that number dropped to 6% in 2015-16. Nearly a third of teachers indicated little or no familiarity with the Cross Cutting concepts in 2014-15, and that dropped to 14% in the most recent school year. Correspondingly, the numbers of teachers indicating a strong understanding in these areas increased significantly. (From 14 to 29% SEP; from 20 to 34% CCC; from 22 to 40 % DCI). The numbers of teachers indicating they are helping to lead implementation in their school or district has more than doubled.

Teacher and Volunteers Share About the Impact of CRS, in their own words

From teachers:

"I love CRS! This year I organized a Family Science Night, and CRS was so great. They helped find scientists from UC Berkeley to run a couple tables, gave me ideas for stations, and kept in close contact with me. CRS also helped round up scientists for my school's two science fairs this year. I could not have run these events without the amazing support from CRS. Thank you!!!" – 2016 California Teacher of the Year Ann Park

"CRS makes science so much more accessible and helps educators save time researching for resources so we can put that time to teaching supporting our students!" –OUSD Teacher

"I deeply appreciate all of the up-to-date science resources that CRS has provided for me as a teacher as well as the amazing science presentations for my learners. This year, I am working at an elementary school that has blocking. I teach 2 math & science blocks each day. When I requested a presentation this year, Elise was extremely accommodating & made it possible for both of my blocks to get a science presentation. The dedication of supporting teachers & students that CRS provides is remarkable. Wish there were more organizations like this one!" –WCCUSD Teacher

"I always look forward to the CRS newsletters. There is so much available to help us teach science more effectively and the newsletter puts it all in one place for easy access. I also enjoy their obvious love for the subject -it's inspiring!" –OUSD Teacher

“Volunteers were an enthusiastic and knowledgeable team and extremely effective connecting with the students. Organized and professional/personable. Hands-on and other real-life examples of learning helped students learn.” --OUSD Teacher

“I really enjoyed the grad students' presentation and how they taught the different centers. It's great to see different approaches and different modes of teaching all at once. The 5th grade students were highly engaged. I like that they talked to the kids in a very respectful way.” –OUSD Teacher

“Amazing work, I feel really fortunate that my students could get a lesson from other teachers and be inspired to be scientists.” –OUSD Teacher

“Thank you so much! All of the volunteers were super friendly and knowledgeable about the subject. My kids were thrilled to have "actual" scientists visit! It was really nice that Jose pointed out that they (the kids) are scientists too! :)” –BUSD Teacher

From volunteers:

“The teacher and the class were wonderful and very engaged and interested in the lesson. It was a pleasure teaching the lesson for them!” –BASIS Volunteer Jason Pflueger

"The science teacher at this school truly cares about her students and treated me with so much respect and the students acted by her example. They were respectful, inquisitive, and genuine. They were respectful of each other and asked creative and thought-provoking questions. I was delighted by the entire experience and we even went overtime because the children were so excited about the topic." –Sabrina Erlhoff

BASIS is the key link that connects scientists to the East Bay community. I am so grateful for the opportunity to visit classrooms and see students and teachers get excited about science and engineering.

I love teaching, and this is the most excited and involved audience I can find! At every lesson I've taught so far, the students have SO MANY questions that we can never answer all of them.

It takes so little to inspire a young student, and BASIS is a great way to do it.

It's really cool to see kids get the concepts and I like knowing that I've gotten better over time.

One of my favorite moments was after teaching our class on DNA, a 5th grade girl who was quiet during the lesson told me that she wanted to be a scientist. I love that sharing my love and excitement about science can validate science lovers in school.

BASIS is very important to me. I am glad to have the opportunity to bring hands-on science into local classrooms. The excitement and curiosity from the students and teachers is inspiring and motivating, on both a personal and professional level. These lessons are not just important, they are fun and help our team work more cohesively and communicate ideas and concepts more effectively.

I am reminded why I like science, which I sometimes forget when experiments aren't working. I also get a chance to interact with my community, and practice communicating science.

BASIS is an amazing program, and the lessons are always the highlight of my week! The lessons challenge me to be a better teacher and communicator, and the students often ask insightful questions and challenge me to learn more about my own field. And I'm always honored to meet and work with great, caring teachers who seek out opportunities like BASIS for their students.

BASIS allows me to break out of the bubble of doing science in academia and re-experience science in relationship with everyday life, giving me important perspective on my research but also reminding me what inspired me to pursue science in the first place. The students have so much energy and I find that I can coast on their enthusiasm for several days after each classroom visit :)

BASIS give me a chance to see kids' eyes light up as they explore science!

CRS & BASIS scientists developed and presented lessons aligned to standards for grades K-8, on more than 80 topics, including:

A Whole New World of DNA and Proteins
Adapting to Survive: Predators & Prey
Albedo: Changing Colors, Sun, and Climate!
All About Animals!
All Systems Go!
BioEngineering: Design A Pill Coating
Bioengineering: Unblock My Heart!
Birds: Evolution and Tools
Brain Talk! How Brains Communicate
Build a BioRobot
Build A Bug
Can You Feel Your Heart Beat?
Can Your Eyes Fool You?
Cardiovascular System
Cells and Microscopes
Chemical Reactions
Chemistry of Water and Carbon Dioxide
Clouds Clouds Everywhere
CSI: Chromatography Science Investigation
Dry Ice Explorations
Earthquake Engineering
Earthquakes in your Backyard!
Electricity, Magnetism and the Wall Socket
Elements of Life
Engineering - Those Darn Squirrels
Exploring Magnets
Exploring States of Matter
Eye didn't know that
Feel Dead Brains
Fossil Formation
Gears in Motion
Germs and Your Body
Glow in the Dark Science
Good Germs, Bad Germs
Go With Your Gut!
Green Polymers

Green Roofs
Hidden Colors
Honey I Engineered Our Food
How to Think Like a Scientist
It came from a single cell
It's just a phase!
Let It Snow!
Magnetic Mystery Planets
Marine and Terrestrial Ecology
Materials and Structures
Microorganisms: Good or Evil?
Microbes in Action!
Mountain Building
Oceans Are For Everyone!
Plant Life Cycles
Plants Adapt to their Environments
Plastics, Recycling, and Composting
Play With Your Food
Properties of Gak!
Renewable Energy & Climate Change
Robots that Run
SEED Solar Cells
Seeing is believing?
Sensing the World Around Us
Skin You're In
Soils are Diverse!
Squishy Circuits
States of Matter
States of Matter (SECO)
States of Matter: Sublime Suds/ Ice Cream Science
The Human Body: Respiratory & Circulatory Systems
The Spice of Life: Variation Within Species
The Water Cycle
The Wonderful World of Water
Tooth Detectives: How Diet Shapes Teeth!
Vision Whitney Lab
Water in our Atmosphere: Make It Rain!
What's In a Color?
Where Do All The Stars Come From?
Wildland Fire
Working Together: Your Heart and Lungs
You Are What You Eat: How Diet Shapes Teeth!