



Scientific Adventures for Girls 2018- 2019 Program Report

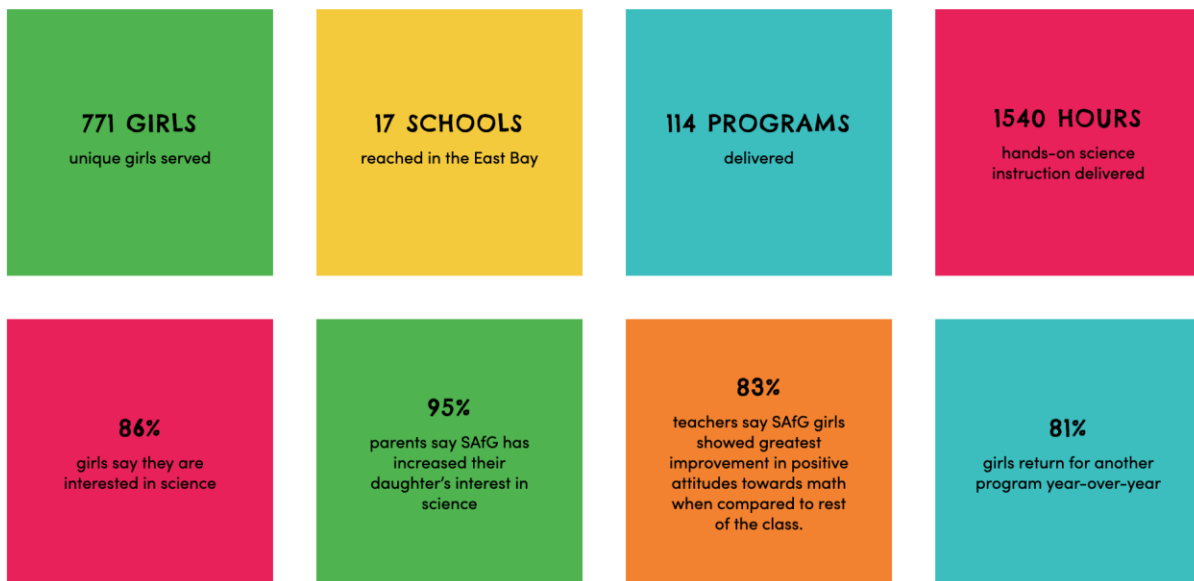


For more information, please contact Courtenay Carr Heuer at ccarr@scientificadventures.org

Scientific Adventures for Girls After School STEM Programs 2018-2019

Scientific Adventures for Girls (SAfG) just ended a very successful 2018-2019 year offering 35 after-school, 8-12-week STEM (Science Technology Engineering Math) sessions at 11 schools reaching 324 (unique) Kindergarten through 5th grade girls. This year we changed our model to focus on offering our afterschool program to the same girls for the full school year - 27 weeks, versus changing girls each trimester, so we could make a greater impact on each girl with consistent programming. SAfG also offered 61 STEM drop-in STEM classes during the school year at six Oakland libraries reaching over 1200+ girls, boys and their families and six “SAfG Family STEAM Nights”, bringing together over 750 children and their families, and finally SafG held 16 days of STEM summer camp through the Emeryville Recreation Department, reaching 150 girls and boys for fun, summer STEM programming.

Since its inception in 2014, SAfG has reached 771 unique girls in the East Bay in its after-school programs:



What is SAfG's Mission?

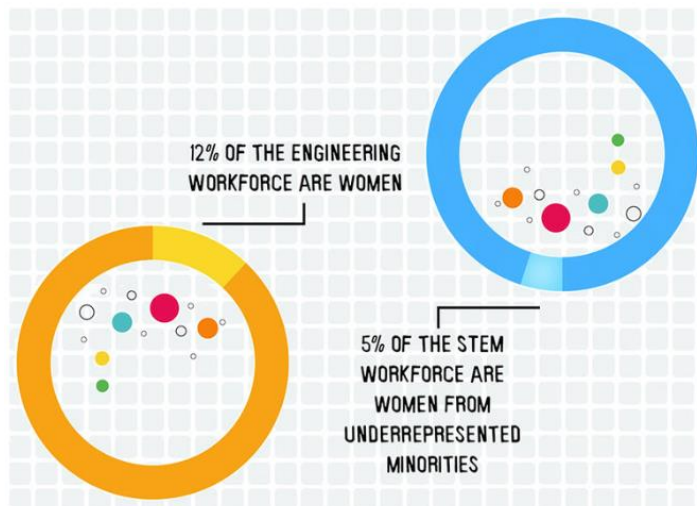
Engage young girls, especially NorCal minorities, in creating a foundation in STEM to improve their economic mobility and create a gender equitable society. SAfG does this by providing after school STEM programs to TK-5th grade children to increase positive attitudes toward STEM, increase hands-on learning opportunities and encourage lifelong learning of STEM subjects.

Why SAfG?

- According to the Bureau of Labor Statistics, there are many job openings in science, technology, engineering and math (STEM), yet there are not enough people to fill the jobs.
- Women, Black Americans, Latinx peoples and Native Americans have the highest rates of poverty and unemployment in the US.
- Although jobs in STEM are on the rise, women (50% of the US population) as well as Black Americans, Latinx peoples and Native Americans (making up 30% of the US population), are largely

underrepresented in STEM fields, and opportunities for economic mobility are scarce due to systemic gender and racial barriers.

- Technology and Innovation are lacking the perspectives and the specific needs of women and underrepresented populations.
- Public education in the US varies widely, so not all children start on equal footing (funding, qualified teachers, course offerings, extracurricular activities, social and emotional supports).
- Although job opportunities in STEM will continue to increase, STEM curriculum is not regulated in elementary school, and starting early is critical. Elementary children in California only receive 0-60 minutes of science (on average 22 minutes and most often not hands-on science) a week and what is offered is often not relevant and misaligned with what companies that may hire these students in the future will need.
- Accessible, engaging STEM programs are not typically offered in elementary school and are not available to most underserved communities in the East Bay.
- Children in early elementary are already forming negative views about science and math.



SAfG's Solution

Theory of Change: If we remove systemic barriers to East Bay girls' participation in STEM activities at an early age, they will be more likely to pursue and attain careers that provide more economic freedom and opportunities to advance society.

These complex problems require a multifaceted approach:

- starting STEM early
- creating welcoming nurturing learning environments
- using methods to attract girls
- bringing STEM directly to all girls
- introducing girls to women in STEM who look like them
- engaging the entire STEM community to address these problems

Therefore SAfG:

- creates developmentally appropriate out-of-school time programs accessible to girls (especially low-income and minority students) and engages Tk-5th girls in the STEM content.
- creates age-appropriate programs which address social and emotional learning as well as trauma-informed practices.



- designs culturally sensitive, real world curriculum appropriate and appealing for girls different ethnicities and socio-economic backgrounds, including educating and engaging their parents.
- incorporates female and minority STEM role models and provide societal and cultural images and environments that promote diversity and opportunity in STEM.
- partners with all stakeholders (industry, NGOs Government) in the STEM Ecosystem to increase impact and reach.

SAfG 2018-2019 After School Program

SAfG reached 324 girls in kindergarten - fifth grades through its afterschool STEM programs held on site at elementary schools. Classes were held once a week for 1.25 hours, depending on the age of girls and the location. SAfG held 35 after school STEM sessions at the following 11 sites:

- Anna Yates Elementary (Emeryville)
- Jefferson Elementary (Berkeley)
- Washington Elementary (Berkeley)
- Emerson Elementary (Oakland)
- Chabot Elementary (Oakland)
- Hoover Elementary (Oakland)
- Sankofa Elementary (Oakland)
- Madison Park Academy (Oakland)
- Martin Luther King Jr. Elementary (Oakland)
- Roosevelt Elementary (San Leandro)
- Temescal Library (Oakland)



Curriculum

SAfG content is facilitated in a variety of out-of-school time settings, from partner school sites, to library drop-in programs, summer camps and special family events, each with a unique set of desired learning outcomes. Our curriculum begins with the end in mind, utilizing a backwards design approach to achieve our final content. This thoughtful process focuses our planning and guides purposeful development of content toward specific, intended results. These results include a dedication to putting diversity, equity, and inclusion at the center of our program design and facilitation, to ensure that every participant might find a reflection of herself in our classrooms.

All SAfG programs feature hands-on, minds-on projects, designed to spark interest and excitement around science topics in our participants. This year, we continued refining our learning objectives for all programs, centering on the qualities of a scientist. The “Six C’s” call out the habits of mind employed by scientists of all ages and served as foundational norms for participants. In SAfG programs, our student scientists are:



Curious, Creative, Confident, Collaborative, Committed, Changemakers. These six qualities were explored in the following thematic curricula used across our sites this past school year:

Project Catalyst: Becoming a Biologist

Debating at two pilot sites in the Fall of 2018, Project Catalyst seeks to ignite a passion for science in each of our girls by experiencing the passion of others, furthering our goal to change the face of science. In this program, we connect our young female participants with local female scientists, who recreate some of their first positive science experiences in the SAfG classroom. Engaging in real science experiences with career scientists is a crucial component of our SAfG Role Model Program, helping students to visualize themselves in these roles in the future. Project Catalyst: Becoming a Biologist, takes our Role Model Program even further, enlisting local female biologists in all biological specialty fields as partners in the development of content and delivery of instruction for the entire session. Our growing network of partner scientists brought live animals, bacteria culturing, scientific drawing, anatomy, and microscopy to life in classrooms across the East Bay this school year as guest teachers. It was an enormous hit with our girls and we realized just how resonant this new program format was when we were nominated for the East Bay Innovation Award in Education. Winning the award in March solidified our commitment to this series and we have begun work on the next installment: Becoming an Environmental Scientist, set to roll out in Fall of 2019.

Operation Slime: Exploring Polymer Chemistry

One of the most valuable aspects of our programming is our ability to be responsive to the emerging interests of participants. When faced with the question “Are we making slime today?” at the start of **every** class this fall at MLK Elementary in Oakland, SAfG staff quickly switched gears for the winter session, designing a new program diving into the chemistry of polymers for a full 10-week session. Our slime craze-challenged participants to become polymer experts, building a repertoire of repeatable slime recipes based on a fundamental understanding of the role of each ingredient, honed by weeks of experimentation with ratios and substitutions. Underlying every class was a dedication to thoughtful, careful concocting, beginning with a master recipe to build fundamental knowledge and skills before diving into the endless variations in the quest for the “perfect slime”. Messy, engaging, frustrating, and fascinating, slime science is quickly becoming an SAfG favorite.



Carnival Science

In the summer of 2018, SAfG hosted two, week-long summer camp programs on Carnival Science. We explored the science behind hard-to-win carnival games, engineered carnival games, optimized a variety of sweet treats, built with balloons, and more! This session of “wow’s!” and “why’s?” culminated in a kid-run carnival with a science twist on the final day of camp. The success of this low-stakes, fun-forward summer programming encouraged us to reformat the projects into a new 10-week session for the 2018-

19 school year, bringing marble roller coasters and air vortex cannons to our classrooms. The science carnivals have been a wonderful way for participants to showcase their learning with peers and parents, deepening our engagement of families and the larger school communities in which we work.

Pow! Bang! Fizz! Science Wiz

Our “greatest hits” program is what we begin with at each new partner school site. Because the projects hit upon a variety of science disciplines, from chemistry to engineering, it serves as a way to assess the interest and skill level of the participants in a dynamic, engaging way. Featuring PVC marshmallow blasters, alka seltzer rocket explosions, squishy circuits, electronic take aparts, oobleck and giant bubbles, there is a little something for everyone, allowing us to capture our audience and set the tone for science fun.

Wildlife Gardens: A Partner Program

Developed in partnership with The Energy Coalition (TEC), the Wildlife Gardens program was a limited four class series at two of our library sites this year. Utilizing TEC Climate Action for Schools curriculum as a jumping off point, Wildlife Gardens is a project-based program designed to investigate the backyards of local library branches and then design a garden to encourage the proliferation of native plant and animal species in our neighborhoods. Students conducted a modified “bioblitz” to inventory what was currently living in these small outdoor spaces, then constructed habitat enrichment items like birdhouses and bug boxes to install with a variety of native plants they determined to be most appealing to the wildlife we were seeking to attract. After our rainy winter, these gardens have a head start at becoming a long-term benefit to the children and wildlife in these neighborhoods.



Storybook Science: Engineering by the Book

In this series, participants were tasked with engineering happier endings to favorite children’s books. The Engineering Design Process was highlighted as participants design, build and test their one-of-a-kind creations, improving upon their designs in iteration and discussing how their work applies to real world engineering challenges. Get-well goodies for grandma are delivered by zip line, Humpty Dumpty is protected from his fall inside custom cases, wolf proof houses are imagined alongside tower escapes and pumpkin-free carriages. Titles continue to be added to this growing library of fun and familiar challenges, expanding into other science disciplines this summer.



Teachers

One of the most important components of the SAfG program is our excellent teaching staff. SAfG wants to ensure that girls get the attention and encouragement they need during the classes, therefore we have a teacher to student ratio of no more than 1:8. Teachers send an email home each week after class to all parents to keep them engaged with what the girls are doing in class and encourage parents to continue the STEM fun and discussion at home. SAfG has some wonderful, nurturing teachers. They are truly the backbone of our program.

Sonia Rawal has worked with children for over 30 years. She received her early childhood teaching credential and has been teaching at Dandelion Co-op nursery school in Berkeley for nine years. She is a strong proponent of inquiry-based and project-based learning. She has been with SAfG for five years.

Rachel Anderson is a graduate of the UC San Diego, trained in ecology, behavior and evolution with a side of physics. She worked for three years in veterinary hospitals as an animal technician and practice manager and spent seven years as a science program coordinator for the Denver Zoo, designing, delivering and evaluating standards-based educational programs for children and adults, both in the US and in South-East Asia. She has been with SAfG for five years.

Charlotte Young is a graduate of UC Berkeley where she studied Microbial Biology and English Literature. She is a strong supporter of interdisciplinary skills and pursuing interests of all different types! Her field of interest has been primarily in medicine, specifically in Optometry and ocular diseases. She has also been a dance instructor for elementary school aged girls and ESL teacher overseas to medical professionals. Her goal is to encourage scientific exploration and lively classroom discussions. With each class she hopes to



share her passion and love for science with her students, and hope they come away with a fascination for the wonderful world of science. She has been with SAfG for three years.

Caroline Roma graduated from Tufts University with a degree in Biology and Environmental Studies. She taught science in Denver in middle school for five years. She is passionate about leading young girls to share her passion for STEM. In her free time she enjoys trail running, cooking with friends, and making jewelry. She has been with SAfG for two years.

Meredith Triplet received a Bachelor's degree in Math and Chemistry from Wheaton College and obtained her PhD in Physical Chemistry from UC Berkeley. Her research explored how proteins in our bodies communicate and make decisions. She engaged in science outreach throughout her graduate career by teaching kindergarten classes throughout the Bay Area about how our amazing bodies can fight against germs that make us sick. Meredith is passionate about science, and is excited to share that passion with kids and families. She has been with SAfG for 1.5 years.

Madeline Carpenter graduated from UC Santa Cruz with a degree in Sociology and a minor in Education. Throughout her career as a student and as a working professional, she has always been most passionate

about working on the issues that affect women and girls. Madeline is dedicated to making sure that every child in each of her classes feels welcomed and accepted so that they may go on to be confident and capable scientists (and/or consumers of scientific information)! Maddie joined SAfG in January 2019.

Leah King is a graduate of Barnard College, Columbia University with a B.A. in Africana Studies and a minor in English. She has 10 years of experience teaching music, art, dance, STEM and empowerment in afterschool programs in New York and Berlin, Germany.

Archa Shrivatsav is a former elementary school teacher who graduated from University of Illinois at Urbana-Champaign with a bachelor's in Elementary Education and a Master's in Curriculum and Instruction. She has taught at schools in Chicago and Oakland and is passionate about co-creating educational opportunity with those furthest from it. She believes science can serve as a powerful catalyst to engage young children in making meaning of their world.

Role Models

Our Role Model Program is another major component in helping SAfG reach its goal of keeping children engaged in STEM for the long term. Research shows that exposure to female role models in STEM early on can help change the way girls see themselves in the future. Our program invites female STEM professionals to visit our classes to discuss their career path, what they do, why they chose to pursue STEM, and why they love their work. We also allow time for our girls to ask questions to give them a better understanding of the role model. Our hope is that our girls can see themselves in each of these women and become inspired to also pursue STEM careers. Often times, it is the first time our students are exposed to careers in STEM. We aim to eliminate any stereotypes they may have of STEM careers and normalize the notion that women also pursue this path.

During the 2018-2019 school year, the following STEM role models volunteered their time to visit SAfG classes to discuss their career path and work on projects with our girls:

- Neerejha Nagarajan - Biocurious
- Melissa Kotterman - 4D Molecular Therapeutics
- Ana Echaniz - Bolt Threads
- Kaylee Walker - Amyris, Inc.
- Dawn Spelke - Diassess, Inc.
- Kate Thi - Lawrence Berkeley National Lab
- Jessica Buffington - UCSF
- Jody Witt - Grifols
- Kina Winoto - Sandia Laboratories
- Emily Davis - Pixar
- Amber Balestrieri - Clif Bar
- Kris Klotzbach - Clif Bar
- Sandra Kozma-Kennedy - SCS Global Services
- Monique Brown - Ross Stores
- Jan Sutchter - Scientific Learning
- Maggie Brown - Microbyre
- Caitlin Chapin - Stanford University



- Emma Hoch-Schneider - Berkeley Brewing Sciences
- Reema Mitra - PriceWaterHouseCoopers
- Susan Hilt - Grifols
- Erin Creel - UC Berkeley
- Anne Berry - UC Berkeley
- Lily Yen Yee - Mattel
- Raga Krishnakumar - Sandia Laboratories
- Brittany Sambol - Clif Bar
- Erika Utter - Industrial Data Associates, Inc.
- Lavanya Shukla - Dataland
- Nicole Ju - Ross Stores
- Shaunti Luce - Clif Bar
- Roxanna Vidal - Agenis
- Cheyenne Martins - Ross Stores

Near Peer Mentor Program

As part of the SAfG Program we also bring girls from middle schools and high schools to serve as “Near Peer Mentors” in the classes with our K-5 SAfG girls. This program provides a younger role model for the girls, as well as opportunities for the near-peer to sustain her interest in STEM and develop leadership skills. During the 2018-2019 school year we had eight Near Peers total serving several of our program sites, including after school programs at Anna Yates Elementary, Jefferson Elementary, Temescal Library, MLK Jr. / Lafayette Elementary and our drop-in library programs at Dimond Public Library in Oakland.



SAfG Program Evaluation Results 2018-2019

SAfG has three main goals:

- On an individual level: positively change the children’s’ attitudes towards STEM and STEM identity.
- On a programmatic level, engage the girls with a robust program that appeals especially to girls, especially Black Americans and Latinx peoples in the areas that we serve.
- On a community level, engage with the families and educate them on the importance of early STEM education by sharing handouts or emails summarizing each class with photos of their children in action.

SAfG's philosophy is to equip each girl with the following behaviors and skills, so that by the time she graduates at 5th grade she is prepared to stay engaged in STEM for the long-term. An SAfG program graduate will exhibit the following:

Behaviors/Attitudes

- She makes mistakes and understands it is okay and sees mistakes as an opportunity for growth
- She is persistent and determined to carry through a project
- She knows how to work within a group of people of different skills and personalities
- She is assertive and knows how to propose her ideas as well as listens to other people's ideas
- She knows that STEM is for women, too. She believes she can be a scientist or engineer.
- She has a parent who understands the importance of STEM and who knows how to access resources to support STEM learning



Technical Skills

- She is adept at using basic tools (screwdriver, drill, etc.)
- She knows how to present findings

SAfG administers written surveys to evaluate our classes by surveying the girls, their parents and their school teachers. SAfG's metrics serve two key purposes: to track progress towards the organization's direct impact and mission and to measure and document success. The design and modifications of SAfG's programs rely on such results.

2018-19 Outcomes: Girls

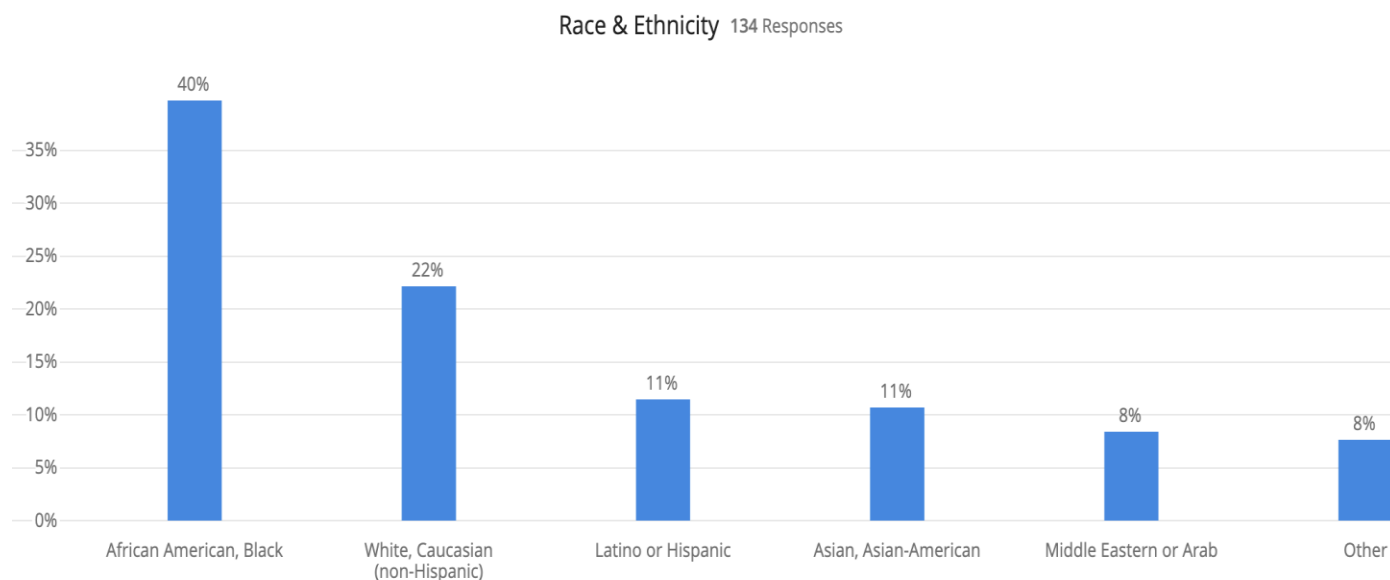
SAfG uses surveys developed by the PEAR Institute (Partnerships in Education and Resilience) which aligns with the data SAfG aims to collect: STEM-related attitudes, STEM Identity and Social-Emotional/21st. Century Skills that are highly correlated with achievement and interest in STEM including perseverance, critical thinking, and relationships with peers and adults. There are two different versions of the survey customized for age groups. The PEAR Institute recommends that only 4th and 5th grade children be tested on STEM Identity and Social/Emotional skills in addition to STEM-related attitudes and interest.



They recommend that children in Transitional Kindergarten through 3rd grade be given the survey which questions STEM interest as the other components would not be fully understood by the student and therefore the results would not be as valid. SAfG aims to conduct face-to-face interviews with 1 to 3 children at each site for classes in TK-3rd grades to gauge STEM Identity and Social/Emotional skills. With

respect to timing and frequency of the evaluations, the PEAR Institute recommends that students only be surveyed once in a school year at the end of programming.

Below is a distribution of the races and ethnicities of the girls we served this 2018-19 school year:



Demographics of SAfG Students:

Oakland Unified School District (including Emeryville): According to the Oakland Unified School District Strategic Regional Analysis, in recent years the school district has experienced demographic shifts reducing the proportion of African American students from 48% to 24%, while Latinx enrollment has grown from 29% to 46% since 2000. Many more English language learners (with Spanish, Chinese, Vietnamese, Khmer, Arabic, and Mam as home languages) are expanding in Central, East, and West Oakland. The number of newcomer students is rapidly increasing, including unaccompanied minors from Central America. Students eligible for Free or Reduced Lunch make up 75% of all students in OUSD district-run schools, and the percentage increases in the more disinvested neighborhoods.



In Emeryville, 44% of enrollment is African American; 24.9% is Hispanic or Latinx; 11% is Asian; 9% is White; 8% is two or more races; 1.5% is Filipino; 1% is Pacific Islander; and 0.1% is American Indian or Alaska Native. Seventy-five percent of the student body qualifies for the Free or Reduced Lunch program.

In areas SAfG serves, there are concentrated environmental stress factors: violent crime, unemployment, residential vacancy, high poverty rates, poor air quality, limited access to fresh food is limited and liquor stores may outnumber grocery stores.

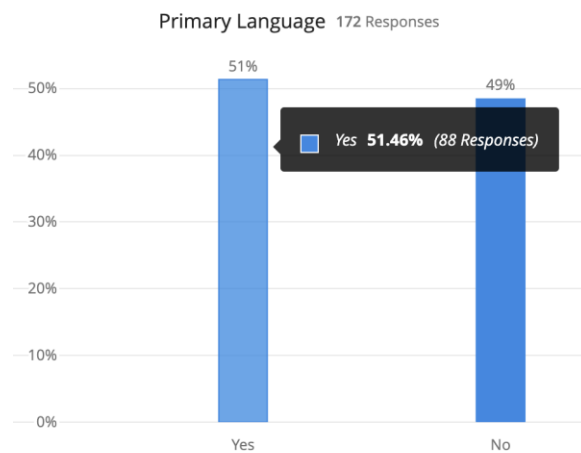
Berkeley Unified School District: According to the Berkeley Public School's website 32% of the student they serve are Caucasian, 24% African American, 21% Latinx, 15% Multi-Racial, and 8% Asian and 34.9% qualify for Free or Reduced Lunch.

San Leandro Unified School District: In the 2018 school year the San Leandro Unified School District was made up of a diverse population of students. According to kidsdata.org, 26.6% of students were English Language Learners (languages spoken as percentages: 19.3% Spanish, 3.3% Cantonese, 1.5% Filipino, 1.4% Vietnamese, and 1.3% Arabic) and 59.7% of parents were born outside of the United States. Latinx students make up the largest portion of students that SAfG is reaching in the San Leandro Unified

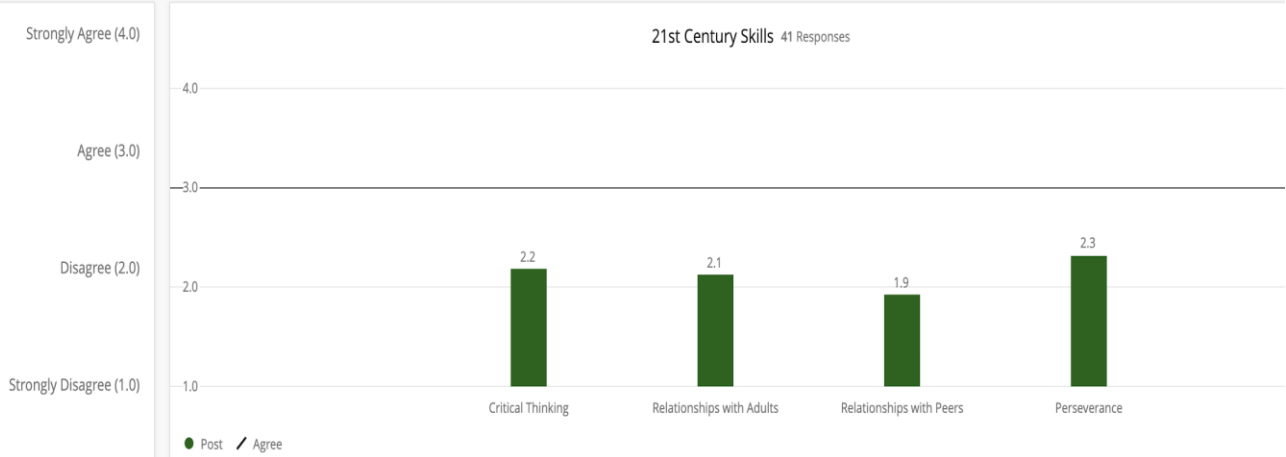
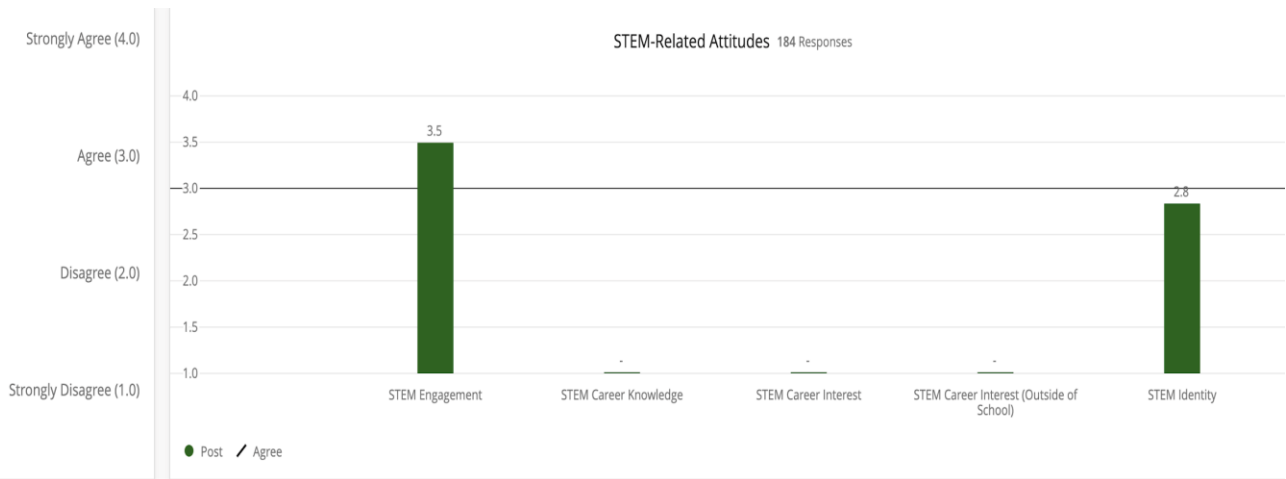


School District at 48%, with Asian Americans at 16.4%, Africans Americans at 13%, Filipinos at 7.4%, Caucasians at 8.6%, Native Hawaiians at 1.2% and American Indians at 0.3% and 63.4% of students were eligible for Free or Reduced Lunch programs. Additionally, like the Oakland Unified School District, in areas SAfG serves, there are concentrated environmental stress factors: violent crime, unemployment, residential vacancy, high poverty rates, poor air quality, limited access to fresh food is limited and liquor stores may outnumber grocery stores.

Below captures how many of the girls speak English as a primary language and those who do not:



Below are statistics on how SAfG's informal STEM programming impacted students' perceptions/attitudes towards STEM:



SAFG girls “engagement” in science scored an average of 3.5 out of a 4 point Likert scale (strongly disagree to strongly agree) leading SAFG to believe that the girls in the classes self-reported that they are very engaged in science.

One striking trend uncovered that girls who took the survey scored an average of 2.8 out of a 4 point Likert scale on science identity, i.e. do the girls see themselves as scientists or do their parents and teachers see them as scientists. While the interest science measures strong, the idea of the girls being a “science person” does not correspond. SAFG met its



original target to bring in female role models in various STEM fields to expose the girls to future career possibilities. However, one possibility for lower score on science identity is the strong gender and cultural biases in STEM amongst our African-American and Latino/Hispanic communities.

Finally, the surveys measuring how girls feel about their 21st century skills (critical thinking, relationships with adults, relationships with peers and perseverance) were directed to the girls ages 9 to 11 years as

recommended by the PEAR Institute. Most girls scored themselves an average of 2.1 (between disagree and agree) which SAfG would like to improve. These 21st-century skills are highly correlated with interest and achievement in science and illuminates how interventions in science education and kids' perception around 21st century skills, generally speaking, can be redesigned. SAfG will review how to modify their approach in the next school year to ensure girls perceive their 21st century skills to be stronger.

2018-19 Outcomes: The Parents

SAfG administers a survey with multiple choice questions asking parents to share their thoughts on the SAfG girls' interest in STEM as well as their social and emotional skills. We also ask parents to rate the quality of the program itself. Finally, SAfG asks how often they talk about science and SAfG projects at home, tracking whether or not parents read the weekly emails our teachers send in an effort to engage the families in STEM at home.

Additionally, SAfG schedules a parent orientation at the beginning of the class to outlay the goals and expectations of the class to try to have one personal meeting.

Based on this years' parent surveys, SAfG met its target of increasing the level of conversation and activity around STEM at home. **100%** of parents who took the survey reported they read the weekly email summaries that the SAfG instructors sent recapping what their daughters did and learned each week. **100%** of the parents also reported that the weekly emails inspired them to do similar projects with their kids at home. **81%** of parents reported that SAfG helped to increase their daughter's interest in science, and the rest reported they did not know.

"Thank you so much for all you've done to introduce the wonders of science to the girls. It's been a great experience. And what a fun way to bring it all together today at the carnival!" Kathleen Quinlan, Parent of SAfG student.

2018-19 Outcomes: The School Day Teachers

In Spring 2017, SAfG started sending an online teacher survey (multiple choice) to all partner schools asking teachers to share their thoughts on the SAfG girls' interest in STEM and their social and emotional skills as well as compare SAfG girls to the rest of the class. SAfG wants to track how its programming impacts the girls during the school day.

Based on the school-day teachers surveys, highlights include the following results:

- Over the course of the SAfG session, did you observe a change in your SAfG students' positive attitudes toward science? If yes, what kind of change? - **80% said all or most improved**



- Which groups of your students showed the greatest improvement in positive attitudes toward science (SAfG girls, non-SAfG girls, Boys, No Difference, I'm not sure?) - **78% said SAfG girls showed greatest improvement**

It is an SAfG goal to create meaningful partnerships and open communication between ourselves and the teachers at the schools that we work at, as we share the same passion for STEM and our shared students. Each school year SAfG asks the public school teachers at the schools where we host our program for feedback, as well as any changes that they may notice in their students after they have participated in an SAfG class. Here are a few outstanding quotes from these teachers:

- *"They LOVED the class! I love engineering and would love to bring in more engineering into the classroom as well"* -- Nicole Lamm, 4th Grade Teacher in the San Leandro Unified School District
- *"Giving students this experience has been powerful. In particular, providing access and exposure to our students of color and students with learning needs to me has been and always is a huge focus of social justice intersectionality among our girls"* -- Ashleigh Talbott, Kindergarten Teacher in the Berkeley Unified School District
- *"Thank you for providing these opportunities for our students. I know that my students were always excited to go to the program. I was impressed by the amount of different activities that the girls were involved in. It is very encouraging to see a program set for the advancement of girls' participation in the sciences. This program also definitely showed improved skills in group work and more drive to participate in class work."* -- Leonardo Reynoso, 2nd Grade Teacher at Anna Yates Elementary

SAfG School Year STEM Classes at Oakland Libraries

SAfG continued the third year of its STEM "Storybook Science" Library Program in coordination with the Oakland Public Library System. During the 2018-2019 school year, SAfG held 34 drop-in STEM classes at the Dimond Library, Golden Gate Library, Melrose Library, Elmhurst Library, Piedmont Library, and the Main Library. Most classes were held once a month for 1.5 hours, several classes were one-offs that were also 1.5 hours. Children and their families had fun doing design challenges based on some of their favorite books. There were approximately 650 participants attending these classes, including parents and caregivers. During the summer of 2019, SAfG is holding an intensive STEM library program each week at three Oakland libraries (Dimon, West Oakland and 81st Avenue libraries). As a special treat during the month of July, to celebrate the 50th anniversary of the Apollo moon landing, SAfG is offering a full month of "Space Science" including building straw rockets and constellation scopes and learning about and exploring the moon.

The public library is an opportune location for informal STEM education. As a long-standing location for informal education, public libraries are utilizing their existing resources as a foundation upon which to expand STEM education (*STEM Equity in Informal Learning Settings: The Role of Libraries, May 2016*). Libraries' roles are evolving to respond to the education needs in the communities they serve – going beyond the popular summer reading programs. (*Public Libraries and Effective Summer Learning: Opportunities for Assessment*). Libraries are well positioned to host a SAfG program for two reasons. First, for many communities, libraries are considered safe, inclusive spaces. Second, libraries serve as regular meeting places for children and their families throughout the school year and summer.

SAfG administers a short survey after each library class. Of the 187 children/families (30%) who completed surveys during the 2018-2019 school year:

- 116 stated that the class project was “Awesome” (highest choice on a 4-point scale), (62%)
- 134 stated “Yes” they would come to another class, and 50 said “Maybe,” (98%)
- 117 reported that it was the first time they had participated in an afterschool science class (62%)
- 94 participants were girls (50%)

We were happy to see that this school year, that 50% of our attendees were girls and that we are reaching children who have not had the opportunity to take STEM enrichment classes in the out of school space.

SAfG Intensive Summer Program at Oakland Libraries

This summer, SAfG continued its summer intensive STEM program, for the third year, at libraries in Oakland. This June and July SAfG offered fun, hands-on STEM classes once a week for eight weeks at three libraries (81st Avenue, West Oakland and Dimond Libraries) for a total of 24 classes being offered in June and July. We continued with our very popular “Story Book Science” curriculum that ties literacy and STEM together. In July we also combined it with “Space Science” to celebrate the 50th anniversary of the Apollo Moon Landing.

SAfG served 348 students and 259 parents/caregivers (607 in total) during these summer programs. Of the students surveyed, 84% of students recorded that the SAfG project was ‘awesome’ and 82% said that they would come to another class. 69% of students said that they had never taken an after-school STEM program before, indicating that SAfG has been a positive and important exposure to science programming to many of the students that we served throughout this summer. 81% of the students served this summer were of the elementary age, our target age group. 60% of the students were female identifying and 39% were male identifying. 78% of students recorded that they ‘love science’ and 71% had a positive image of themselves in relation to STEM and science, recording that they thought of themselves as ‘good at science.’



SAfG Family STEAM Nights

This school year SAfG reached approximately 750 children and their families at our Family STEAM Night events. These events were co-hosted by six of our schools: Sankofa Academy, Emerson Elementary, Anna Yates Elementary, Madison Park Academy, Washington Elementary, and MLK Elementary. Our goal for these events is to generate excitement in STEAM and encourage families

to partake in STEAM engagement at home. Our events consisted of hands-on, interactive STEAM activities for students and families to participate in together in a fun way.

The two themes SAfG offered were Sports Science and Carnival Science. SAfG provided 6-7 activity booths related to a theme. At our Sports Science night, our stations included: Dissect It: What's in a ball?, Beat It: Heart Health, Eat It: Food Is Fuel, Kick It: Perfect Angle Catapults, Win It: DIY Medals, and Spin It: Exploring Rotation. Our Carnival Science stations included: Why Can't You Win: Midway Games, DIY Marble Roller Coasters, DIY Ice Cream, DIY Airzookas, and How Many Licks to the Center of a Tootsie Pop. There were also several partner booths at each event, some of which were: Cal STAR, The Energy Coalition, and TEAM Inc. Each event was staffed by SAfG teachers, elementary school staff and parents and many corporate and industry volunteers from throughout the East Bay.

This year SAfG was able to collect 170 Child Surveys, 132 Parent Surveys with a total of 302 responses (40%).

- 56% of families reported that this was the first science event they have ever attended together as a family.
- 84% reported the event increased their interest in science.
- 69% reported the event made them think of themselves as a "science person" even more.
- 88% reported that the event taught them that it's not just simply knowing science facts that are important, but skills such as hard work, creativity, teamwork, etc. are just as important in science and math.

The feedback that we receive through our surveys provides us with invaluable data for understanding each of our schools individualized cultures. We can use this information to more carefully target the work we do, so that we engage as many students and their families as possible. In conclusion, the data we have collected indicates that, through our Family STEAM Night events, we have had a large and positive impact on several East Bay schools and communities. We will continue this program at seven schools during the 2019-2020 school year!

Special Daytime Classroom Collaboration at Anna Yates Elementary

In the summer of 2018, our partners in the Emeryville Unified School District reached out to SAfG for science support during the school day for grades TK-3rd grade for the upcoming 2018-2019 school year. For the fall trimester, SAfG staff worked with the 1st grade team to develop and facilitate a customized set of ten, NGSS standards-based programs around "States of Matter" to support student learning per the EUSD district assessment rubric. The two first grade classrooms continued with SAfG into the winter trimester, transitioning to our Storybook Science program, while we undertook developing a new set of ten, customized "Earth Science" programs around weather for the TK classroom. We finished out the third trimester with the 2nd and 3rd grade teams, bringing Storybook Science to three classrooms of eager engineers. Each trimester featured 50 minutes of hands-on, cooperative learning once a week for each classroom, significantly increasing the amount of science instruction for these students. Watching our after-school participants bring their SAfG experiences to bear, as these girls step forward and shine in their daytime classrooms, allows us to see the impact of our after-school programming on the school day.

While intensive, this type of collaborative program development is an intriguing path to facilitate deeper partnerships with our classroom teachers, while helping to support and expand science instruction throughout the school day. We hope to watch teachers integrate these units next school year and become a lasting piece of these classrooms in years to come!

Special Education STEM Class at Anna Yates Elementary

This past school year, Scientific Adventures for Girls worked with Anna Yates Elementary to provide a Special Education STEM session during school hours. This specialized session provided a space for a small group of up to eight students with specialized needs to explore their scientific ideas and thoughts. This small group dynamic provided each student with the opportunity to receive individualized support and one on one time with our SAfG teaching staff. The students learned from our Storybook Science curriculum, which focuses on scientific literacy and engineering. SAfG was grateful for the opportunity to work with these amazing children!



SAfG STEM Summer Camp at Emeryville Recreation

For the third summer in a row, SAfG partnered with the Emeryville Recreation Department to offer the STEM component during its 2019 summer camp. SAfG offered two full days of its popular “Storybook Science series each week to 150 children each week for eight weeks. Girls and boys had the opportunity to design and build foil boats, paper airplane launchers, dissect owl pellets, and learn about and exploring the moon, among other projects.

SAfG Partnerships

SAfG recognizes the importance of working together and collaborating with other organizations to make the most impact. We want to support all organizations working towards the goal of engaging more girls and boys in STEM. SAfG currently collaborates or partners with the following organizations:

SAfG partnered with Lawrence Hall of Science twice this year to co-host a “Sunday Funday” at the Hall, first in February to celebrate International Day of Women in Science and then again in June to celebrate the 50th anniversary of the moon landing. In October 2018 SAfG participated in the East Bay Mini Maker Faire offering a hands-on project for over 150 children. Finally, in July, SAfG is helping the organization Selfe-STEM round out a week of STEM camp for girls from 8-18 with two, hands-on STEM projects. These partnerships allow SAfG to extend our reach and teach others about the importance of Women in Science.

Type of Partnership	Who
Cost Share with SAfG	<ul style="list-style-type: none"> • Bay Area Community Resources • Emery Unified School District • San Leandro Unified School District • Berkeley Public Schools Fund • Parent Teacher Associations
Volunteers, Role Model, Teaching Assistants and Near Peers in SAfG Classes	<ul style="list-style-type: none"> • Institute for STEM Education at Cal State University, East Bay • Cal State East Bay Community Service-Learning • UC Berkeley • Techbridge Girls • Bishop O’Dowd High School • Industry and local STEM Professionals (50+ companies)
Community Partners offering shared Programming	<ul style="list-style-type: none"> • Lawrence Hall of Science • Oakland Public Library System • Emeryville Recreation Department • Energy Coalition • Cal Star • Team Inc. • Selfe-STEM • Chabot Space and Science Center and the Center for the Advancement of Science in Space • Sandia Laboratories

Exciting News for SAfG This Year

- SAfG won the East Bay Economic Development Alliance Innovation in Education Award
- SAfG is highlighted in the San Francisco Business Times (March 29, 2019)
- SAfG is featured in STEM Next's newly released white paper 'Changing the Game in STEM with Family Engagement'
- SAfG and the Institute for STEM Education at the Cal State University East Bay (CSUEB) STEM Institute partnered on the “Scholar Program” bringing CSUEB students to teach in SAfG classes.
- SAfG rolled out its Project Catalyst Program: Becoming a Biologist, partnering with industry in the East Bay to build and implement curriculum. Project Catalyst: Becoming an Environmental Scientist coming in 2019-2020 program!
- SAfG offered academic day STEM classes during the school year at Anna Yates, including a Special Education STEM class
- SAfG became a member of the Bay Area STEM Ecosystem and The Alameda County Office of Education: Alignment Bay Area to share its knowledge in the K-5th grade space.
- SAfG introduced new website as of May 1, 2019
- SAfG hired Volunteer Manager one day a week – quadrupling the number of volunteers in the classes and Communications Manager one day/week.
- SAfG released a new video highlighting its programs.
- SAfG is celebrating 5-year anniversary in 2019

Thank you to our Funders, Partners and Supporters!

In conclusion, SAfG's goal is to engage children, especially girls, for the long term in STEM. We are very proud of our work this past year engaging the children of Oakland/East Bay Area in science, introducing science concepts through hands-on activities that motivated them to take risks, to learn how to talk about science, to learn it is ok to make mistakes, to help them work as a team and overall promoted a joy of discovery, which is important for all future scientists! SAfG continues to grow each year and reach more girls and boys in the East Bay. In 2019-2020 we will be adding 4 new schools/programs. SAfG is also forging new partnerships in 2019-2020 to increase its impact. We want to thank all our wonderful, generous funders, partners and supporters for making SAfG a success! We could not do it without you!