The Community Science Workshop Network Story:

Case Studies of the CSW sites

February 2014

Inverness Research Associates

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Becoming a Networked Organization

Case Studies of the CSW Sites
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Excelsior Case Study

Fresno Case Study

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COMMUNITY SCIENCE WORKSHOPS

Excelsior Case Study

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Excelsior Science Workshop
San Francisco, CA
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I get to hang out with my friends and build things and use tools. I built a birdhouse for my grandma for Christmas. Today I'm building a wobble-bot.

~ESW youth participant

I. Excelsior Science Workshop site description

The workshop

At nearly 3,200 square feet, the Excelsior Science Workshop (ESW) consists of a former gymnasium, two side rooms, and a kitchen adjacent to a church in the Excelsior District of San Francisco, southeast of the Mission District. It is located at 35 San Juan Avenue, a residential street between a thoroughfare on one side and a bustling commercial street on the other. From the outside, it almost looks like another home, with a staircase leading up the side of the building to the front door. The four maples in front of the building are four out of five trees on the entire block. The Excelsior neighborhood is traditionally a low-income, underserved neighborhood, and is truly one of the most ethnically diverse neighborhoods in San Francisco.

The Excelsior Science Workshop is an expansion of the Mission Science Workshop. Dan Sudran, the founder of Mission Science Workshop (the flagship model for Community Science Workshops) and his staff had long wanted to serve the people in the southeastern region of San Francisco. As one of the lead educators at MSW and ESW described:

> *What has happened over time in the Mission District of San Francisco is that prices have been going up and its been hard for families to stay there… a significant amount of the low-income families in San Francisco and a huge percentage of the public school system comes from both the Excelsior District and Bayview/Hunter's Point, which are both in the southeast part of the city. And for those with free and reduced lunch, it's an even higher percentage.*

Furthermore, many of San Francisco's public services, even for youth, are focused on the center regions of the city, which leaves the regions on the periphery, such as southeastern San Francisco and Daly City, even more overlooked. As one MSW/ESW educator put it:

> *What's tricky is that so many of San Francisco's services, even for youth, very much center in the center of the city where it's appealing and close to*

> *transportation, and there's lots of fun cafes around near your office. It's easier to get investors to come hang out with you there. There is actually a very huge disparity. There are some amazing services out here but not nearly as many as there are in the center of the city.*

While all kids are welcome at Mission Science Workshop, it is simply a few too many bus rides for kids in these regions to get there.

So Sudran and the MSW staff began their search for a potential new space. Typically, the policy for new Community Science Workshops is that they should secure a free space as a way of demonstrating buy-in from the city. However, under Jerry Brown, the policy for California Redevelopment Funds put a freeze on nonprofits taking over any municipal spaces built with Redevelopment funds, which means most public buildings such as libraries and community centers. Due to these constraints and the unique real estate challenges in San Francisco, Sudran eventually widened the search to include spaces available for rent.

Around this time, Sam Haynor, one of the permanent instructors and outreach coordinators at MSW learned that the Excelsior Action Group, also located at 35 San Juan Avenue, was having their monthly meeting so Sudran attended and described what they were looking for. According to Haynor:

> *Dan said there was this phenomenal moment where people just starting pointing up to the ceiling at this space. It had just been an empty space that the church had rented to special use groups but it was too much for them to lock it and unlock it and provide for, so they were excited to have a group using it on a regular basis.*

When Dan Sudran first described the current location of ESW to fellow Network members, he had this to say:

> *We've found kind of a dream space at Excelsior and Mission, what we are calling the ESW, the Excelsior Science Workshop. The reason I say it is a dream space… it is not just because it is actually about 3200 square feet with a possible expansion space downstairs which has just been a junk room as we are getting ready… but it is at a crossroads for almost every single neighborhood in Southeast San Francisco. It is on a direct Muni [municipal transportation] line and within walking distance. It is an incredible convergence.*

The MSW staff negotiated to have all of the electrical in the facility re-done to meet the needs of a workshop and the church (Ocean Avenue Presbyterian) has reduced the Excelsior Science Workshop's rent by that amount. Renovation and remodeling of the space began in November of 2012. While ESW has been

providing programs to schools since January of 2013, the official grand opening of ESW was March 13th of 2013.

The ESW Grand Opening

On a Wednesday night in mid-March (the 13th) the turn-out for the grand opening of the Excelsior Science Workshop in District 11 of San Francisco was very impressive. At any one time, as many as 100 people gathered in the A-frame space approximately 60 feet long and 30 feet wide. John Avalos, the District supervisor, representing the Crocker-Amazon, Excelsior, Ingleside, Oceanview, and Outer Mission areas of San Francisco attended. The opening occurred on Avalos' birthday so the crowd sang and presented him with a cake. He gave a brief talk during which he described the importance of science and how ESW could encourage and support future scientists and engineers. After the cake, Supervisor Avalos sawed a piece of wood in half, to represent a ribbon-cutting ceremony.

The action was festive and felt carnival-like. Children and adults participated in hands-on activities with bubbles, speakers, generators, and played air hockey on a hand-made table, and played with various sound-making devices like xylophones. Children crawled through giant tubes of ducting material. They dissected owl pellets, played air hockey on a handmade table, and observed living animals such as sea stars. There was a photo booth and a film of whales playing. Samples of various rock forms were on a table. One man brought two Scarlet Macaws and drew the attention of youth and adult admirers. Two young men conducted an experiment on stage with liquid Nitrogen, which eventually made a loud popping noise.

Attendees, particularly residents of the area, were encouraged to provide feedback on the space and the event, and to make suggestions for the kind of programming they would welcome – from content and activities, to the days and times that programming would be most useful.

Supervisor John Avalos at the ESW Grand Opening
March 2013

In addition to Excelsior Action Group, other partners who were instrumental in championing the launch of ESW were John Avalos, the district's supervisor, his wife Karen Zapata, a social justice teacher at a neighboring school, and the Lisa and Douglas Goldman Fund, which provided a grant for $75,000. The Community Science Workshop Network itself received $25,000 in start up funds from the Gordon and Betty Moore Foundation, and purchased the equipment and tools for the maker shop within ESW, including hammers, screwdrivers, power-saws, and drills. They have also funded the purchase of computers, which will arrive at ESW soon.

Consistent with the model for Community Science Workshops, Excelsior Science Workshop has a wealth of tools, artifacts, specimens, instruments, and materials to promote scientific inquiry and creativity. Tables and interactive exhibits all located everywhere around the room. There is also a hand-made air hockey table, microscopes, a Van de Graaff generator, and tanks with aquatic turtles. What is not in place yet are computers for youth to use, and this has its advantages for promoting hands-on learning and exploration.

Staff and Programs[1]

The Manager of the Excelsior Science Workshop is Sol McKinney, an alumnus of and much-beloved educator from Mission Science Workshop. He is a highly skilled facilitator of science learning experiences and knows how to engage and motivate youth. McKinney began attending MSW in the early 90s, shortly after Sudran opened the program. Sudran said:

> *He was a student here in '92, the year after I opened and so he always tells the kids about that. He is the perfect person and he is also bilingual, his mother is Mexican and so he is always learning Spanish and he understands tough kids really well and he is good with tough kids. He has a lot of skills to get them excited – kids you would never think would get into science – because they see that he is kind of cool. He is cool geeky, not just geeky. The way he works and handles kids is really cool.*

One other instructor currently works 30 hours per week at Excelsior Science Workshop, along with one volunteer who is a Civil Engineering major at San Francisco State University, four high school and middle school student volunteers, and staff and volunteers from Mission Science Workshop.

Since its debut, ESW has offered an array of programming that benefits local schools, such as Monroe Elementary, and community members. During the school year, ESW offers approximately ten sessions per week of school day programming, during which teachers in the area bring their students to the workshop for an hour and a half, each session, and an enrolled afterschool program for children from the Boys and Girls Clubs. On Mondays during the school year, from 3:30 to 5:30, ESW hosts Tinker Time – a drop-in program free to anyone who wants to participate. As of November 2013, ESW began offering Family Science Drop-In events on the third Saturday of each month for five hours per session.

ESW provided a Whale experience for Monroe Elementary School on a day in the 2012-2013 school year. Outside of the school year programming, ESW provides a six-week summer program at the workshop for three hours a day, three days a week. In addition, ESW has had a presence at San Francisco Sunday Streets and Science in the Park events.

Even having been open for less than a year, as of the writing of this report, ESW has provided well over 730 session hours and hosted over 3700 visits for nearly

[1] A statistical portrait that includes select ESW program attendance data is appended to the end of the Mission Science Workshop case.

2000 distinct individuals – with only one full time and one part-time instructor (who had a serious bicycle accident and was not able to work as many hours as he had hoped).

Participants[2]

The majority (close to 70%) of the participants in ESW programs are between eight and 12 years old. It is believed that the ethnic split among various ESW programs is similar to those of MSW's, and that the demographics for the school programs would largely reflect those of the surrounding elementary schools.

II. Contributions of Excelsior Science Workshop

Experiences of and benefits to youth

As with other Community Science Workshops, the Excelsior Science Workshop provides many benefits to the youth who participate in its programs, including a safe place to explore and use tools, a place to develop social and cooperative skills, a place to apply their design thinking, and a place to enhance their content understanding and confidence in STEM.

When we asked one girl what her favorite thing was about ESW, she said:

> *I get to hang out with my friends and build things and use tools. I built a birdhouse for my grandma for Christmas. Today I'm building a wobble-bot.*

This girl is a 4th grader at a neighboring school and was introduced to ESW through a class field trip. She has been visiting regularly ever since – on about five Mondays in a row.

[2] A statistical portrait that includes select ESW participant data is appended to the end of the Mission Science Workshop case.

Two girls build wobble-bots

One teacher who first came to ESW when she brought her class told her own children about it and they had to see it for themselves. This teacher said:

> *I love how free-form it is. It lends itself so well to kids' natural way of being. I just knew they would love it. They love the Exploratorium too but for them, it's so much reading and there is really just one way for them to do things. Here they can choose so many different things and explore and really get into it.*

A mother said:

> *I could tell when we got here that she was completely fine without my help.*

Another mother said:

> *I love it here. The kids don't even know they're learning. This is a good safe place for them to be independent.*

One instructor said:

> *It's hard sometimes because I want to help them and I know they don't need it.*

Tinker Time

On a recent Monday afternoon at 3:30, Tinker Time – the once-weekly drop-in science time at Excelsior Science Workshop – begins. Two boys rush in the door. One says, "Oh yeah, Sol's back!" The other says, "Sam, you're here too!" They throw down their backpacks (with such urgency that one boy's cell phone falls out and comes apart on the floor) and grab two squares of wood they have been working with. These pieces are about 1 inch thick and two feet by two feet. They position them at angles. As I approach to ask what they're working on, one boy, Jimmy, asks me without hesitation, "Will you hold this right here?" So I hold it and he immediately begins to hammer the pieces together. As Jimmy tries to nail the edge of one board onto the other, the nail simply pushes the other board away. He experiments by holding the two boards together in a different way. But the nail still pushes the other board away. His partner Seth comes over: "no, don't use a nail… you want to screw the pieces together… the screw is stronger and will work better."

Jimmy tries to extricate the nail from the wood using the hammer but it's not budging. "How do I get this out of here" he asks – of no one in particular. I don't say a word, still holding the other board for him, and he continues at it, eventually finding the leverage and purchase he needs. Without further ado, he grabs a screw and a drill. I manage to ask again what they're working on and they tell me it is going to be an 'animal habitat' for Seth's lizard, who he has had for three years. Seth says, 'It's not going to be where he lives but where he can spend time when he is active… like a lizard playground.'

The boys manage to drill one screw into place, now holding the edges of the board together. An ESW instructor asks about their design. They explain they will eventually have three boards screwed together. She asks, "what about the fourth side – and the top and bottom?" They look at each other. They puzzle over this question and debate amongst the two of them the merits of having six sides made of wood, versus four sides made of wood and two made of plexiglass, versus five sides made of wood and one made of plexiglass. They discuss the implications of the design for the lizard's warmth, comfort, and viewing pleasure. Eventually they settle on having four sides made of wood and two sides made of plexiglass, to form a cube.

They move on to the next step, which is screwing a third board in place but then they discover that the edges are not flush – in fact, the boards are not straight at all, they are warped, so they do not meet squarely. The same instructor is still observing. She asks them, "Have you guys worked with clamps yet?" Seth says, "clams?" "No, clamps" the instructor repeats. "I'll get some for you," she says. She returns with two long clamps and helps them to situate the clamps to secure the three boards together. As the boards are clamped together to form a tighter seam, one of them snaps slightly at a knot: "we can fill that with wood glue" the group decides.

Within a half hour, the boys have measured the lengths of the edges, marked off even distances between screws and assembled their three pieces together. Eventually their parents arrive to take them home and they must gather up their belongings – they have run out of time. The instructor reminds them to put everything away so they clean up their supplies, returning their tools to the appointed areas and store their animal habitat in a back room. They will pick up their project again next Monday.

On surveys that students completed at each of the sites, those from ESW were overwhelmingly positive about their experiences. It is obvious that the resource-rich site itself helps to promote the use of tools, creating and building projects,

and designing and conducting investigations. Eighty-three percent of the ESW student respondents strongly agreed with the statement "I can use tools," 92% strongly agreed with the statement "I like making projects," 92% strongly agreed with the statement "I like doing experiments," and 83% strongly agreed with the statement "I enjoy doing science."

Clearly, students also simply enjoy spending time at ESW. Ninety-two percent of ESW student respondents strongly agreed with the statement "I have fun at the ESW program," and 83% strongly agreed with the statement "I would like ESW again or more often." Students' experiences at ESW seem to have increased their perseverance and made them hungry to learn more. Sixty-seven percent strongly agreed with the statement "I can create new things," 83% said "I like to make things and find out about stuff," 75% strongly agreed with the statement "I have my own ideas about things I want to make," and 67% strongly agreed with the statement "there are things I want to find out more about."

Extended benefits to youth, families, young staff and community

A true community approach to supporting and nurturing youth: As we have noted across the sites, Community Science Workshops provide alternatives for youth who may not have other options for spending their free time constructively. On a recent visit to ESW, one mother said:

> *I wish my son who is going to be 16 on the 12th could have experienced this. He has ADHD. This would have done him a world of good.*

We reminded her that people of all ages are welcome at ESW. She said she would bring him when he completes his rehab program.

A mother and daughter create bubble sculptures

On this same visit, three mothers and two fathers were present helping any child who asked for help – not just their own children. In fact, in many cases, children sought out the advice or assistance of adults who were not their parents.

III. Capacity and capacity building, sustainability

It is difficult to believe that Excelsior Science Workshop has been in operation for less than one year – it looks like a very mature site, in the true CSW sense, which is to say everything is being constructed and deconstructed at the same time. It doesn't look brand new and it doesn't look old and static either. One mother said, "I can't believe I didn't know about this workshop until a few months ago!" not realizing it had only been open to the public for a few months.

It is a testament to the capacity of the Mission Science Workshop leadership and staff that they could so effectively transfer their successful practices to a new context in such a seemingly seamless fashion. There appears to be a true collaboration between MSW and ESW to the extent that staff members (even the cleaner) easily float between locations, depending on their availability and the needs of the program. The early success of ESW is also largely attributable to the success of MSW. MSW's successful partnerships with schools within San Francisco Unified fostered ESW's partnerships with schools such as Monroe Elementary, Bayshore Elementary, San Francisco Community School, and Mission Education Center. As teachers have brought their classes to ESW, they

have in turn brought their own children to the workshop, while the students in their classes have in turn brought their families to the workshop. In that sense, there is a very high return on investment for the school programs as they lead to even greater exposure of the workshop and numbers of visitors to the workshop.

Exposure to lenses

Funders such as the Lisa and Douglas Goldman Fund, which was a backer of MSW was convinced enough of the value to extend their funding to ESW, when they typically only fund projects for one year. Other partners such as the Excelsior Action Group, the Ocean Avenue Presbyterian Church, the Boys and Girls Club, and San Francisco Unified School District have contributed and will continue to contribute to the sustainability of ESW.

IV. The Role of the CSW Network

The Community Science Workshop Network has been very helpful in providing equipment and expertise to the Excelsior Science Workshop as it starts up. The Manager and permanent instructor are both staff from Mission Science Workshop who officially still report to Sudran. Other instructors, volunteers, and consultants from MSW also contribute their time to ESW. MSW and the Network have been sources for equipment, specimens, exhibits, and curricular ideas. As has been seen in other new CSW sites, the collective Network history, track record, and reputation has provided some heft when leaders are negotiating with important stakeholders.

The Maker Space at Excelsior Science Workshop

The professional development or "all-staff trainings" as they are referred to within the Network continue to be valued. As one MSW/ESW instructor said:

> *For me personally the trainings are so big. The best part of the trainings for me is just seeing everybody and talking and chatting. It's the feeling that you are part of a movement or a bigger thing… more than just one place. So that's special. The trainings have been tremendous.*

The curriculum that the Network has documented, curated, and assembled online has been tested and is well-written – this has served as a major contribution to ESW and all of the Network sites. As Haynor said:

> *There's a lot of stuff out there on the Internet. What I've learned more and more and what I really appreciate about the Network site is that there is the credibility… that you have to have done a project with kids, and experimented with it and done for a bit before it gets loaded up there… which I really appreciate. And they are very well written. The quality is so high. A lot of times I find on the internet that people just repeat the same projects that they just read somewhere else, that they may not have made themselves. And then actually trying them, I realize "oh, this doesn't work."*

Another way in which the Network has contributed to all sites, and particularly new sites such as ESW, is to encourage them to create their own individuality and spirit, based on local contexts, without forcing them to conform to a overly-specific prescription – while still providing a sort of common identity. As he reflected on the Network expanding to even more new sites, Haynor said:

> *When we get beyond the point where it's easy for us all to meet up all the time… Right now, it's at a community level and I know everybody, but it might get to a point where it will be even more important to have some common core stuff that we have, like curriculum. I really appreciate that about the relationship the Network has set for itself. It isn't a corporate logo stamping… It's sort of a cheerleader for everybody.*

Overall, McKinney and the MSW/ESW staff have insured that the Excelsior Science Workshop site is well-organized and drawing a steady, consistent group of youth through class field trips, afterschool programs, including those with the Boys and Girls Club, and Drop-In programs on Monday afternoons and the third Saturdays of every month. Along the way, conversely, the lessons learned that the Network observes through the development, launch, and ongoing maintenance of the Excelsior Science Workshop will be important for articulating and refining their practices for bringing on new sites.

COMMUNITY SCIENCE WORKSHOPS

Fresno Case Study

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Fresno Community Science
Fresno, CA
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They take field trips in the summer time and they help with the homework and my sons are always over here building stuff… the staff are so helpful and it is a great place for my kids… I work a lot of hours also and I am gone like 10 hours a day, but the boys, they can come over here and it keeps them busy and I don't have to worry about them.

~Mother of 3 workshop participants

I. Fresno Community Science site description

Fresno Community Science refers to a multitude of programs including a main workshop space for drop-in programs and a central administrative space, science resources and activities that are brought into schools in the Fresno area, afterschool programs at public and private schools, family activities, environmental science camping trips, and a mobile science workshop that drives to communities within and around Fresno to provide hands-on science experiences for families who can't come to the workshop. The Fresno Community Science workshop itself is located in central Fresno, just west of Highway 41, in Granny's Neighborhood Park.

Located in central California, Fresno is the fifth largest city in the state and serves as the financial and commercial center of the San Joaquin Valley, a region known for its extensive agricultural economy; in fact, it is known as 'the raisin capital of the world." The population of the city of Fresno hovers around half a million but the neighboring areas are home to another half million residents, to bring the total population of the county close to a million. Over half of the residents are Hispanic or Latino and of those, 85% are Mexican. In 2008, the median household income was $44,552. Approximately 20% of residents have less than a 9th grade education. Another approximately 20% of residents have completed high school or obtained their GED. Yet another approximately 20% have had some years of college but not obtained a degree. About 7% have obtained an associate degree and about 13% have obtained a bachelor's degree.

Fresno Community Science has been serving the city and surrounding areas for almost 19 years. They began providing programs in 1994, from a small office space in Dickey Playground, adjacent to the Chicano Youth Center (CYC). At that time, the then- and current director of Fresno Community Science, Manuel Ibarra Hernandez, was Vice-President of the CYC. Hernandez is an electrician by trade, and has substantial experience working with youth and garnering community support for youth advocacy. As a result, within a short time, Hernandez was able to mobilize sufficient support for the work to move to a

larger permanent site, which remains the central hub for the Fresno Community Science activity today.

The Workshop

The Fresno Community Science workshop is located in a low-income neighborhood of primarily African American and Latino/Hispanic residents. The director reported that, "the gang activity is always there. They are always recruiting, always" yet sometimes the feeling in the neighborhood is relatively peaceful; at other times, there is significant tension and violence. There are youth who live in the nearby neighborhood who walk to the workshop, while others are driven to and from.

A chain-link fence surrounds Granny's Neighborhood Park, where the doublewide trailer that houses the Fresno Community Science Workshop is located. There are two doors to the workshop, accessible via a short set of stairs or a ramp. Signs on the exterior of the trailer and on the van that are often parked outside say "City of Fresno Life and Environmental Science." Upon entering the workshop, visitors encounter worktables, counters, tools, machines, and exhibits. The youth are expected to sign in before participating in the drop-in programming, but there is no fee and youth can come and go during open workshop hours. Most of the workshop is space dedicated to working with tools and projects; there is also a small percentage of space dedicated to exhibits, models, and projects that staff and children have built.

Staff and Programs

Manuel I. Hernandez remains the director of all of the Fresno Community Science programs, usually working well over 50 hours per week. Veronica Cortez works part-time as the assistant administrative coordinator for those programs, as well as a substitute instructor/educator. At the workshop site (referred to simply as "Granny's") Jose Sandoval serves as the coordinator, managing the day-to-day operations. Hernandez oversees seven staff members who work as informal educators at the workshop and provide science programs at school sites. Each of these educators hold positions that are officially 30 hours per week; however, between working at the workshop during drop-in hours and at school sites, as well as participating in field trips and community events, the educators usually dedicate close to 40 hours per week of their time. Hernandez is the only staff member funded through the City of Fresno; the other staff are all paid through contractual arrangements with schools and grant monies. The Granny's workshop is also often supported by student interns. What is notable about the work of Fresno Community Science is that the staff work together to build the capacity of the site as a whole. Hernandez, in particular, works to ensure that

staff are well-prepared to take on a variety of potential roles, thereby guaranteeing that they will have the capacity to sustain this work in the future.

Through Fresno Community Science, this staff of ten provides a range of programming for youth and the communities throughout the city and in some surrounding areas. In 2012-2013, the drop-in program (available six hours per day, five days a week) at Granny's alone was visited approximately 5,000 times by 250 individual visitors and provided at least 1,500 program hours. After-school programs are offered at seven locations, including public schools overseen by the Fresno County Office of Education (FCOE), which covers the rural areas surrounding Fresno, Fresno Unified School District (FUSD) and Clovis Unified School District (CUSD). In addition, Fresno Community Science has partnered several private nonprofit groups to provide afterschool programs in other settings. Overall, Fresno Community Science provides at least 80 afterschool sessions per year for an annual total number of afterschool program hours of 160.

A key component of the Fresno Community Science's offering is their school-day program, which sees staff providing hands-on science lessons for seven schools (Forkner, Carver, Kratt, Gibson, Starr, King, and Webster) within Fresno Unified School District. These seven schools are not the same as those that benefit from the afterschool programs, extending Fresno Community Science's reach even further. The program runs all day in schools, two to three days per week, depending on the school, for a total of 720 program hours a year. The purpose of these programs is to serve schools that are not able to support a science program. Educators from Fresno Community Science collaborate with the classroom teachers to plan hands-on, creative lessons that support and enhance the teachers' existing curriculum and align with the necessary standards. Importantly, the Community Science educators do not replace the classroom teachers – the two of them genuinely work together and the classroom teacher assists the Community Science educator with the science lessons, activities, and projects.

In addition to drop-in, afterschool, and school-day programs, Fresno Community Science offers an impressive series of events. They offer eight four-hour sessions of summer programming through the Migrant Education Program, and they have a presence at several community happenings sponsored by the city of Fresno and Fresno County, and located within the Central Valley. Throughout the year, particularly during the winter and summer breaks, Fresno Community Science organizes immersive environmental education opportunities: they host water and paddleboard camps at the San Joaquin River and River Gorge, and they host camping trips through the California State FAMCamp program on National Forest and Bureau of Land Management property in the Sierras, at Shaver Lake, San Simeon, Camp Fresno, Camp Edison, and DovaBella.

Participants

Fresno Community Science estimates that they have approximately 6,250 visits to their drop-in programs at Granny's per year. These youth are approximately 40% girls and 60% boys. Half are between the ages of eight and 12; and 30% are 13-16 year-olds. Approximately 50% are African American and 40% are Latino/Hispanic, with the balance being of Asian, Caucasian, and Native American descent.

The demographics of the students reached through the school-day programs of Fresno Community Science vary dramatically. For example, the students served through the school-day programs at Forkner Elementary, which is on the north side of Fresno, are primarily (~80%) Caucasian, while those at Carver Elementary, which is on the west side of Fresno, are mostly (60%) Latino/Hispanic and African-American (30%). The ethnic split among students reached through the afterschool and summer programs is also varied; however it is slightly closer to that of the west side (primarily Latino/Hispanic and African-American).

II. Contributions of Fresno Community Science

Experiences of youth

On the whole, Community Science Workshops provide opportunities for youth to spend time in constructive ways in comfortable, safe, and motivating environments – and Fresno Community Science exemplifies this tradition. The drop-in program at Granny's draws a steady crowd of repeat visitors. Youth we observed participating were relaxed and engaged with the projects and staff, in part because they had been coming to the workshop on a regular basis for several years. The workshop clearly provides a safe and comfortable environment in which children and young adults from the neighborhood can spend their free time, without being overly constrained by rigid expectations. One participant said:

> *You can decide whether you want to walk around and look at things or sit down and pay attention.*

Youth participants appreciate the freedom they have to explore, observe what the staff and other participants are doing, and enter into a project when they are ready. One participant said:

> *You can usually just sit down and watch what they [staff or other participants] are doing and try to make things.*

At the same time, the workshop challenges participants because it introduces them to tools and phenomena they may not have experienced before, and can introduce design limitations they must contend with. The projects encourage participants to persevere through challenges and frustration. Two male participants described two of their favorite projects -- "the rocket" and "the boat." Both of these projects were described as being somewhat complicated and challenging, but the boys seemed to appreciate this, or at least not be intimidated or overwhelmed by the challenges. One of them said:

> *My favorite project so far would have to be the boat. I like it because you can put it in the water and it just goes… Connecting the battery to the circuit, and the motor to the battery with the circuit, it wasn't frustrating… I can't say it was easy... it was a little complicated.*

Because these design challenges prompt youth to be determined and persevere, it is not surprising that it is often the process that is emphasized, rather than the product. Kids we interviewed were able to describe in detail the previous projects they had created, and importantly, the process they went through to complete their projects. Youth and their families take a great deal of pride in what results from the creativity and perseverance that happens at the workshop. There were two striking examples of this during our visit. One family we interviewed described a project the two boys in the family had undertaken at the workshop: they welded two bikes together to make a double bike. The mother said:

> *It was cool, they were riding it up and down the street. The back person was pedaling and the front person was steering.*

Then a staff member told the story of a duct tape canoe-building experiment that required curiosity, enthusiasm, and persistence:

> *We had a group of girls who wanted to design a duct tape canoe. Their interest was sparked from going on canoe trips and then Jose mentioned that we could use duct tape to make a few things… I think it was just a crazy idea that they had seen on Myth Busters or something, and they asked,' is it possible, can you make a duct tape canoe?' Jose told the girls, 'You let me know of the design that you are*

thinking of and we will look up ideas' and they worked on it for days and days and weeks and weeks. And they took it out and they tested it in a pool nearby to see if it was working, made some adjustments and they took it out to their camping trip and it worked. They made duct tape paddles. They were so, so proud of it.

Youth and their families value the opportunity participating in the drop-in program provides for them to be introduced to scientific phenomena. The youth we interviewed were able to remember and describe a range of science-oriented learning experiences they had at the workshop:

One time he had a snake there… it took a long time for the snake to eat his food and the snake shed his skin like 3 times, but that is like the life cycle of an animal.

We made something out of cornstarch and water, and when you touch it fast, it feels solid. It is solid and liquid… Because all of the little particles in there, they just lock in place, but when you put your finger in there slowly, it just sinks to the bottom.

We learned about different things… Like what stuff is made of and what kind of chemicals are in soap. And chemical reactions and different atoms and particles...

It is fun here because you get to make stuff and learn about new things like how to make something, know what a circuit is, and know how to connect a circuit and to make a light light.

Youth have very positive relationships with not only their friends and siblings at the Fresno Community Science workshop but also with staff, and experience a sort of reciprocal-mentoring situation. These workshops provide opportunities for young adults to benefit from the guidance of older mentors and to develop their own leadership skills, working as mentors. The day we observed, eight participants, mostly middle school aged African American boys and girls, who were coming and going in the workshop, worked on Halloween-themed projects. They installed lights for eyes into small bat and pumpkin models. Later in the session we observed a 13 year-old boy helping a younger girl with installing her lights. Youth and parents see this as a key feature of the workshop. In general, staff members working with youth have a relaxed yet focused banter with the youth participants, where it was clear that the adults had control of the tone of the workshop, but also clear that the youth were respected. Youth like the staff because they "are funny and playful." As one youth participant described, the combination of adult staff and science make the workshop worthwhile:

If there were no Manuel, no Jose, no science… I wouldn't stay.

Extended benefits to youth, families, young staff, and community

The workshop is a place where modeling respect is a priority: The feeling of mutual respect between staff and youth is as important to staff as it is to youth. Staff commented on the importance of prioritizing the building of mutual respect between staff and youth and the larger community:

> *We have high schoolers that we watched when they were in middle school -- we saw how they interacted with each other before they came here. Once we are around them, I feel like they even have a little bit more respect towards one another. They see the relationships that we have with our co-workers and we have with them and we respect them. We will give them respect and usually, we will get it back.*

The workshop is a safe haven for neighborhood children to spend their time productively: The families we interviewed were grateful that the Fresno CSW provides wonderful experiences for youth after-school, and reported that there aren't other organized activities for youth after-school in what is sometimes a violent neighborhood. Youth we interviewed said if the workshop were not there, they would just be playing outside, or they would be at home looking after younger family members. The working mothers in the neighborhood have few alternatives for keeping their children safe, and knowing where their children are afterschool, other than the Fresno Community Science workshop. One mother commented that the Fresno CSW has kept her in the neighborhood:

> *I have actually considered moving and the reason I didn't want to move, was because of this. There are a lot of bad things happening in the neighborhood and it keeps the kids away from that. I know that they can come here and go straight home. I don't have to worry about them being here, because there is a lot of violence out there….*

The workshop is a place for open-ended exploration and creativity: The workshop provides a space that allows youth to explore things they are curious about in a way that is difficult for schools to do because they are constrained by multiple factors. Staff members noted how the workshop encourages youth to think outside the box. As one staff person said:

> *The more you work with them, you start to notice that they open up and they are no longer thinking in a box... they are actually developing and thinking. They start to know how to use these tools and they start to get creative and that is when their ideas start coming in. That is just wonderful when they start to become creative and start to use the name of the tools and start to want to open up, without being afraid of being wrong.*

Youth participants like that the workshop is "less boring" than school, but they also like that what they learn at the workshop connects to the science learning they do in school. They said:

> *I think that [being at the workshop] helps me more in school and it helps me to pay attention more and to know more things.*
>
> *I think the science workshop is like a place for kids to connect and learn new things and apply what they have learned here to school.*

The workshop provides access to tools and training in how to use them: Perhaps most importantly, in neighborhoods with apartments and no garages or tools to work with, and in homes where father figures are sometimes in short supply, Fresno Community Science offers both space for youth to not only work with tools and build things, but to do so under the guidance of caring adult males. As one mother noted:

> *They learned to build things here and they are more into like working on things, and these are things that I can't do with them at home, because there is not a father in the home first of all, and we don't have a garage, we live in apartments and they don't have access to workshops… Manuel is real good with them, real good.*

Fresno Community Science is making major contributions to youth and administrators in the school setting: Youth are having equally positive experiences in the school-day programs that Fresno Community Science runs. We observed two Fresno Community Science educators implement activities at two different elementary schools – one activity about the water cycle and one about changes to the Earth's surface that was a follow-up to a previous lesson about weathering and erosion. The instructors facilitated structured lessons; they talked about science content early in the lesson, and then had the students do a hands-on activity that in both classes we observed, had multiple steps that the students all did at the same time. The overall tone of the lessons was interactive and engaging: the students were asked questions; they were called "scientists"; and the instructors referred to previous discussions of the topic and built on previous relationship with the students.

Student at Forkner Elementary observing her volcano project

The school-day program staff we interviewed reported seeing improvements in participants' confidence over time. Students are learning that it is okay to make mistakes, to backtrack and figure out where their project or experiment didn't work out as they had planned, and that having "wrong" answers is one way that scientists learn. One Fresno Community Science educator said:

> *Now in the second year of doing the science lab, now they are more open and they don't care if they mess up, because they think if they do something wrong, that they could backtrack and maybe fix it…*

Another educator noted how over time, the students in the school-day science program change their thinking about seeing themselves as makers:

> *There are times where kids come into my classroom and they are telling me that they want to be a geologist or about a new project that they are putting together at home or that they didn't know they could make their own toys. They start to become more aware of the materials they have, and that is when I realize that they are thinking. They are getting creative and they are developing more interest in the subject.*

We conducted an informal interview with the principal of Forkner Elementary School. He reported that Fresno Community Science is providing a much-needed service: that of augmenting mostly textbook-based science learning with hands-on lab experiences. He reported that although some teachers were resistant to having the added science component (they thought they were having "even more added to my plate"), they soon learned that the students were much more excited about science; some teachers even complain now that they do not get enough time with Community Science educators. The principal said that the teachers are expected to co-teach along with Community Science educators, and that "the teachers love being in there too. They have fun also." Forkner Elementary also participates in Science Olympiad – and one of the Fresno CSW members is their coach. The Forkner principal said:

> *Our district is lucky to have someone to partner with like CSW. Because really [without it], I don't see at this point how science would be [happening] here.*

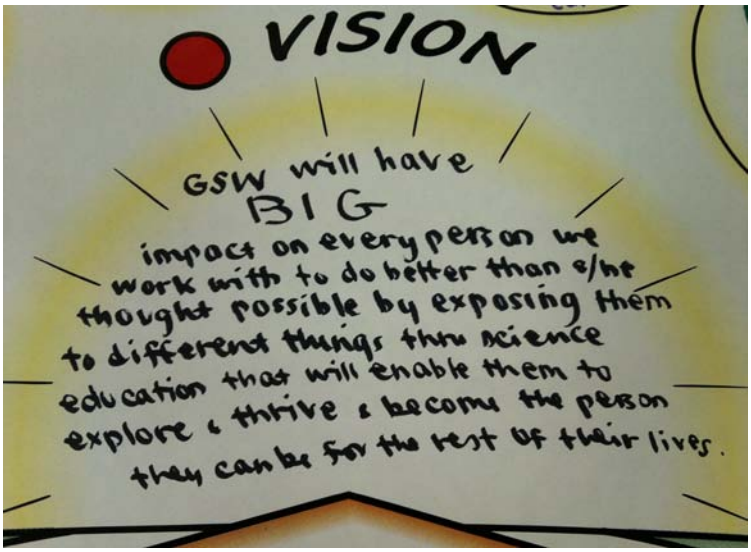
The Fresno Community Science programs influence career choices of staff: Young staff members from the Fresno Community Science program report that it has influenced their career paths. Particularly in places like Fresno, where repeat participants are the norm, there is a multi-generational dynamic of children coming to the workshop as participants, then as helpers, then as staff, as leaders, and even as potential site directors. As two Fresno staff people reported:

> *I have been switching my career path, the degree that I want. I started actually with forensic evidence and I wanted to be a lab technician and then around that time I started working here and I realized how much I really do like working with the students.*

> *I was going to school to be a psychologist and when I started working here, I changed my career to liberal studies and now that I am doing the morning sites, it is making me more aware of how much I enjoy teaching science and I am hoping to get my masters in science and so I am able to teach maybe a workshop lab at a middle school. It has pretty much changed my career path.*

As the director of the new Sanger site noted:

> *Our staff are young people looking at careers ahead of them, at the university and credentials in science and engineering – they stopped to work with us because it was a part time job that fit into their school schedule -- who are now asking 'Can this be a real job?' They want to make a career out of this, because they see the value in what we do. So here is another piece of evidence to show that we have an effect on not only the youth as learners, but also our staff as learners who have been empowered by working with us who not only have clarified their vision for the future, but not want to be part of the future of what we do…*



Vision for Granny's Science Workshop

III. Capacity, capacity building and sustainability

In addition to the strong partnerships that the drop-in, school-day, and afterschool programming has afforded Fresno Community Science, it has had a multitude of other partners since its inception and it continues to attract support. Recent partners include: the National Science Foundation; California State University, San Francisco; California State University, Fresno; City College of San Francisco; Fresno Unified School District; Fresno Police Department; Fresno City College; California Department of Fish and Game; Joel M. Murrillo, Attorney at Law; Central Valley Science Project; Watsonville Environmental Science Workshop; Fresno United Neighborhoods; San Joaquin River Stewardship; the Tinkering Network; and the CSW Network. Hernandez has also received support from local small businesses and the Fresno Bee newspaper. These groups have contributed financial resources, food for field trips, equipment and supplies, or time and expertise. Importantly, Dr. Jose Luis Bautista has been a major benefactor, providing financial resources, as well as time, expertise, and even moral support.

The City of Fresno partnership provides Fresno Community Science with the actual facility for the drop-in program, the use of City vehicles, and funding toward salaries. In exchange, Fresno Community Science provides programming for the City youth who come to the workshop and for those that participate in the community events and environmental science field trips. In two local school districts (Fresno and Clovis Unified School Districts) and for the Fresno County Office of Education, Fresno Community Science has contracts to provide in-school instruction and support for environmental and science-based field trips.

The principal of Forkner School reported that the school PTA was funding the "science lab" (Fresno Community Science programs) there.

Several agencies -- San Joaquin River Conservancy, River Tree, and California Department of Recreation's Habitat Conservation Fund -- provide grants to Fresno Community Science to support environmental education field and camping trips to the San Joaquin River and sites in the national forest; along the San Joaquin the Fresno Community Science group is given access to private land. The director spent a large portion of the Habitat Conservation Funds to purchase camping equipment and supplies in this last year, since families in the area are unlikely to have these supplies, much less are able to buy new gear. The California State Parks FAMCamp program provides staff training and certification, and also camping equipment, with the goal of getting families into the State Park system. Families and groups who access this program can camp at no cost.

The Community Science program benefits from other opportunities as well. The Fresno police department provides in-kind resources, such as used bicycles, to the workshop. Fresno State University and Fresno City College partner with the CSW to provide students and scientists that assist with or lead field trips. The Exploratorium, in San Francisco, provides funding for hands-on summer science programs to both the Fresno and Sanger Community Science sites.

IV. The role of the CSW Network

As one of the original members of the Community Science Workshop Network, Fresno has both contributed to and benefitted from network activities and resources. The Network all-staff trainings have provided the Fresno Community Science staff with many resources, including: content knowledge and project ideas, opportunities to explore various approaches to working with a range of audiences, occasions to discuss ways that they each work with their communities, and the support that comes from being part of a larger group guided by the same mission. Fresno staff members also value being able to visit other CSWs throughout the state and to observe the similarities and differences in terms of participants and approaches.

Fresno Community Science educators we interviewed value the professional development so much, they reported wanting even more time in trainings, and to get out in the field together. In particular, at least one staff member in Fresno would like to have the group develop field trips, projects, and resources related to the Central Valley agricultural industry. Another staff member described how he is invigorated when he goes to trainings:

Getting [the network] perspective on the same problems that I have kind of reinvigorates me. After like 6 months of the same problem over and over again and I don't know what to do, I can ask Gustavo (in Watsonville), what he would do about this. And then I come back with a new mindset and ready to take it on. If that happens every 6 months, then like 3 months or every 2 months, how great that would be…

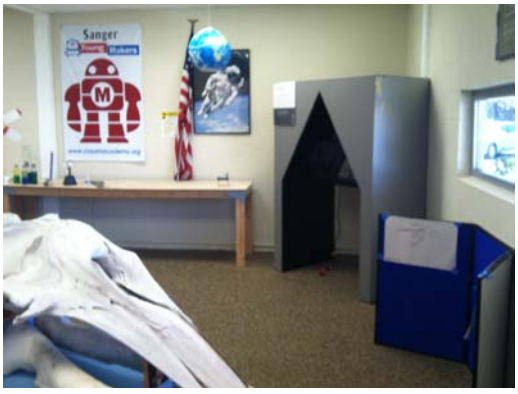
In turn, the Fresno staff members feel comfortable contributing their own ideas to the Network as well. They feel free to raise difficult issues and to share program ideas and assets with the larger group. For example, one Fresno staff person brought the FAMCamp resources to the attention of the Network, and as a result, Watsonville staff members are now certified in the FAMCamp program.

The Fresno Community Science staff have both contributed to and drawn from the project archives that are on the CSW Network website. Fresno staff members suggested adding even more information to the website, such as worksheets and other materials for working with specific grade levels and curricula in the school-based programs, as well as practical tips such as how to work within school schedules.

<u>New site: Sanger SAM Academy and Community Science Workshop</u>

As we spent time with Manuel Hernandez, director of Fresno Community Science, we talked about the importance of developing indigenous leadership in rural communities. Hernandez said:

I like to develop within and stay within. But sometimes they [staff] leave and that's okay too because they're going to go do it somewhere else. Wherever they end up, they're going to start talking and the conversation begins and then it starts the whole thing over.



Sanger workshop

Appropriately, we were on our way to see the new Sanger site, about 20 minutes east-southeast of Fresno, on Highway 180. Still located within Fresno County, Sanger is a small (~ five square miles) city with a population is approximately 25,000. A key component of the vision for the CSW Network is to bring on additional sites. Fresno Community Science has done just that by being instrumental in the process of launching the Sanger Community Science Workshop. Jerry Valadez, the director of this new site, has a strong background in informal and formal science education and research, and has been involved with the CSWs for many years, and recently served as a board member for the CSW Network. He and his wife Bernadette started three to four years ago to open the Sanger CSW, with "seed money" from the Network and with funding from an anonymous donor. Valadez recalled the beginnings of the Sanger site:

> *The idea of coming out to Sanger really started 3 or 4 years ago. Manuel and I, as a member of the board at that time, and working closely with Manuel in Granny's Park and then the previous workshops, had tried to bring the CSW concept out to this rural area, in Parlier and other places. And because of lack of resources and support and being able to follow up, a lot of the staff would show interest and then it would fall through the cracks. We had the idea of coming to Sanger and starting something here, to become the launching pad to go out to the rural areas. When the idea of funding a dissemination site here came together, it was through one funder who wants to remain anonymous. That allowed the funding to leave the Bay Area to come here. We are still under the constraint that most of the funding, like the Moore Foundation is Bay Area-centric, and so this other donation allows flexibility in that so some more funding can come to the Central Valley.*

Fortunately, the mayor of Sanger also contacted Hernandez because he wanted to bring resources to the community on the periphery of Fresno. Hernandez recalls:

> *I said to Jerry 'yeah, the mayor of Sanger wants to talk' so we went there and he showed us around and showed us all these empty buildings. So we saw the one right next to the newspaper – the Herald – and we said, 'That's the one we want,' and he said, really?'*

Upon entering the Sanger workshop

The group put in a tremendous effort to remodel the space. Hernandez said:

> *It took a lot to get it up and running. It was a horrible place inside but the space is big. There is a big warehouse in the back.*

The Sanger Science, Art, Music (SAM) Academy and Community Science Workshop had its grand opening to the public at the end of September 2013. Valadez sees the site in Sanger as serving both the residents of Sanger itself, and also as a jumping-off point for serving the surrounding rural areas. Additionally, he and others in the community have as a goal to open this site to become accessible for community groups who want to work on improving opportunities for youth. This would include activities such as hosting teacher training programs, developing environmental education curricula for local agencies, and serving as a satellite campus for nearby community colleges.

> *It's a music shop on one side, a workshop on the other side and an art shop in the back. It's going to offer professional development for teachers. We have a lot of ideas; we just don't have all the money.*

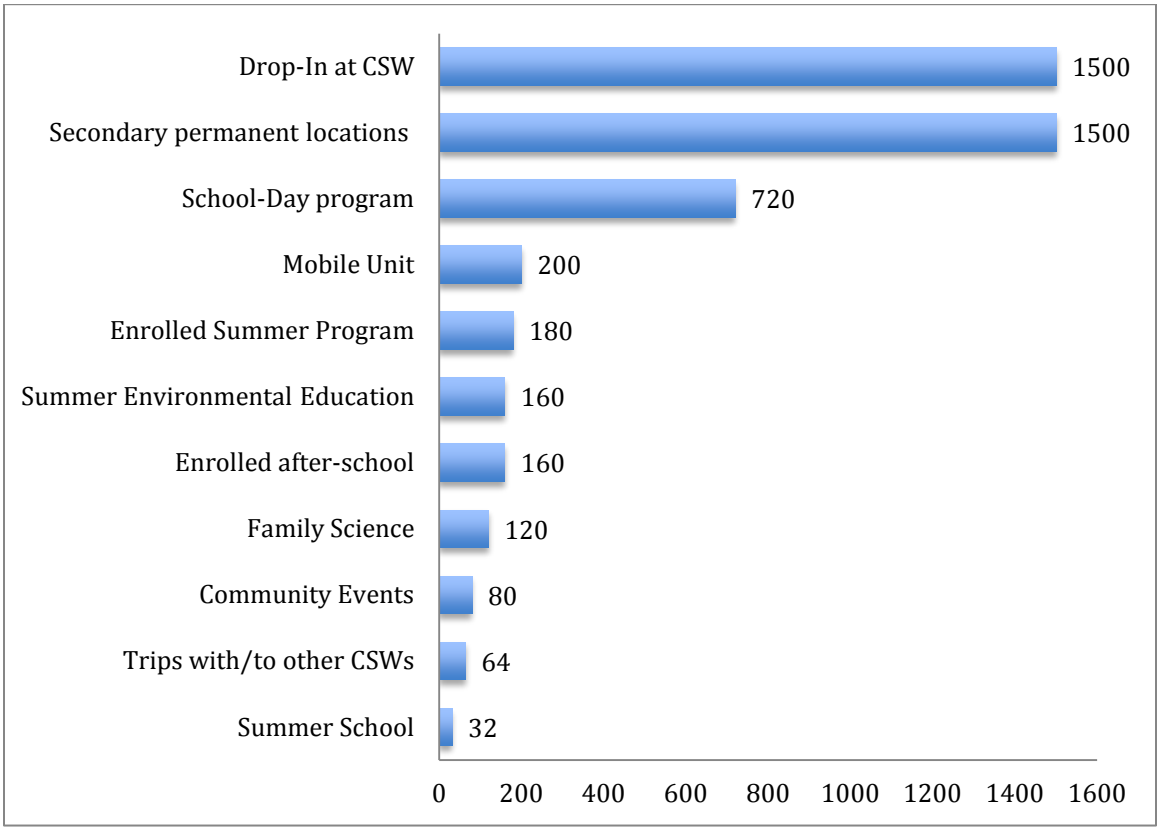
The CSW Network provides funds to support staff development, and to make connections within the Maker AmeriCorps Vista Initiative (as a result the Sanger site has two new volunteers who will help with research, fundraising and sustainability).

The famous CSW juvenile grey whale skeleton

Statistical Portrait for Fresno Community Science

Fresno Community Science provides 4,716 session hours annually in the programs presented in the graph below.[1]

Fresno Community Science session hours per year, by program



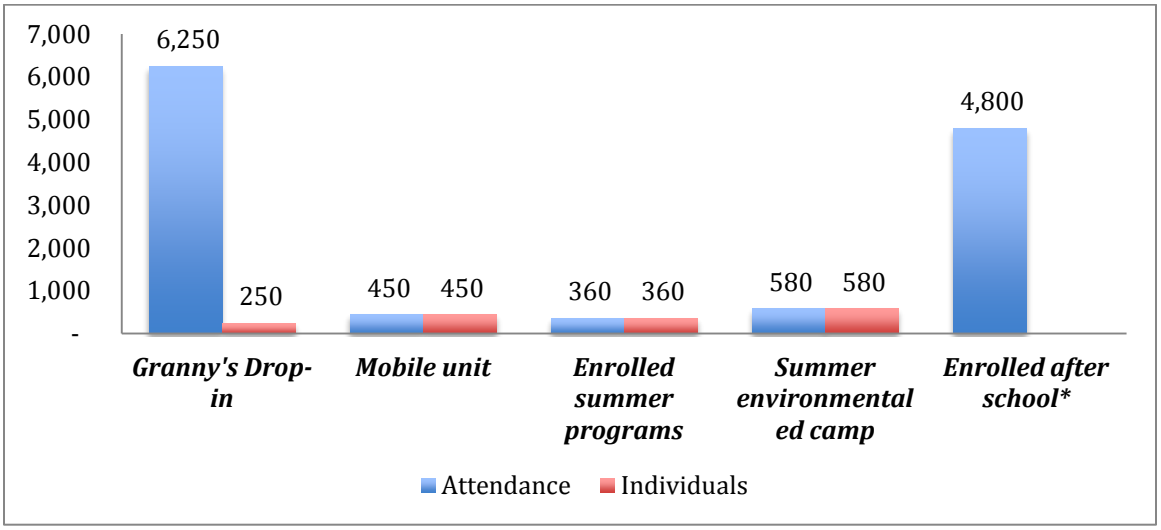
Calculated by multiplying number of sessions by hours/session.

[1] Additionally it sponsors family camping and student intern experiences not included in the graph.

Attendance at selected Fresno Community Science programs

In 2013, Fresno Community Science reported that it has over 24,365 "through the turnstile" visits to/participation in its programs. More than an estimated 13,565 individual youth[2] participate in these programs annually.

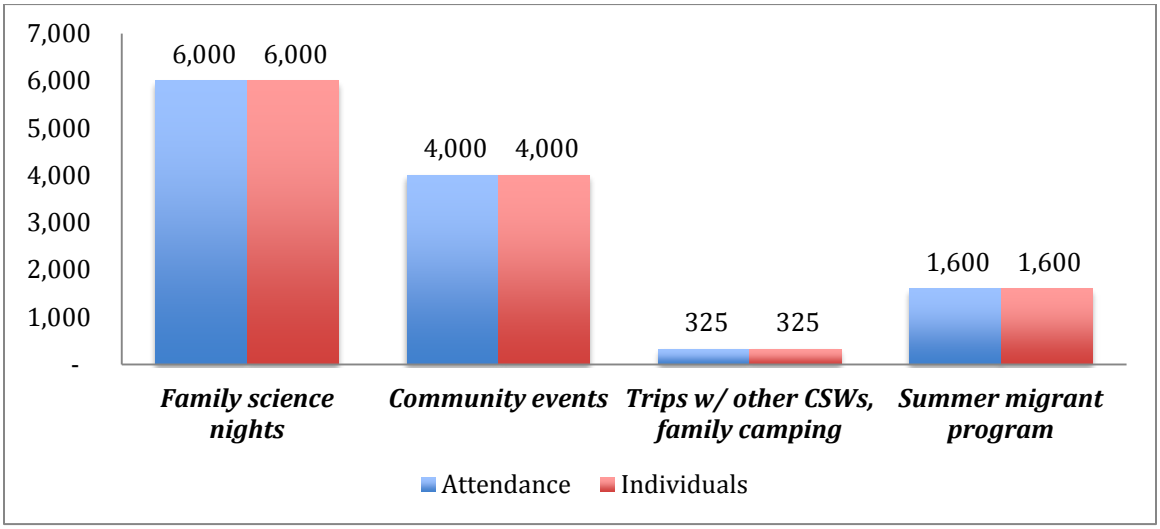
Attendance and individuals at Fresno Community Science programs
(graph 1 of 2)
Actual counts for five programs



** Individual count for the enrolled after school program is not available.*

[2] Figures for Granny's, the Mobile Unit, Enrolled summer and after school programs, and the Summer Environmental Ed Camp are actual counts. Figures for Family science nights, Community events, the Summer migrant program, and Trips with other CSWs and family camping are estimates. Individuals are counted once for each program they attend; it is likely that some are counted more than once – once each for each program they participate in.

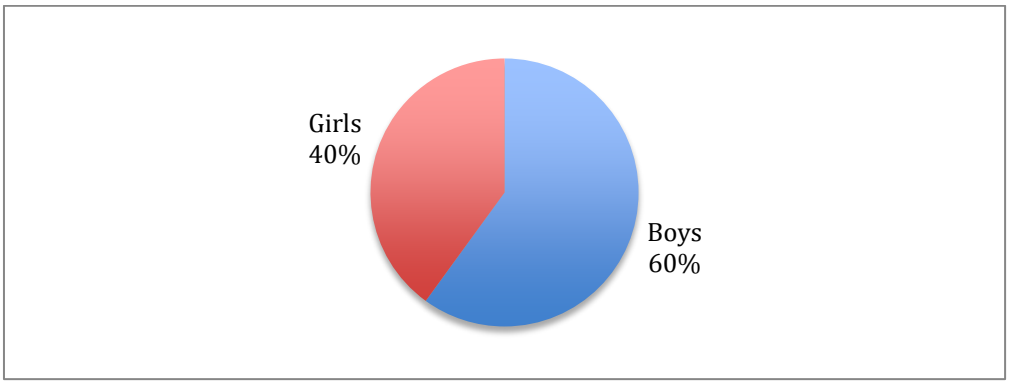
Attendance and individuals at Fresno Community Science programs
(graph 2 of 2)
Estimates for four programs



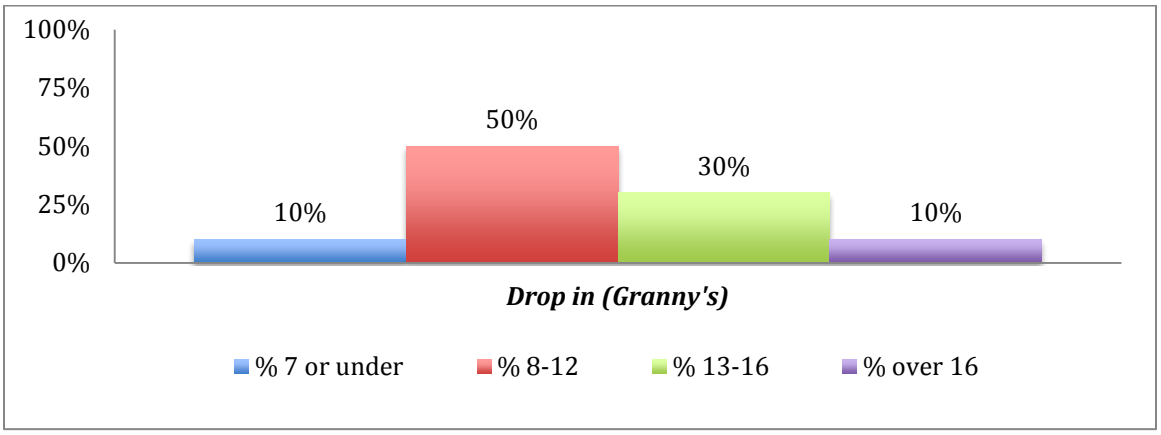
Demographic data

Fresno Community Science tracks the gender, age and ethnicity of Granny's Drop-in participants. In addition it provided ethnicity data for summer and after school enrolled programs and two schools it serves.

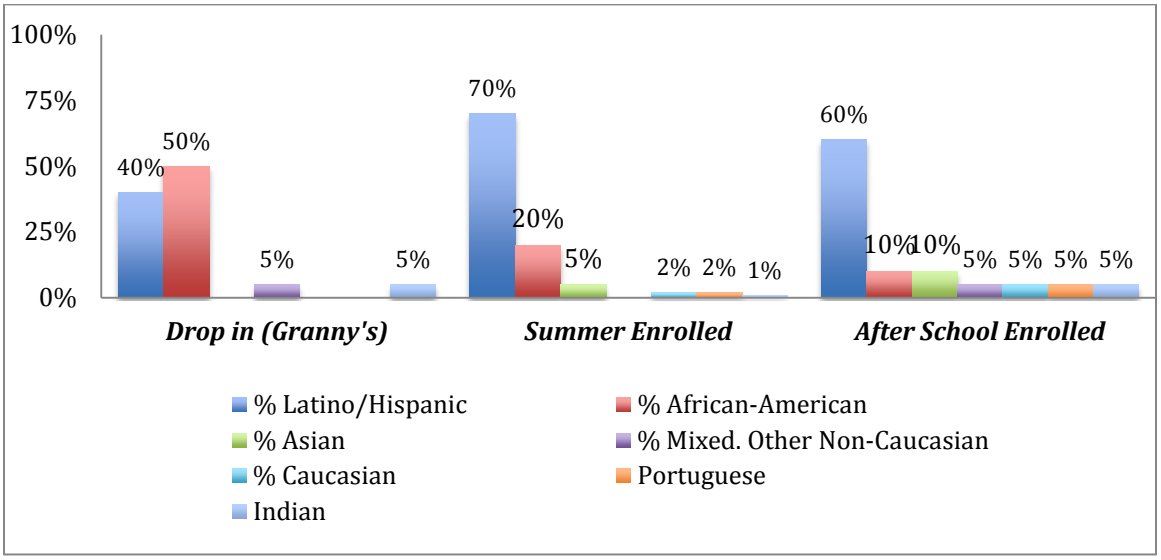
% of participants who were girls at Fresno Community Science's drop-in program (Granny's)



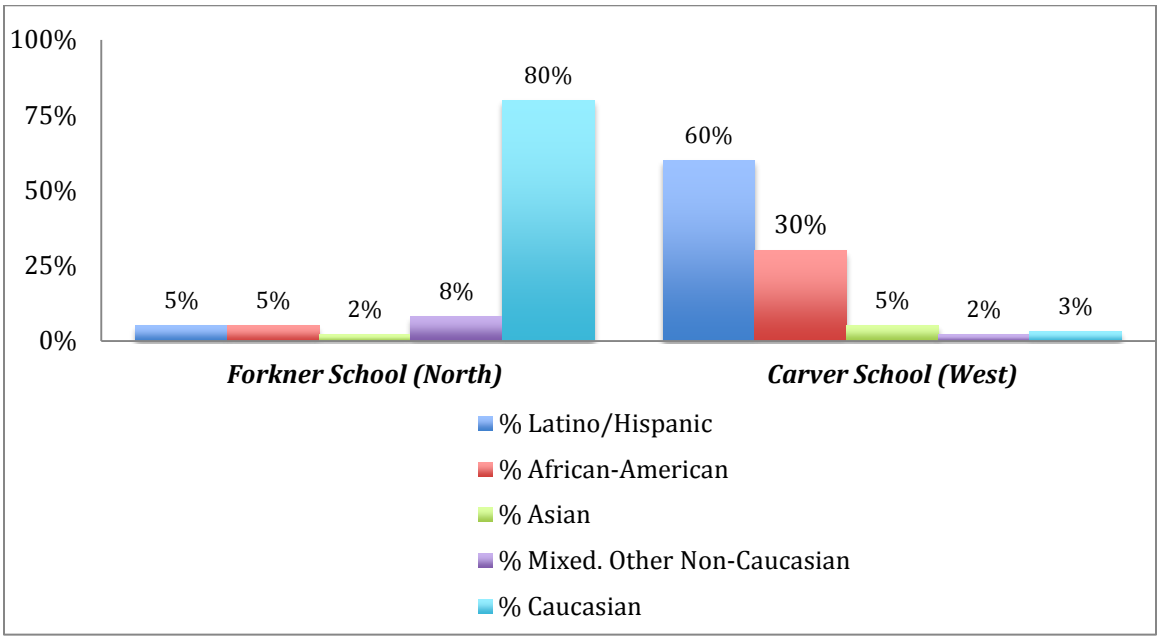
Age distribution at Fresno Community Science's drop-in program (Granny's)



Ethnic split at Fresno Community Science's drop-in and enrolled programs



Ethnic split at two schools served by Fresno Community Science's school-day program



COMMUNITY SCIENCE WORKSHOPS

Greenfield Case Study

February 2014

Inverness Research Associates

Greenfield Community Science Workshop
Greenfield, CA
February 2014

My 15 year-old wants to work every day in his future. He has changed because he used to just go to school… now he is thinking about continuing in school to prepare himself to do work, so that he can provide for everything when he is an adult. The workshop probably has contributed to his ideas because there are so many activities that… can contribute to what he wants to do in his life. I am really grateful for the workshop; it has really been an advantage and a benefit for my children.

~Parent

I. Greenfield site description

The Greenfield CSW, which launched in Spring 2011, is one of the newest sites in the Community Science Workshop Network. After six months of offering activities in after-school programs at an elementary school and the Public Library, the City Council voted unanimously to let the Greenfield CSW use the old City Hall building. This location in downtown Greenfield is the hub of the programming and is within walking distance of three schools, and a mile from two others. The neighborhood is primarily businesses bordered by residential apartments, but quiet for a downtown area. Moms walk their babies by in strollers. A colorfully painted sign on the front of the building identifies the Greenfield Science Workshop.

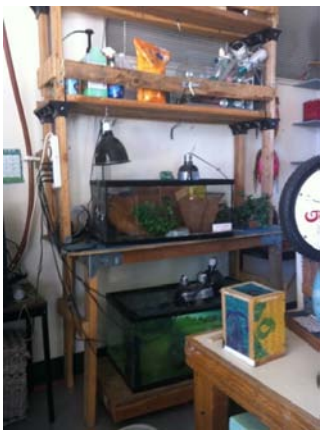
Greenfield CSW

The community served by the Greenfield CSW is predominantly hard working agricultural laborers. They are 99 percent Latino and lower income. The workshop fills a void in the community by offering engaging, fun, hands-on and self-directed activities to youth in the afternoons while their parents are working.

The Workshop

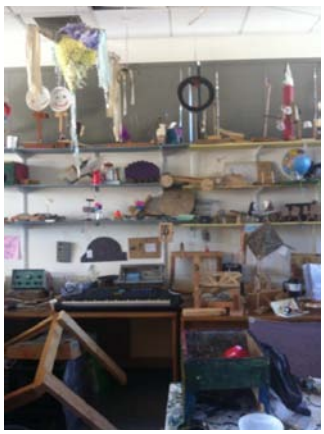
Lists of workshop needs

Visitors enter through a side door off of the parking lot. A sign reading "Greenfield Science Workshop" hangs over the entrance. Two signs in English and Spanish in a window at the entrance announce that the workshop is seeking volunteers for cleaning and organizing, preparing snacks, and teaching hands-on science. Upon entering, a visitor sees large worktables with materials and tools on top. Different tables function as different workstations.



Exhibits of living things

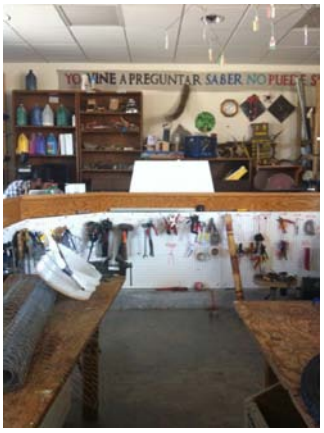
Interior workshop



Youth's projects

Animal cages with creatures -- a guinea pig, turtle, serpents -- are to the left surrounded by tables with miscellaneous items -- TV monitors, a globe and a gyro-gizmo (kid made), microscopes, a vacuum pump, a constructed wooden box with a kid-made biplane in it and an area for messing around with electricity. Other workstations host glue guns, painting, and bike repair. Youth-created projects are in several places around the workshop. Some are labeled as to what they are but others aren't.

A wide array of supplies, and materials such as wood, chicken wire, and bike parts are stored in different areas of the main room. A tool organizer with labels hangs within reach on a half-wall, and supplies are stored in cabinets labeled in Spanish and English. Art supplies are in a back corner next to rocks and natural phenomena like antlers mixed with another display of kids' projects. A banner hangs on the back wall that reads, "Yo vine a preguntar saber no puede ser lujo;" it emphasizes the importance of learning to ask questions. The atmosphere is cluttered and busy but definitively kid friendly.



Tools and supplies

Back rooms of the building store larger materials such as wood, and controlled, more costly items such as small motors and batteries. In January 2014, the City of Greenfield granted the Greenfield CSW access to the entire space, and the workshop staff is in the process of structuring the space to include a wider variety of exhibits and activities for its participants.

Staff and Programs

Greenfield has a full-time site director, two half-time employees, and three student assistants. The site director administers the site, oversees all of the site's programming, and conducts the drop-in program, fieldtrips for schools, excursions, community events and weekly staff trainings. One half-time employee (female) assists in the drop-in program and another (male) conducts the two after-school programs. Three student employees (a male and two females) assist in the after-school programs for three hours a day, four days a week for the school year. Summer programming, which consists mainly of the drop-in program, is coordinated and delivered by the site director and one student assistant.

The staff offers over 1,750 program hours annually. In 2012-13, these included the daily afternoon drop-in program with an informal Girls' CSW time one day a

week, elementary and middle school after-school programs, elementary school fieldtrips, community and school events, Migrant Education mathematics and science enrichment, three camping trips, and two visits to the Monterey Bay Aquarium.

The drop-in program is open Tuesday, Wednesday, and Friday from 3-6:30, Thursday (Girls Day) from 2-6, and Saturdays 11-4, offering 975 hours of programming for 50 weeks of the year.

The after-school programs offer eight hours of programming weekly, two hours at each school twice a week, for 42 weeks. Motor Toys is an engineering and technology program offered at both an elementary and a middle school. The middle school robotics program, which is part of the middle school Motor Toys curriculum, includes participation in an annual underwater ROV competition sponsored by MATE.

Oak Avenue Elementary students had school-day fieldtrips to the CSW in 2012-13. Classes of students visited the workshop for three hours each for 48 sessions. In 2013-2014, the Greenfield CSW will be partnering with another elementary school, Mary Chapa Technology Academy, to provide students with school-day enrichment field trips.

Greenfield is involved in five community events a year and offered a total of nine in its first two years. In fact, one of the first activities of the site was a community event at the Farmers Market. Two large community events that the CSW contributes to annually are Farm Work Day and Greenfield Harvest Festival, and the other two are solely sponsored by the site and resemble large Family Science nights for the community. The site director estimates that community events contribute 25 hours to the total annual programming. Excursions to Monterey Bay Aquarium and camping trips give students and their families' opportunities to learn about the world outside of Greenfield. The camping trips are offered jointly with Watsonville and Fresno CSWs.

Participants

The youth who come to the drop-in program at the workshop are 99 percent Latinos mostly between the ages of 8 to 12 years; five percent are younger and 35 percent are older. Girls represent 30 percent of the drop-in participants, but approximately 50 percent of the after-school programs. One of the afternoons we observed the drop-in program, the number of participants ranged from 4 to 11 youth ages 7-12, with about 6 participants the majority of the time. All were Latino boys. On a later visit, we observed more girls participating as shown in

the photograph below. The site director estimates that average daily attendance is 25 youth. The total count for individual participants annually is 5,200.

The El Camino (Mary Chapa) Elementary after-school program serves two different groups of 20 kids maximum. The number of participants tends to range from 15 to 20. The Vista Verde Middle School program serves 40 participants.

II. Contributions of Greenfield CSW

Girls working on a project with a staff member

Experiences of youth

The workshop drop-in program provides free-choice learning opportunities with participants coming and going as they please. Participants get ideas from models of projects, a CSW binder of projects, and exhibits. A plethora of materials are available. In fact, there are so many activities, materials, projects on display, and phenomena inside the workshop that new visitors can have difficulty sifting out what they want to work on immediately. There were two new participants when we observed. The director showed an 11-year-old boy the binder of activities, and he looked wide-eyed at it for an extended time and wandered around looking at displayed projects. He interacted with some of the participants, whom he may have known from school, but on this initial visit, he never got focused on a project. A first-time girl participant never engaged with a project either but seemed to be taking in all of the potential.

We observed three to four regular participants engaged in projects throughout our two-hour observation. One boy was building his second doghouse and others were repairing bicycles. The doghouse project stood out as a bridge between the boy's home life and the workshop because after he built his first

doghouse at the workshop, he took it home and painted it. Another boy demonstrated an elaborate hamster cage he had built.

Hamster cage project

Boys outside workshop with bikes.

Other kids were coming and going. Some of the boys stayed outside in the parking lot riding or working on their bikes. Participants who are distracted for extended periods can become disruptive, and the site director sometimes has to intervene. One of the student assistants told a story about how a disruptive participant in the after-school program became engaged when given the opportunity to pursue his own ideas. The assistant said that the kid had his own ideas that he was interested in rather than the project of the day. He was misbehaving, so the assistant told him that if he finished the current project, he could do one that was his own idea. He became engaged, and he is "hooked in" to the projects that they bring in.

Often participants have to be patient to wait for the site director's help; he has a lot of simultaneous demands for his attention. The site director used some effective management strategies. One was to answer a participant's request quickly while working with another youth, so the child who was temporarily stalled could return to his project. He also engaged a group waiting for his attention by getting them to think about someone else's question about a bicycle. Another alternative for kids is to work one-on-one with the other staff person. We observed the other staff person working quietly and over an extended time with two youth. Most kids tended to preference the site director, however, calling his name and waiting for his attention when we observed. The different styles of the staff compliment each other well and offer the participants different options.

One of the two after-school programs, Motor Toys, meets in the cafeteria of Mary Chapa Elementary School. The day we observed, the CSW staff person was

conducting the program with the assistance of three high school assistants. Two teachers assisted part of the time.

Motor Toys 4th grade drawbridge project with student assistants

The participants come to the cafeteria from the daily school extended care program and participate in CSW activities 1 day a week. Student engagement varies because the students have long days at school that start at 7:00 am, and they do not choose to come to the CSW program. Rather, it is part of their extended care program. Fourteen 4th grade students attended the day we observed.

The participant experience in the after-school program differs from the drop-in program. The program usually offers a different hands-on project each day. The day we observed, the lead staff person introduced the project with a handout and explanation for the first few minutes with all the participants seated at a table in the cafeteria facing him. The handout was bilingual in English and Spanish and had content about simple machines and pulleys, and a reflection question at the end – "Think of a modern day drawbridge. What are the advantages and disadvantages?" The staff person made connections with the drawbridge project they would construct, simple machines they had made in past activities, and mechanical advantage. He showed them a model. The staff said that the drawbridge project was more complex than most of the activities the elementary students were accustomed to.

The explanation was over quickly and most of the kids went to work immediately building a drawbridge from wood, using hammers, nails and glue guns. The lead staff person was on his hands and knees helping the students with difficult hammering and design issues. The high school students helped with drilling holes and hammering. Many of the participants had not yet mastered hammering, but were skillful with the glue gun. The lead staff person reminded participants to put on their goggles when hammering as a safety

precaution. He enforced the rule when one boy resisted. The participants who talked with the evaluators were interested in and thinking about how to assemble the drawbridge with pre-cut pieces. Most students engaged and persevered with the project, following the model quite closely. A few of the kids were trying their own approaches such as deciding the order of construction and problem solving when they had skipped a step. Even when nails were resistant and pieces didn't align, they were motivated to finish. A couple of girls sat for a long time with their materials in front of them just chatting. They said that they were waiting for the student assistants to drill holes for them. None of the 4th grade students was drilling because of safety concerns.

One of the hallmarks of the CSW experience is offering opportunities for kids to pursue their own curiosity, so we asked the lead staff person about these kinds of experiences. He said that participants have some opportunity to come up with their own ideas, and he encourages them to try them out even if he is skeptical. The site director views this program, Motor Toys, as a strength of the site. He said that the combination of moderately challenging structured projects with some free choice works well for their audience. The student assistants told us enthusiastically about how they encouraged exploration for a participant.

> *We started letting him try a different way, like the same project, just like maybe with the motor a different way…He would try it and it would actually work. Well for us, it was pretty exciting because it is different and for him, trying it different was something big because that means that he is thinking outside of the box and he is putting his own ideas into it, while making it work.*

The middle school robot competition allows for more individual determination and collective thinking. We learned how the robot team solved a problem of getting their robot to return to the surface of the water after picking up an object on the bottom of the pool by attaching an inner tube to the top of the robot with a manual pump.

Extended benefits to youth, families, young staff and community

The Greenfield CSW programs benefit the kids, their families, who only occasionally come to the workshops but value the quality of the experiences their children have there, the young staff assistants, and the community as a whole where gangs present a growing threat to unsupervised kids.

Offers a safe place that enriches life experiences: Greenfield CSW enhances kids' life experiences through a wide range of social, creative, intellectual, and recreational activities. It provides youth a safe place to go to be with friends while learning about science, engineering, construction, and natural phenomena. The workshop

provides ideas, materials, exhibits to examine, and activities to stimulate thinking. The staff encourages visitors to pursue their own ideas in hands-on projects they choose. They learn how to use wood and other materials to create simple machines and the science concepts they encompass. They learn how to measure accurately and why it matters. As one staff member said, the workshop provides the youth with learning experiences that are different from those they encounter at school: " [The participants] can touch and they can experience and try different things and they can [use] their own thinking." The participants themselves value their experiences:

> *They teach us a lot – mostly about biking – parts, how to take them apart, work on them. I knew about some of the tools. I did not know about the clamps.*
>
> *You can do projects and just stuff that you can't do at home because you don't have stuff.*
>
> *I just like coming here because I am bored. My mom is not home. [I am] with my other brothers.*

Offers STEM experiences: The Greenfield CSW contributes much needed STEM experiences for participants, who are not what we would consider highly STEM activated. The elementary participants do not get hands-on science at school and few experience creating and building projects at home. The middle school students have science classes but not necessarily hands-on experiences. The Greenfield CSW is the primary provider of these kinds of experiences for most workshop participants. A CSW staff member said, "[The participants] can see on their own that they can work with magnets, with the air, and with the helium and with gases, and with safety of course, but that will make them think about being a scientist… It is more informal and I think that gives them another perspective of science, different than in the classroom." There is nowhere else in these kids' lives where they encounter this combination of experiences.

Nurtures emotional and mental development: The workshop offers consistency in staff and nature of activities, so over time, participants build personal relationships with the staff and know what experiences to expect. With parents working long hours, time with attentive adult role models, focused on projects, nurtures kids' development.

Teaches cooperation with social norms: To participate in all of the activities and events, the youth have to get along socially and follow the rules of which there are few; at the same time there are expectations to meet if they want to participate in workshop events such as excursions and camping trips. The

programs offer younger kids opportunities to interact with and learn from older ones.

Increases sense of self-efficacy: The student assistants benefit from their jobs at the CSW because they gain job experience, take responsibility, and earn money. A senior said that she was learning to be more independent before going off to college while learning to use equipment:

> *Somehow it is preparing me and as a person it is making me more responsible and since I am getting out of high school, it is making me be more independent in a way. It is getting me the skills that I need… working with the children and kind of understanding them and being able to work with the equipment that we use.*

Two assistants (one male and one female) said that their experiences had changed their attitudes toward science:

> *I thought science was not cool, was boring and stuff and so, I like helping the kids and building stuff. [I'm] liking more science.*

> *I have always kind of liked science but…it was most in chemistry, but right here I have noticed they take measurements in building stuff. There are a lot of things added to it…measurements, friction and then everything that Jose explains to us…It is like we learn how to build something, but at the same time, we are learning so much from it, and that has been really helpful.*

Families value interesting and practical experiences for children: The parent we interviewed at Greenfield said that all of her children have gone to the workshop from her 15-year-old son down to her pre-school son. She said that her creative 4th grade daughter likes to work with art supplies and make piñatas. The variety of activities offers something of interest for each of them, and they learn practical things.

> *They feel very entertained with something to do when they are here. My kids have learned how to work on bikes and they can repair their own bikes. Jose guides them in that and they learn useful things at the workshop that they can use in their life.*

The CSW fills a void in the community for free, safe programs for kids: Greenfield CSW has no competitors in the community offering free programs for kids. The community sports programs and the after school extended care programs charge fees. Gangs are prevalent in Greenfield, and one of the primary benefits to the community is that the CSW offers kids, who might otherwise be on the street, a place to be safe, learn, and socialize with other kids and adults without the threat of gangs. The City Council recognizes the value of the Greenfield CSW to the

community and showed its support in offering the building to house the workshop.

III. Capacity and capacity building, sustainability

Greenfield has grown rapidly in two years. Professional development has fostered the growth of the staff's skills. The site director offers training every Saturday morning in addition to two network-wide development days in 2012-13.

Funding and partnerships have supported the growth of programs and staff. The Packard Foundation funding expanded the after-school program and paid for a half-time employee in the drop-in program. The Community Foundation for Monterey County funded the fieldtrips offered to Oak Avenue Elementary School. The site's partnerships are with the City of Greenfield, Greenfield Unified School District, Regional Migrant Education Program, and Salinas Landfill. The City provides the workshop space, insurance, and payroll for the workshop for which it gets a variety of safe, enriching programs for youth. Greenfield Unified offers space for and a teacher who helps supervise the after-school programs and provides transportation for fieldtrips. The CSW provides fee-for-service activities for kids during Migrant Education meetings, tutoring for migrant education students at the workshop and at a local high school. Salinas Landfill provides the workshop with recycled materials.

All of the partnerships seem to be strong from the perspective of the site director. The partnership with the schools and the district is moving towards more cost sharing, which suggests that the schools favor continuing the relationship.

IV. The role of the CSW Network

The Greenfield site owes its existence to the CSW Network. Dan Sudran held a vision for many years for a CSW in Greenfield, which adhered to the notion of starting workshops in "forgotten communities."

Funding support and political advocacy: The Network initially funded the site director's position and hired him in March 2011. He had previously worked as an educator at the Watsonville CSW. The Network also helped secure Packard Foundation funding for Greenfield's Motor Toys program, which was modeled after Watsonville's Packard-funded Motor Toys. The Network has advocated for the site with the mayor, the city council, and the city manager. It helped the site director negotiate the terms of the three-year agreement for the old city hall where the workshop is housed. The site relies on the continued support of the

Network in its ongoing negotiations with the city manager's office. In 2012, the Network supported the expansion of the programs by helping the site director negotiate to add a middle school program. The schools and city were resistant to hiring youth assistants to work in the program because of past experiences with liability issues. The outside support of the Network bolstered the argument that the CSW would provide a safe experience. Similar support from the Network helped Greenfield start a fieldtrip program funded by the Community Foundation of Monterey County.

Professional development and vision: The site director has attended formal Network professional development and visited different sites informally to observe how the staff work and the nature of the activities and exhibits. The variety of CSW "personalities" in the Network has benefited Greenfield's own culture and character development.

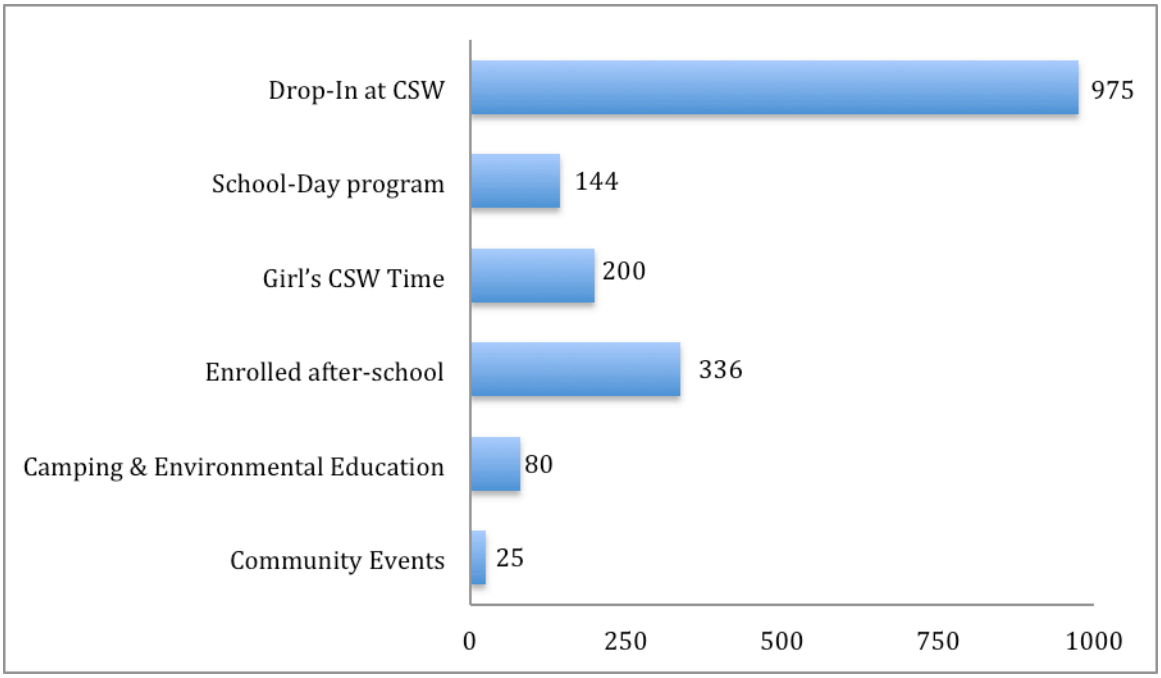
Curriculum, materials and equipment: The Network has provided Greenfield with equipment such as two different kinds of microscopes, a vacuum chamber, and a Van de Graaff generator. Greenfield has gotten most of its curriculum ideas from Watsonville and the online database of CSW-wide activities being compiled by the Network.

Greenfield's contribution to the Network

The Greenfield site has contributed its voice, experiences and expertise to the activities and discourse of the CSWs. And secondly, it has provided a good test case for the Network's potential to start, build and sustain new sites. Greenfield offers a case for reflection on the Network's capacity to support new sites.

Statistical Portrait of Greenfield Community Science Workshop

Greenfield CSW session hours per year, by site and program

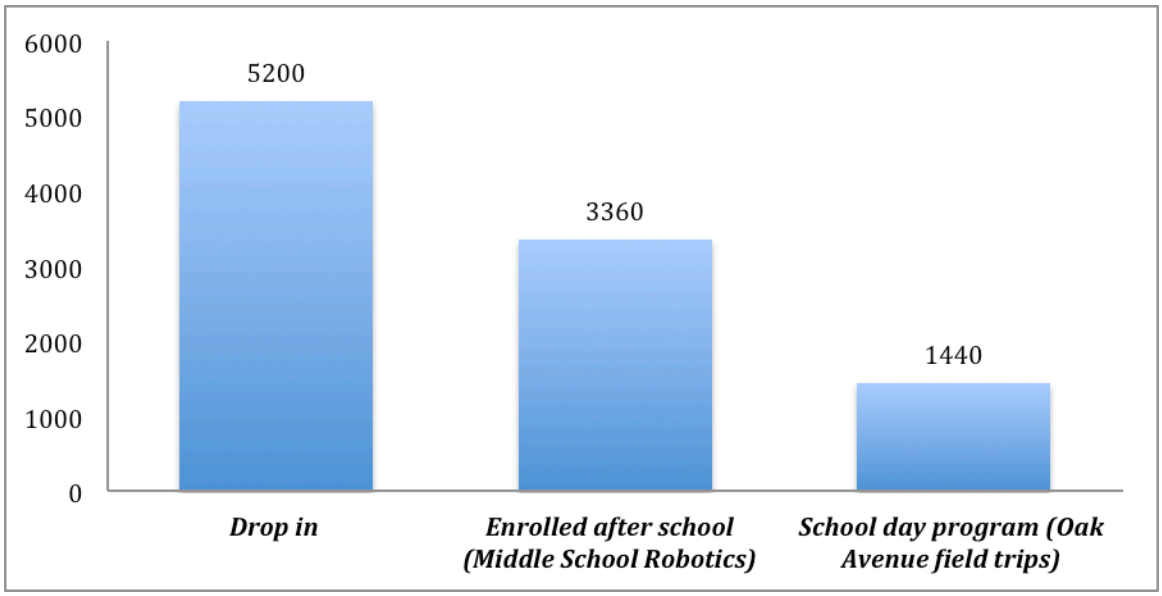


Calculated by multiplying number of session by hours/session.

Attendance at the Greenfield Community Science Workshop

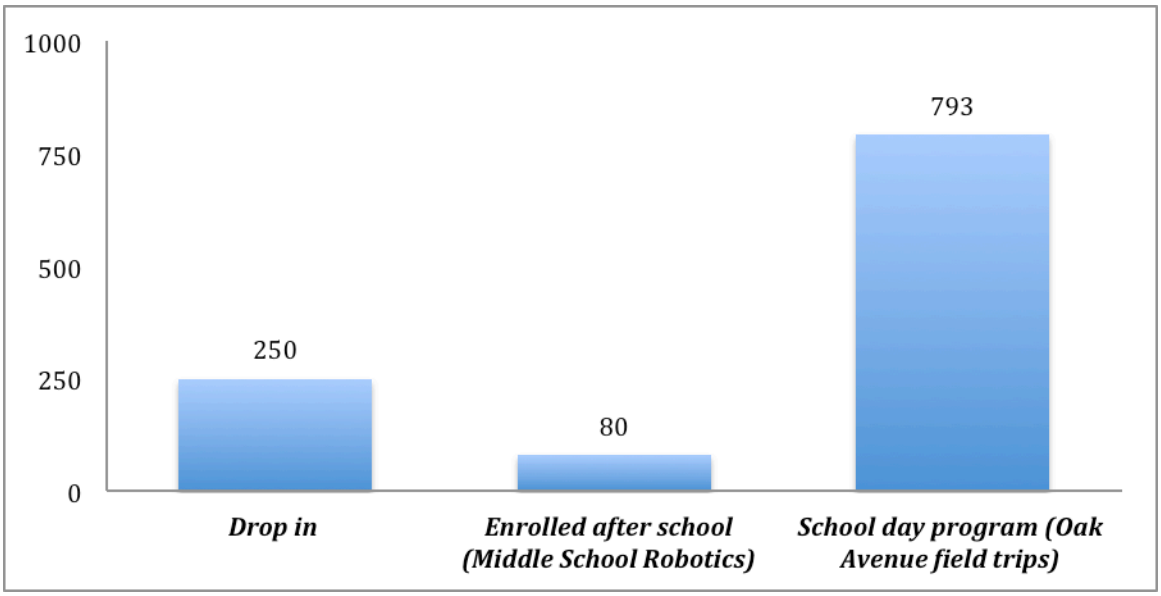
Greenfield CSW staff provided estimates of participation by individual youth and for "through the turnstile" visits by these youth for three programs.

Attendance at selected Greenfield CSW programs (estimates)



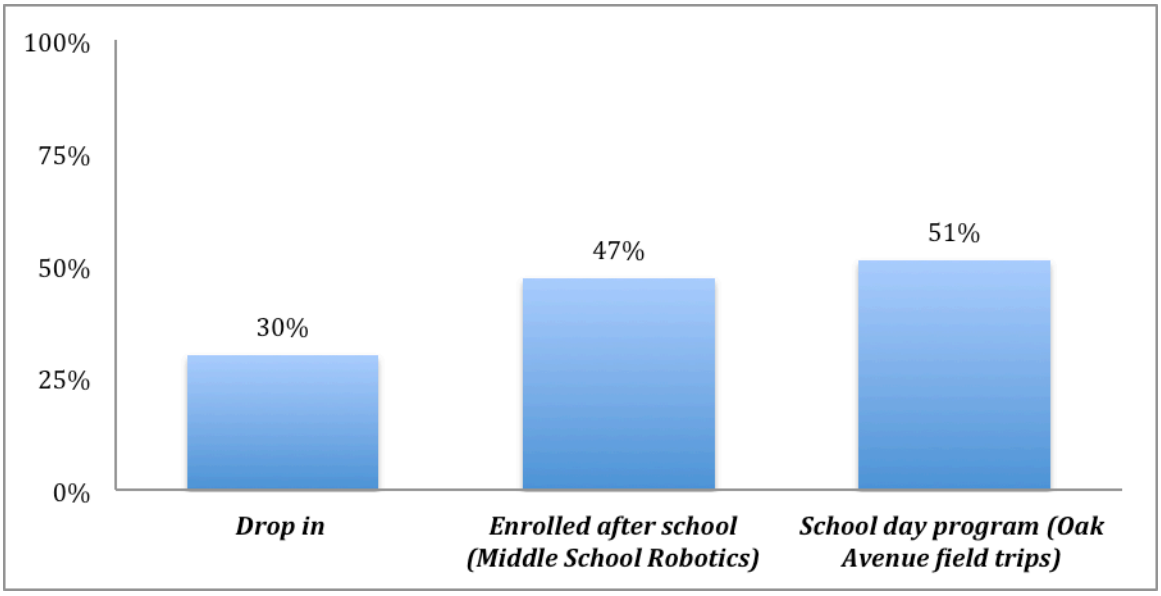
These are "through the turnstile" counts of total visits.

Individuals participating at selected Greenfield CSW programs (estimates)

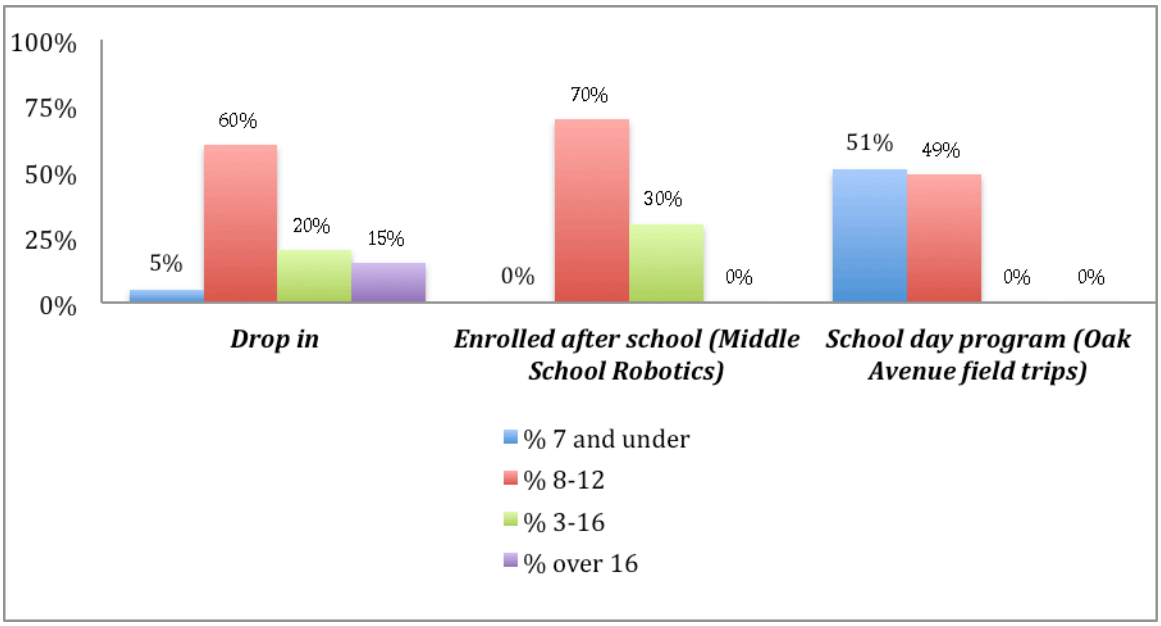


This graph counts each individual once for each program attended; some individuals may have attended more than one program.

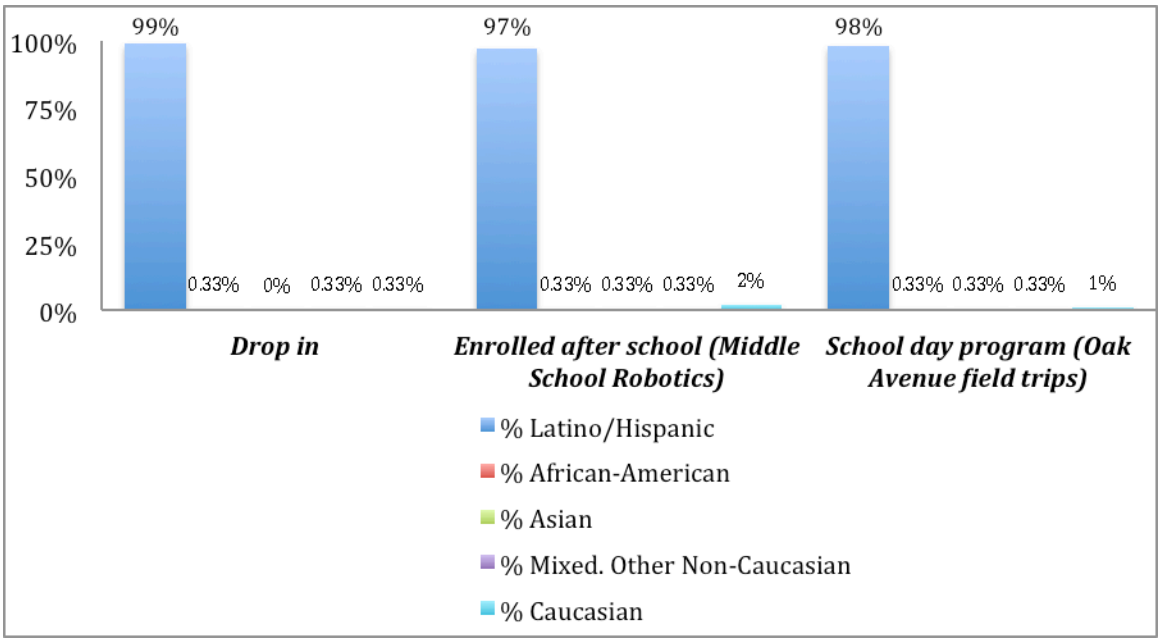
Percentage of girls at selected Greenfield CSW programs (estimated percentages)



Age distribution of participants at selected Greenfield CSW programs (estimated percentages)



Ethnic split of participants at selected programs at Greenfield CSW (estimated percentages)



COMMUNITY SCIENCE WORKSHOPS

Mission Case Study

February 2014

Inverness Research Associates

Mission Science Workshop
San Francisco, CA
February 2014

The [Mission Science Workshop] is like my daughter's forest in there and she gets to go explore. So we have made it an effort to bring her here and let her go.

~Parent

I. Mission Science Workshop site description

The Workshop

The Mission Science Workshop stands as the original flagship model upon which the CSW Network is based. The Mission District itself is located in east-central San Francisco. While gentrification has shifted the demographics of the Mission District in the past two decades, it is still the center of a vibrant Mexican, Latino, Chicano, Guatemalan, Salvadorian, and Nicaraguan community. As of 2010, approximately 40% of the district was Hispanic or Latino (of any race) (Census Bureau; California Department of Finance).

The story of the origin of the Mission Science Workshop is the story of Dan Sudran, the founder. Successful in formal education, even going to law school, Sudran never connected with science as it was taught in school. As he began collecting artifacts and specimens (with a permit) and taking things such as electronics apart on his own time, he realized the power of science in the 'real world'. Sudran went on to become a self-taught scientist, science teacher, and graduate of the Exploratorium's Teacher Institute. In the late afternoons, Sudran could be found tinkering in his garage in the Mission District with instruments, specimens, bones, rocks, tools, and simple machines. Noting how captivated the children in his neighborhood were by these things and building on his background in community activism and organizing, Sudran opened his garage in 1991 to the underserved youth in the Mission neighborhood, so they could explore, create and complete investigations with him, and spend their free time constructive and empowering ways. He has said:

> *I learned from working with Cesar Chavez to organize one person at a time, so I started teaching one kid at a time.*

In 1991, with space provided by City College of San Francisco (CCSF) at their Mission District campus, he created the first, official Mission Science Workshop. At that time, the workshop consisted of over 50 exhibits, microscopes, live animals, marine plants, and workshop tables.

Sudran said that the mission of MSW is "to expand knowledge, thinking, and imagination, with tools of discovery and things to discover."

Currently, the MSW is located in the former auto shop of Mission High School, which was built in 1927, adjacent to Mission Dolores. The sign on the outside of the workshop says, "Wonder-full Science." The ~2,500 square foot workshop is stocked full of bones, fossils, tree rings, specimens, artifacts, and living animals including snakes, lizards, and rodents. There are shelves and tables, upon which sit hundreds of tools: irons, glue guns, saws, rulers, vises, screwdrivers, balances, thermometers, hammers, files, a drill press, pliers, clamps, scissors, sewing machines, musical instruments, and hand drills. There are also posters, white boards, and articles posted on the walls, and microscopes on the tables. Exhibits and projects located around the room have been built and are used to demonstrate specific phenomena, such as centrifugal force. In addition, there is a plethora of material that can be used for various projects, such as electronics, wood, fabric, yarn, paints, and clay.

One parent commented:

> *There is just stuff going on in every nook and cranny, all kinds of different stuff, everything.*

During an interview for National Public Radio, Sudran described Mission Science Workshop as follows:

> *It's your own dream garage, in a sense. Just a bunch of stuff you can play around with, without being nervous that the curator's gonna have a nervous breakdown.*

Family Science on a Second Saturday

One parent we interviewed said:

> *I like the creative chaos of it. I think it is like mad-science Exploratorium and I know how it could overwhelm some personalities, but if you can like chill enough to focus or explore – or not focus, just bounce around – it is just amazing.*

Staff and Programs

Dan Sudran is the Executive Director and a full-time educator at Mission Science Workshop. Currently, two full-time educators and a part-time Development Director/part-time educator play critical roles in helping Sudran run the MSW. The staff is highly qualified – one holds a PhD in Molecular Biochemistry – but most importantly, they are working at MSW because they hold the same core values that guide the workshop and they believe in the overall mission.

The reach of the MSW in San Francisco alone has expanded to serve over 21 different schools and 12 different community organizations, while partnering with one college and one university. Furthermore, the workshop is increasingly reaching out to communities in the East Bay. Mission Science Workshop currently provides six general categories of programs: classroom enrichment programs, afterschool programs, summer programs, professional development, bi-lingual community programs, and "Whale Week."

Classroom enrichment programs consist of school-day programs that occur when teachers from the surrounding public schools bring (usually walk) their K-12 students over to the workshop to participate in a lesson or investigation that complements their curriculum. Educators from the workshop also travel to some schools – most notably McKinley Elementary School and Paul Revere Elementary School – to work with teachers to implement a hands-on, inquiry-based lesson in the classroom. Currently, MSW runs approximately 575 such sessions that provide upwards of 1,000 session hours of classroom enrichment programs per school year, and serve nearly 3800 students and teachers.

Mission Science Workshop partners with pre-existing afterschool programs in schools or other community-based organizations and provides an afterschool program at the workshop Monday through Friday. This program is slightly less guided by formal curriculum than the classroom enrichment programs. On average, the afterschool program meets for about 2 hours per session two to three days per week from September through May, for a total of approximately 200 session hours per school year. Three fairly consistent groups of youth take advantage of the afterschool program over the course of approximately 30 visits, for a combined total of 90 visits.

The summer program, called "Summer Scientists" happens in the afternoons of the first seven weeks of summer for thirty hours per session and serves up to 60 students from 2nd through 8th grades. This is an open opportunity for youth when they can explore, tinker, create, and learn. In the mornings during the summer, MSW holds workshops for SF Unified School District's Child Development Centers.

Mission Science Workshop partners with San Francisco Unified School District to provide inquiry- and exploration-based professional development for teachers throughout the year both at the workshop itself and in the schools where teachers work.

The bilingual community programs include Second Saturdays, conducted in English and Spanish on the 2nd Saturday of each month during the school year (September through May). During these visits in the last year, MSW served at least 550 unique individuals (while registration is encouraged, not all visitors sign-in). MSW will also create "curiosity boxes" that can be sent directly to the door of a home or organization in the community. Additionally, MSW has a presence at community events such as San Francisco's "Sunday Streets" festival.

Whale Week is a relatively new addition to the MSW catalog of offerings, resulting from Sudran discovering, hauling, and cleaning a 36-foot gray whale

that washed on the beach in Pescadero, California. MSW brings the bones to a location (school or community organization) and the participants reassemble the skeleton, applying science, math, art, and language arts skills all the while. MSW estimates that 3000 individuals saw or worked with the whale skeleton last year.

Participants

The majority (66%) of MSW participants are 8 to 12 years of age. 30% are seven years old or younger, and only four percent are 13 and over. Across programs, the average of girls' to boys' attendance is roughly 50/50. A few more girls (54%) attend the Second Saturday program and fewer (30%) attend the Summer Scientists program. During the community events we observed, both male and female family members were present and active. The ethnic split for programs varies quite a bit, depending on whether it is a school program (53% Latino or Hispanic, 17% Asian, and 14% Caucasian), a summer or community program (37% Latino/Hispanic, 31% Caucasian, and 16% Asian), or an afterschool program (40% African-American, 40% Caucasian, and 10% Mixed).

II. Contributions of Mission Science Workshop

In a *California Wild* article, Sudran said:

> *I learned from working on social causes that you don't do things halfway if you're working to change people's lives. You go whole hog or don't bother. I've made myself into a science nerd, not just to satisfy my curiosity but to help the community.*

Creating opportunities for underserved youth in both urban and rural communities to engage meaningfully with science is an increasingly critical challenge, given the reduced funding and attention afforded to science in schools. Furthermore, as we've seen and heard, children and young adults in underserved communities have scant places and spaces in or near their homes where they can safely and creatively spend their out-of-school time – much less in an environment where caring, supportive, and knowledgeable adults are available to support their personal, social, and intellectual development.

Experiences of and benefits to youth

The Mission Science Workshop provides a safe and educationally challenging space for youth to spend their time when they might otherwise be standing on street corners or hanging out in parks with few constructive activities to choose from. MSW is a social context that demands a positive peer culture and as a

result, youth have opportunities to develop personal leadership skills, which can nurture self-esteem.

Exploration and playfulness: Children and adults who come to the workshop are exposed to tools and materials that they may have never used before that are quite useful. They are not only allowed to use them, they are encouraged to practice using them, in a safe supported way. Sudran and the MSW staff believe that science "teaching" is about letting the students learn from exploring into materials and phenomena. As Sudran said,

> *I'm not the teacher. The materials and experiences are the teacher. I'm just making them available.*

Spending time with frogs and tadpoles, creating magnetic pendulums, or studying adaptation from examining different animal skulls and skins—all allow students to experience things firsthand and begin to develop their own understandings of important fundamental science concepts. One parent noted how important the exploration and playfulness that MSW staff stress is for learning science:

> *It brings science to a level that it becomes a game – [it's] how they play. They are not forced to [learn]; it's hands-on science learning. As a kid, I was taught science from a book and a blackboard. [Here they can] make a magnet sculpture and learn about magnetism. You don't even know what you are doing any more: is it art? science? It's a playful scientific exploration; a lot of magic seems to happen.*

Varieties of spinners

One student at the after-school program at MSW said,

> *We get to explore. We get to come here for free and it's like a gift. It's like a museum but they don't charge us any money. We get to come here for free.*

Curiosity and questioning: Mission Science Workshop provides support for children's individual development – so they can be active, self-directed learners. Sudran has described the importance of children's own curiosity for all of the activity at Mission Science Workshop:

> *What really drives the whole process is the kids' curiosity… that sense that there is a reason to be alert.*

One parent we interviewed commented:

> *[MSW staff] ask about how things work, and [then the students have the chance] to be able to hold the question and think on their own how they figure that out. And then [they get to] experience failure as part of the process – as a data point but not as something to feel badly about.*

The focus on exploration more than explanation in both the classroom activities and those at the MSW helps to stimulate youths' curiosity. One second grade student we spoke with was in the process of building a magnetic pendulum. We

asked him how it was going to work when it was done. He said, "This is going to hang down and there will be a magnet at the bottom here in the middle, and magnets all around on this piece of wood and it will move." When we asked him, "what will be making the pendulum move?" he explained, "The magnets. If you turn them one way, it pushes, and if you turn them the other way, it pulls. So it will push and pull it."

MSW provides a complement to and bridge with "school science": The workshop provides a creative artistic outlet as well as a place to develop and reinforce STEM content that they may have learned elsewhere – perhaps in school – or that they may not have even realized they learned. The workshop is an essential complement to school for some students. Sudran said:

> *All these things we let kids do… kids love that because they don't get to do them in schools.*

A mother we interviewed said:

> *Our kids are in public school and I don't know what privates are like, but public is filled with the rules and the regulations and the test scores and this [MSW] is the antithesis of that.*

One teacher, whose class makes frequent visits to the workshop, described the benefits to her students:

> *At the workshop, they dissected owl pellets; the kids were so excited digging out bones and reconstructing skeletons. The workshop is great because they get to do an experiment and then they get time to just explore and touch whatever they feel like. The kids spend all day at school being told not to touch things and how to stand in line. Having a place where they can touch everything and explore what interests them is great!*

Examining a tarantula exoskeleton

A different classroom teacher said:

> *The classroom is more confined. They like it here [at the workshop] more. They can touch everything and touch the tools.*

Even when a MSW-provided activity occurs within the school setting, MSW staff foster a science experience for students that is rich in exploration, playfulness, questioning, relationship with interested adults, and inquiry. In the span of one day at a school, we observed MSW staff lead second graders on the construction and exploration of magnetic pendulums, and 5th graders on creating clay model molecules as part of an exploration of the periodic table. Another day we saw MSW staff engage first grade students in creating their own thermometers with water, straws and food coloring, and discussing adaptation with first graders amidst possum skulls, snake skins, birds' nests and whale baleen.
Furthermore, MSW provides a bridge for some students between school activity and family activity. Two fifth grade students we interviewed remembered vividly working with bones from the workshop and one talked about how that experience had carried over to an interaction with her parents at the workshop:

> *The bones were like puzzles. He brought in cow bones, gophers... we had to figure out how to put the bones together. And it made me think about how my own bones are put together. And then my parents came to the workshop with me on Saturday and there were even more bones for us to look at. They love it there.*

Confidence in science: Those we've interviewed noted that as a result of their experiences with MSW, youth are more confident in science and see it as more

accessible – they are willing to take risks, try things, and are generally more open to investigating new things. Teachers and parents both have noted that even the restless kids are more engaged and confident in MSW science activities.

As one teacher said:

> *I think there is an excitement they get about science... and science isn't something to be afraid of. The kids aren't nervous about trying things.*

Teacher and parents both also noted that girls, in particular, have become increasingly confident about science. Teachers have reported regularly seeing their eight and nine year old female students holding the snakes. As one teacher said:

> *Science, especially among girls, has changed. Everyone is really into it. There is no difference [between the genders now]. Before, there was some hesitation from the girls.*

One parent said:

> *I have observed that her daughter, who has been coming here much longer than mine, is much more confident. She goes straight in there and she just creates, she doesn't need any help and she knows what she is doing and my daughter is getting to be that way after coming here, more than in the beginning. Much more confidence today – she went straight over to what she felt like doing.*

A different mother continued:

> *In the very beginning she wanted help and that was just in the beginning and I have been sent away ever since and in fact, I want to be involved and she is like 'no, mom you have to go away.' I have noticed her independence and she feels comfortable and I think she feels like she owns it a little and I love this. I think one reason I might have been sent away early on because she didn't want me to see her figuring it out and now she just doesn't want me around because she is just doing her own thing. I just think it is awesome.*

One of the many animal residents at Mission Science Workshop

One eight year-old girl, when asked about what she liked best about coming to MSW, said:

> *I especially like the snakes. They crawl all over, probably because they are cold and they want to be warm.*

Extended benefits to youth, families, young staff, and community

MSW also provides a place for children to solve practical problems or issues that can in turn benefit their families and communities – from making a Mother's Day present, to fixing stereos, to building things that can be used in the home; such as a tortilla press, shelving, curtains, or a dog house. One parent we interviewed said:

> *My daughter has electrical circuitry – the concept – down. She totally gets it and that is from here. No question. They studied it in school a little bit, then we came here right afterwards and Dan had a project set up and she really gets it.*

Another parent joined in:

> *When you just hear it, it goes in one ear and out the other, but when you actually do it, and you are involved, it sticks.*

A true community approach to supporting and nurturing youth: Not only does MSW provide a safe place for youth to explore, it provides a supportive environment for families and the community to come together and spend time.

A mother explained:

> *I really, really like that Dan [Sudran], well he gets the message out by walking around telling people or just sort of announcing that parents need to let their kids do the stuff, but they want parents to be involved and have the fun happen together and the exploration happen together and I think it is great, because I am so handy and I will be 'let's do this and let's do this' and he has reminded me.*

One parent said:

> *Today, I feel more comfortable here and my daughter is just off on her own and I don't really feel like hovering around her and supervising every little thing that she is doing – she will just go off and do whatever she wants and see what she is in the mood for. There are all kinds of different outlets in there, aren't there?*

Another parent reflected:

> *We overprotect our kids, and I think in the City [San Francisco], we hover around them because we can't let them go run across the street. And the [Mission Science Workshop] is like my daughter's forest in there and she gets to go explore. So we have made it an effort to bring her here and let her go.*

Families also come together to work with each other's children. One parent said:

> *Another thing that I usually end up doing, since my daughter sends me away, and the way that it is all just friendly and personal, I will end up helping other kids and I really like that. The informality lets you do that.*

Develop a sense of self and possibilities for the future: In some cases, MSW has led participants to think differently about themselves and their future. At times, they begin to see they have options for pursuing science, math, and other skill-based options.

One mother said of her daughter:

> *She wants to grow up to be an artist/scientist.*

In several occasions, individuals who came to MSW as youngsters have assumed leadership responsibilities at the workshop, even becoming program managers. The wide range of possible career trajectories and life-long learning experiences that MSW reveals to youth are very powerful.

Sudran said:

> *A number of our students have gone on into science. But of course, even where they haven't, I'd like to think that it gives them a sense of not being satisfied with anything less than an interesting life.*

Currently, there are national research and design efforts underway to learn more about how students can be engaged in science in ways that lead them to be persistent, long-term science inquirers. The researchers in this effort hypothesize these young science learners to be "captivated by phenomena; committed to learning science, and persistent in doing so over time; capable and self-confident about doing science; and conscious and appreciative of the role science plays in the world." Researchers have identified dispositions that serve as building blocks for an activated science learner; these include: curiosity, motivation, responsibility, persistence, science capable, identity, appreciation, and interest. The experiences of the youth we have observed and interviewed seem to foster many of the dispositions outlined in this research.

III. Capacity and capacity building, sustainability

Partnerships with schools

Over the past three years, MSW has deepened its relationship with two particular schools – McKinley Elementary and Paul Revere Elementary – where MSW staff provide the bulk of science instruction since, as the principal of one of the schools said:

> *In some ways, we are a typical elementary school when it comes to teaching science these days. The attitude is, "If I get to it, I get to it."*

McKinley Elementary is located in the area where the Castro district comes together with Ashbury Heights and Duboce Park. It is a relatively small elementary school for San Francisco, housing some 350 students in grades K-5,

with about half of the students qualifying for free or reduced lunch. Most of the teachers are veterans, having taught for ten years or more, with some relatively newer teachers in the mix. Paul Revere Elementary, a K-8 school in the heart of Bernal Heights, is home to a population of just over 400 ethnically diverse students, of which 70% are considered socio-economically disadvantaged.

At both schools, the strengthening of the partnership and expansion of activities was spurred on by a group of active parents who were interested in their children having both a higher quantity and more meaningful science learning experiences at their schools. At McKinley Elementary, the Parent Teacher Association approached Sudran, to ask whether MSW would be willing to provide science enrichment for their classes. The parents visited MSW and brainstormed ideas with Sudran. Based on that discussion, Sudran proposed a program and budget. Some negotiation was required, based on the constraints of the PTA's budget and the number of MSW staff available to do the work but they came to an agreement which has continued to serve the mission of MSW and McKinley Elementary well. Similarly, students from Revere had been visiting MSW through field trips and the parent group was also interested in expanding what they saw of MSW's efforts.

Sudran has said of MSW's work in schools:

> *What's amazing to me is the amount of quality work we do in the trenches in the classrooms with five teachers. What we're doing in the schools is deeper, more profound than what other informal science institutions in the City can provide. If you really want to make a difference, you have to get down and do it.*

Other partnerships

While deepening existing partnerships, Mission Science Workshop is in a continual state of seeking out new and additional partners. Currently, MSW's partners (in addition to schools) include: the Mission Beacon Center, 826 Valencia, Aim High, Mission Kids, Mission Education Center, two YMCAs, two Children's Development Centers, the Indian Education Program, City College San Francisco, and San Francisco State University. The program has over 22 volunteers and hosts professional development meetings for MSW staff, as well as staff from other workshops in the Community Science Workshop Network – all of which are also considered partners.

Capacity and sustainability

In terms of capacity and sustainability, we believe that MSW and the CSWs in general are an extremely cost-efficient means to provide communities with short-

and long-term benefits. It is a mission-driven and values-based approach, which in turn provides a greater return on investment than many other educational initiatives or efforts. Sudran's comments reflect this:

> *We see this idea of being small and everyday. The smaller stuff we do and using sparingly everyday stuff and not letting money overwhelm our efforts. Staying true to what we know is true. It's neat that we can show we're doing stuff on a shoestring. We see a lot of hope. We're motivated and we don't have to have all of this fancy stuff. The rest of the world is like us. People have to get by like we do. Our program is more like the real world.*

Running the Mission Science Workshop requires about $500,000 a year. It is currently funded by the city of San Francisco (30%), and 70% through the San Francisco Unified School District, Parent-Teacher Associations (PTA), and funders including: the San Francisco Department of Children, Youth, and Families; the Stephen J. Bechtel, Jr. Foundation; the Gordon and Betty Moore Foundation; the Lisa and Douglas Goldman Fund; the Joseph & Mercedes McMicking Foundation; the Sam Mazza Foundation; the Morris Stulsaft Foundation; and Paul G. Hewitt. In 2012, MSW won a Best of the Bay award from the San Francisco Bay Guardian.

Excelsior Science Workshop

Most notably, Mission Science Workshop expanded to a new site in a neighboring community called the Excelsior Science Workshop (see separate description of this site).

IV. The role of the CSW Network

The Mission Science Workshop resulted from a strong grass-roots community effort and was successful beyond optimistic expectations. Both in its form, and its development history, the Mission Science Workshop has offered a valuable model for creating a new kind of community program that serves local youth – many of whom might be categorized as being highly at risk of failure, or of very poor performance, in formal school settings. The success of the Mission Science Workshop has been replicated successfully in other settings throughout California and has led to the creation of the Community Science Workshop Network.

The Network has hired curriculum development specialists at the sites, and there are currently several dozen activity write-ups posted on the community pages of the CSW network website, with materials lists, descriptions, photos, and for

some, videos. Staff from MSW played a key role in recording that curriculum. Site directors and staff we have interviewed at sites are utilizing these write-ups in several ways. Most sites have a binder with the activities printed out for youth to flip through when they need project ideas.

Staff development

Mission Science Workshop has hosted an all-staff professional development event for the Community Science Workshop Network, providing an opportunity to build community among all the staff at the workshops, share project ideas and science concepts, raise questions, and continue to build the shared vision and knowledge of the network. Workshop staff we have interviewed about the training have found them to be useful in many ways, from making connections to learning new project ideas.

Outreach

Sudran has played a critical role in the Network. He has been active in forging connections with the Maker Network and other Tinkering advocates. He has also actively sought to initiate new sites in Vallejo and Coachella, as well as in other areas in the East Bay and West Contra Costa County, like Martinez. He sees this outreach as a critical component of the work of all sites in the Community Science Workshops Network. He wrote:

> *By outreach, I mean always seeking to reach new kids and also reaching out to other programs that serve youth, in and out of science. Of course, our main outreach at MSW is to schools, but in another community it might be Boys and Girls Clubs, YMCA, Latino or African American civil rights groups, science museums/institutions, etc... There is a vision that we are always trying to spread our movement to new corners of our world, little by little.*

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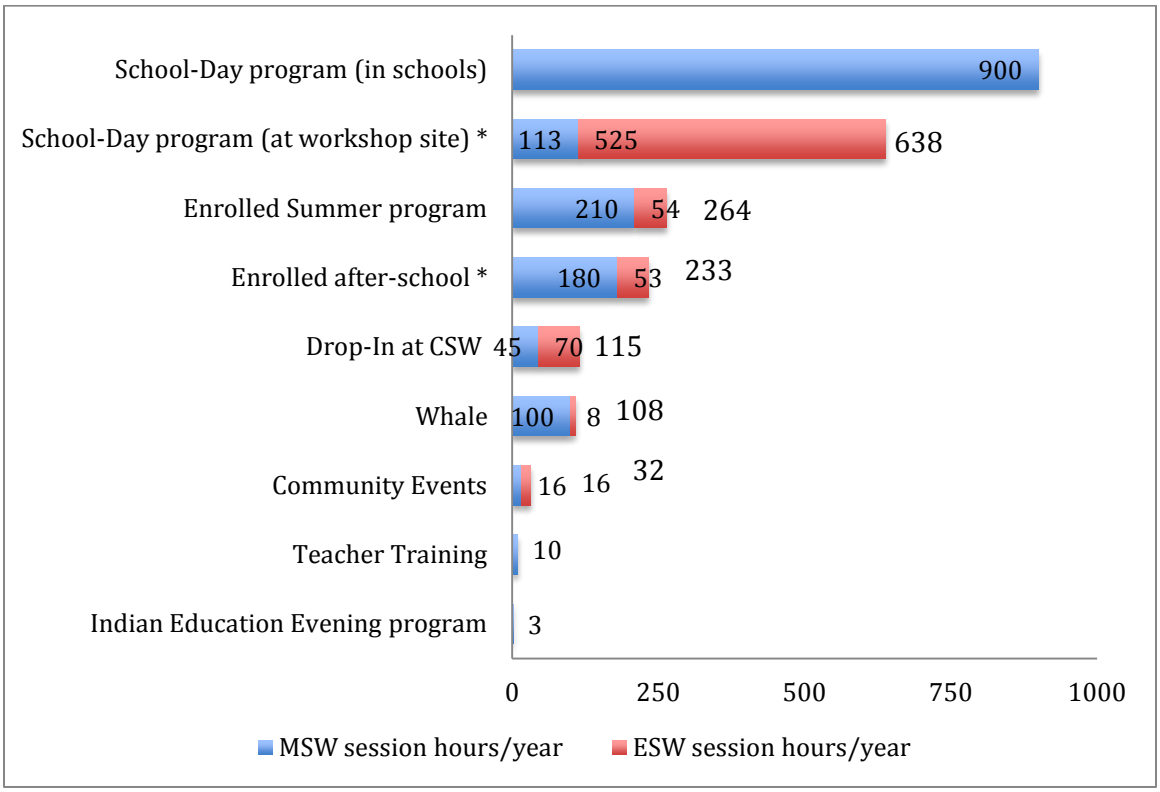
National Public Radio, All Things Considered. 2012. *Kids get hands-on with science in a 'dream garage,'* by Amy Standen. June 21. http://www.npr.org/2012/06/21/155519815/kids-get-hands-on-with-science-in-a-dream-garage

Wagenvoord, H. 2001. The circle in the mission (science track). *California Wild*. 54, 2, pp. 44-45.

Statistical Profile of the Mission Science and Excelsior Workshops

1. Session hours per year, by site and program



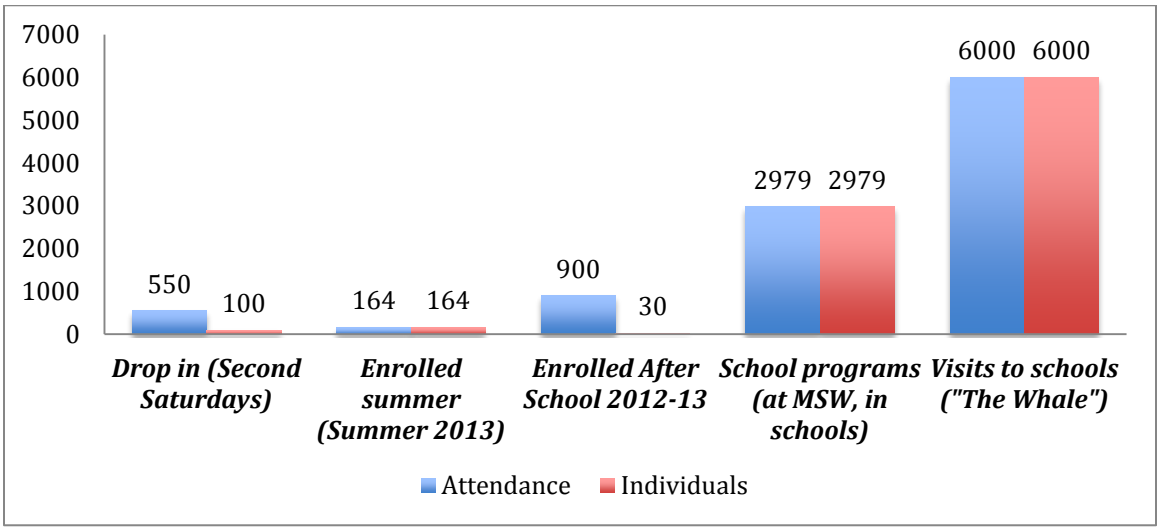
Calculated by multiplying number of sessions by hours/session. Starred items [*] indicate programs where several sessions were offered, and they varied in length. We present here an estimate based on the assumption that half the sessions were long and half short (e.g., enrolled afterschool programs varied between 144 and 216 session hours, so we average here to 180 session hours). More detail on exact session hours is provided in the program chart for this CSW.

Five MSW Programs

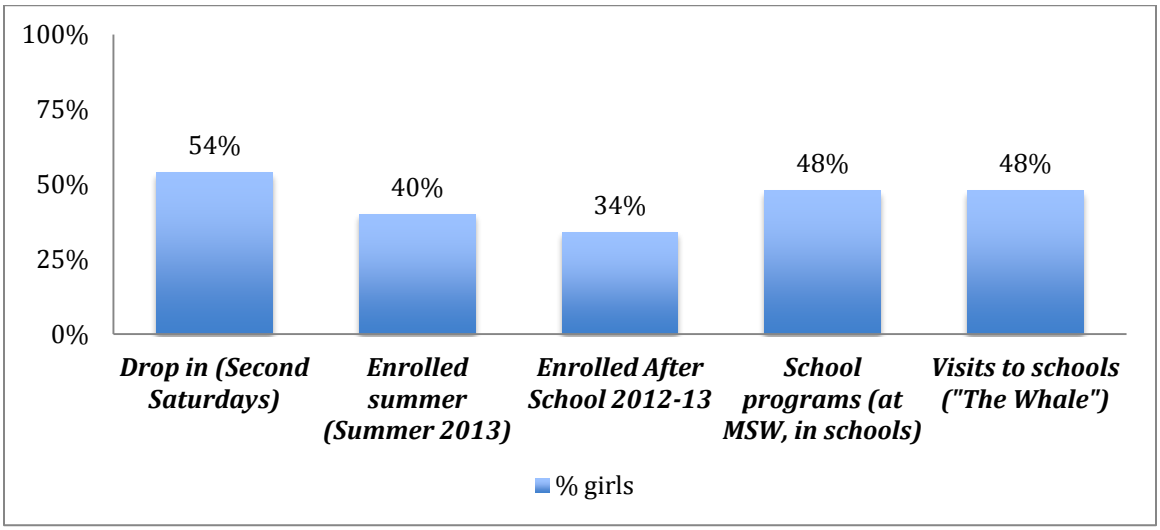
Attendance at selected MSW programs

Annually MSW estimates that it has 11,422 "through the turnstile" visits to/participation in five of its core programs. Up to an estimated 10,102 individual youth[1] participate in these programs.

Attendance and individuals at selected MSW programs

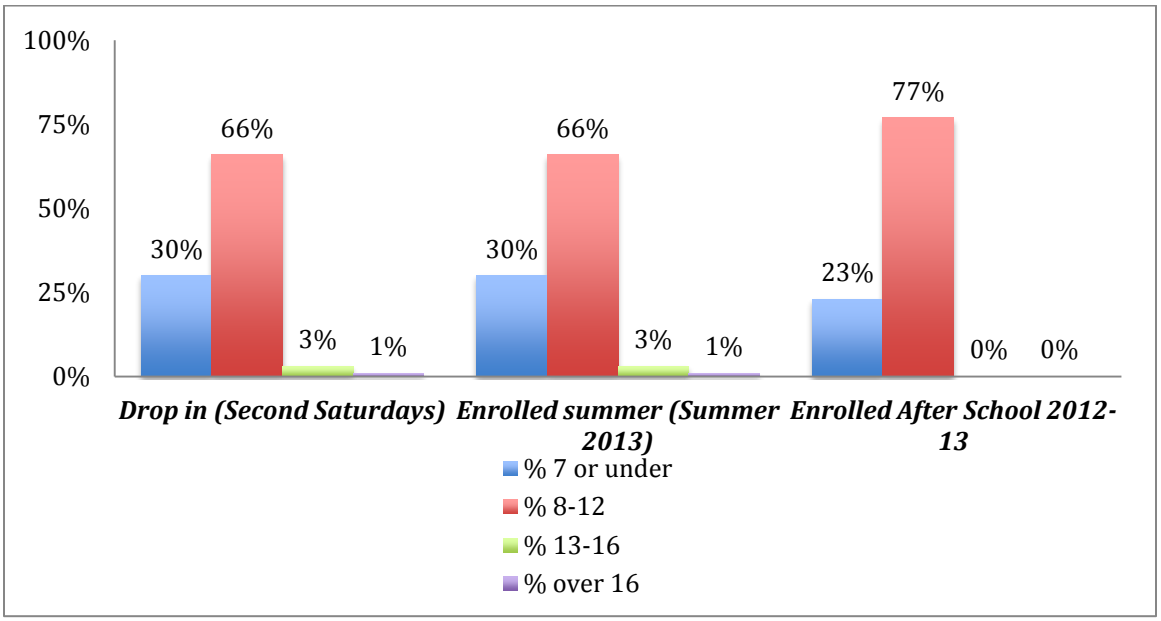


% of participants who were girls at selected MSW programs (estimated)

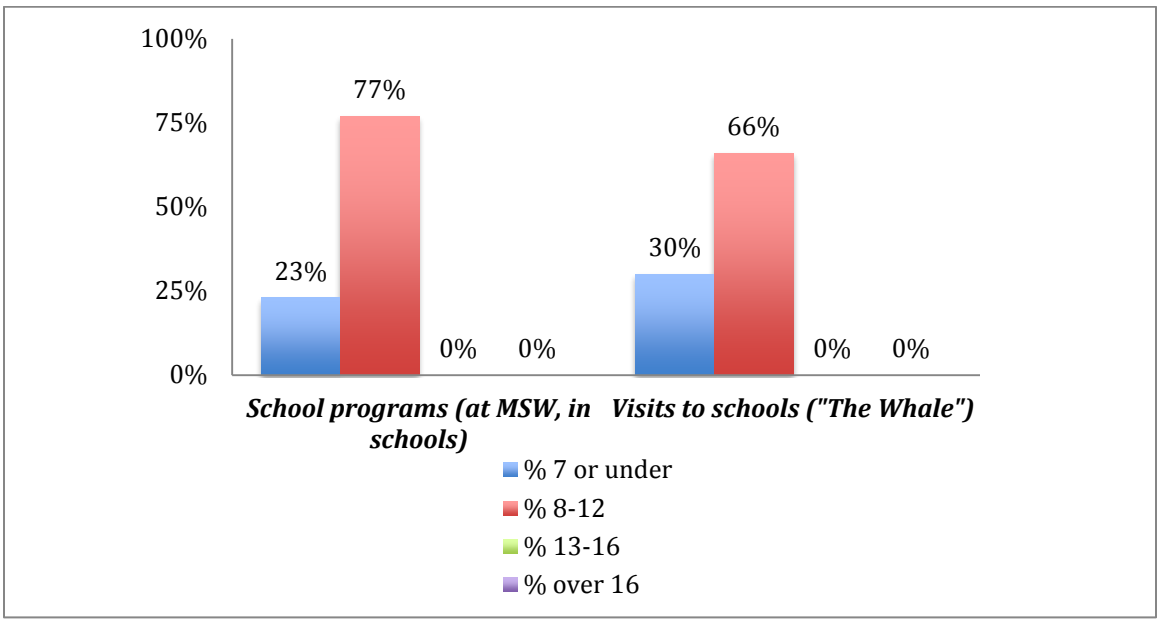


[1] Individuals are counted once for each program they attend; it is likely that some are counted more than once – once each for each program they participate in.

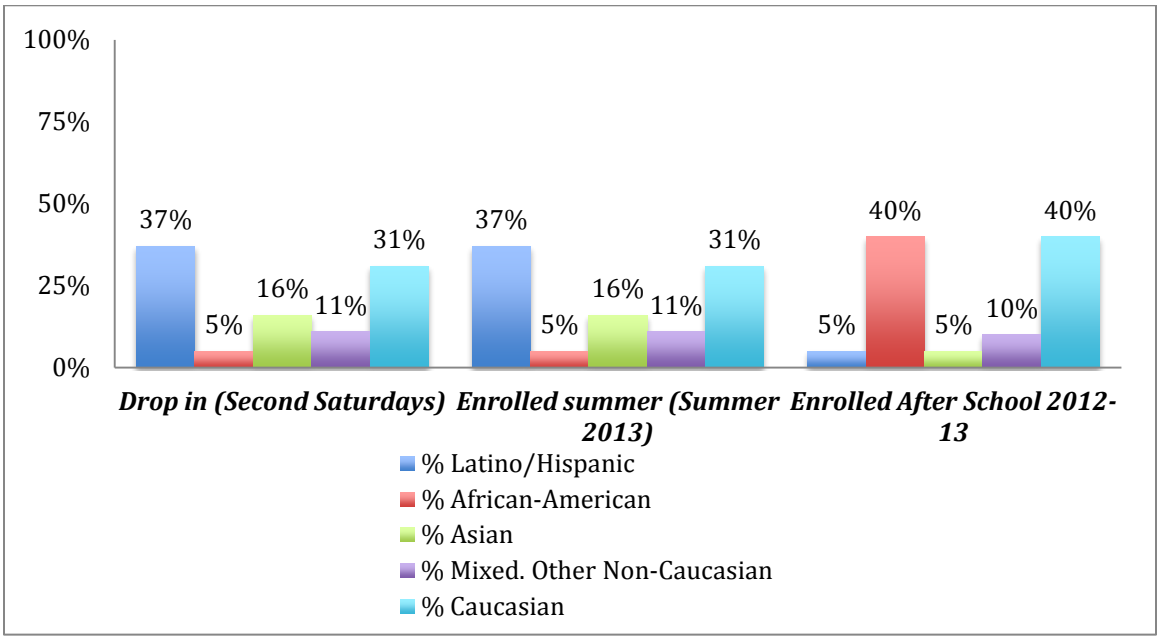
Age distribution (estimated) at selected MSW programs: graph 1 of 2



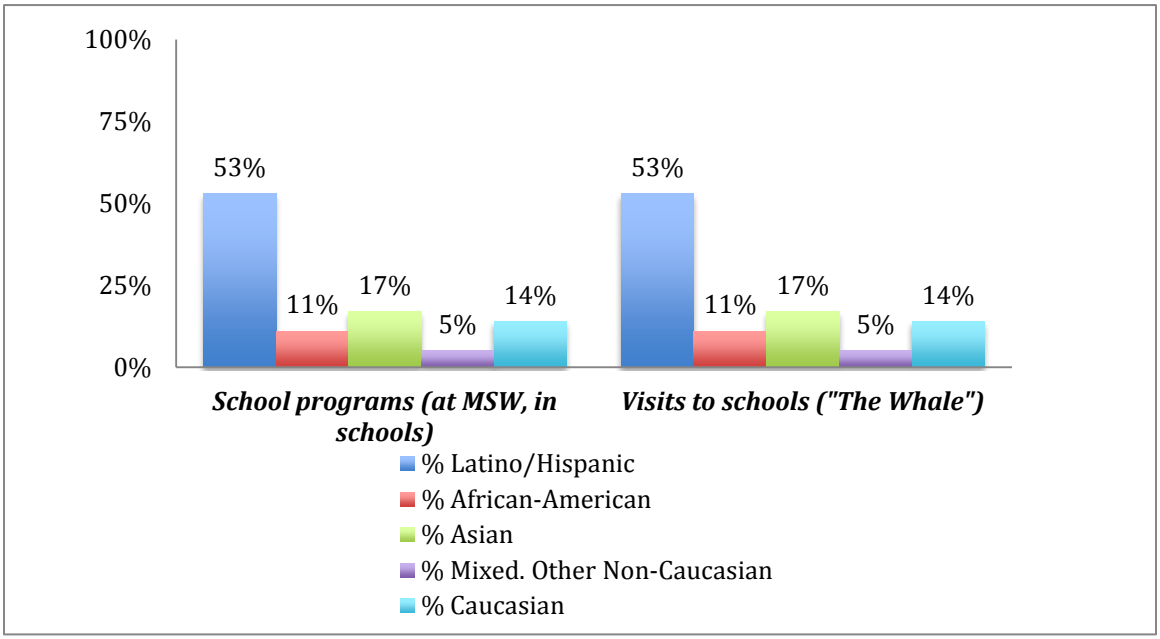
Age distribution (estimated) at selected MSW programs: graph 2 of 2



Ethnic split (estimated) at selected MSW programs: graph 1 of 2



Ethnic split (estimated) at selected MSW programs: graph 2 of 2

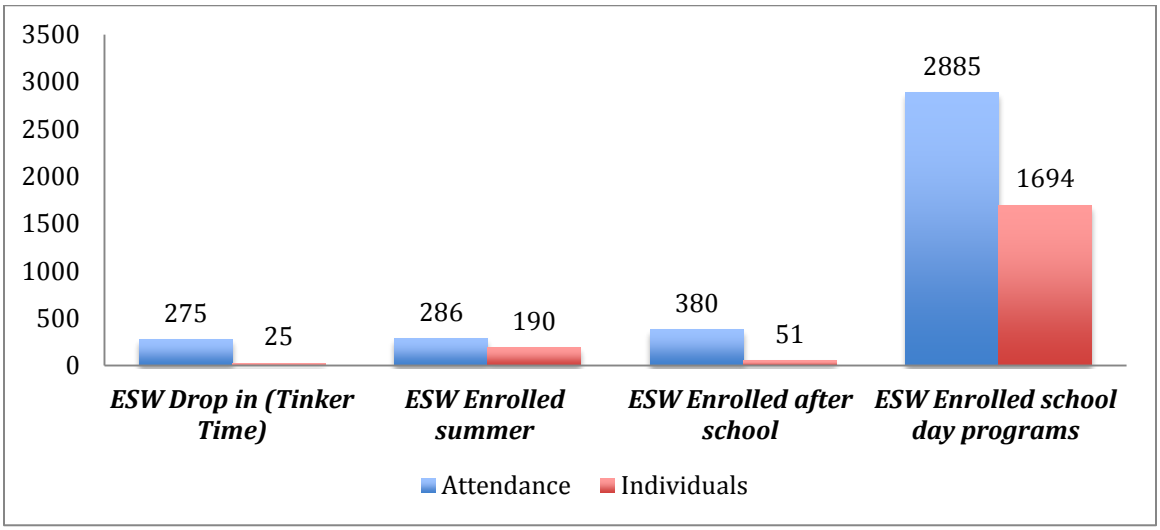


Four ESW programs

Attendance at selected ESW programs

Annually ESW estimates that it has 3,826 "through the turnstile" visits to/participation in four of its core programs. Up to an estimated 1,960 individual youth[2] participate in these programs.

Attendance and individuals at selected ESW programs

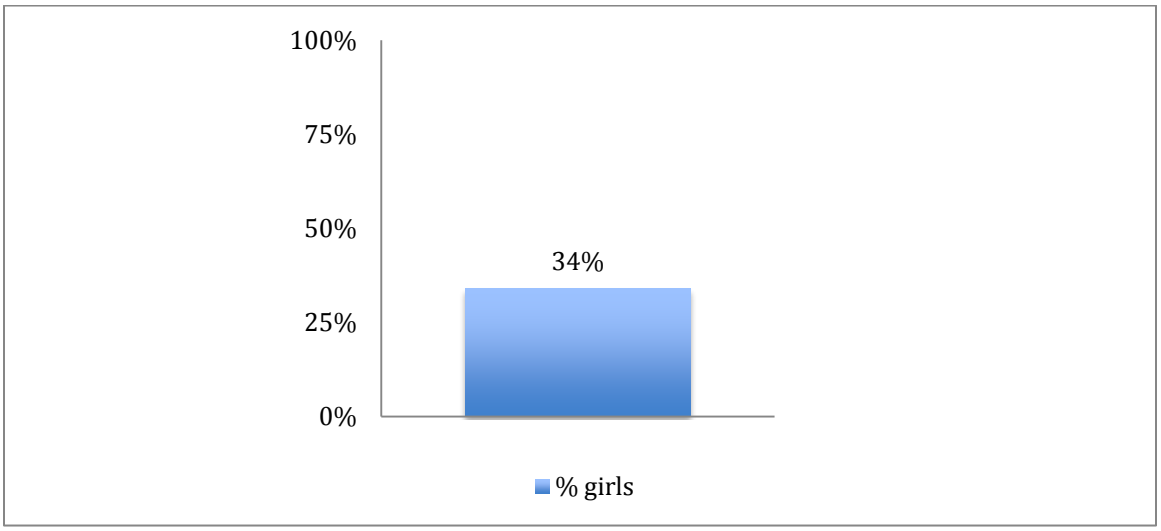


Figures are estimates.

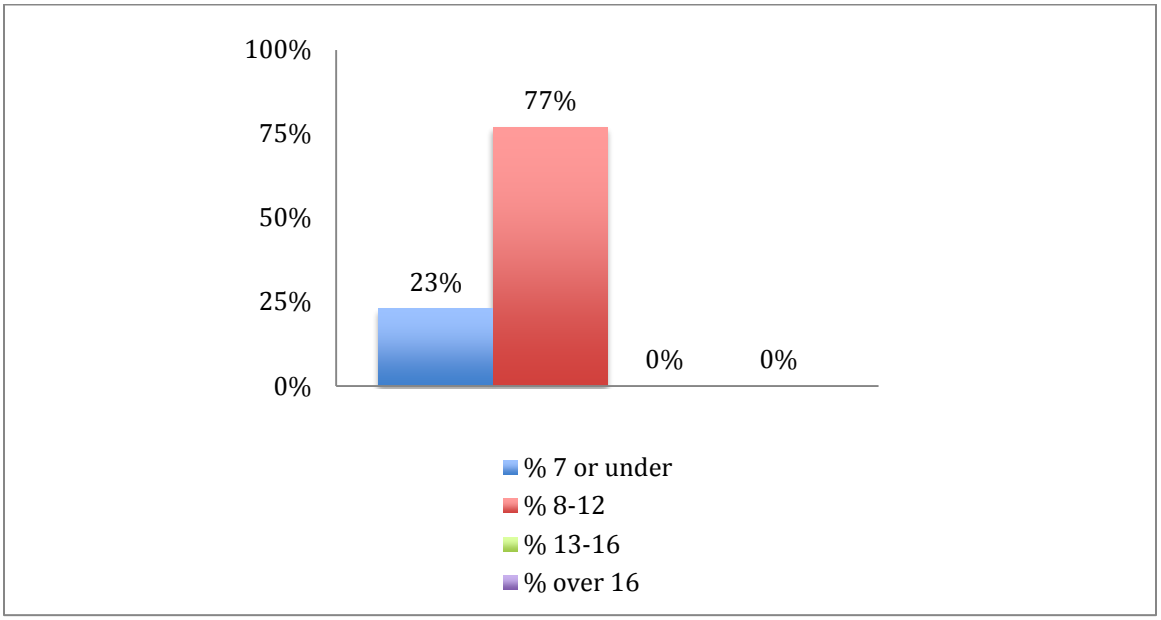
The ESW provided the same demographic figures for each of these four programs.

[2] Individuals are counted once for each program they attend; it is likely that some are counted more than once – once each for each program they participate in.

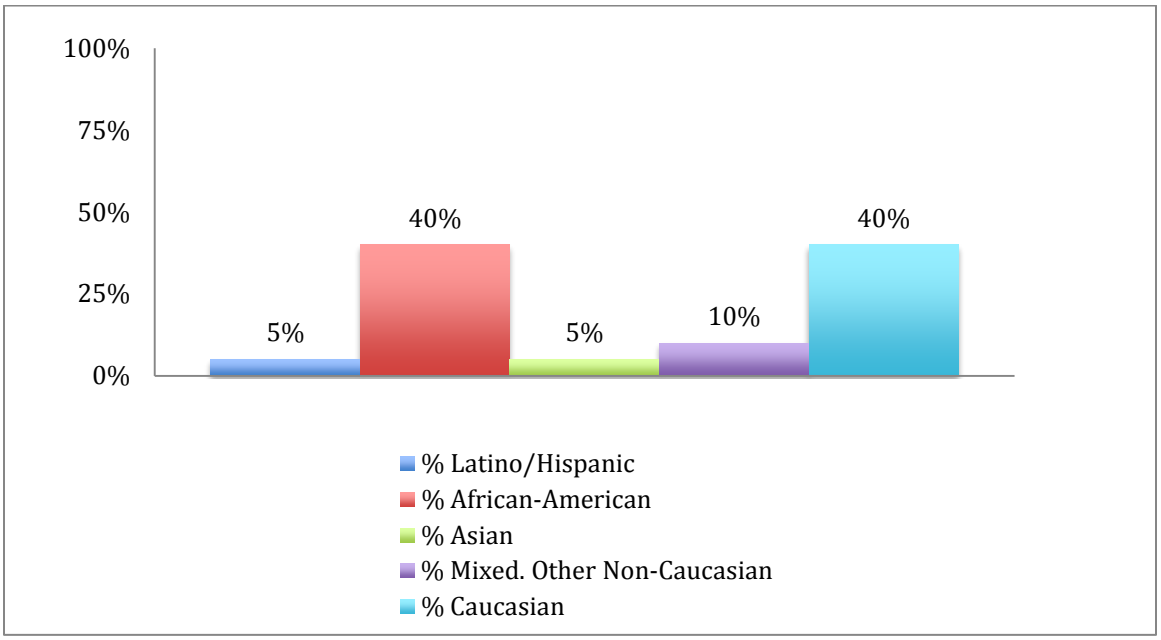
% of participants who were girls at four selected ESW programs (estimated)



Age distribution (estimated) at four selected ESW programs



Ethnic split (estimated) at four selected ESW programs



COMMUNITY SCIENCE WORKSHOPS

Oakland Case Study

February 2014

Inverness Research Associates

East Oakland Discovery Center (Oakland CSW)
Oakland, CA
February 2014

Troubleshooting, like when they are trying to make a car and they can't figure out why it isn't going faster. They will look at it to see, to make sure that the wheels are all hitting the ground. Those examples give them a way to learn – and because they are interested in the project and are more engaged, they get more out of it. That is true with a lot of the Network workshops.

~EODC Instructor

I. Oakland site description

From the outside, the East Oakland Discovery Center appears as a cozy house adjacent to a grassy park. It is located on High Street, a relatively narrow but busy street in Oakland. About 15 minutes northwest of the High Street location is the West Oakland Discovery Center, located in an Oakland Housing Authority building, not far from the waterfront of the Port of Oakland and an AMCO Chemical Superfund site.

Oakland is diverse in ethnicity and socio-economic status. While the African-American population has been declining slightly over the past few years, they are still the majority (54%) of residents. There are considerable numbers of Latino, Cambodian, Lao, and Chinese residents as well. East Oakland, West Oakland, and some portions of North Oakland are considered by many to be the heart of Northern California's African-American community.

Visitors access the East Oakland Discovery Center (EODC) via the side entrance (up some stairs or a ramp) and as they approach the entrance, the Center's garden is visible to the right, behind what is the back of the house. Visitors are also likely to see bicycles leaning against the railing, waiting to be repaired or tinkered with. Upon entering, visitors see: interactive exhibits, an aquarium, and a chicken coop directly ahead; a rack of several guitars and a clipboard for students to use to sign-in on the right; and an electronic keyboard and a second chicken coop on the left.

Youth are able to learn about animal care and husbandry

The East Oakland site has been in operation for 19 years. The director, Rich Bolecek, was one of three people from the neighborhood who founded the Discovery Center in 1994, prior to the National Science Foundation grant for Community Science Workshops. The original intent of the Center was to offer local youth a place where they could come for positive social interactions and learning experiences, a safe haven in a street drug culture. Bolecek said:

> *I started this place because I lived in the neighborhood and I wanted to do something to reduce the crime. I didn't feel it was fair to let the kids go into lives of crime and blame them for that unless we gave them constructive opportunities to do other things and to make other choices. So myself and a neighbor and his daughter started this place about 18 years ago. After about a year or so, we got together with Dan [Sudran] and went in on a National Science Foundation grant together.*

He explained how this particular house came to be used as a workshop:

> *The city had purchased this house with the intent of tearing it down to make the park bigger, but they didn't have enough money to tear it down and so it sat here vacant for years. Then we approached them and asked them to let us use the house. They refused to pay for fixing it up and so we raised the money and fixed it up and used it as an opportunity to hire and train teenagers from the neighborhood who wanted to learn construction skills. We spent about a year rewiring it and earthquake retrofitting it and teaching construction skills to the local youth who wanted to learn those things. Then we got it up and off the ground.*

Over time and with the help of the NSF grant, the Discovery Center evolved into a hands-on science workshop for the predominantly African American youth in

the neighborhood. Its proximity to the recreation center next door ensures a steady flow of youth who want alternatives to playing pool or basketball.

> *We did it for a year and a half as volunteers, but then the kids were real interested in this place and so we had a lot going on here… then the leadership at the time of Parks and Recreation, who we had never met, sent a message to us that they had heard a lot of good things about what was going on here and if we wanted to, they would provide us with matching funds for a grant. So we applied for the NSF grant, got matching funds from the city, and at that point, the city put me on the payroll.*

Bolecek brought to the Discovery Center his experience in community organizing and conflict resolution, a background that has served the Center well, in terms of the strong community support and the funding it now has. This success is what led to the opening of the West Oakland Discovery Center about 16 years ago during the '97-'98 school year. An advisory board composed of community members and parents support both Centers.

Equipment and tools that are on hand at the Centers include: hammers, drills, saws, a potters wheel and clay, several guitars, an electronic keyboard, computers, shovels, gardening tools, pliers, glue guns, microscopes, beakers, magnifying glasses, eyedroppers, wire cutters and much more. At EODC, there are two computers with internet available for kids to use for games, research, and projects.

Staff and Programs

Bolecek serves as the director of both the East Oakland and West Oakland Discovery Centers and is on the books at 37.5 hours a week, though he usually puts in more time. Bolecek reports to the director of the City of Oakland Parks and Recreation. At WODC, there is a half-time site coordinator and half-time instructor, in addition to another half-time staff member who serves as the music and art mentor, and bike repair shop leader. At any one time, there are an average of four additional staff members who provide programs at other recreation centers in the area.

Dawn Samaniego is a key staff member at Oakland Discovery Center and is "home-grown" as some in the CSW Network say, since she grew up in the Fruitvale area of Oakland and began working with the Center when she was in high school. She said:

> *I actually knew the program when I was in high school. I helped build the raised beds back there and then I went to college at San Francisco State. I wasn't quite*

sure… I emphasized Biology but I was a liberal studies major and after graduating, I went into AmeriCorps and was a literacy tutor. During the winter breaks, you don't get paid, but they say if you can find a volunteer place, we will help pay for that, and so I worked here and was able to work in the woodshop and really loved it. Once I was done with AmeriCorps, [the director] offered me a job and so that is how I ended up here.

We talked about the value of youth who grow up in the neighborhood and stay, in order to contribute their knowledge and skills.

I think it is important. I know a lot of people leave, but I stay with the community. Sometimes all the resources leave. But you still have a lot of people that are proud of living here and want to give back.

At the moment, all of the programming at the Oakland sites is afterschool programming, because their primary funding source, which is Kids First, does not provide for school-day programs. The East Oakland and West Oakland sites each provide approximately four to four and a half hours of both drop-in programming and enrolled afterschool programming five days per week. In addition, the staff members collaborate with other recreation centers to provide a couple hours of activities each week. Both EODC and WODC offer an enrolled summer program that runs about ten weeks, which is also approximately four to four and a half hours per day, five days per week. Staff members also work with kids at street fairs and environmental sites, such as creeks, and the Center joined with other CSW sites to take kids to see the grey whale that washed ashore near Pescadero Beach.

Independent explorations

Participants

The youth attending the Discovery Center come from lower socio-economic level families, many of whom are receiving welfare and/or are single parent homes. In addition to the majority African American population, approximately one-quarter of the participants are Hispanic/Latino and a few are Pacific Islanders or whites.

Approximately 358 individuals attended the Drop in program at East Oakland Discovery Center in the past year for a total attendance of 3,250. At the West Oakland site, 313 individuals attended for an annual attendance of 3,000. About 55% of all of these individuals are boys and about 45% are girls. These programs serve a relatively wide range of ages. The vast majority (92%) of visitors are between six and 15 years of age, with most (54%) between six and ten. Seven percent are even older than 16, which is somewhat unusual among CSWs. Sixty-seven percent of the kids who attend the Discovery Centers' drop in programs are African American, 19% are Latino or Hispanic, 6% are Asian, and 6% are mixed. The demographics for the 120 youth in the enrolled afterschool programs and the 146 youth in the enrolled summer programs at both sites are the same. Of the participants, Samaniego noted that at both sites, most of the participants come from the neighborhood.

II. Contributions of Oakland site

Experiences of youth

Consistent with the mission and vision for CSWs, the Oakland Discovery Centers serve local youth who do not have a great number of options for how to constructively spend their out of school time, and they provide spaces for youth to explore freely, confidently, and safely. Of these youth Samaniego said:

> *Most of them probably can't afford to go to any after school programs because they would have to pay. A lot of them, obviously, their parents are either not around… we don't even know a lot of the parents, since they aren't involved as much. If weren't here, I don't know if the kids would stay at home or if they would wander the streets.*

Kids move freely in and out of the spaces and are provided with a menu of potential activities and projects. Each month, the Centers provide workshops and projects on a different theme such as earth science, botany, flight/air pressure, and forces and motion. However, youth are always free to design their own projects or simply tinker with bicycles or other tools and materials, or play

musical instruments. During all hours of operation, youth can choose from these organized projects or work on or with computers, animal care, kitchen chemistry, woodworking, simple chemistry projects, music, art, and more.

Youth creating art using a potter's wheel

This free choice learning environment keeps the youth engaged since they know they have control over their own self-directed exploration. One staff member said:

> *A lot of the kids are from the neighborhood and so they walk here, and a lot of times, they have some ideas of what they want to build or they want to fix something. A lot of times we try to have new projects – at least once a week – to engage them in something, but sometimes it doesn't pique their interest. It is very much that they are guiding their experience while they are here and they can go out, slide down the hill that we have there on their little makeshift cardboard sled or fix a bike or help somebody else fix a bike and help out with cleaning up or help other kids. So it is really very much gauged on what their interest is, but we do, we are here to help them, and facilitate and assist them in whatever they need.*

Youth's responses to our student survey illustrate the above points. Seventy percent of respondents strongly agreed with the statement "I have my own ideas about things I want to make" and 75% strongly agreed with the statement, "There are things I want to find out more about."

Independent bike maintenance and repair

The Centers have a wealth of tools and materials for youth to use, many of which they are unlikely to have encountered anywhere else. Staff members described how they have seen youth benefit from building things with the tools at the Centers:

> *Being able to use tools that I am sure they weren't able to use before and learn skills, which they probably can't explain themselves… use saws, properly drill, use a vise or clamps, and be able to manipulate wood in certain ways and try to build things out of that. I think the experience of being able to build something with their hands is so important.*

On saws, Gak, Barbies and strawberries

On a sunny and warm fall afternoon, East Oakland Discovery Center was abuzz with about 30 neighborhood youth ranging in age from six to 15. A volunteer was working with a group at the pottery wheel, where they learned to throw pots and other objects d'art, and then paint them. Another group was working with a scroll saw to cut their names (or the names of friends or family members) out of wood. Yet another group was making glow-in-the-dark Gak. A fourth group was outside repairing and riding bicycles. In the Center's garden, a young girl about six years old practiced watering soil with a hose – she said she had never done it before. She also had never seen a strawberry plant and seemed skeptical of its identity, since she could not see any berries. She and a boy had to negotiate how much time each of them would be able to use the hose versus the shovel, and discussed which plants they should water and which were weeds.

Individuals were also engaged in their own private explorations. A 14-year old young man was playing something beautiful on the electronic keyboard. He had never had a lesson and only played at the Center but one would have thought he had been playing consistently since he was five. One girl examined a butterfly wing under the microscope. Another girl was hammering nails into a board to create different patterns. A boy had disassembled and then repurposed a Barbie doll to create a Halloween decoration, adding various fabrics and pipe cleaners. Two brothers were playing games on the computers.

Three staff members from Oakland Discovery Centers were on hand, along with a couple of volunteers, an older sibling who was helping, and two instructors from the local afterschool organizations. The youth who were present asked questions of all the adults.

The staff members at Oakland Discovery Centers are careful to guide and facilitate kids' work and projects without telling them exactly how to do it or what to look out for. This in turn helps to encourage youth to learn to experiment with different potential solutions and troubleshoot on their own. As we discussed the design-thinking or engineering-thinking that she sometimes sees students display, one instructor said:

> *Just starting things… it is just through trial and error that they figure out what is best and they see that maybe this one thing didn't work so then they kind of work on that.*

Building cars

This can be a challenging adjustment for some youth because they have often learned in school that there is one right way they are supposed to learn. Samaniego said:

> *When kids have trouble, I always try to have them think about it instead of me giving them the answer, but it is hard for them because they are of that mentality that 'you are supposed to tell me how to do it, because I will get in trouble if I don't do it the right way'. I think having them think about it… sometimes they get frustrated and they give up, but a lot of times they try it out and maybe it doesn't work but then they will try it again.*

This perseverance is critical for youth to develop as students and young adults in everyday life, and it can in turn lead to increased confidence and self-esteem. Samaniego said:

> *I know how frustrating it can be for them and I have noticed more recently… I don't know if it is because of computers and phones, but their attention is really short. I noticed they worked through it a lot more in years past. It is a good process to go through. Some of them get frustrated and say 'I can't do it.' But having staff to work with them, pretty much almost one on one, not the whole time, but kind of helping them and guiding them through that, it gives them a boost of confidence and their self-esteem is raised because they made that and they can show it to their parents. I think that whole process of getting frustrated and not knowing how it works and working through it and resolving it is pretty rewarding for them. The end product, they can share.*

Girl using a scroll saw

Indeed, on a survey administered to all of the students across CSW sites, a relatively high percentage (65%) of the youth who attended the WODC and EODC said that they strongly agreed with the statement, "when I get stuck, I can figure out what to do next," which demonstrates this perseverance and ability to troubleshoot. The increased confidence is evidenced in the fact that 75% of youth respondents strongly agreed with the statement "I can do things in the Science Workshop I didn't think I could do before." Oakland youth were even more enthusiastic in response to several prompts regarding making and creating new projects and experiments at the Oakland Discovery Centers.

Seventy-five percent strongly agreed with the statement, "I like to make things and find out about stuff," 75% strongly agreed with the statement, "I can create new things," 90% strongly agreed with the statement, "I like making projects," 90% strongly agreed with the statement, "I like doing experiments," and 90% strongly agreed with the statement, "I would like to do Science Workshop again or more often."

Extended benefits to youth, families, young staff and community

As we have noted in the past, the Oakland Discovery Centers provides a constructive alternative for students to spend their time. It is a location rich in resources such as caring adults, instruments, materials, tools, musical instruments, and creative opportunities. Youth are able to explore and discover new interests, such as art or music, in addition to science. The Centers also helps kids find jobs on occasion and can help them study for their GED (General Educational Development) test if they are not engaged or performing well in school.

There are extended benefits to the families and community in the neighborhood. A staff member said:

> *We don't see a lot of families but we do have some. Yeah, some parents, mothers, who come and help out once in a while, when they have the time.*

For some of the youth, the Centers provide a bridge between learning and what is happening in their home lives. On the particular day of our visit, there were some siblings of regular visitors who had joined in the activity of the day. Visiting youth often build things that are useful in their homes. Samaniego said:

> *We are looking out for those who need it. Some of the families come and they need something fixed and so we help them. Somebody came in with… they had just moved and their bed frame for bunk beds had split and so we had to figure out how to fix it. Or we might help with making shelves for their house or simple things like that. I think it is a resource for some of the community members.*

The center organizes community clean-up days as well.

Girls using a microscope and building with a hammer and nails

III. Capacity and capacity building, sustainability

The Discovery Center has broad-based community support and has received support from and exchanged support with a wide array of partners. As stated earlier, the program is currently funded primarily through the *Kids First* program. The City of Oakland Office of Parks and Recreation provides the East Oakland building, facilities, utilities, maintenance, and payroll services. The Carmen Flores, FM Smith, Arroyo Viejo, Tassafaronga, DeFremery, Golden Gate, and Manzanita recreation centers provide additional locations and participants

for programming, while the Discovery Centers provide training for their staff to conduct science activities with youth. The Oakland Housing Authority provides the space for the West Oakland site. Previously, Oakland Discovery Center has received funding from the United Way, the Urban Children's Fund, and the Environmental Protection Agency.

Bolecek described the financial arrangements of the Oakland Discovery Center:

> *For 18 years now, the city has been paying half of my salary and the other half of my salary and 2/3 of the cost of the program, I have been raising from grants, from other sources. So the city pays for about 1/3 of this plus provides the building, utilities and that kind of thing. We are all city employees, but about 1/2 to 2/3 of the cost of the program, we raise that. Dawn and I write grants and raise that money in grants and give it to the city who administers it. They do the payroll and the stuff around that payroll.*

To get the word out about their program, staff from the Oakland site participates in street fairs during the summer, they pass out brochures printed by Oakland Parks and Recreation, and try to keep their website content up to date. Samaniego said:

> *Our program is local so they hear about it from here. We have been getting some calls from the website, but mostly it is through word of mouth from the kids. I also know a couple of teachers, a teacher from Allendale Elementary who sends her kids here. I worked with her in AmeriCorps and she is a 4th grade teacher, and so we know some of the students, because Allendale is a couple of blocks over.*

The Oakland sites have developed capacity for writing independent grants, to supplement or fill in for the monies from the City.

IV. The role of the CSW Network

Staff from Oakland started to help with the curriculum documentation and have attended Network meetings and contributed to discussions about the mission and vision of the Network. The director and staff of the Oakland Discovery Centers described other benefits of belonging to a Network as a group that can help all the sites purchase equipment together, sponsor all-staff trainings, and monetary support to hire extra staff.

Of these activities, Bolecek said:

I think it was helpful for us to streamline or focus our activities into some kind of format. It helped us think more formally about how we can document our activities. They helped us with a blog that we can formally write all of that stuff down and so we have some kind of documentation, and that helps when new staff comes and you can show them that stuff. We received technical assistance, which allowed us to greatly expand our activities.

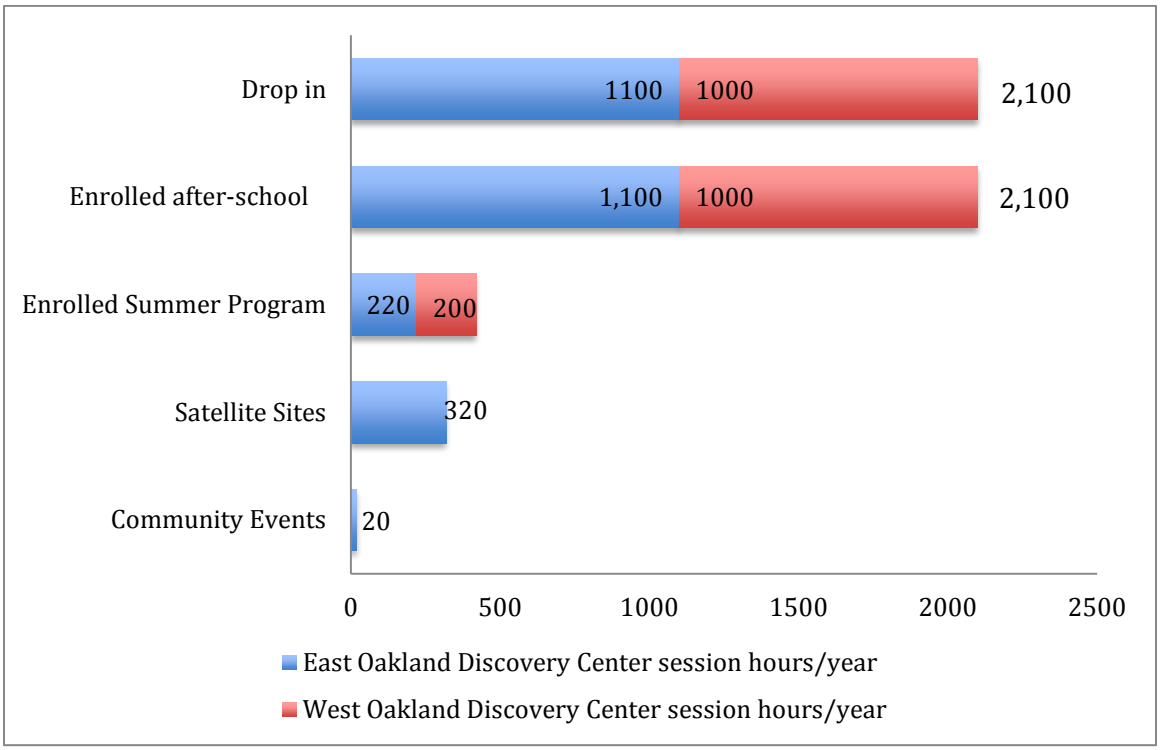
The Oakland sites were able to obtain a telescope, a welder, a couple of vacuum pumps, in addition to several smaller items. Staff from Oakland attended the CSW Network-sponsored all-staff training events in San Francisco and Watsonville, and hosted their own at the Oakland site. Of course, the Network also provided monetary support to hire extra staff.

In September of 2013, the Oakland Discovery Centers decided that meeting the demands of the Network was interfering with its first priority, which is meeting the needs of its community. In addition, Oakland Discovery Centers had a different view than the Network leadership of how a Network should be run or function. Therefore they are no longer affiliated with the network.

The opportunities that arise when organizations are connected through a Network are exemplified in the case of the 36-foot long juvenile grey whale that washed ashore near Pescadero. Sites communicated with each other about it and nearly every site, including the Oakland Discovery Centers, brought groups of kids from their local communities to view the whale – a truly once-in-a-lifetime experience for many inner city and rural youth. At the same time, the case of the Oakland Discovery Centers highlights the challenges that can arise when organizations that have functioned independently for quite some are brought together in a Network structure.

Statistical Portrait of Oakland Discovery Center(s)

Oakland Discovery Center(s) session hours per year, by site and program



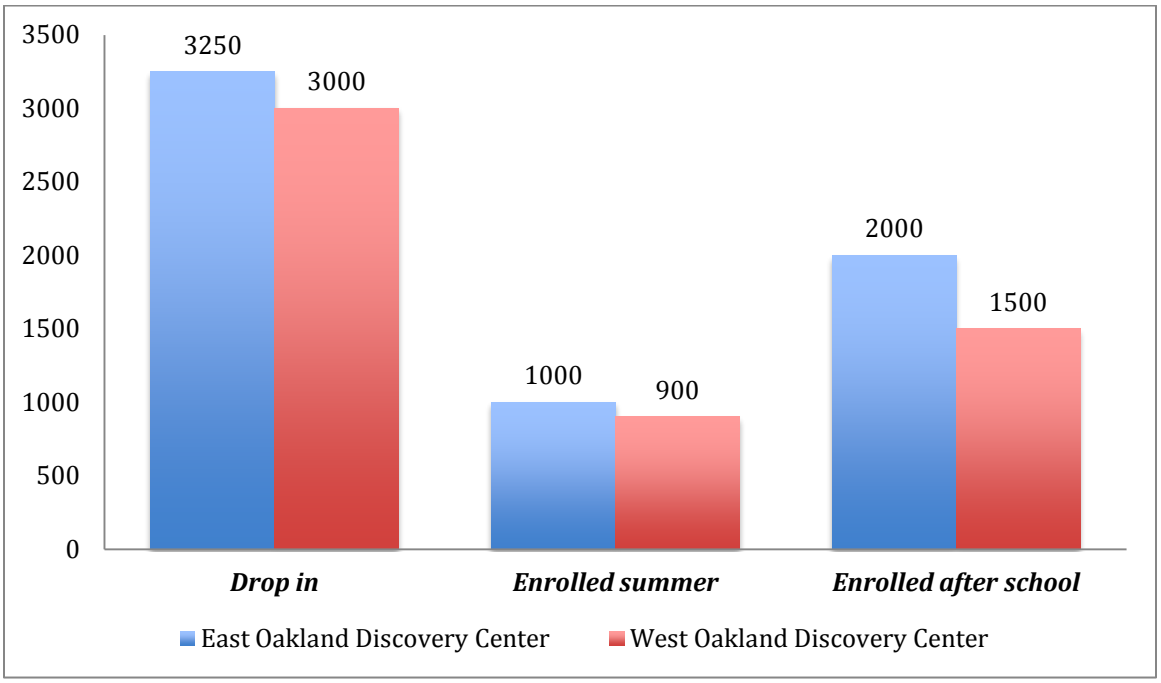
Calculated by multiplying number of session by hours/session.

Attendance at the Oakland Discovery Center(s)

Oakland CSW staff estimate that it has a total of 11,650 "through the turnstile" visits to/participation in six of its core programs (6,250 in EODC programs and 5400 in WODC programs). Up to an estimated 937 individual youth[1] participate in these programs (504 in EODC programs and 433 in WODC programs).

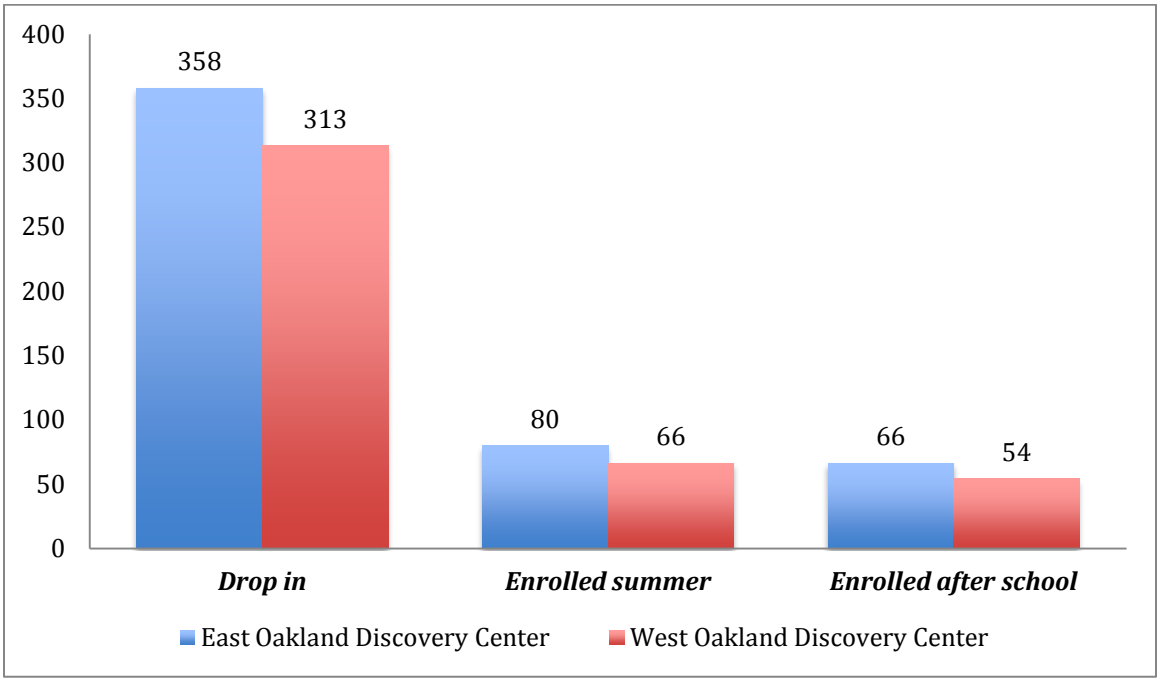
[1] Individuals are counted once for each program they attend; it is likely that some are counted more than once – once each for each program they participate in.

Attendance at selected Oakland Science Center programs



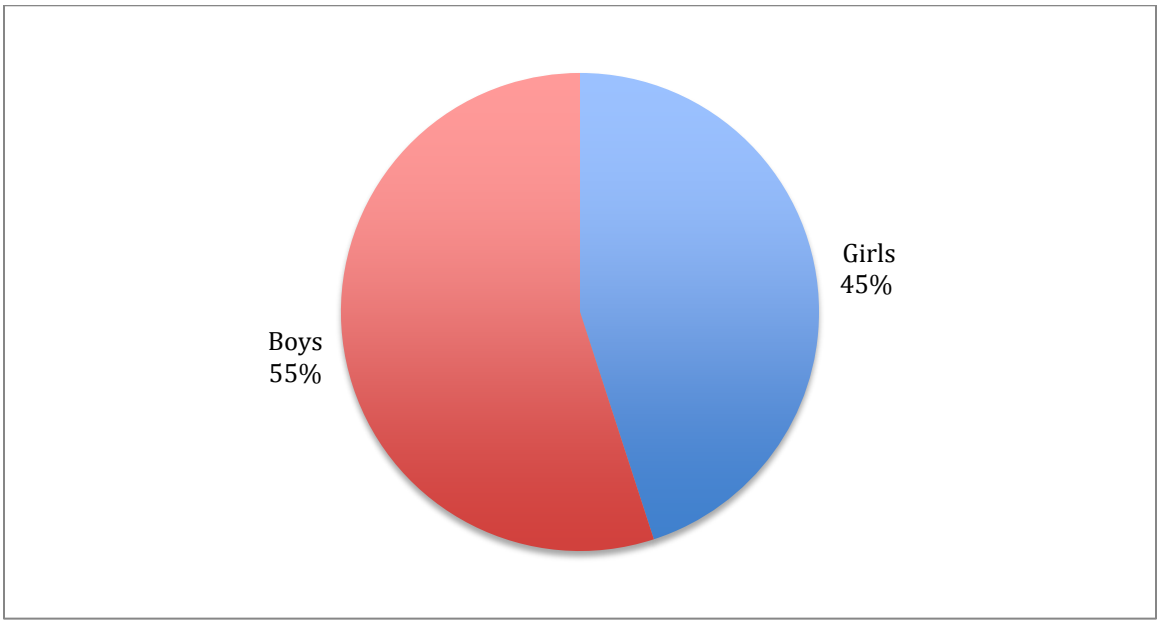
These are "through the turnstile" counts of total visits.

Individuals participating at selected Oakland Discovery Center(s) programs

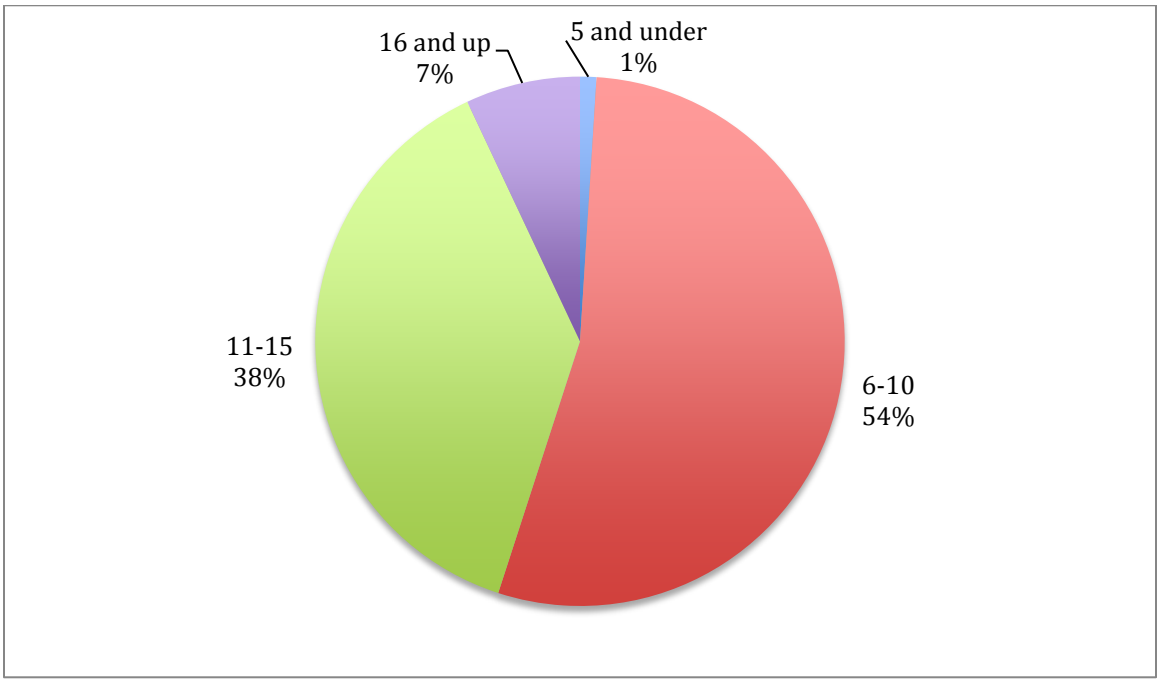


This graph counts each individual once for each program attended; some individuals may have attended more than one program.

Gender of participants at Oakland Discovery Center(s) (actual percentages, unspecified program(s))

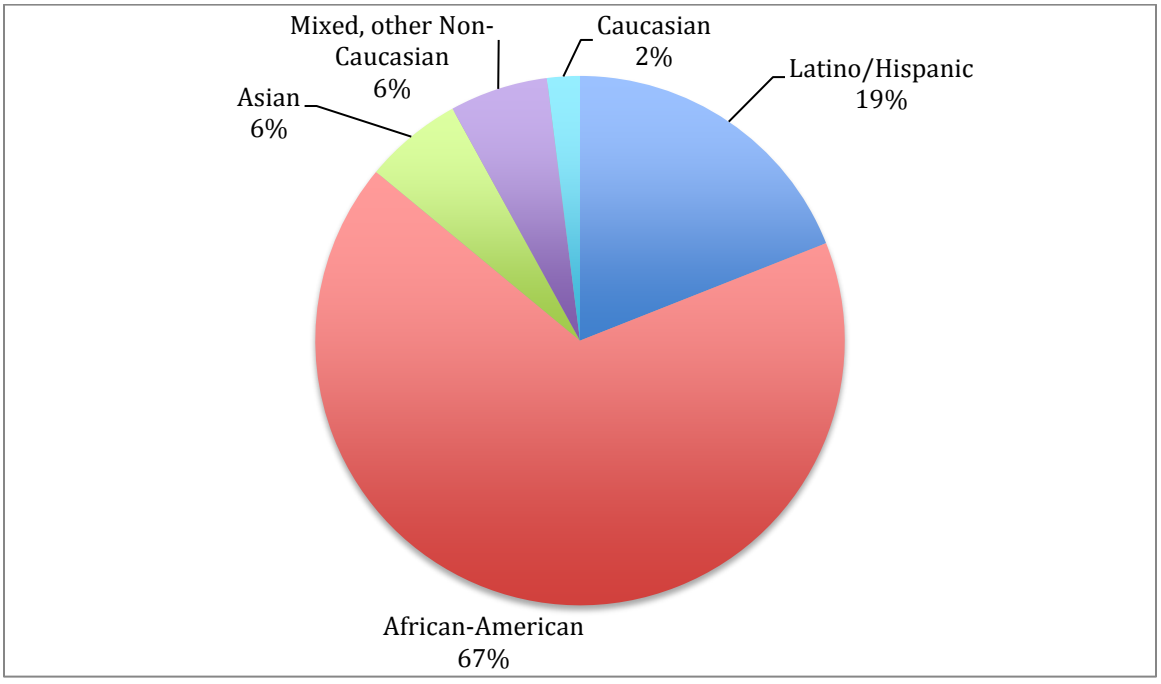


Age distribution of participants at Oakland Discovery Center(s) (actual percentages, unspecified program(s))



Note that this site reports age ranges that differ somewhat from those reported by other CSW sites.

Ethnic split of participants at Oakland Discovery Center(s) (actual percentages, unspecified program(s))



COMMUNITY SCIENCE WORKSHOPS

Watsonville Case Study

February 2014

Inverness Research Associates

Watsonville Environmental Science Workshop (WESW)
Watsonville, CA
February 2014

Since my kids have been coming here, I see them becoming more independent. They have learned how to pay attention to their own safety and use tools in a safe way and they learn the rules for how to do that. They can kind of take care of themselves.

~Parent of youth in drop-in program

I. Watsonville site description

The Watsonville Environmental Science Workshop (WESW) was opened in 1997 by director Curt Gabrielson. The primary building is located in a city park and is run by the Watsonville City Public Works Department. The main workshop site, known as "Second Street," serves low-income, mostly Latino youth and their families from a mixed residential and business district in central Watsonville. The community served by this site is largely of low-income Latino workers in the agricultural industry. The workshop is seen as a core part of the infrastructure of the neighborhood, meeting multiple needs of the community. It offers a range of CSW programs for youth as well as cross-CSW trainings and staff development. The founder of this site helped envision and then create the CSW Network.

The Second Street and Arthur Road Workshops

The Second Street workshop building is in a park, with large trees and a playground on the property. An outdoor garden is adjacent to the workshop building, and a large outdoor storage space sits alongside as well. The indoor space is inviting, with ample natural and artificial lighting, and a welcoming informal atmosphere. Approximately forty percent of the space is dedicated to displaying exhibits and model projects; approximately 60% of the space is for working on projects. In this last year the staff cleaned up and painted the inside walls of the workshop, as well as cleaning up some of the exhibit models, so the main room has a fresh, clean feel. There is a space dedicated to live animals and organic artifacts, well-organized and labeled tools, shelving with a range of raw materials and recycled parts for building things, and large work spaces that are kept clear so that they are accessible and inviting. Whimsical projects created both by staff and youth are displayed around the room. They serve as inspiration for new creations and invite participants to add new work to the collection.

The Arthur Road workshop is much smaller than Second Street, but there is ample lighting and workshop table space to serve the smaller number of participants who go there. There are no exhibits because the space is used by the workshop but also by a church group as a place to worship.

The satellite sites and school programs

The facilities at satellite sites range from outside picnic tables and asphalt workspace with a rough shed-type building, which is minimally used, to a very pleasant, well-maintained recreation center with lots of windows and multiple rooms, and useful equipment such as a sink and microwave at San Andreas. School programs take place in multipurpose rooms with lunch tables as workspace and plenty of floor space.

Staff

Watsonville has a full-time site director and assistant director. There are two other major staff members (at 20 and 30 hours per week, hired with city funds), and three part-time staff who work between 15 and 20 hours per week. Additionally, the site supports four other part-time staff with special areas of expertise (e.g. video curriculum developer, science enrichment specialist). There are nine young-adult part-time staff who work particularly with the after school programs and two high school drop-in program assistants, and the CSW Network coordinator also contributes to running satellite programs at the WESW.

Programs

Watsonville is a well-established site, with its Second Street location serving as a base for a range of programs both there and at the other locations in the city. Not including community events or field trips, the site currently offers over 3,184 hours of programming each year.

Watsonville runs two drop-in after-school programs called "Second Street" and "Arthur Road". The Second Street site is the more permanent, established site with most of the resources and longest hours. Second Street is open 5 days per week, 250 days per year; Arthur Road is open 3 days per week, 150 days per year. There is a special CSW girls only program that runs for two hours once a week at the Second Street Workshop.

There are two enrollment-based after-school programs; the staff rotates to provide programming at 13 different elementary and middle schools, 34 weeks out of the year.

Watsonville has two school-day programs: one is based at the Second Street Workshop and serves two continuation high schools for at-risk youth by providing weekly science classes at the workshop two different days of the week. The other is held at Linscott School two days per week.

Watsonville CSW staff members serve additional youth by setting up temporary "satellite" sites at five locations. Each site receives two to four hours of programming one to two days per week.

Watsonville CSW participates in approximately five community events throughout the year. These include the Fourth of July parade, Earth Day, Cabrillo Sustainable Energy Fair, National Night Out, and Dia del Niño. The site also conducts 3-day camping trips (about two per year) and day-long field trips (over 10 per year) to a range of environmental- or science-based sites such as the recycling center and water treatment plant, Seacliff Beach, and Watsonville wetlands.

Participants

The youth participants at this site are primarily Latino/Hispanic (82%). Roughly half are between the ages of eight and 12; one-quarter are seven and younger. Just under half (45%) are female. The Watsonville director reported that they have served approximately 2000 individuals per year, for a total of approximately 22,000 visits.

II. Contributions of Watsonville Environmental Science Workshop

Experiences of youth

We observed youth at the Second Street drop-in program (and briefly at Arthur Road), at a school site (Motor Toys), and at two satellite programs.

Overall, the experience of the participants reflected a "typical" CSW experience. That is, we saw a range of projects being developed where the youth were using tools and materials to explore, design, build, and/or fix a project. The programs are welcoming and inclusive; we did not see any youth who were "left out," standing on the sidelines, or not able to get help if they needed it.

Drop-in program: The drop-in program, especially at Second Street, reflects the core values of the network, where participants have open-ended opportunities to explore projects and artifacts of their own interest, and where they have the tools and adult assistance to make a project idea come to life. In this last year, the director built a biology/organic station in the workshop to engage the long-term participants who have already worked on most of the projects at least once. She wanted to have an area that is constantly changing, so now there are more live and organic specimens.

A nine year-old girl, who has been coming to the workshop daily for the last year, said she looks on the project wall for ideas. She was deeply engaged, working with a staff member to make a "planet box". She picked out her own wood pieces, her own nails and then worked carefully to put the box together. She used the scroll saw and drill press. She was smiling the whole time we observed her working, and the staff person was kind and patient with her. She said her favorite project overall is the birdhouse.

WESW Second Street drop-in participant with staff

The After-school programs: Motor Toys, Science Teach: There are two after-school programs that offer Motor Toys at six middle schools and Science Teach at seven elementary schools. These programs run for two hours, twice a week. The programs usually consist of a single project that all participants create; once every five sessions the kids can make a project of their choice. The middle school Motor Toys serves grades 6 and higher and is designed to build cumulative skills in robotics and circuits leading up to an invention session. Science Teacher for elementary students is organized into units such as the human body, levers, gas and matter. Both programs hire high school students as mentors to work with younger youth. Science Teach hires at-risk students and Motor Toys hires STEM oriented, college bound students. Staff said that they consciously encourage participants to come up with words to describe the materials they are working with and to build their observation and scientific vocabularies. Projects are sometimes set up to provide very little direction so that participants have to ask a lot of questions and think about the project in order to move forward. Staff reports that they encourage students to try different approaches or designs from the model, to be scientific and take risks within the constraints of the materials they start with.

One example of this was a youth who built a motorcycle in the after-school Motor Toys program:

> *A kid wanted to make a motorcycle. So based on the material that we had, all recycled materials more or less, this is what we more or less came out with. There is a lot of my ideas and a lot of his ideas and in the beginning he didn't know exactly. …he wanted this*

thing to pop a wheeley...We studied a little bit about leverage and everything and so he was changing the length of the body versus the weight…He took basically three days and so those are two-hour sessions, but during that session he had to create a poster too, and so that he can talk about what he built and what it is and what it is meant to do and what are the difficulties and if it worked the way he wanted it to and what were the modifications.

Satellite program: The WESW offers programming at five different locations with their satellite program. Staff and volunteers drive to neighborhoods where under-served families live and provide programming in those communities. This program serves youth who are too far away to be able to easily access the two permanent workshop sites, or who are unable to cross neighborhood lines to make it to the workshop, due to gang violence or other tensions. The van carries many of the same kinds of materials and tools that are available at the permanent drop-in sites, but on a smaller scale.

We visited two satellite programs, one at San Andreas and the other at River Park. The San Andreas satellite is at the recreation center of a housing development. The kids come during the week for homework help, but on Friday afternoons and Saturdays WESW brings activities. All of the kids who come to the program live in the housing development.

When the WESW van pulls up the kids help carry in the materials and equipment. There were 14 kids the day we were there. Two WESW staff members were running the program with assistance from a 10th grade student who gets paid by his school to help in the workshop and to tutor. The WESW brings the materials for a specific project each session, but also provides materials and tools for projects that individual students are working on.

The day we observed the first activity they did was to pull out a pot of borax crystals they had made at a previous session. The kids were excited and talked with the staff about what had happened since they last saw the pot. The other staff person then assembled a group of five kids at a table and started explaining how to make a parachute on top of a bottle that blasts it into the air. He had a model parachute and was using it to demonstrate to the kids as he talked about the materials and design. All of the materials were on the table and available to them to make their own. Several kids were working on other projects of their own choosing. One older girl was creating something from fabric and a boy was working on his go-cart.

Go-cart project

Two participants at the San Andreas site talked about how much they like the WESW days:

> *We come a lot of times…On Fridays they [WESW] come and we do stuff, like projects. We can do birdhouses, houses like for dogs, or crystals… We don't have any homework on Friday. We just come here and do fun stuff with her.*

Both boys and girls were engaged and enthusiastic about their projects. One girl's favorite project was making a doll house using wood and the glue gun. A boy said, "My favorite project has been the crystals." Participants learn to use a variety of tools but have help until they are ready to use them independently. The girl mentioned above said that she was afraid of using the drill so she asks for help from a staff member, but she had mastered other tools:

> *I learned to use like all of the tools that they bring, and I learned how to use the [glue] gun.*

A boy liked the variety of materials and tools:

> *I learned that everyday that you could use…different supplies and so you could do different stuff, like you could use like a lot of different tools that you don't know, to do something new.*

One participant was working on a go-cart at a table by himself. He is considered a WESW success story because he was previously a bit of a troublemaker, not engaged, and had to be asked to leave a couple of times because of disruptive behavior. When he landed on the idea of making a go-cart, he got very engaged in this long-term project even though his friend who was helping him quit the project. He was getting lots of support in terms of materials, tools, and expert consultation on problem solving from staff members. When asked if he liked to come to the workshop, he said he did because "every Saturday I just do different projects and I only work on my go-cart on Fridays with [WESW staff person]." His favorite project so far was a Styrofoam boat he built with a motor.

A different boy talked about how some projects are more long term and how the workshop accommodates that:

> *Yeah, but if you don't finish it, you could either take it home and then bring it back the next Friday, or you could give it to them and so you don't forget it and then they will bring it back to you.*

The other satellite site we visited was River Park. We only made a quick drop-in visit and did not observe a particular project-of-the-day. The participants stayed outside around the van and picnic tables. Neighborhood kids seemed to know the WESW staff person well. There were five or six youth who were mostly socializing. Two girls said that their mom liked for them to come here; one said that her mother was surprised that the chair the girl made did not break when she sat in it.

School-day program: Watsonville offers a school-day program held at two different locations. One is held at the Second Street CSW for two different high schools, one day a week each; the other is held at Linscott (K-8) Charter.

The workshop-based, school-day program is for two groups of at-risk high school youth. One group comes from a continuation school (New School, part of Pajaro USD); the other is from an alternative school within the Santa Cruz County Office of Education. We observed part of one session held for the New School students. There were presentations of projects the students themselves created during the session at the workshop. They included a tornado and two different car models. The students had the opportunity to practice, in an informal, non-threatening setting, building on an idea or interest of their own and presenting what they created to a larger group. The building time of the session was informal and also focused; the staff member had the youth's attention as he asked them to discuss their projects and to talk about the science behind them.

Extended benefits to youth, families, young staff and community

The youth participants in all of the programs offered at WESW are having a range of inquiry-based science experiences that they would otherwise not experience. The presence of the site and its work with the community also provide a range of additional benefits to the families that participate, and to the staff that conduct the programming.

In all the programming efforts, we observed some core experiences common to all the programs:

The workshop welcomes and respects all youth of the community. The many youth served by the WESW programs were treated with respect and were honored enough to be expected to try and to participate. The assumption on the part of the staff was that each youth had the capacity to learn and to build something with their own hands. No idea that a participant brings is ever dismissed. Youth express authentic excitement and pride about the things they make at the CSW.

Project created by girl at Second Street Drop-in Program

The staff knows how to engage participants in their own ideas. Staff is engaged and is comfortable with the chaotic nature of the drop-in environment. The staff understands the importance of ownership, of letting the participants engage in the development of their ideas, in the actual building and putting together of a project, and of solving problems.

The workshop provides much-needed exposure to STEM content and processes: The youth were exposed to a wide range of science, technology, engineering, and mathematics concepts. They were actively given opportunities to hear and use STEM vocabulary, and to experiment with STEM concepts and natural laws through their projects (and the tools and materials used to make them). For example, the participants at the San

Andreas satellite site were exploring the design of parachutes and aerodynamic concepts, and in previous sessions they had explored concepts related to floating and design in making boats with motors, even if implicit. And the borax experiment was a study of changes in states of matter. The work that happens at the workshop supports and enhances school learning.

The parents are involved at the WESW. Youth said that their parents like coming to the workshop, and they like that their children spend time there. We learned – by talking with a parent, with the staff and with the youth participants – that the Second Street Workshop in particular is seen as a "home" and the staff as "family" for the youth who spend time there. This demonstrates a strong feeling of trust in the workshop, on the part of the community. A boy at San Andreas said that his parents like that he makes projects at the workshop and that it offers activities that the homework program does not offer:

> *My parents think about the project that it is better because [the after-school homework program] doesn't have all of the stuff for the project, and we come to [the staff] to say, 'do you have this to make the project?' My mom and dad think it is pretty cool because that way I get entertained too. And [it's] really fun.*

The workshop provides a safe place for children who don't have other alternatives. The WESW helps meet young community members' basic needs -- a safe place off the street, food, kindness, an alternative to gang involvement -- while also providing skills and inspiration for possible studies or careers in STEM or art. The site is serving children who are under-served due to poverty, lack of opportunity in school, and/or lack of family support.

III. Capacity, capacity building and sustainability

The Watsonville Science Workshop has proven itself in terms of sustainability over sixteen years. The site receives recurring grants and invitations to large events such as the Maker Faire. Another piece of evidence that the site is sustainable is that it is meeting funders' grant requirements without changing or abandoning its original mission. And, as the director reported, "We survived the recession."

The site also survived a change in site directors from the founding site director to a person with a very different management style. This is evidence of distributed capacity at the site, meaning that it is not all centered in one person. The site has training sessions for staff every Saturday for two hours. These trainings ensure that staff members continue to learn projects, science and skills for working with participants. One established staff member reported that he wants to see more training happening for the younger staff, especially in terms of science content. Trainings like this are likely

to contribute to the sustainability of the staff, as they will feel empowered to do their jobs better.

The community views the site positively for the safe, interesting opportunities it offers young kids, and for the job opportunities it offers older kids. The Watsonville ESW has become a "pipeline" for participants who come to the workshop first as participants, then as helpers, then as staff. This serves as a kind of social capital, in that the site has at least a small group of people who know the workshop experience, who value it, and who become invested in the workshops as an important community resource. There are several examples of youth who started at this workshop as participants, and who now are in leadership positions and who are planning to go into STEM majors in college due to their experience with the WESW.

The largest supporter of WESW is the City of Watsonville. The general fund provides for two full-time staff with benefits plus three part-time staff, vehicles, and a portion of materials and supplies, mostly for the drop in programs at Second Street and Arthur Road. The City also handles administration of the Packard Foundation grant.

Other funding sources are as follows: The Packard Foundation funds $44K a year for Motor Toys after-school program for Pajaro School District (6 sites). This includes staffing, materials, and training. The site believes this has the potential to be a "revolving" grant because the grant has already been renewed once. The Community Foundation contributes to the cost of high school and college staff, and "floating" staff for drop-in and satellite sites. Community Initiatives, a fiscal sponsor of the CSW Network, pays for video and curriculum development and a part-time salary for staff work at satellite sites. Pajaro Unified School District and Santa Cruz County Office of Education provides "fee for service" for high school programming both at school and workshop sites. The Santa Cruz County Food Bank provides snacks for participants at workshops, on field and camping trips, and meals for kids during the summer when they do not have food at school. Loaves And Fishes provides food especially for the girls science program.

IV. The role of the CSW Network

The Watsonville Environmental Science Workshop has both benefited from and contributed greatly to the CSW Network. As noted early in this case, Curt Gabrielson, the founder of the Watsonville workshop, was one of the early developers of the CSW Network. He participated in planning meetings, rallied the other directors to contribute and to add their thinking and their time to network the CSW Network development, and brought his multiple connections to the table. Also, the current network coordinator is a part-time staff member in Watsonville, and so knows the work of the CSW both from a site and a network perspective.

Curriculum development: The WESW has gotten ideas for programs and activities from other sites, especially in biology from MSW. The site director reports that she wants to model working with the school district like the MSW does. She is also inspired by Fresno to do a Family Science Night at one of the schools. The CSW Network hired a curriculum developer, and Watsonville has benefited from this person's contributions to the collective programming and activity options.

Professional development: The Watsonville director and staff have participated in all staff trainings and retreats.

Network administration: The WESW director feels supported and encouraged by the CSW Network because the directors all have the same vision for their work, and as a relatively new director, she asks lots of questions about how to address challenges that arise. She feels especially networked or connected with Fresno and Greenfield due to geographical proximity. The director said that she understands the value of network administrators bringing the work of all sites, as a cohesive unit, to potential funders. The sites refer each other to funders to demonstrate particular strengths that are being offered to underserved youth.

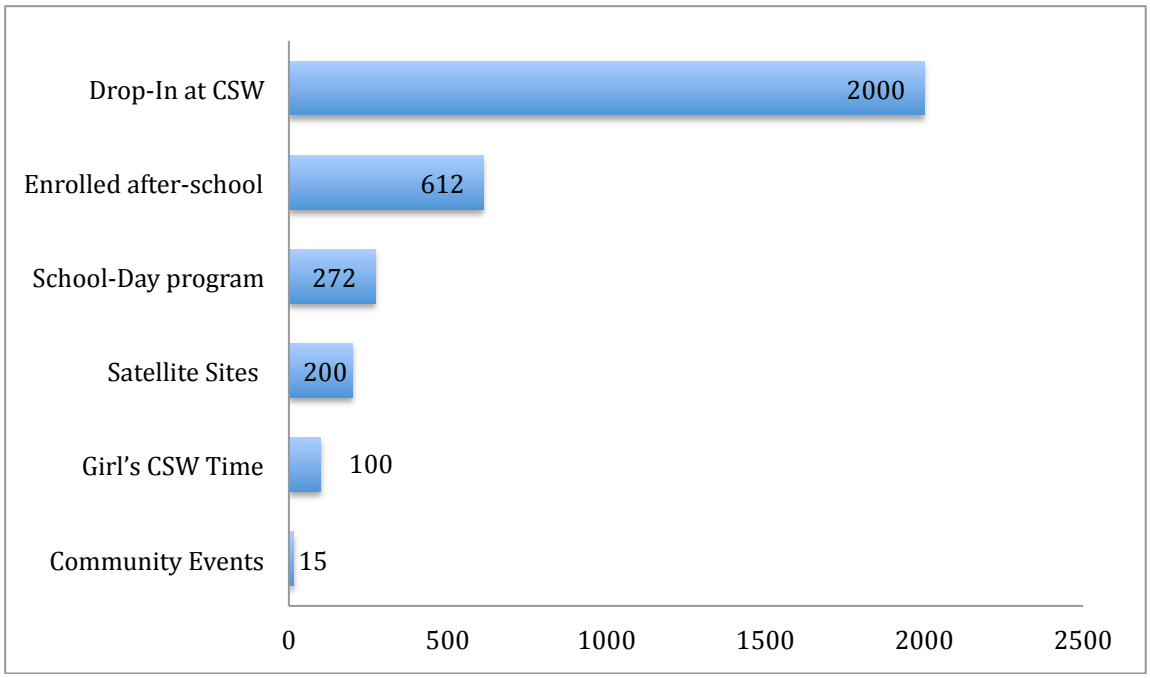
Watsonville's contribution to the CSW Network

Curt Gabrielson, the founding director of the WESW, was instrumental in forming the CSW Network -- attending director planning meetings, helping to develop non-profit bylaws, and recruiting the current CSW Network coordinator. The current site director is on the CSW Board and participated in the strategic planning network retreat held in Spring 2013. The director is working with MSW to try to open a site in Salinas. When Inverness was conducting their site visit, representatives from Salinas met with Dan, and briefly with the director as well, right in the workshop space. Additionally, Watsonville partners with Greenfield on field trips. By partnering together, the two sites can share resources, as well as camaraderie, friendship, and connection to the larger network.

Watsonville is sharing activities and approaches with other sites. This site has significant expertise in community development and environmental education, work that the founding director started and that the current director is continuing. The site also participated in Maker Faire with other members of the CSW Network, connecting the work of the CSWs to the broader making community.

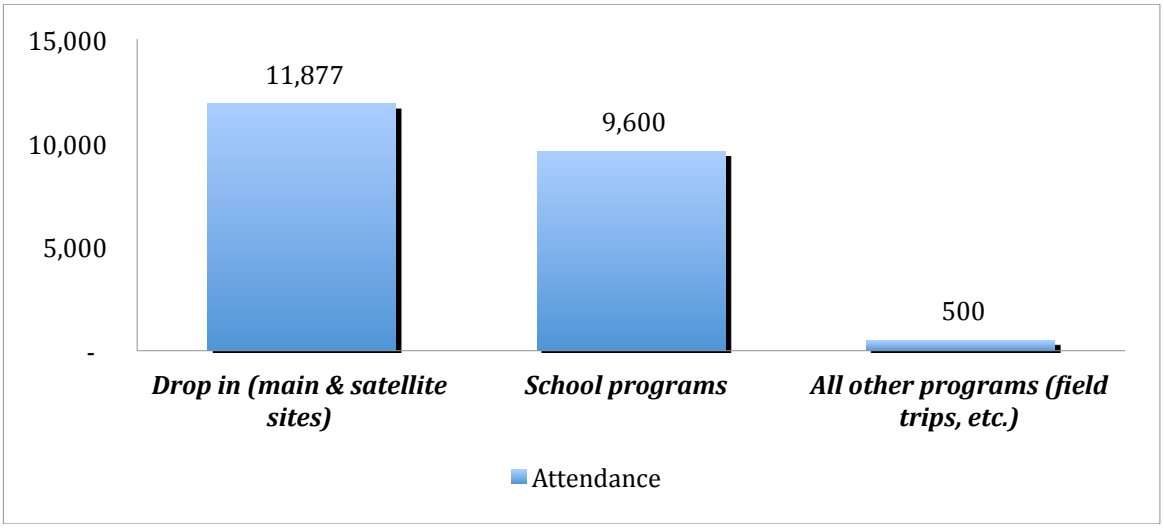
Statistical Portrait of Watsonville Environmental Science Workshop

Watsonville ESW session hours per year, by site and program



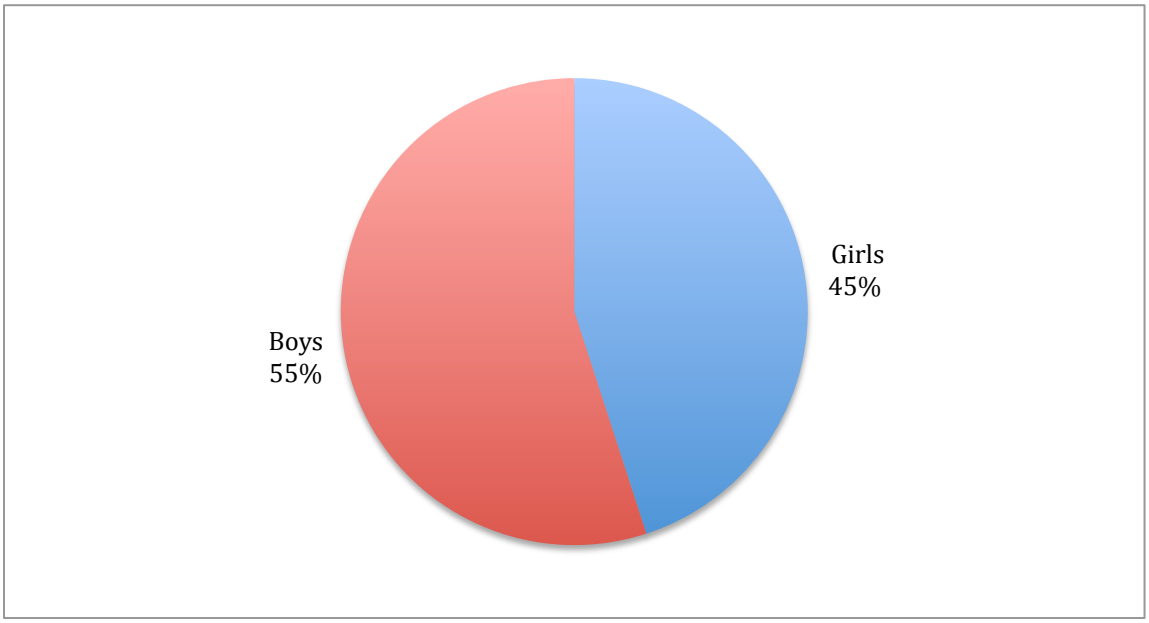
Calculated by multiplying number of session by hours/session.

Attendance at the Watsonville Environmental Science Workshop (2012-2013)

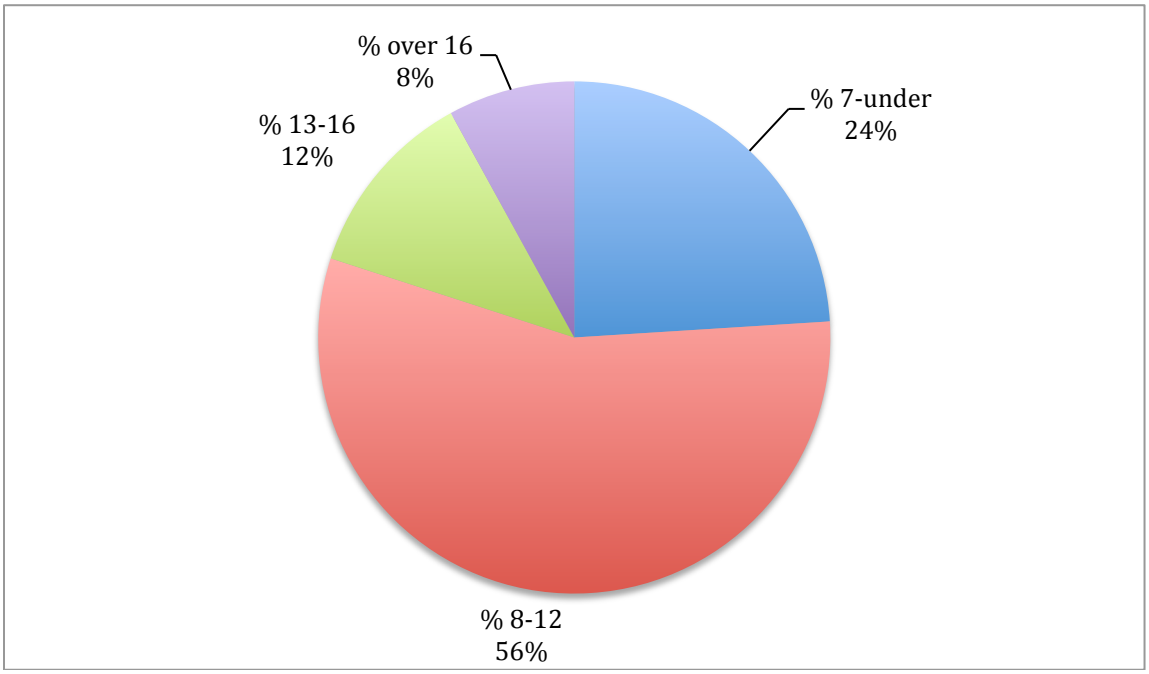


Watsonville CSW staff report that a total of 2,000 youth participate annually, for a total "through the turnstile" attendance of 21,977 visits per year.

Gender of participants at Watsonville ESW (estimated)



Age distribution of participants at Watsonville ESW (estimated)



Ethnic split of participants at Watsonville ESW (estimated)