



# Community Science Workshops: An Evaluation Portfolio

*Perspectives on the Community  
Science Workshops*

Inverness Research

# **Community Science Workshops: An Evaluation Portfolio**

Perspectives on the Community  
Science Workshops

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All photographs courtesy of Community Science Workshops national office.

# Welcome to the CSW Evaluation Portfolio

Welcome to Inverness Research' Community Science Workshops (CSW) Evaluation Portfolio. In this portfolio, we report on CSW—a project that grew from a single science teacher's garage in 1991 to a national network of dozens of workshops in seven states by 2006.

Community Science Workshops are community-based non-profit programs that offer underserved youth living in low-income, high-minority neighborhoods a fun and safe way to explore their world through science. Community Science Workshops are what the name implies: They are workshops full of equipment and tools, located in mostly urban community spaces, where local youth can explore, investigate, and build—all with the support of caring, knowledgeable adults and in a culture of scientific inquiry and constructive social interaction.

As evaluators of these National Science Foundation-funded CSW initiatives for the past 12 years, we have gathered statistics on the scale, scope, and cost-efficiency of CSW services to youth. We observed youth at work in the shops—building bird houses, taking apart computers, repairing bikes, growing plants, and so on—and interviewed youth, their parents and teachers, CSW directors and community partners. We attended meetings of CSW directors and interviewed the national coordinators and principal investigators. In our research on dozens of science education initiatives throughout the country, we rarely encounter projects that have the combination of positive characteristics that the CSWs possess. Our findings suggest that CSW is a model for serving underserved youth that is both powerful and feasible, in that:

- CSWs serve an important population in an important content area.
- CSWs produce important benefits to youth.
- The CSW model is replicable.

- The CSW model is cost-efficient.

We present the major findings from our research and we provide our independent perspectives on CSW in the following four report modules:

- **Community Science Workshops: A Powerful and Feasible Model For Serving Underserved Youth. An Evaluation Brief.** The purpose of this evaluation brief is to inform funders and policy makers about the value of the CSW model as an educational resource for underserved youth and communities.
- **Community Science Workshops: Building a Bridge to Science for Urban Youth. A Descriptive Look at CSWs.** This descriptive module tells the story of the CSW program—how CSW arose and spread, how local CSWs are structured and led, and what programs and experiences they offer to youth.
- **What Do Community Science Workshops Do For Kids? The Benefits to Urban Youth.** This module analyzes the range of benefits youth receive from their participation in CSWs—from personal, to social, to academic.
- **CSWs by the Numbers: A Statistical Portrait of Community Science Workshops.** This module describes in quantitative terms the scope and scale of the CSW’s work and accomplishments—e.g., where CSWs are located, the type and quantity of programs they offer, how many youth they serve, and what resources are needed to run the workshops.

It has been a privilege serving as formative and summative evaluators for CSW through the years, and we hope that these report modules will provide useful insight into their history, accomplishments, and future potential.

# Acknowledgements

Inverness Research wishes to thank all the CSW staff, partners and participants who talked with us over the years and welcomed us at their workshops, conferences, and meetings.

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# Community Science Workshops, A Powerful and Feasible Model For Serving Underserved Youth An Evaluation Brief

## Introduction

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### **Opportunities for urban youth to learn science**

For more than a decade there has been a steady drumbeat of concern about science and math education opportunities for urban youth. In 1995, the Urban Institute published a comprehensive report on conditions for science reform in urban schools, identifying factors that support and impede teaching and learning (Clewell, et al., 1995). Dozens more studies have come on the heels of science reform efforts and, with few exceptions, the findings about school-based science are bleak, especially for urban youth in poverty. In March 2007, Science published a NIH study finding that elementary grade students are over-exposed to basic skills and have far too few opportunities for rich, student-centered learning in science (Pianta, et al., 2007). Other studies, in contrast, point to the benefits of informal science as a promising avenue into science for urban youth-particularly when science-rich experiences are embedded in local urban contexts (for example, Barnett, et al., 2004; Barnett et al., under review; Jones, 1997).

### **A study of the Community Science Workshops**

In this brief, we report on the Community Science Workshops (CSW), a project that has grown from a single science teacher's garage in 1991 to a national network of 30 sites in 2006. Community Science Workshops are what the name implies: They are workshops full of equipment and tools, located in urban community spaces, where local youth can explore, investigate, and build-all with the support of caring, knowledgeable adults and in a culture of scientific inquiry and constructive social interaction.

We of Inverness Research spent 12 years studying Community Science Workshops (CSW) in California and in six other states. We gathered

statistics on the scale, scope, and cost-efficiency of CSW services to youth. We observed youth at work in the shops-taking apart computers, repairing bikes, growing plants, and so on-and interviewed youth and CSW directors. We also attended meetings of CSW directors and interviewed the national coordinators and principal investigators. In this brief, we distill the major findings from our research, and we provide our independent perspective on the CSW.

In our research on dozens of science education initiatives, we rarely encounter projects that have the combination of positive characteristics that the CSWs possess. Our purpose in preparing this evaluation brief is to inform funders and policy-makers about the value of the CSW model as an educational resource for underserved youth and communities.

This brief is the first of four evaluation reports generated from our research which comprise this volume, “The Community Science Workshop Evaluation Portfolio”. The other three provide more detailed perspectives on the CSW:

- ***Community Science Workshops: Building a Bridge to Science for Urban Youth-- A Descriptive Look at CSWs*** tells the story of the CSW program, i.e., how CSW arose and spread, how local CSWs are structured and led, and what programs and experiences they offer to youth.
- ***What Do Community Science Workshops Do For Kids? The Benefits to Urban Youth*** analyzes the range of benefits that youth receive from their participation in a CSW—from personal, to social, to academic.
- ***CSWs by the Numbers: A Statistical Portrait of Community Science Workshops*** paints a statistical portrait of the CSWs—where they are located, how many programs they offer, how many youth they serve, how many hours they operate, and how much the workshops cost.

## **Summary Findings**

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Our research on the Community Science Workshops yields a set of findings suggesting that the CSW is a model for serving underserved youth that is both powerful and feasible:

- **CSWs serve an important population in an important content area:** CSWs reach youth who have plenty of curiosity but little

or no access to rich and constructive hands-on learning experiences in science.

- **CSWs produce important benefits to youth:** CSWs experiences provide youth with knowledge and skills that are important-and sometimes life-changing-to their personal, social and academic growth.
- **The CSW model is replicable:** As of 2006, there are multiple CSWs in 12 cities in seven states. In the national CSW community, there is both the desire and an established process for starting up new sites.
- **The CSW model is cost-efficient:** The cost per youth participant per year is \$114. Nearly half of the roughly 17,000 youth served annually, who attend on a voluntary basis, are in the workshops for 50 hours a year, and a third are there for more than 100 hours.
- **The CSW model is sustainable:** CSWs transition to non-NSF, community-based funding after three years.

## **The Community Science Workshop Model**

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Dan Sudran, a San Francisco science teacher and community activist/organizer, opened up his garage full of tools to neighborhood youth in the Mission district in 1991. He involved youth in projects and investigations when they dropped by, drawing from his knowledge of science, love of tinkering, and commitment to education in underserved communities. When he secured space to create a workshop on a university campus in 1992, he called it the Mission Science Workshop. In Sudran's words, the mission of the CSW is "to expand knowledge, thinking, and imagination, with tools of discovery and things to discover."

Community Science Workshops are neither science museum nor school, neither youth club nor YMCA. Though each has its own flavor, they are typically part science center, part wood shop, part art studio, part nature center. Most importantly, they are workshops in the traditional sense of the word, packed with tools and materials to tinker with, and things to observe, take apart, build, test, and fix.

CSWs vary in size, but they typically serve 550-1,200 youth annually through 800-1,000 hours of programming, and they reach another 400 youth and other community members at outreach programs. Most

participants are 8-12-year-olds of ethnic minority backgrounds, with roughly equal numbers of girls and boys. Site directors report that many youth not only participate in workshops for 50 hours or more per year, but do so for several years. The average CSW operates on a budget of roughly \$100,000 a year, making the average cost per participant roughly \$114 per year.

*"To expand knowledge, thinking, and imagination with tools of discovery and things to discover."*

*Dan Sudran, founder*

### **A mission-driven model for educating youth**

With grants from the National Science Foundation, what Sudran founded has grown to six CSWs in California (three with multiple sites) and multiple CSWs in cities in six other states. While the CSWs do not take a franchise approach or even espouse a single model, our study of CSWs' work over time and in various settings suggests that, in fact, a definable and replicable model has evolved. These are the model's key dimensions:

**Strong sense of mission:** From our earliest observations, we have seen CSW directors, PIs, and staff as primarily mission-driven people. They respect the youth in their poorest communities and recognize that not all of their educational needs are being met, or can be met, in schools. For example, CSW staff observe that it is rare for children to have an opportunity to use their own hands and a screw driver or tape measure to work with a piece of wood, metal, clay or a recycled object to create something or to figure out how something works. Simply tinkering or what scientists call "mucking about"-following one's own curiosity, with access to tools and resources for investigation-is not typically valued in formal schooling nor is it often supported in high poverty homes. In our research, we came to refer to this absence in many children's lives as "endangered experiences." More typically, urban students become disenchanted with learning, especially in science and math.

The CSWs evolved because the founders-and subsequent directors, PIs, and partners-believe in the inherent value of providing youth who are

underserved by our society with access to a safe, supportive atmosphere in which to spend productive time with a caring, knowledgeable adult. Science, with an emphasis on youth-directed inquiry, provides the context within which CSWs work with youth and provide these kinds of endangered experiences. (For detailed findings on benefits to youth, see “What Do Community Science Workshops Do For Kids? The Benefits to Urban Youth” later in this volume.)

*"They [CSW staff] really help you . . . [there are] bad things going around the neighborhood, but this is the right place to come. What I like most about coming here is that they help you when you need help, they are here when you need them, they are by your side."*

*10-year-old African American girl and CSW "regular"*

**Core values underlie varied programs:** CSWs are not a cookie-cutter franchise. Some are open after school on a drop-in basis, some offer more structured programs during school hours, and a few provide programs during weekends and holidays. CSWs are typically cross-disciplinary; they can be about materials science, engineering, technology, physics, environmental science, natural history, and/or art. What the CSW leaders refer to as “core values” is what binds them together in a common approach to working with youth. Eighteen core values are listed on the CSW web site, along with eight statements saying “what a CSW is NOT.” The core values emphasize a particular learning environment, e.g., accessibility to tools for discovery, personal investigation and inquiry, and purposeful problem-solving (“not chaos”); as well as ways to serve the intended clientele, e.g., free of cost, located in an underserved neighborhood, respectful, and with relationships to schools if possible. The eight statements about what CSWs are not about include computer games, cookbook science, baby-sitting or hanging out.

**Embedded in communities:** CSWs are housed in community centers, parks and recreation district buildings, or schools. They are jointly funded by the National Science Foundation (NSF) start-up grants and local community organizations. Finding community partners who share the mission and can offer financial or other support is a vital and challenging aspect of starting up and sustaining a CSW.

**A well-equipped workshop that supports meaningful projects:**

While CSWs have their own local flavor and offer a range of programs to best serve the youth in their neighborhoods, they have in common that they are well-equipped with tools and equipment that youth can work with using their hands. Part of starting a CSW is to equip the physical space, using a recommended tools list.

**Led by mission-driven people with “hybrid expertise”:** CSW

directors are men and women who have a personal commitment to the CSW mission and who have what we have come to call a “hybrid” expertise. They are caring adults who are able to create a safe space to nourish children’s individual and social growth; they have a passion for and knowledge about science and first-hand learning; and they have the skills and connections for fundraising and community relations. They come from a wide range of backgrounds, including school teaching, museum education, environmental education, and the trades (e.g., one is a former electrician). In a few CSWs that have been in existence for many years, CSWs are beginning to “grow their own” leaders, as former participants grow into the caring, knowledgeable adults. A vital element of the start-up process of a CSW is to identify people with these qualities who have potential to become directors. Those who become new directors then receive careful mentoring and support by others in the CSW network.

*Alfonso Cumplido started going to the CSW in Watsonville, California when he was 11 years old. Growing up in a first-generation immigrant family of farm-workers from Mexico, Alfonso told us, **“When the science workshop came, it was something new and exciting, because of all the projects and activities that they do, I thought it was really cool.”** He added, **“If you learn how to learn, it is harder to forget things. [They showed me] how to use a hand saw, hammers, how to weld, how to use a scroll saw, miter saws, drill presses, everything. Just being around people that believe in you is really great. It just lifts you up and gives you a thought that you can make it.”** Now in his early 20s, Alfonso lives in Fresno, California, where he is a paid staff member for the CSW and is in college. He told us, **“Wow, this is a really good way to help people. I want other kids to believe in themselves; I guess that is why I am committed to helping. Just like people at the CSW believed in me, I want to believe in everybody else.”***

### **An evolving CSW network**

A national network of CSW sites is evolving and developing. To date, the national coordinator's office has served the following main functions:

- administers grants and starts up new CSW sites,
- sponsors an annual conference where all CSW staff members share ideas,
- maintains the CSW website, which enhances the visibility of the CSWs as a program and provides resources to members,
- offers travel grants so that directors may visit other sites.

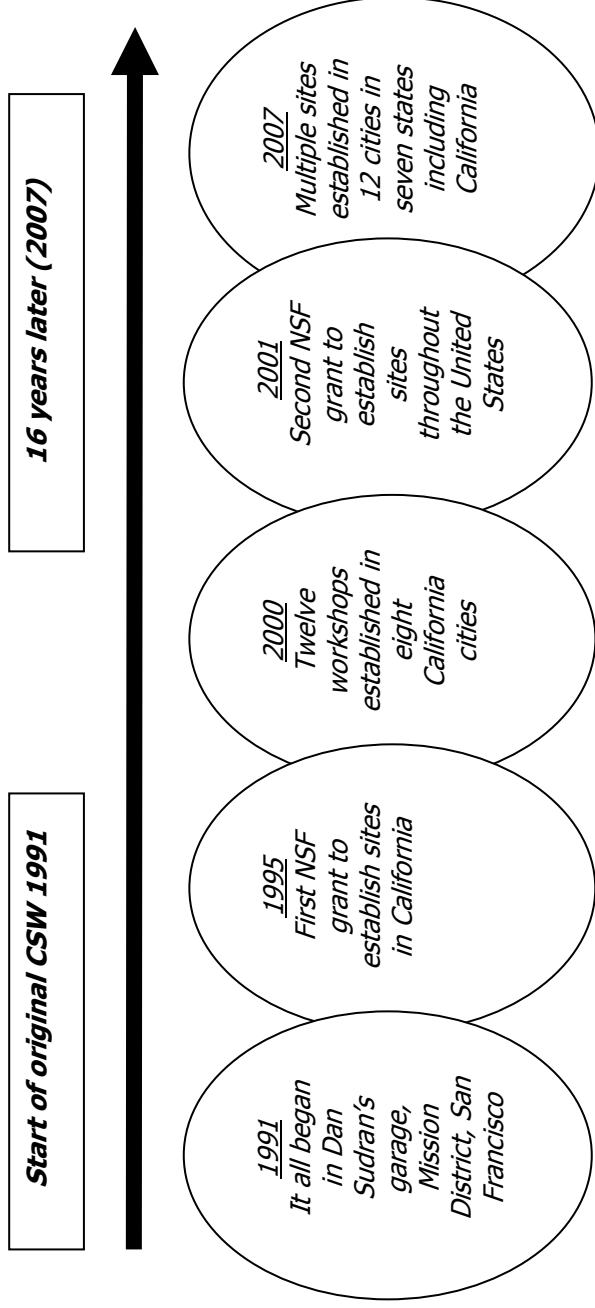
An effort is underway within the CSWs to design the network for sustainability and future growth.

Please see the graphic “From Idea to Reality - An Evolution of CSWs” shown on the next page.

For additional descriptive information about CSW, their history and distinguishing features, please see “Community Science Workshops: Building a Bridge to Science for Urban Youth” later in this volume.



## From Idea to Reality – An Evolution of CSW's



## **Issues And Challenges**

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Like many worthy endeavors, CSW has not been without its challenges both at the individual site level and at the national network level.

### **Network development**

Strong leadership at the national level, we believe, is imperative if CSW is to meet the developmental challenges of maintaining existing sites' vibrancy and cohesiveness, and of building new sites in more cities. Our documentation of the CSWs over time shows that the CSW national network has provided considerable support and inspiration to individual sites. However, developing a strong and unified network has been a significant challenge. There is not yet a shared vision of the design and function of the network as a whole. Leadership for this network-building endeavor is emerging from the pool of veteran directors, and they are making progress. However, there is little untapped capacity within the pool of CSW directors that can be brought to the considerable task of structuring and coordinating a strong national network entity. Our own observations of the CSW and other networks, as well as others' research (Lieberman & McLaughlin, 1992 and Lieberman & Grolnick, 1996) suggests that network leadership requires skills, knowledge, and propensities that are congruent with but qualitatively different from those of site leadership.

The advantages of a CSW network are many, and some are already evident, such as sponsoring cross-site learning, identifying fertile ground for new sites and starting them, and sharing resources. As the CSW continues to scale up, the network function of maintaining cohesiveness and program standards around the core values will become even more critical. Given the considerable demands on directors and their modest funding, we believe the building of a successful and lasting CSW network will require an investment in resources targeted to that purpose.

### **Site development**

Those who start up and direct sites face numerous challenges, including finding compatible partner organizations, securing sustained funding, and maintaining a site whose programs serve the local community while adhering to CSW values.

**Community partners.** Partnerships with community organizations can initially appear to be win-win, with both groups expecting to gain from and contribute to the relationship. We have observed, however, that once the work begins in earnest, conflicts can arise around values, organizational practices (CSWs tend to be incompatible with highly bureaucratic organizations), or follow-through on commitments of funds, space, support staff, equipment, or assistance with public relations. Negotiating with partner organizations is time- and energy-consuming for CSW staff at best, and can occasionally involve dissolving partnerships and starting over.

**Sustainable funding.** All CSW sites are expected to become sustainable within their communities. While many sites have been successful at establishing ongoing funding beyond their initial NSF grant and have become institutionalized in their communities, some sites have struggled. Competition can be fierce for a space within which to operate as well as for community funds, and not all CSW directors have sufficient fundraising and marketing skills to simultaneously run their workshop and secure its future.

**Sustainable leadership.** Another site-level challenge is to find, support and retain staff i.e., finding directors and support staff with the mission, knowledge, and skills to do this kind of work with youth in this way, and also have the political savvy needed to work constructively in the community and with their partner institutions. In the lexicon of the CSW, directors need not only be tinkerers and science educators, but also “suits” who can “dress up and sell” the CSW concept to a business, a city council, or a foundation.

These challenges are not insurmountable, but when they are addressed only at the site level, they consume attention and resources that could be devoted to programming. In our view, these challenges speak further to the need for the CSW to build a strong national network, which could provide directors with professional growth opportunities and shared resources. To date, the CSWs have survived-and many have thrived-as local sites and as a network because the leaders hold their mission at the center of what they do.

## **Investing In The CSW As A Powerful Model For Youth**

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Creating opportunities for underserved urban youth to engage with science and with their own learning remains an important educational challenge. These youth have too few places near their homes where they can spend their out-of-school time in a safe, productive, science-rich environment where knowledgeable adults are focused on their personal, social, and intellectual development. We have studied dozens of science education projects-both formal and informal-and the CSWs stand out as being powerful in their short- and long-term benefits to youth, as being cost-efficient, and as being both scalable and sustainable. CSW's mission-driven and values-based approach, with the sciences at the heart of the work, has been vital to its success and will continue to be so. This rare combination of qualities, in our view, makes the CSW model worthy of ongoing investment as a valuable addition to the urban science education landscape.

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# Community Science Workshops: Building a Bridge to Science for Urban Youth

## A Descriptive Look at CSWs

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### **What is a Community Science Workshop (CSW)?<sup>1</sup>**

Community Science Workshops<sup>2</sup> are community-based non-profit programs that offer underserved youth living in low-income, high-minority neighborhoods a fun and safe way to explore their world through science. Developed over the past 14 years, CSWs now operate in 12 cities throughout the nation—six main CSWs in California with numerous satellite sites, and sites in six cities across the country.

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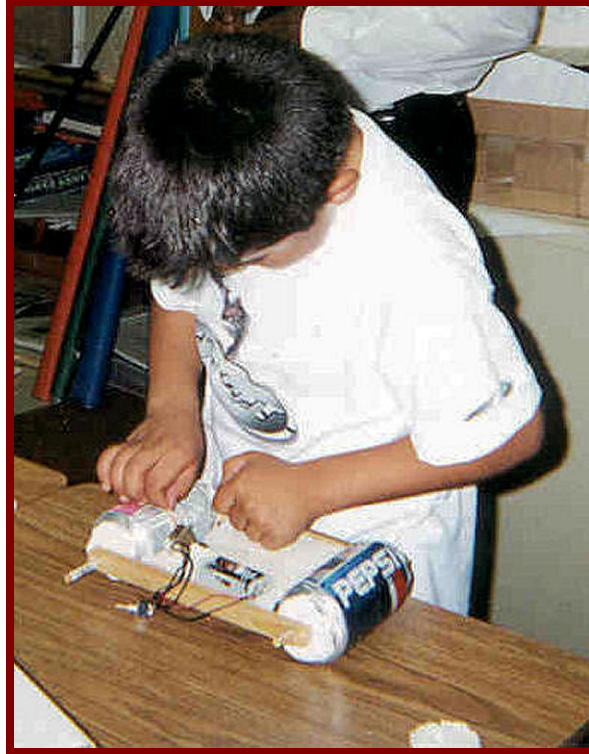
<sup>1</sup> All photographs in this report have either been modified so that faces may not be identified, except in the cases where we have clear permission for such use.

<sup>2</sup> The Community Science Workshops (CSW) website is located at: <http://www.scienceworkshops.org>.

Neither school nor science museum, the CSWs are an unusual kind of institution. They are part science center, part wood shop, part nature center—all in the heart of urban neighborhoods. Located in community centers and schools, they attract youth from local neighborhoods who drop in after school and on weekends. At these places, children, mostly eight to twelve year olds, play with homemade exhibits. They also build their own birdhouses, stereo speakers, hydraulic cars, robots, and rockets. They care for fish and snakes and examine pond water under microscopes—all the while working with other youth and caring adults.

CSWs are community centers devoted to providing local youth with opportunities to engage in their own projects and to pursue their own firsthand learning. Filled with science, technology and art, these workshops offer young people alternatives to gangs, drugs, violence and boredom in neighborhoods where there are few other positive alternatives. CSWs provide a space for exploration with tools, workbenches and a variety of self-directed projects, as well as group programs for students to tinker with things and ideas and learn about science in an informal atmosphere. These high quality inquiry-based science education opportunities provide youth with the materials, resources, and coaching that develops many different skills, reinforces their natural curiosity, and instills an excitement about learning, science and technology. As Dan Sudran, founder of the Mission Science Workshop upon which the Community Science Workshops were based, said:

*Good science teaching is good materials science—it is about getting the “stuff” this world is made of into kids’ hands so they can learn about it by playing and working with it through observation, experimentation, and project building.*



Typically, youth who come to the workshop engage in projects or experiments, working by themselves or with partners. The site director generally helps get the youth started on a project, then he or she roams the room working with groups of youth to guide them through their projects. They might work on constructing a music box as a gift for their moms; they might tinker with an old computer, tearing it apart to figure out what all the parts are and how they go together; they might take water quality samples from a nearby creek and study the samples; they might construct robots, rockets or sculptures. The following vignette illustrates one youth's experience at a CSW:



*Jesus, a nine year-old Latino boy, comes to the Workshop almost every day. He likes making projects that he can give to his mom as gifts. When he goes home with projects, he gets to reflect on them further when he tells his mom how he made them and how they work. He explained how he made a fan. "I started by looking at the model." Then he cut a small piece of wood, drilled a hole for a cable, nailed two pieces of wood together, connected a switch, battery and motor. He made the blades of the fan by drilling a hole and connecting a dowel with a nail in the center.*

While many of the sites consist of one workshop and one director, several of the CSWs operate “satellite sites”—additional workshops in other spaces in the same city. In some cases, these satellite sites have their own directors who run the programming. In one case, Fresno, California, there is also a mobile science workshop which operates out of an RV and offers programming throughout the city.

Current CSW sites include:

- San Francisco, California: Mission Science Workshop (1 site)
- Oakland, California: Brookdale Discovery Centers (2 sites)
- San Jose, California: Joseph George Science Workshop and Computer Studio, (1 site)
- Watsonville, California: Watsonville Environmental Science Workshop (1 site)
- Fresno, California: Fresno Community Science Workshop (2 sites plus mobile science workshop)
- Los Angeles, California: University of Southern California Mesa-Mission Science Workshop (10 satellite sites)
- Washington, DC: Columbia Heights Community Science Workshop (1 site)
- Houston, Texas: The Children’s Museum of Houston’s Science Workshop at Edison Middle School (6 sites)

- Miami, Florida: Citizens for a Better South Florida's Community Science Workshop at Citrus Grove Elementary, City of Miami Virrick Park and Holmes Elementary (3 sites)
- New Orleans, Louisiana: New Orleans Community Science Workshop (1 site). (In August 2005, the New Orleans site was severely damaged by Hurricane Katrina but is now being rebuilt. Until they have a physical site again, the CSW director is doing CSW activities in the schools.)
- Newark, New Jersey: New Jersey Community Science Workshop at Montgomery Academy (1 site)
- Boston, Massachusetts: Boston Community Science Workshop at the John D. O'Bryant Math and Science School (1 site)

In short, CSWs:

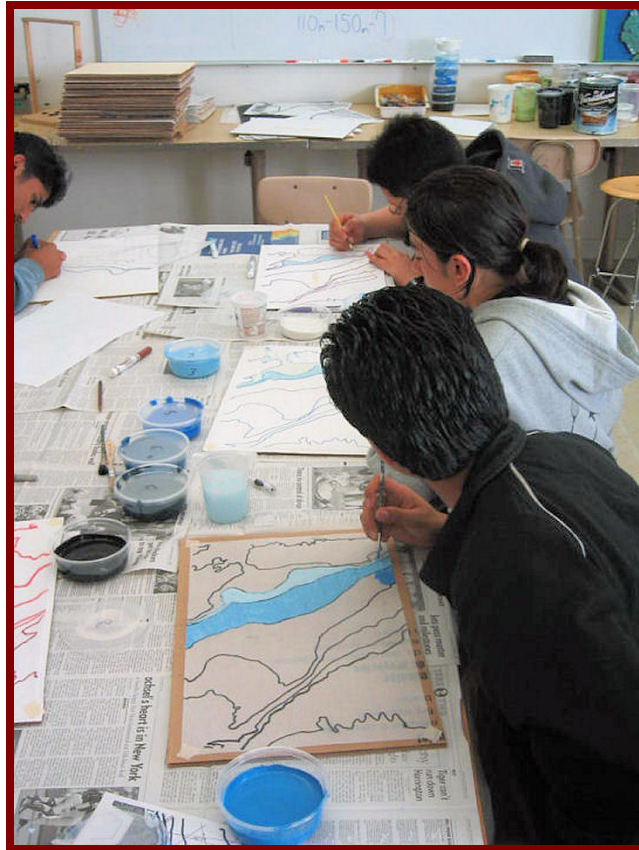
- Serve large numbers of children,
- Provide long-term support for youth, many of whom are at-risk and who reap real benefits from their association with CSWs,
- Create multi-faceted science-focused programming that serves youth, parents, and teachers in creative and appropriate ways,
- Generate local partnerships, as well as financial and in-kind support to aid in their on-going efforts to be self-sustaining.

## **How did the CSWs come about? What is the history of the Community Science Workshops?**

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Community Science Workshops began in the early 1990's with the Mission Science Workshop in San Francisco, grew in the late 1990's with the development of the other California CSWs, then went national in 2000.

## The Origins: Mission Science Workshop



The Mission Science Workshop (MSW) began in Dan Sudran's garage in the Mission district of San Francisco, a predominantly Hispanic community. Sudran is a self-taught scientist who lives in the Mission. With a long history of community activism and organizing, Sudran was interested in serving the children of the Mission district. He was also a teacher and graduate of the Exploratorium's Teacher Institute. Sudran had confirmed for himself the value of learning through investigation, experimenting and building things. As Sudran said:

*I subscribe to the theory that the brain and hand evolved together and human beings learn best when our brains and hands are inseparable partners in the process of investigation and problem solving.*



*Dan Sudran, founder of the CSWs*

During the late afternoons, he was often in his open garage tinkering with simple machines and tools. Neighborhood kids started dropping by and tinkering alongside Sudran. He began an informal drop-in program in his garage, and looked for sponsors to help him fund and house a more permanent neighborhood science center. In a spring 2001 article in *California Wild* magazine<sup>3</sup>, Sudran said:

*These kids are living in a neighborhood prone to youth violence. Some are deterred from coming here because of gang turf issues. They've never heard of the Exploratorium, and even if they have, they've been herded through with their classes. So I started getting this idea about a neighborhood Exploratorium. I liked the idea of making it happen in a neighborhood,*

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<sup>3</sup> Wagenvoord, H. Spring 2001. The Circle in the Mission (Science Track). *California Wild*, Vol. 54, No.2, p. 44-45.

*but I didn't want to turn my house over to it. I learned from working with Cesar Chavez to organize one person at a time, so I started teaching, one kid at a time.*

In 1992, as a result of the backing from key Exploratorium staff and Sudran's ability to articulate and share his vision of a community science workshop, City College of San Francisco donated a space on the second floor of their Mission Campus building to house the program. The facility held 50 exhibits, microscopes, live animals, marine plants in aquaria, and workshop tables. It was also filled with different types of programs that allowed children, teachers and parents to be creative, pursue their own interests, and "do" science. In addition to the after-school drop-in program, MSW has historically offered field trips, Saturday programs, and family nights. In 2006, the workshop moved to nearby Mission High School.

It is the enthusiasm of the kids that has kept Dan Sudran involved all these years. In the *California Wild* article, he said:

*When I hear kids come in and say, 'Ooh, this is really cool, look at this' it's obviously opening their eyes to something. They wouldn't say that unless it was something new and interesting to them.*

And Sudran has devoted a lot of time to this cause. In the same article, he 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.*

## **The First CSW Grant: Replicating the Mission Science Workshop Model**

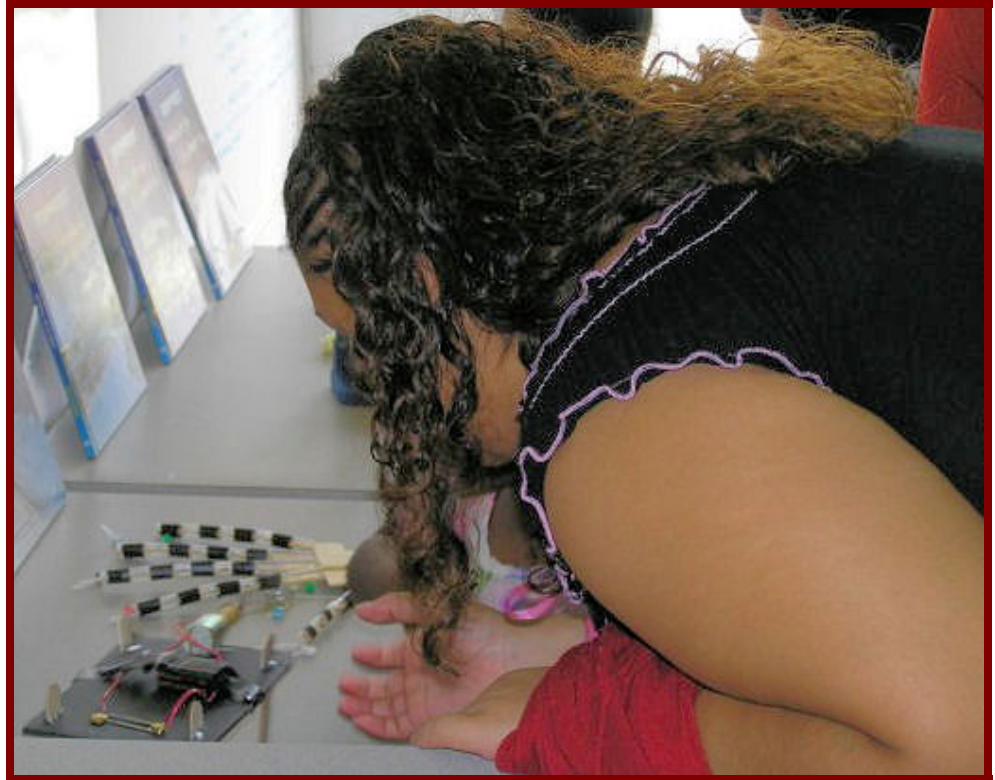


In 1994, the National Science Foundation gave three million dollars in funding to create the Community Science Workshops throughout California in order to replicate the model of the Mission Science Workshop in under-served neighborhoods throughout the state. Over the course of a four year period, eight main sites were established in Oakland, Los Angeles, Fresno, San Bruno, San Jose, Stockton, Bayview-Hunter's Point in the Bay Area, and Watsonville. Of these, five cities still have active sites, and several of these have opened "satellite" workshop sites serving additional youth in other areas of their cities. These workshops are housed in community and youth centers, schools, and colleges. These sites have been highly successful at serving many underserved youth through their programming efforts. In addition, these sites were all successful at securing additional funds so that they could continue to thrive after NSF funding ended.

Inverness Research served as the external evaluator for the first round of National Science Foundation funding to the California

sites. To learn more about our evaluation findings, see the Inverness Research evaluation report from January 2000<sup>4</sup>.

### **The Second CSW Grant: Taking the Model Across the Nation**



In 2000, the National Science Foundation provided an additional three million in grant funds to create Community Science Workshops throughout the nation. To date, science workshops have opened in six cities throughout the United States (outside California). Like their California predecessors, these sites are housed in a variety of places, from community centers to schools, and partner with a variety of community agencies, such as non-profit community-based organizations, children's museums, science centers, city parks, and schools.

The National Science Foundation provided supplemental grant money for the project to include California sites in its national

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<sup>4</sup> Inverness Research. The Community Science Workshops: A Report on Their Progress. January 2000. Electronic version available at: [http://www.inverness-research.org/reports/ab2001-01\\_Rpt\\_CSW\\_ProgressRpt.htm](http://www.inverness-research.org/reports/ab2001-01_Rpt_CSW_ProgressRpt.htm).

networking and dissemination activities. NSF funds were also used to support the entire Community Science Workshop network banding together to provide programming and assistance to the areas affected by Hurricane Katrina.

Much of the effort in recent years has focused on establishing and sustaining the network of CSW sites across the country. To that end, the CSWs have a website, and have annual meetings where directors come together to share ideas and learn from each other.

Dan Sudran summarizes the power of the original idea and the resulting growth of the CSW network:

*When I began the Mission Science Workshop in my garage... I had no idea it would grow as it has grown. That experience showed me the power of the idea of using a workshop setting to bring science to life on a neighborhood level for children, teachers and parents, and using materials, tools and instruments of discovery.*

## **What does a CSW look like?**

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CSWs are all quite different, yet share much in common, especially the fact that they are very much “of” their particular community. Having local flavor is important. Sites have different strengths and emphases (e.g., GPS mapping, fixing bikes, sewing, natural history, environmental stewardship, music recording). CSW is not like a fast-food franchise, where one size fits all. CSWs reflect their community and their leaderships’ interests and strengths. They reflect these different things, but they share common structures and core values.

Community Science Workshops generally are stocked with benches and stools or chairs; in addition most have long tables around the edges of the workshops to house tools, as well as spaces for glue guns and soldering equipment. Most have pegboards and pegs to hold tools, and a stockpile of plywood and other materials for building projects. Many have live animals of some sort: snakes, lizards or gerbils. Many have microscopes for examining things, as well as smaller exhibits that demonstrate specific phenomena.



One of the key elements of the workshops is the abundance of tools available for youth to use in developing their projects. The tools at most CSWs include the following:

- hand saws
- hammers
- rulers and squares
- pliers
- vises
- clamps
- screwdrivers
- scissors
- files
- hot glue guns
- soldering irons
- hand drills
- drill press
- scroll saw
- table saw

Most sites also have paints, crayons, markers, glue, sand paper and glue sticks available.<sup>5</sup>



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<sup>5</sup> All photographs in this report have either been modified so that faces may not be identified, except in the cases where we have clear permission for such use.

## **Who runs the Workshops?**

### ***Site Directors***

Each CSW is directed by a very important individual—an adult site director who works with the children, organizes the materials and space, and works with the community. These site directors manage not only the day-to-day operations of the site, but also are the main adult that youth interact with when they come to the CSW for programming. They are highly knowledgeable about and passionate advocates for the communities in which they live and the youth in those communities. They are inquirers and tinkerers and are highly skilled at facilitating the development of youth’s inquiry skills. They are caring adults who listen to the youth in their programs and help them grow and develop. The site directors are each unique individuals with a range of backgrounds; some are scientists, some are environmental activists, one is a former gang member, some are parents, and some have education backgrounds. They share the ability to facilitate youth in developing the skills and confidence they need to carry out their own inquiries and projects.

LeAnn Adam, CSW National Project Coordinator, describes the role of the site director in the following way:

*The CSW director’s two main objectives are to run and coordinate the daily activities of the program and to establish and implement plans for the growth and sustainability of the workshop. Creating, running, and expanding a CSW requires dedication and long hours. Therefore, the most important qualification of a successful CSW director is a love of learning through exploration. The director must “live and breathe” tinkering with objects/materials in pursuit of scientific understanding. He/she must be passionate about sharing this enthusiasm with children, parents, and teachers in the community. The director must be able to comfortably communicate with the children being served and the community members involved with the CSW.*

*There is no “cookie-cutter” description of the perfect CSW Director. This is a particularly beautiful aspect of the job. The director is free to explore many areas of science and art in order to bring his/her personality to the workshop. A healthy CSW reflects its director’s scientific and artistic interests through the creative projects, experiments, and activities done by the children in the community. It is the goal of each CSW to serve as many children, parents, and teachers as possible through this process of exploration.*



### ***The Management Team***

The Community Science Workshop project has been shepherded through its iterations by several key individuals that comprise the management team.

Dr. Paul Fonteyn, Provost at the University of Massachusetts in Boston and previously of San Francisco State University, is the Principal Investigator on the National Science Foundation grants to CSW. Dan Sudran, founder of CSW, serves as Co-PI on the NSF grants. The national grant has been managed by LeAnn Adam, the CSW National Project Coordinator.

### **Who comes to the CSWs?**

The youth who participate in Community Science Workshops come from the local neighborhoods in which the CSWs are housed, and from nearby schools; thus, they reflect the demographics of the neighborhoods in which the workshops are located—African American, Hmong, Chinese and of Latin-American origin. More importantly, these tend to be underserved

youth who do not have other opportunities for after-school and extra-curricular activities available to them in their neighborhoods. Additionally, often the youth who benefit the most from workshop programs are those individuals who have not had success in traditional schools and are often seen as being “at-risk.” For more information on the experience of youth participating in CSWs, see “What Do Community Science Workshops Do For Kids? The Benefits to Urban Youth” later in this volume.

### **What are the types of programs that are offered?**

CSWs as a whole are exploring a range of programming approaches from after school drop-in to school-related methods of serving youth. The types of programs offered at each CSW differ from place to place, but in general, most CSWs offer one or more of the following:

- **Drop-in programs:** These are scheduled times—usually after school, in the evenings, or on weekends—when the workshop is open for youth to come on their own accord and work on their own projects. These programs are offered both during the school year and sometimes in the summer, depending on the site.
- **Special focus programs:** These have a set theme or one project that all participants work on at the same time (like building a wooden box for gardening).
- **Field trip programs:** These are times, usually during school hours, when school groups and their teachers visit the workshops, usually for a special focus activity.
- **Outreach programs:** These involve CSW staff going into the community (to schools, parks, festivals, etc.) and facilitating hands-on science and art activities.

The programs offered at each of the CSWs cover a range of topics, including physics, environmental sciences, natural history, geology, anthropology, photography, art, and practical things like how to build a bird house or music box, or how to fix a bike. For more information on the types of programs offered at CSWs, see “CSWs by the Numbers: A Statistical Portrait of Community Science Workshops” later in this volume.

The “curriculum” for a CSW comes from a variety of sources. One is the original Mission Science Workshop, where Dan Sudran and his colleagues developed many projects, such as the pin-hole camera and the paper-cup motor. Also, individual directors, staff and volunteers at the workshops have developed many of their own projects over the years, and those activities are shared throughout the network of CSW sites. Sometimes site directors simply draw on their own interests and passions, sometimes the organizational resources or materials they have available drive their curriculum, and sometimes they are attentive to teachers’ requests to cover certain topics in order to complement what the students are getting in school. Perhaps most importantly, students generate their own ideas for projects, creating and building things that are of importance to them.

## **What are the core values of a CSW?**

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Community Science Workshops place certain values such as tinkering and discovery at the heart of their work with young people. The CSW directors and management team have thought about and articulated a set of core values<sup>6</sup> that guide their work and make it unique compared to most other after-school and youth science programs. In addition to tinkering and discovery, these core values include things like using an inquiry approach to learning, having tools and materials accessible to youth, providing time for self-guided investigation and reflection, and having skilled, caring adults available to facilitate and guide the learning. These shared underpinnings of their work are maintained and supported through the national network, and help describe to the outside world who they are and what they do.

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<sup>6</sup> CSW’s core values are published on their website located at <http://www.scienceworkshops.org/site/csw/section.php?id=25>

### **What types of organizations do CSWs partner with?**

Community Science Workshops work in partnership with many different types of organizations. These organizations—such as Parks and Recreation Departments, science and children’s museums, school districts, universities and colleges, and community-based organizations—provide a range of supports for the CSWs, including space for programming, materials, staff and/or volunteers, public relations, and additional funding. In return, these organizations receive hands-on science programming provided by the CSWs for the youth they serve. The CSWs “fit the bill” for a lot of agencies looking either to serve youth directly or fund opportunities for underserved youth.

For example, the Washington, DC CSW partners with the Latin American Youth Center and Smithsonian’s National Zoological park for program management, recruitment of participants, and volunteers. The Miami site partners with Citizens for a Better South Florida, a multi-lingual environmental education non-profit organization. They also partner with Home Depot for donations of scrap wood, the Biscayne Nature Center for busing and field trips, Dade County Emergency Resource Management for funding and educational materials, and Florida International University and Miami Dade College for interns and volunteers.

For more information on the types of community organizations CSWs work with, see “CSWs by the Numbers: A Statistical Portrait of Community Science Workshops” later in this volume.

### **Where do the CSWs fit in the larger educational landscape?**

CSWs reside in a realm we call semi-formal education. It is not formal, like school, and it is not completely informal. It is not the Boys and Girls Clubs or YMCA. It is a different kind of idea, a different kind of approach and infrastructure for supporting youth. It is a unique idea and a relatively new creation. It is not a science museum, not a school, but a workshop.

Community Science Workshops are institutions that hold a special place in the education landscape. Like libraries and museums, they are outside of the formal arena of education, but connected to it. They provide additional services and specialized programming to youth who need it the most. They provide a venue to offer more in-depth and inquiry-based experiences to youth than most schools can.

CSWs are neighborhood-based and materials-rich. CSWs develop partnerships with community organizations. Shared characteristics include the fact that they are all located in the middle of urban areas, they are inquiry-based, science-based, materials-based, and have the goal of empowering children in terms of their interests and their knowledge, attitudes and skills.

To learn more about this unique effort in the context of the nation's educational landscape, see Inverness Research's evaluation brief of the CSWs, "Community Science Workshops: A Powerful and Feasible Model For Serving Underserved Youth" later in this volume.

# What Do Community Science Workshops Do For Kids? The Benefits to Urban Youth

## Introduction

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In this module we present what we have found to be the key benefits to youth participating in the CSWs, and how these benefits reveal the core values of the CSWs in action. At the outset we note that, particularly at CSWs that offer drop-in programs, many participants return to the workshops over and over, on their own free will. We think this is an important sign of CSW's success. This ongoing voluntary participation suggests that CSWs are providing an environment and activities that are intrinsically satisfying to youth who could choose other, less constructive ways to spend their free time. A site director describes this well:

*I think the most significant measure of the success in this program is that although we allow students to drop-in whenever they want, a core group comes every single day. They are clearly having some of their needs met or they would not return. When I have to kick someone out for a day for disciplinary reasons, they always return as soon as they are allowed back. The kids began to buy into the "free choice" model gradually and then embraced it wholeheartedly.<sup>7</sup>*

Our multi-year evaluation<sup>8</sup> of the CSW program included site visits to multiple Community Science Workshop sites around the country; interviews with participants, site directors, and other stakeholders; and observation of and participation in CSW programming and special events. This report summarizes our overall findings and offers links to profiles of individual

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<sup>7</sup> The quotes in this module have been lightly edited for clarity and readability. We have made every effort to maintain the intended meaning of the speaker.

<sup>8</sup> Inverness Research. *The Community Science Workshops: A Report on Their Progress*. January 2000. Electronic version available at: [http://www.inverness-research.org/reports/ab2001-01\\_Rpt\\_CSW\\_ProgressRpt.htm](http://www.inverness-research.org/reports/ab2001-01_Rpt_CSW_ProgressRpt.htm).



participants. What we learned from our research helps to illuminate the reasons why youth continue to seek out CSWs on their own.

*Located in an urban middle school, this workshop's space is painted in the partnering museum's signature colors—bright green, yellow and purple. The space is quite large—almost 2,500 square feet. There are two storage areas, a range of hand tools (hammers, saws, drills, screwdrivers) along the back wall, work tables and stools in the center of the room, and "centers" (such as nature, painting, etc.) artfully separated from the main space by bookshelves and placards which the children painted. The children also painted some of the tables and stools. Around the perimeter of the workshop are several exhibits from the partner museum: a top table, giant gears, and a KNEX bridge-building activity. Large tools like drill presses and band saws, and a kiln are set off from the main space by old backdrops from the Magic School Bus Inside the Earth exhibition. The space is bright, large, tidy, well-organized, and very welcoming, and its availability was one of the main reasons the workshop came to be housed at this school.*

*The youth here expressed and exhibited unique and individual views about the workshop experience. It seems to serve a variety of needs in interesting and varied ways. For some, it is a rare opportunity for these participants to work with tools. Girls, especially, seemed intensely interested in working with their hands. The process of building things is as absorbing as the product. Two sixth-grade girls we interviewed said: "We like coming to the workshop because we learn how to use tools and get to keep what we make." One of these girls was constructing and painting a jewelry box for Mother's Day. For other students, the science workshop is a place to envision and give form to their own ideas. One youth has become so proficient at building that he simply looks through books and finds projects that interest him and then he designs and produces objects to his own specifications.*

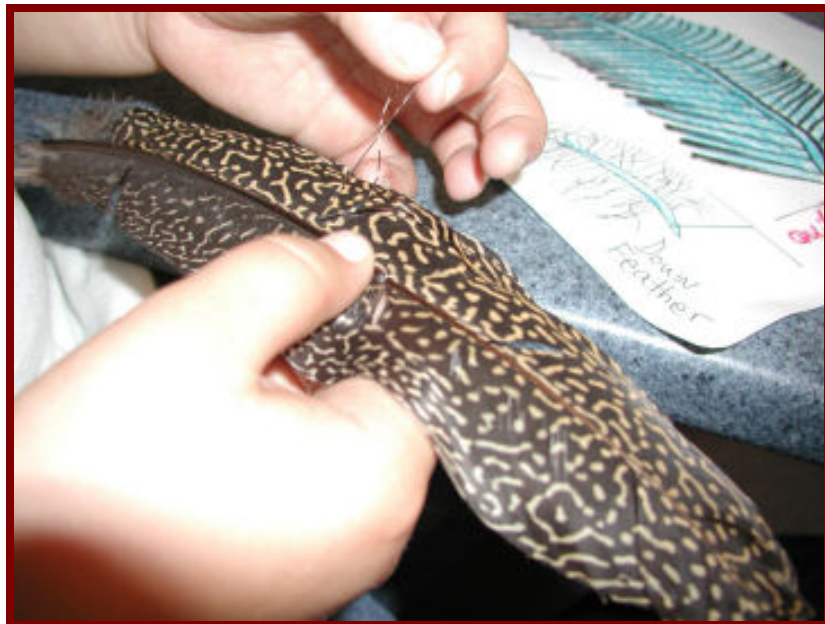
## Benefits to Youth

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### **CSWs help children develop knowledge and skills for school and life**

*We planted the garden in front of the CSW sign. We test pH hardness with [staff]. We check to see if it's basic or acid. If it's hard it has chemicals which is kind of good because it can kill bacteria. If it's soft it has no chemicals and is kind of bad. Sometimes we make experiments, make paperclips float on water. Water Olympics was really fun. We filled a cup almost up and used an eyedropper to see how many drops it took to fill it. -CSW participant*

**CSWs are outside, yet supportive of, school educational efforts.** They provide a context for children to get help with and develop special projects for school (such as Science Fair projects), and to learn more content about those projects in a hands-on format. In some cases children can also get help with their day-to-day homework assignments. The CSWs also provide youth with the chance to engage in a wide range of projects that cross multiple subjects areas and content foci, which can inspire children to pursue an area of interest to them. See section “Profile: Malcolm—The CSW is a place to explore inherent interests” later in this module <sup>9</sup>.



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<sup>9</sup> In this module we did not use participants' real names, nor the workshop they attend, in order to protect their privacy.

At the CSWs, **children have access to—and learn how to use—many common and useful tools**, ones which traditionally are only available to adults. The workshops also provide exposure to phenomena, natural objects, systems, and materials to which urban youth may not be exposed in other contexts. For example, a CSW director explained how his participants have been involved in local creek cleanups, and that they spend time year-round in the garden at the CSW—which is located in a densely populated urban setting. A participant told us, “We dissected owl pellets and checked out the fur. Every time you do an experiment the CSW staff tell you something—like ‘An apple fell on a man’s head and he said, What was that? and he discovered gravity.’”



**CSWs provide a place for children to solve practical problems**, like fixing their bikes or making Christmas presents. Children sometimes take these skills home; for example, we interviewed a participant who applies what he has learned about computers at the CSW to help friends and family with theirs. One CSW director reported that participants learn how to use sewing machines at his workshop; this activity has also served as a way to attract more girls to the workshop. A participant told us about the variety of skills they learn and the tools they get access to: “We like coming to the workshop because we learn how to use tools and we get to keep what we make. We learn how to use a

hot glue gun, and how to make a hole in wood. We learn about saws and drill presses.”



### **CSWs provide support for children’s individual development**

*You can make different stuff out of your science experiments. You can bring imagination into your science experiment... and then it will be perfect.*

-CSW participant

Youth benefit from participating at the CSWs because—rather than being passive or directed—**youth can be active, self-directed learners**, challenged in a constructive way to think for themselves. They have the chance to be creative; to investigate a particular interest, project, or phenomenon; and to express themselves through that creativity and those investigations. CSW staff recognize that making mistakes is a key part of the learning process, and allow children to explore without exerting expectations of perfectionism or meeting some externally-imposed standard. A workshop participant explained how the workshop provides opportunities for self-directed learning: “I have been coming here for about six months, and I am really interested in the woodshop. I love to be creative with wood. It

does feel good being creative, because you get to experience everything yourself.”



### ***The importance of learning from mistakes***

*A 13 year-old girl who was fairly new to the workshop was working on one of the introductory projects – cutting the letters of her name out of wood blocks with a coping saw. She had placed one block in a vise and was sawing away on it when a staff person walked by. It was clear to the adult that the block was not properly placed in the vise; at some point in the sawing, everything was going to clatter to the floor. The adult asked the girl, “Who showed you how to set that up like that?” The girl shrugged. The staff member asked, “What do you think will happen when you get down to this point with your saw?” Again, the girl shrugged. Rather than correct her, the staff person then said, “Well, keep sawing and let’s see what happens.” She told us, “Unless, it is really expensive or dangerous, we let them make the mistakes and learn from them.”*

**CSWs nurture self-esteem** in their participants. The core staff of the CSWs are caring, committed adults who provide support to children who often do not have a support system at home or at school. This helps children to become more confident in themselves personally as well as in their skills and abilities. As one child explained, “It’s useful knowing how to make things out of wood and how to compost. And if you have trouble, you can help yourself.”



CSWs pay explicit attention to setting appropriate boundaries for children, which creates a respectful and safe space at the workshops. Individual children are in a social environment where they are learning to respect themselves and others, and where they are learning self-governance. As one director noted:

*When I began as director, the kids were very rude to staff and to each other. They were used to doing whatever they wanted - going to the bathroom and not returning, using foul language, being very loud and disruptive, or sitting around socializing. I began to create a safe space and I got control very quickly. Students have to be working on something in order to stay, but we do not harass: we encourage. The rules are strictly enforced, uniformly, and as a result the students know where the line is and they have stopped pushing. They want to be there, and often a participant will let a new kid know when he or she is too close to [breaking the rules].*

This director's approach is consistent with that of many other directors we have observed. Rather than applying harsh or intimidating disciplinary measures, directors apply the core values of respect and safety to create an environment where individuals want to be a part of the constructive social context.



At the CSWs, **youth gain opportunities to develop personal leadership skills.** Through the context of the CSWs, participants can contribute back to the workshop and also to their communities. See section “Profile: Alfonso—From young participant to staff member, the CSW changed his life” later in this module.

A site director, in her weekly report, wrote the following story about the positive personal changes the workshop has instilled in one of her participants:

*We had a victory today! Erika came in last year; she is a painfully shy child who does not take initiative. You can hardly get a word out of her. Most of the time she is hanging back while other kids do projects. We have been working on her almost six months, and finally today she came right out and spoke up without being prompted, just like she had always been doing it. I almost fell out of my chair! Later that afternoon, as I was telling someone else about a project, I turned to her and said, "You might be interested in this, Erika." (For several days I have been trying to interest her in a project, any project). She then turned to me and spoke very firmly and said "You already have me working on two projects." I almost did a cartwheel! But instead I calmly turned to her and told her she should pick the one that interests her, and she did!*

### **CSWs provide a constructive social context**

**The CSWs provide a safe place** for children to be off the streets, in a nurturing environment, and with constructive things to do. This kind of environment can be unusual in the lives of these children, who often face troubled family and school lives and have few similar opportunities. The workshops provide a consistent and stable environment. Children know that—as long as they follow the rules—they are welcome.



### ***The CSW is a place to feel connected***

*April, a 10 year-old girl who comes regularly to the one of the CSWs, experiences a strong sense of family and support at the workshop, both because she comes there with her sisters, and sometimes nieces and nephews, and also because she feels that the workshop is a safe place in a dangerous neighborhood: "[The CSW staff] really help you... [There are] bad things going around the neighborhood, but this is the right place to come." April expressed several times how helpful and supportive the workshop staff has been for her: "What I like most about coming here is that they help you when you need help, they are here when you need them; they are by your side."*

*April and her sisters come from a family with many challenges including poverty and an absent father. The director at this site, in reflecting on April's family life and her time at the CSW, noted, "For her, the Workshop is like a home away from home." April's 8 year-old sister added another example of how the CSW staff care for the participants: "And then after we cleaned the creek, [the director] has these little bars that you can eat, and we had pizza too—it was so good!"*

The CSWs also **create a context where everyone and every thing matters**. Adults at the CSWs respect children. These adults value children's insights, abilities and strengths, trust the children to know what they want, and allow them to pursue their own interests. It is expected that children will treat other participants, the adults, the materials and the environment with respect. A participant explained, "I have a lot of fun being here—sometimes we make stuff in the woodshop or we go around helping keep this community clean."

The CSWs also **provide a positive peer culture**, where younger children can work with and see positive influences from older children (teenaged youth) and young adults. These relationships are important in that youth can "see themselves" in the young leaders, and can view—within their own social and cultural context—alternative and more positive ways of being than the often-chosen path of gangs, drug abuse, and other reflections of lack of opportunity. Because of these positive conditions, the CSWs benefit youth by providing them with a constructive social context in which to spend time.



### **CSWs can lead participants to rethink their sense of self and their possibilities for the future**

In some cases, through the CSWs, participants begin to think differently and more openly about possibilities for their future. They begin to see that they have options for pursuing science, math, and/or other skill-based options for their lives, either building on school-based learning, or developing specific skills and interests that emerge at the workshop. A staff member told us about how a girl who came often to his workshop matured in several dimensions:

*A girl from the projects came for many months to participate at the workshop... During our meetings with kids she was heard by others, and spoke to the group and was an exceptional leader amongst them. When a vacancy was open she applied and was hired... [S]he became confident at leading activities, knowledgeable about bikes and operating power tools. On many occasions she created innovative toys that the children enjoyed making with her... Some four to five years since her first visit she matured in several ways—socially and intellectually—and has joined another [youth leadership] program. This person developed a potential [at the CSW] to not only earn a living in a single-parent family, but others learned from her at the same time. -CSW staff*

A group of three older participants offered their own explanation of the workshop experience. Two of the boys were recent immigrants from Mexico and one of them came to this country

two years ago unable to speak or read English. He is now the class president at his middle school and plans to be a civil engineer. When we asked him how his participation in the workshop fits with his future plans, he told us that it would “improve his education.” When asked to explain this, he said that there were many things at the workshop that he had never seen, nor would be able to work with, at home or at school. He cited books, tools and equipment. And then he said, “The people I meet at the workshop know things about work and school that I need to know.”

We see that the CSWs create an environment and a structure where youth can begin to alter their sense of self, and develop the wherewithal to have a different life than that predicted by their socio-economic status. At the CSWs, students can learn about respect, gain self-determination, and experience the value of industriousness, inquisitiveness and skillfulness in application of problem-solving abilities.





In summary, as long-time researchers of the CSW initiative, we have learned that the core values of this project seem to be the right ones to drive the design and implementation of its programs. These values are woven explicitly and implicitly throughout the ways that CSWs work with youth. As we have noted throughout this report, through these core values, youth learn a range of practical skills; implementation of these values also create a context where children can gain confidence and self-determination. We feel that these important benefits lead youth to be very likely to develop a sense of stewardship for their environment, and also to contribute positively to their communities.

## Profile: Malcolm

### The CSW is a place to explore inherent interests

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Malcolm<sup>10</sup> is a 12-year-old 6th grader who regularly spends time after school at one of the CSWs. Malcolm's inherent interests and abilities in science and engineering flourish in the environment provided by the CSW. In the woodshop room of the CSW, he explains with pride his model of a bridge and the school assignment that instigated his project. The idea started out as an "earthquake project." Students in his class were given a design challenge to create a bridge that could survive simulated earthquake tremors. Malcolm explained his success.

*This smaller bridge was for an earthquake project. We had a table in a classroom and then we shook it; whoever's bridge was very damaged got points taken off. In my whole class, I got the most points. The people who had the most points in the project passed the idea to other 6th grade classes. So our project will be, like, an example of what other classes could do.*



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<sup>10</sup> Though this participant gave permission to display the pictures of him in this report, we do not use the participant's real name.

When asked about how he solved the problems he encountered while making his project, Malcolm explained in some detail several aspects of his decision-making in terms of design and choice of materials:

*I thought I could get a lot of these cables and twist them together, but that wouldn't be safe. It just has little weak wires into it, but then the plastic is really strong. I didn't know how to do it, and so the workshop helped me with part of it, and told me what is inside the real thing.*

Projects like the one Malcolm demonstrated and explained often stimulate creative thinking about other sorts of possibilities. Beaming with enthusiasm, Malcolm explained an “invention” he came up with and how the CSW supported him and helped him develop his idea:

*I found a scooter with no back wheel; I passed it for a couple of weeks and then I finally brought it to the workshop. It didn't have no back wheel and then for awhile, I was thinking of “How I am going to make a back wheel for it?” I didn't have ideas and so my friend gave me an idea of knocking the back brakes off, because we didn't have custom wheels that would fit on the back wheel and so I knocked off the brakes. But then there was still a problem—the back thing was rubbing against the wheel and so I cut it off with this special saw. First I knocked off the brakes and then I cut the metal off. It solved my problem, it was good. The back wheel fit. I made up an invention!*

Malcolm's story serves as a good example of how the CSWs can nurture and develop nascent interests and inclinations in science and engineering. The CSW provides an opportunity for children like Malcolm to open their minds and explore their interests, without the restrictions or constraints of a school setting, and with a supportive atmosphere where children's ideas are valued.

## Profile: Alfonso

### From young participant to staff member, the CSW changed his life

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*Alfonso Cumplido (left) working with youth in Houston with the Fresno Sciemobile, October 2005*

*I want other kids to believe in themselves; I guess that is why I am committed to helping. Just like people at the CSW believed in me, I want to believe in everybody else.*

Background: Alfonso Cumplido<sup>11</sup> is a 22-year-old living in Fresno, California. He first encountered the CSW as an 11-year-old living in Watsonville, where his family lived next door to the Environmental Science Workshop<sup>12</sup>. Alfonso grew up in a first-generation immigrant family from Mexico; in his younger years the family lived in Los Angeles and then in Watsonville.

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<sup>11</sup> With his permission, we have included Alfonso's real name in this profile.

<sup>12</sup> This is the official name of the CSW based in Watsonville; in this module we refer to this workshop as the Watsonville CSW.

Alfonso's family are farm workers who, for some time, migrated within California to work the farms before settling in Watsonville between 1986 and 2004.

Alfonso had been going to Marinovich Park where the Watsonville CSW is housed, even before there was a workshop. He went there to be with friends and play "because there was really nothing to do at home. My dad was off working and he wouldn't have time to take us out or anything, and he was always working weekends. My mom was always busy with the house and she was working nights."

When the Workshop opened in 1997,

*I met Curt [the CSW director in Watsonville] and everybody else that was involved and I thought it was really cool. It was just something different. I had grown tired of just going out and playing with my friends. It was all the same thing. I was tired of that, so I would just stay home and watch TV, but then when the science workshop came, it was something new and exciting, because of all of the projects and all of the activities that they do—I thought it was really cool.*

Alfonso went almost daily to the Watsonville CSW until the middle of his freshman year in high school. At that time, he became quite busy with schoolwork and his two jobs. When it came time for Alfonso to go to college at Fresno State University, Alfonso asked Curt whether there was work for him at the Fresno CSW. Alfonso had, over the years, established a very positive relationship with Curt, and decided he wanted to stay involved with the efforts of the CSWs. He had also met Manuel Hernandez, the Fresno site director, on joint Watsonville/Fresno CSW field trips.

*After I moved out from home [to go to college], I just discovered I loved kids - a lot of them reminded me of myself when I was little. Since Manuel works with underprivileged kids, I thought, "Wow, this is a really good way to help people," which is always something that I would like to do.*

Curt helped Alfonso make contact with Manuel, who immediately provided a place for him. Alfonso has now been working with Manuel as a staff member for three years.

**Benefits of the CSW for Alfonso Cumplido:** This long-term participant feels very strongly about the benefits of the CSWs for his life. He benefited from his participation in multiple ways.



**Learning about creativity, and how to think for himself:** At the CSW, Alfonso was given, and took advantage of, multiple opportunities to be creative and to make many science-based projects—both those designed and instigated by the site director, and also projects of his own invention. By learning in a hands-on way from the director, Alfonso was able to “help Curt doing all of these crazy inventions and activities... [I]t was really cool that he gave us a chance to do that.” In this way, Curt served both as a teacher and as a role model for how to think for oneself and build on ones’ own interests. “You went there and you learned how to think for yourself, which is a great skill... [I]f you learn how to learn, it is harder to forget things, than if you just [memorize] them.”

**Learning how to use common and useful hand and power tools:** Before coming to the workshop, Alfonso not only had not used tools, but he was afraid of them. He was very impressed when, upon expressing interest in the CSW, Curt said he would teach Alfonso how to use the tools that so often are only available to adults:

*I was more scared that I would chop off my fingers. I guess I used hammers once in awhile to kind of “work” on my toys that were broken and I would probably break them even more. But, I didn’t really use tools very much. But I remember, when Curt’s shop opened, he was like, “Yeah, you can use any tool; I just got to show you how to use them.” He showed me how to use a hand saw, hammers, everything. I remember when he came back and I was in high school I went to visit him and he showed us how to weld - that was pretty cool. I learned how to use a scroll saw, miter saws and drill presses.*

**Gaining guidance and a vision for his life:** Although Alfonso felt he had emotional support and good intentions for his life from his family, he could see their limitations:

*I have always had support from my parents, but they just didn’t know how to give it to me, because they never got it and they both just went to 6th grade and then they stopped going to school because they had to work when they were little. They didn’t really know how to give me the right support or how to guide me very well, even though they have always told me, “You should go to college.”*

The CSWs were able to provide an infrastructure of support, and the groundwork for Alfonso to see a better life for himself than that from which he came:

*That was one of the great things about the CSW, because they showed me their support, and at an early age, I found out they were there to help me out and to guide me. So just being around people that believe in you and think there is something special, is really great, because you are a lot more; it just lifts you up and gives you a thought that you can make it, and you can do something other than just go out and work in the fields.*

Related to this is the fact that many of Alfonso's peers, over time, ended up on more destructive, unhealthy life paths. Because of the social structures of the community, many of Alfonso's friends from middle and high school, who "were all really good kids...in my eyes" lacked enough attention from caring adults, and for various reasons became involved with gangs:

*[Going back to the community after time had passed,] I was like, "Wait, wow. That is weird." I remember we were just in 6th grade and I thought there was no way my friends would be in a gang, but they were and now I go back to Watsonville, even though my parents don't live there anymore, to visit some friends and family that I still have there, but I hear that a lot of my friends are in prison. They are so caught up in that game.*

**Alfonso's perspectives about the CSWs and their contributions to youth:** Alfonso feels that the CSWs have a very important role to play in under-served communities. He thinks that an important issue at this time is that there is not enough staff capacity at the sites to serve the local youth in the one-on-one, personal way that he experienced the Workshop:

*There needs to be a lot more to it, because it is a small program—it is not as small as it used to be, but it needs to grow a lot more for it to be really effective and to reach a lot more kids. I saw it in my neighborhood—a couple kids did get involved, but only a few of them I see got the message and chose to go.*

*It needs to be a lot more personal, because a lot of the kids—like me—need the attention they don't necessarily get at home. One of the main reasons I think, because their parents are working so hard trying to just make a living.*

Alfonso feels that the communities and schools served by the CSWs need to make a greater commitment to support them and to recognize the CSWs' importance:

*I think the CSWs need to be spread all over. I think the schools need to embrace it a lot more, the community needs to embrace it a lot more. It just needs to expand a lot more for it to be effective to a lot of people.*

Alfonso understands that, in order for him to be able to make a real contribution to the CSWs, perhaps in a greater leadership role, that he needs to complete his education. He experimented early in his college career with mechanical engineering but did not feel it was a social enough job for his interests and personal inclinations:

*I realized I really wanted to be a part of the CSWs and to be a part of it, I need a good education and to learn how to write so I can do grants and work with people and get some background on teaching. And also, marketing: if I do open up my own shop or take one over or something like that, I can use my marketing background to gain support.*



Because of the way that his relationship to the CSW evolved, and the kind of person that he is, Alfonso feels a strong sense of loyalty and commitment to the Community Science Workshops and the youth they serve. Because of this commitment, because Alfonso is bilingual in Spanish and English, and because he comes from a family background that is shared by many of the CSW participants, Alfonso is uniquely poised to make significant contributions to the CSW youth and to other members of the CSW network. Above all, Alfonso's deep appreciation for the potential in everyone, and the fact that it was brought out in him through the CSWs, makes this young person very likely to make great progress in his own life and the lives of others through the venue of the Community Science Workshops:

*I talked to all of my friends, we are really smart and we had a lot of potential and I remember that a lot of people told me that I had a lot of potential and I was going to do something really great sometime. I believe that everybody has potential to do something great. I don't think I have gone as far as I have wanted, and there is still a lot that I want to do.*

# **Community Science Workshops Evaluation Portfolio:**

Data Module



# CSWs by the Numbers: A Statistical Portrait of Community Science Workshops

## Introduction

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This module provides a set of quantitative snapshots of the Community Science Workshops (CSWs) to complement the other reports that comprise the CSW Evaluation Portfolio-the Description of CSWs, the Benefits to Youth, and the Evaluation Brief modules-and to build a solid representation of the scope and scale of the CSW's work and accomplishments.

The snapshots are organized around the following question areas.

1. How many CSW workshops are there, where are they, and how long have they been there?
2. What are the characteristics of the youth and communities that CSWs serve?
3. How many programs do CSWs offer? What kinds of programs do the CSWs offer? How many of each kind of program do they offer? How many hours of programming are devoted to the various types of programs offered by the CSWs?
4. How many students do CSWs serve in their core programs? How many youth and community members do the CSWs serve in other programs? How much exposure does the average participant have to key CSW programs?
5. How have the CSWs expanded and grown since 1994?
6. What does a typical workshop accomplish in a year?
7. What support do CSWs attract from their local communities?
8. What level of staffing and funding is needed to run a CSW site?

Our findings are based on the following data sources:

- Monthly program reports from national workshops 2001-05 (programs offered, hours of programming, participants)
- Annual site reports from national workshops 2001-05 (staffing, partnerships, funding)
- Program and site reports from California workshops during 1998-99, the last year of NSF funding of the California CSW sites
- One-year program reports from two California sites for 2004-05

**Data sources for “CSWs by the Numbers”**

	1998-99	2000-01	2001-02	2002-03	2003-04	2004-05
Calif. Workshops	Data for 8 sites	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	Data for 2 sites
National Workshops	<i>NA</i>	<i>NA</i>	Data for 1 site	Data for 4 sites	Data for 5 sites	Data for 6 sites

The interested reader can also consult the Methodology section at the end of this module for a brief discussion of our methods of collecting quantitative data about the CSWs and lessons that we learned. We believe that our reflections will be of use to others charged with documenting the scope and scale of similar programs.

## 1. How many CSW workshops are there, where are they, and how long have they been there?

**As of July 2006, there were CSWs operating in 12 cities in seven states.**

- Six California cities are served by workshops established under the CSW's first NSF grant (awarded in 1995).<sup>12</sup>

### California communities served by sites established under the first CSW NSF grant in 1995

City	CSW Workshop(s)	Year established	Status in 2006
San Francisco	Mission Science Workshop	Early 1990's, with first formal support from San Francisco State in 1992	Active
Oakland	Brookdale and West Oakland Discovery Centers	1995-96 (operated programs prior to receiving NSF grant)	Active in 2 locations
Fresno	Fresno Community Science Workshop	1996-97	Active in 2 locations; also operates a ScienceMobile
Los Angeles	University of Southern California MESA Mission Science Workshop	1996-97	Active in 10 locations
San Jose	Joseph George Science Workshop and Computer Studio	1996-97	Active again after a hiatus
Watsonville	Environmental Science Workshop	1997-98	Active

<sup>12</sup> Three other sites established under the first grant are now defunct.



- Six other cities across the country are served by CSWs established under a second NSF grant in 2001 to expand the program nationally.

**National Community Science Workshops funded by the 2001 NSF grant**

<b>City</b>	<b>CSW Workshop(s)</b>	<b>Year established</b>	<b>Status in 2006</b>
Washington, D.C.	Columbia Heights CSW	2001	Active
Houston	The Children's Museum of Houston Science Workshops	2002	Active in 5 locations
New Orleans	New Orleans CSW	2002	In August 2005, the site destroyed by Hurricane Katrina, but being rebuilt. Providing outreach to schools.
Miami	Citizens for a Better South Florida's CSW	2002	Active in 3 locations
Newark	New Jersey CSW	2004	Active
Boston	Boston CSW	2004	Active

## 2. What are the characteristics of the youth and communities that CSWs serve?

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**CSW workshops are located in poor, mostly urban, heavily minority communities where children are unlikely to have access to the kind of opportunities that the CSWs provide.**

- We identified eight schools that house and/or are heavily served by a CSW. Eighty-four percent (84%) of the students in these eight schools are eligible for free and reduced lunch. Nine in ten students attending these schools are of African American (58%) or Hispanic (35%) descent.
- We have district data, but not school level data for another five communities served by the CSWs that provided data used in this report. In those cities and towns, 67% of the students are eligible for free and reduced lunch. Forty-seven percent of the students are Hispanic, 24% are African American, and 16% are Asian. CSW workshops are located in some of the poorest neighborhoods in these communities.

**Poverty measure and student ethnicity for schools and districts served by CSWs**

	<b>Students eligible for free and reduced lunch</b>	<b>Amer Ind</b>	<b>Asian</b>	<b>Hisp</b>	<b>Black</b>	<b>White</b>	<b>Other</b>
<b>Schools served by CSW</b>							
Citrus Grove Elementary, Miami	94%	0.1%	0.2%	96.8%	1.7%	1.2%	0.0%
Holmes Elementary, Miami	98%	0.0%	0.0%	3.6%	96.4%	0.0%	0.0%
Crocker Elementary, New Orleans	88%	0.0%	0.0%	0.0%	100%	0.0%	0.0%
Montgomery Academy, Newark, NJ	90%	0.0%	0.0%	18.3%	81.7%	0.0%	0.0%
Edison Middle School, Houston	91%	0.0%	0.0%	98.7%	0.6%	0.7%	0.0%
John D. O'Bryant Math and Science School, Roxbury (Boston)	63%	0.5%	22.9%	17.4%	47.7%	11.6%	0.0%
Cole Elementary, Oakland	77%	0.0%	6.4%	15.8%	76.7%	1.1%	0.0%
Maxwell Elementary, Oakland	71%	0.0%	5.8%	30.5%	60.5%	1.1%	2.1%
<b>School Average</b>	<b>84.0%</b>	<b>.01%</b>	<b>4.4%</b>	<b>35.1%</b>	<b>52.2%</b>	<b>2.0%</b>	<b>0.3%</b>
<b>Districts served by CSW</b>							
District of Columbia Public Schools	62%	0.0%	1.7%	9.7%	83.6%	4.9%	0.0%
Los Angeles Unified	75%	0.3%	6.3%	72.5%	11.8%	9.1%	0.0%
San Francisco Unified	61%	0.6%	51.3%	21.4%	14.5%	9.6%	2.6%
Pajaro Valley Unified School (Watsonville, CA)	59%	0.2%	2.0%	76.3%	0.6%	20.7%	0.1%
Fresno Unified	79%	0.7%	16.6%	53.7%	11.5%	17.5%	0.0%
<b>District Average</b>	<b>67.2%</b>	<b>0.4%</b>	<b>15.6%</b>	<b>46.7%</b>	<b>24.4%</b>	<b>12.3%</b>	<b>0.6%</b>

(Source: National Center for Educational Statistics (NCES) Common Core of Data, 2003-04)

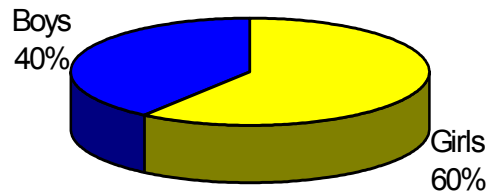
**At the national CSW workshops in 2004-05, the typical youth attending after-school programs was a girl between eight and twelve who was Hispanic or African American.**

- Girls comprised 60% of the youth served by the after-school programs, and boys 40% (based on data of 709 youth attending scheduled, after-school programs at five CSW national workshops in 2004-05. Sites felt most confident about their ability to track participants accurately at this type of program.)

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**Gender of participants in scheduled, after-school programs (2004-05)**

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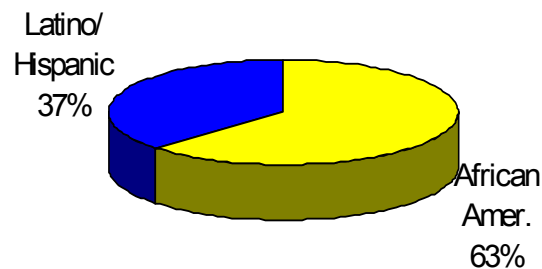


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- Almost two-thirds (63%) of the youth were African American; the other 37% were Hispanic.

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**Ethnicity of participants in scheduled after-school programs (2004-05)**

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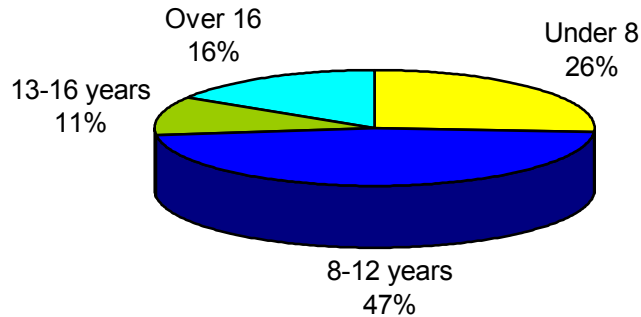


- Youth from eight to twelve years old comprised nearly half (47%) of after-school program participants in 2004-05. Twenty-six percent were younger, 11% were 13-16 years old and 16% were over 16.

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**Age of participants in scheduled after-school programs (2004-05)**

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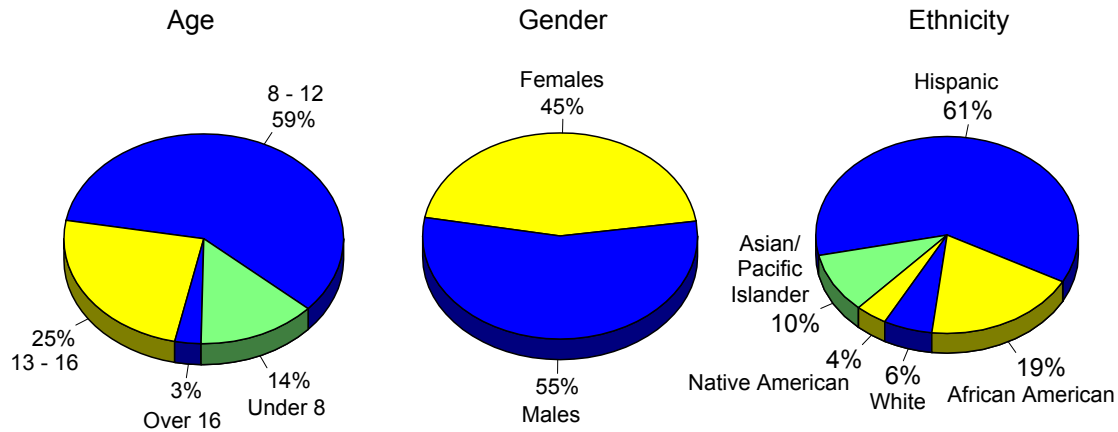



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**The current profile of youth served by the CSW national workshops (as described above) is consistent with the foundational commitment of the California CSWs in the 1990s to serve poor children of color who have little if any access to enrichment opportunities.**

- Since their beginnings, the CSWs have served poor, underserved children. In 1998-99, the typical CSW participant at the California workshops was a Hispanic boy or girl between eight and 12 years old. Fifty-five percent were boys and 45% were girls. While Hispanic participants were in the majority (61% of participants), CSW programs attracted a rainbow of students: 19% African American, 10% Asian or Pacific Islander, 4% Native American, and 6% white.
- Site directors estimated that 95% of the participants were from lower socio-economic families, and 77% had few similar enrichment opportunities. Thirty-seven percent were seen as being at very high risk of entering the juvenile justice system. (*Source: Data for all programs from six California sites in 1998-99.*)

## A profile of CSW student participants (California, 1998-99)



### ***Evaluator comments: Youth and communities that the CSWs serve***

*There appear to be several differences between the youth served in California and nationally. Compared to the national workshops in 2004-05, the California CSW workshops that were established in the 1990s attracted more boys and fewer girls, and more Hispanic youth and fewer African American youth. The gender shift is of particular interest. The data suggest that the proportion of girls participating has increased from 45% to 60%. Several factors may account for this apparent shift. Workshops certainly have striven to attract and hold girls. In addition, many of the site directors at the national workshops are women, so they may make girls feel more comfortable at the workshops and serve as role models. Finally, many of the recent national programs have been provided on a set schedule rather than on a drop-in basis. We suspect that in the rough neighborhoods where CSWs are located, young girls' parents and guardians may be more willing to let them attend regularly scheduled programs. We wonder if the girls themselves favor one type of program over the other.*

### **3. How many programs do CSWs offer? What kinds of programs do the CSWs offer? How many of each kind of program do they offer? How many hours of programming are devoted to the various types of programs offered by the CSWs?**

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**CSW workshops offer a diverse portfolio of science-based programs in informal science settings that serve youth and also reach out to serve and find support in their local communities.**

- We identified five distinct CSW program types:

Drop-in programs provide the opportunity for youth to come on their own accord during regularly scheduled times, when they can work on their own projects. These programs are offered both during the school year and sometimes in the summer, depending on the site. This is the format for many California CSW programs.

Special focus programs have a set theme or one project that all youth work on at the same time (like building a wooden box, gardening, dissection sessions, robots, or a creek-water analysis project). The national workshops offer many staff-led programs that meet regularly after school and/or over the summer. During a typical session, staff introduces a phenomenon and then oversees and encourages students as they engage in a related activity.

Outreach programs are when CSW staff go into the community (often into schools, but sometimes to Park and Recreation centers, community festivals, etc.), and conduct hands-on science and art programs there.

Field trip programs are provided for school groups and their teachers visiting the Workshops.

Other programs fall into a “grab-bag” category of a few miscellaneous activities and events whose format and intended audience don’t fit easily in the other categories (e.g., “speakers,” when it is unclear if the audience is children or the community).

## CSW programs

***Collectively, CSW workshops mount and provide a large number of programs each year.***

- Summarizing for the years and for the workshops that we documented<sup>13</sup>, CSWs offered a total of 181 programs.

In this section we report data about programs for three different time intervals: 1998-99 (last year of the California CSW grant), 2004-05 (last year of the national grant, when data for two California sites was also collected); and 2001-05 (duration of the national grant).

- In 1998-99, eight California CSWs provided 37 programs for youth and their communities.
- In 2004-05, eight CSW workshops reported collectively that they provided a total of 90 programs.
- Between 2001 and 2005, the six national CSW workshops provided a total of 110 programs.<sup>14</sup> [Note: This data overlaps with the total above for 2004-05, but we use cross-year data to portray program growth.]

***The majority of CSW programs are designed for children and are mostly conducted at the workshops. However, a substantial minority of CSW programs reach out to the broader community.***

- Of the total 181 CSW programs we documented, CSWs offered 143 programs (79%) designed for children and another 38 (21%) programs that reached out to the broader community (including children).
- In 2004-05, 66 programs (73%) served children at the workshops or in schools. The remaining 24 programs (27%) publicized the CSWs and met the needs of the larger community through activities like booths at environmental fairs, speaker programs, etc.
- Looking more closely at 2004-05 programs, we see that 31 programs were ongoing after-school (16%) and summer (19%) programs at the workshops. Another 35 programs served school groups either in their schools (22% of programs) or through field trips to the workshops (17%). The remaining 24 programs (27%) publicized the CSWs and met the needs of the larger community through activities like booths at environmental fairs.

<sup>13</sup> Eight California sites in 1998-99, six national sites between 2001-05, two California sites in 04-05.

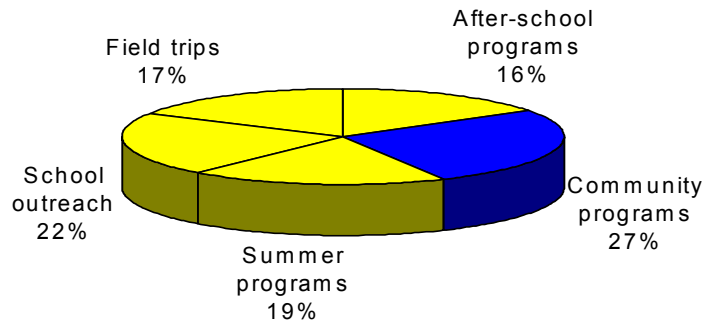
<sup>14</sup> Each year a program was offered, it was considered a separate offering. We present data for 2004-05 unless trends or changes since 1998-99 merit comment.



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### Types of CSW programs (2004-2005)

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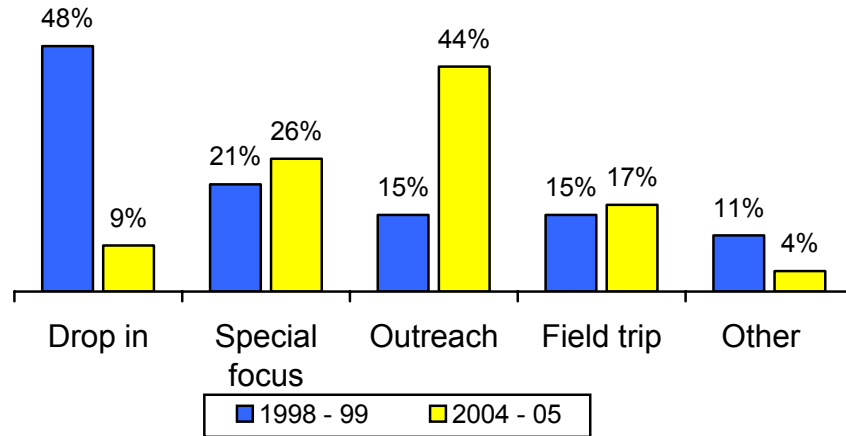


***Workshops operate year round, tailoring their mix of programs to the needs and opportunities in their communities and to their own evolving capabilities.***

- In 1998-99, the eight California workshops' 37 programs included 16 drop-in programs (48% of their program portfolio); seven special focus programs (21%); five each of outreach programs and field trips to CSW workshops (15% each of total programs); and four (11%) of other programs.
- In 2004-05, 40 of the 90 documented CSW programs at eight workshops were outreach programs (44% of all the programs), 23 were special focus programs at the workshops (26%), and 15 were school field trips to the workshops (17%). There were also eight drop-in programs (9%), and four (4%) of other programs.

**Percent of CSW programs by type of program:  
Comparison between 1998-99 California programs and  
2004-05 California and National programs**

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*(Source: Data provided by eight California sites in 1998-99 and six national sites and two California sites for 2004-05)*

**CSW Program Hours**

***The great majority of CSW program hours are devoted to programs for children, with the most hours provided for ongoing, scheduled/organized programs.***

- In 2004-05, CSW workshops provided 7,880 hours of programs. The majority, 6,643 hours (84%), were for ongoing programs at the workshop. They also provided 239 hours (3%) of outreach programs at schools, 131 hours of field trips to the sites (2%), and 867 hours (11%) of community outreach plus a few hours of miscellaneous other programs.

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**CSW program hours by audience and program setting (2004-2005)**

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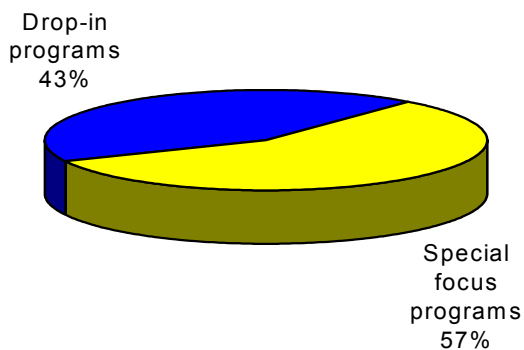


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- Of the 6,643 hours of ongoing youth programming provided by the workshops in 2004-05, 3,814 hours (57%) were given to special focus programs for youth, while the other 2,829 hours (43%) were offered as drop-in programs.

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**Percent of program hours for ongoing youth programs by program type (2004-2005)**

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***The CSWs provide steady and substantial programming year round.***

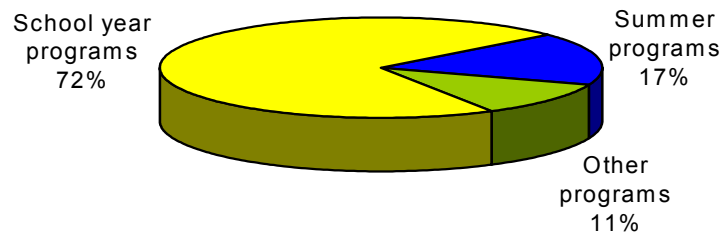
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- In 2004-05, over two-thirds of CSW program hours (5,315 hours, or 67% of the total hours) were devoted to sustained **after-school programs** at the site. During the school year, they also provided another 370 hours (5% of total hours) of school outreach and school fieldtrips to the sites during the school year.

- Workshops provided 1,327 hours (17% of the total) of drop-in and special focus **summer programs** for youth.
- The rest of the program hours (867 hours, or 11% of the total) were given to community outreach and a few other short programs offered throughout the year.

**Percent of program hours by time of year the programs are offered (2004-2005)**

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***Evaluator comments: Programs offered by CSWs***

*In a relatively few years, the CSWs have been able to establish and run a notable variety of programs benefiting underserved youth and their communities. While our five program categories help portray CSW programs in broad strokes, they can hide differences in programming across workshops. For example, in 2004-05 both California and national sites provided outreach programs. The newer national workshops often reached out to their communities through activities like booths at festivals, and special program days at Parks and Recreation Centers—activities that would raise community awareness of their presence. In contrast, the better established California workshops provided most of their outreach programs in schools and classrooms, although they also continued to do some broad community outreach as well. Interestingly, in 2004-05 there was a jump in the number of school field trips at the national workshops; perhaps this is indicative of their deepening relationships with local schools.*

**4. How many youth and community members do CSWs serve? How many students do they serve in their core programs? How much exposure does the average participant have to key CSW programs? How many youth and community members do the CSWs serve in other programs?**

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**An estimated 6,500 to 8,250 individuals were served by the national CSWs funded by the second CSW grant between 2001 and 2005.**

It is not possible to state precisely the total number of individuals that benefited from the national CSW programs, because CSWs were not able to track individual participants from year to year. We estimate the number of individuals served by the national CSWs based on our knowledge of the programs:

- We know that if each individual participated in only one program and only one year, 5,127 young people would have participated between 2001 and 2005. The true figure of youth served could be estimated at between about 2,500 (which assumes that each youth attended two programs or attended two years) and about 3,750 (which assumes that about half the youth attended more than one program or more than one year).
- In other CSW programs such as fairs and open houses, 5,628 youth and adults would have been reached if each individual participated just once. Given the nature of that type of programming, it seems likely that most individuals participated just once. Conservatively, we estimate that roughly 4,000-4,500 individuals benefited from CSW programs that met community needs or drew in community speakers.

Using these estimates then, we make a conservative calculation that between 6,500 (i.e., 2,500 at youth programs and 4,000 at other programs) and 8,250 (i.e., 3,750 at youth programs and 4,500 at other programs) individuals were served by the national CSWs (other than CA) between 2001 and 2005.

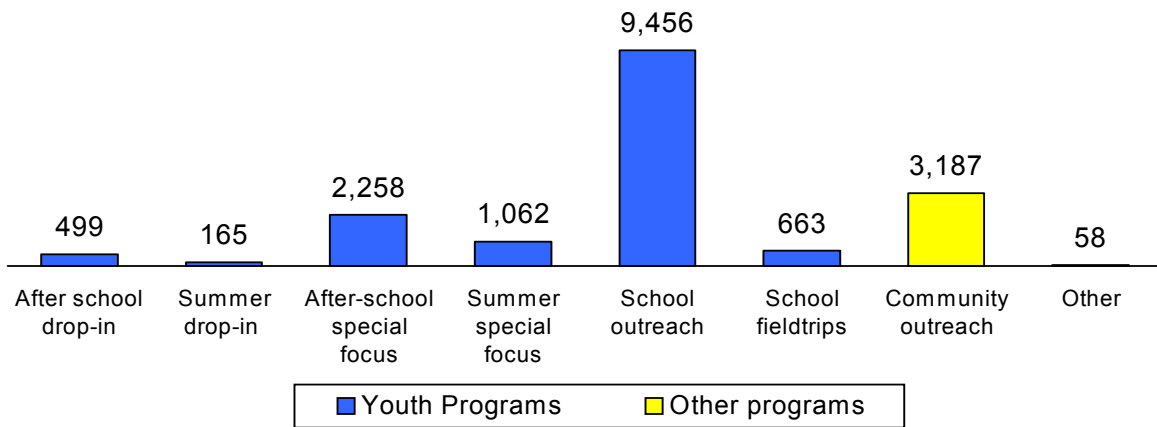
**In 2004-05, the six maturing national sites and two well-established California CSW workshops collectively served over 17,000 individuals, the great majority of whom were youth.<sup>15</sup>**

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<sup>15</sup> Again, it is important to remember that not all of the California sites operating that year provided information for this report. However, the combined participation figures for the two California sites and the six national sites gives a fairly accurate snapshot of total CSW reach in a single year.

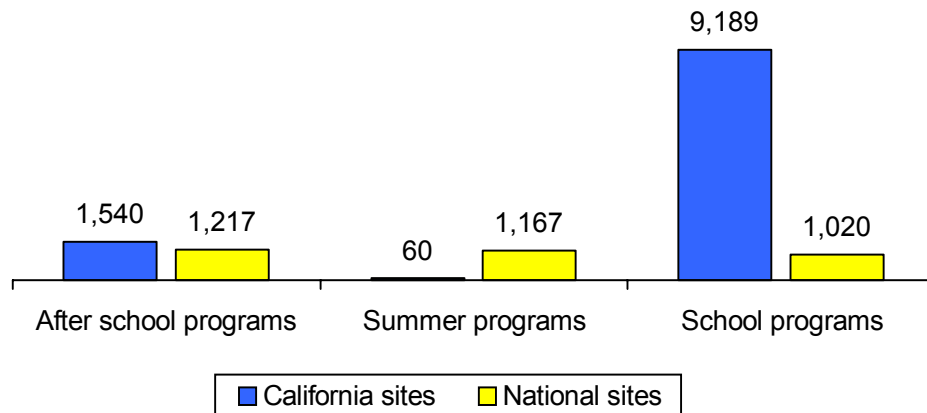
- In 2004-05, the national and California CSW workshops that provided figures for this study served a total of 17,438 youth and others. There were 14,193 young people who participated in youth programs (81% of all individuals served over the year). Another 3,245 youth and adults (19% of total participants) were reached by other CSW programs such as fairs and open houses. By far, the largest number of youth were reached by school outreach programs.

**Number of participants at CSW programs by type of program (2004-2005)**



- The **national workshops** served 3,044 youth through after-school programs, summer programs and programs for school groups. The longer established **California workshops** served 10,789 youth, the majority through school outreach programs at one of the two sites.

**Number of participants in youth programs by program type (2004-05): Comparison between California and national sites**

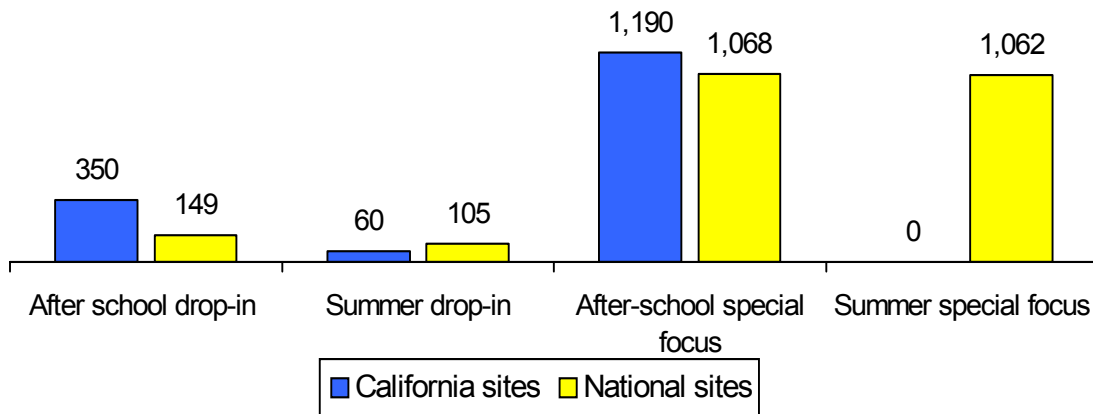


*(Source: Data for this graph provided by six California sites in 1998-99 and six national sites and two California sites for 2004-05)*

**In 2004-05, the national and California CSWs served 3,984 individual youth in their core programs (i.e., ongoing special focus and drop-in programs at the site).**

- Of these youth, 80% were engaged in scheduled, organized special focus programs.

**Individual youth participating in CSW core programs by program type and time of year (2004-05)**



- At the four workshops that provided information about attendance at after-school programs, average attendance ranged from seven to 59 students per day.

**CSWs provide sustained service to most of the youth that attend their programs.**

- In 2004-05, the after-school programs operated on average three to five hours a week for over eight months. Summer programs were typically several weeks to a month long, and operated for partial to full days.

More than 2/3 of the children who participated at California workshops in 1998-99 came nearly every day that their program was offered. This is our most complete data on participant “exposure” to the CSWs; we present findings for that year below:

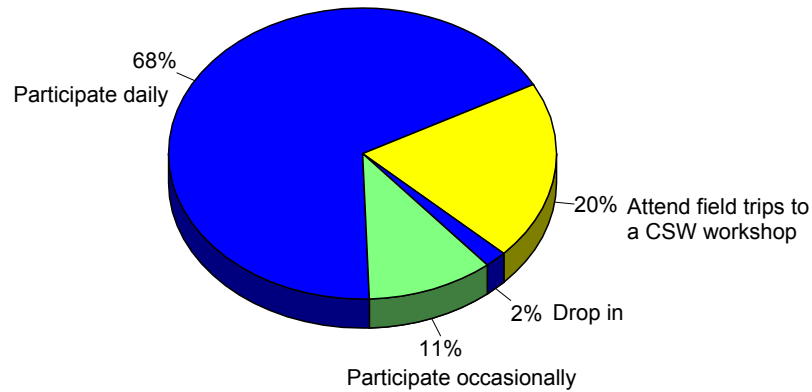
- The average workshop served 154 youth through programs that were heavily weighted to drop-in programs.
- An estimated 68% of the children attended nearly every day the program was offered, and another 20% participated on a more occasional basis. The group of “regulars” slightly changed composition every few months when new youth discovered the Workshop and others drifted away.

- Thirty students (different from the “regulars”) visited the typical workshop on field trips.

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**Patterns of student participation in CSW programs (California 1998-99)**

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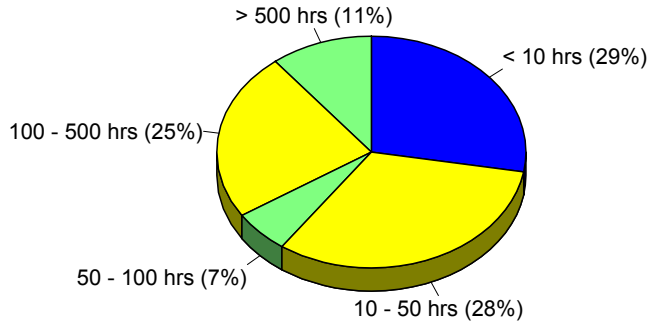


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- Almost half (43%) of the youth served by the CSWs in 1998-99 participated at least 50 hours or more during the year, and more than one-third (36%) participated for 100 hours or more. Under one-third (29%) participated in a CSW activity for less than ten hours.
  - Site directors reported that many youth stayed with the workshop site for multiple years, as the figure below implies, given the number of youth who participated for hundreds of hours.



**Hours of student participation in CSW programs (California 1998-99)**

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<b>Total # hrs participating in one program</b>	<b>N of students</b>
> 750 hrs	37
500-750 hrs	104
250-500 hrs	33
100-250 hrs	278
50-100 hrs	81
10-50 hrs	344
< 10 hrs	366

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Note that a student who participates in more than one program is counted as a participant in each program he or she attends.

## 5. How have the CSWs expanded and grown?

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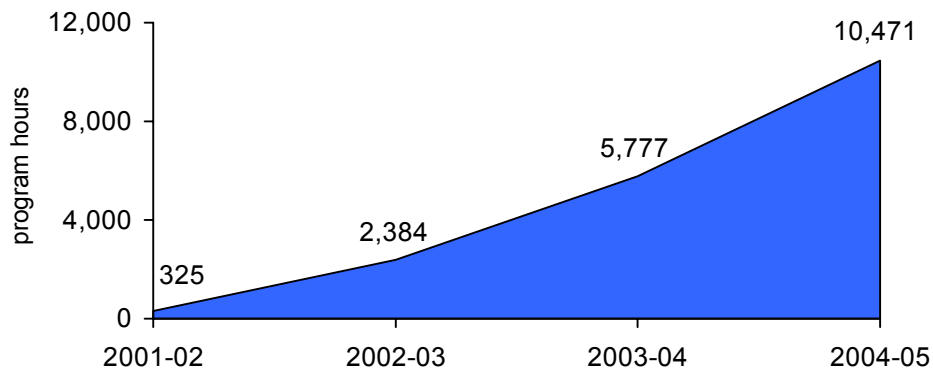
Since the first CSW workshop was established in 1994, the CSWs have grown to serve 12 communities in seven states.

As new workshops came on board through the national CSW grant between 2001 and 2004, the hours of programs they offered rose from 325 hours in 2001-02 (at one site) to nearly 5,000 program hours by six sites in 2004-05.

- By June 2005, national CSW workshops had provided a total of over 10,471 hours of programs, 10,259 (98%) of which were youth-focused. This is equivalent to 29 months of six-hour school days of programming.

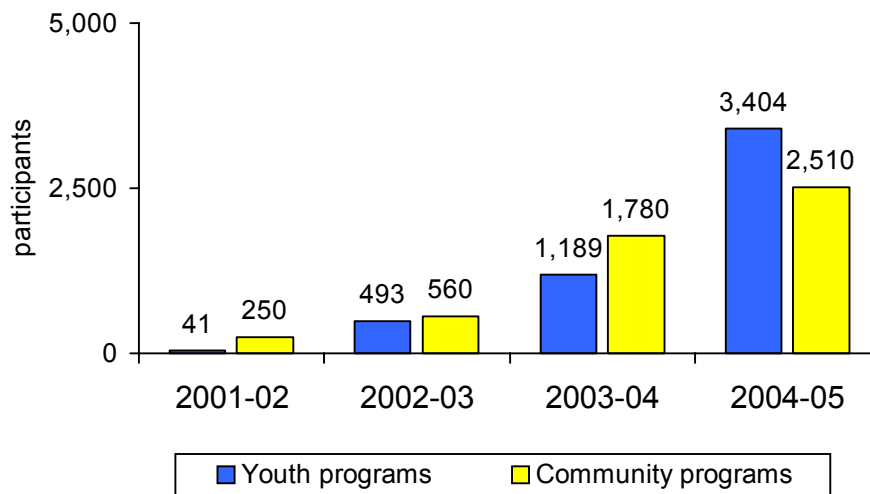
### Cumulative hours of programs at CSWs funded by the national grant (2001-2005)

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**The number of individual participants served annually by CSW programs for youth and CSW programs for the community rose rapidly over the same period.<sup>16</sup>**

**Growth in annual number of individuals served by the CSWs (2001-2005)**



**While we do not have data that permits a full description of the growth of California sites from 1998-99 to 2004-05, we do have data that suggests that their capacity to reach large numbers of youth has increased substantially.<sup>17</sup>**

- In 1998-99, eight California sites provided 7,423 hours of youth programs that served 1,232 youth. In 2004-05, just two California sites provided 2,476 hours of youth programming that served 10,789 young people. In 2004-05, one of these sites reached large numbers of young people through school outreach programs while continuing also to run robust programs at the workshop.

<sup>16</sup> Individuals were counted for each program they attended, so within a year there is a small amount of over-counting of participants. Moreover, as noted elsewhere, some children participated for multiple years, so it would be misleading to present this data as "cumulative."

<sup>17</sup> For the California CSW grant in the 1990's, Inverness Research Associates documented programs and participants only for the final year (1998-99); therefore we cannot document growth during those years. As noted elsewhere, however, the California sites operated year-round, and in the final year of the grant implemented 37 programs, provided 7,423 program hours, and served an estimated 1,232 children.

***Evaluator comments: CSW growth***

*In a multiyear project, one hopes to see evidence of expanding capacity both to provide programs and also to attract and serve clients. This is exactly the pattern that we see for the national CSWs between 2001 and 2005. The program remained relatively small its first two years, as national staff sought out the right locations and local leadership and then equipped workshops. As new workshops came on board, and the established workshops gathered momentum, program growth took off. It is notable that the national workshops provided nearly half of their total hours of programs and served nearly half of the total number of children and community members during the final year in which we collected data. As their capacity grows, sites must decide for themselves the best balance between serving fewer children in more depth and more children but at a lesser depth. Moreover, they must decide how much energy to expend on programs at the workshops and how much to give to outreach to schools and the community.*

## 6. What does a typical workshop accomplish in a year?

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**Based on data provided by sites in 1998-99 and 2004-05, we found that in a year the hypothetical typical CSW site:**

**--provides four to eleven programs  
--offers approximately 800-1,000 hours of programming  
--serves between 550-1,200 youth at programs targeted to young people  
--reaches another 400 youth and other community members at outreach programs.**

- In 2004-05, the average site:
  - offered eight youth programs and two or three community outreach programs;
  - provided 985 hours of programs;
  - served 1,774 young people at youth programs and reached another 406 individuals (youth and adults) at outreach programs.
- Our most complete quantitative information about the different programs operated by the CSWs was provided by California sites in 1998-99. That year, the **typical CSW site** offered four or five different programs for youth<sup>18</sup>: two drop-in programs, and one each of special focus programs, outreach programs, and field trips to the workshop. Depending on the type of program, they ran for between 10 to 413 hours and were attended by between 16 and 50 students each day they operated.

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<sup>18</sup> In interpreting the numbers, it is important to note that although the average number of participants in a drop-in program is 27 compared to 48 in field trips to the workshop, an average drop-in program serves individual young people many more hours than does a field trip program.

**Participation rates and program duration for CSW programs by type of program  
(California 1998-99)**

	Drop-in programs	Special focus programs	Outreach programs	Field trips to CSW Workshop
Number of programs	2	1	1	1
Number of students attending the average program of this type each day they operate	27	18	50 <sup>19</sup>	48
Average number of weeks in each year the programs of this type operate	35	13	14	NA
Average number of hours per week the average program operates	14	10	3	NA
Average total hours each program operates each year	413	72	53	10
Estimated annual participant contact hours for each program	8,971	1,796	1,730	414

***Evaluator comments: Accomplishments of the typical CSW site in a year***

*Sites vary greatly in their capacities, levels of development, settings, and strategies for serving youth in their communities. Therefore it is not a surprise that sites vary considerably in how many programs they mount, how many individuals they serve, and how many hours of programming they offer. However, based on the profile of the typical site, we can generalize to say that the workshops mature to become quite productive, especially given the fact that they operate with limited staff and financial resources.*

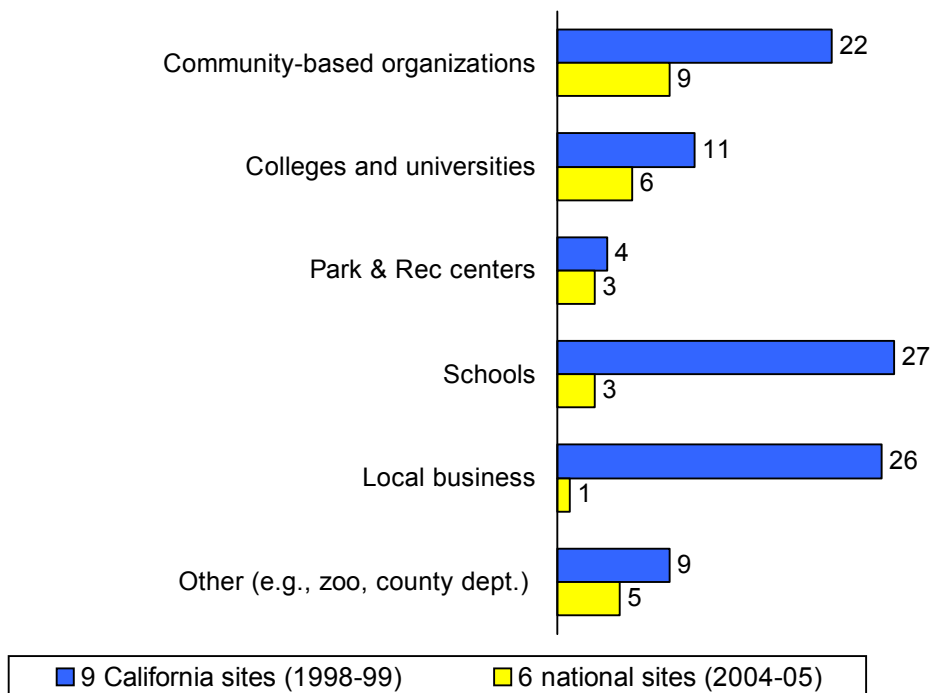
<sup>19</sup> Two programs reached large numbers of students (53 and 135 students); three involved 20 students each.

## 7. What support do CSWs attract from their local communities?

**The number and range of CSW partners and supporters speak to the wide appeal of the CSW concept.**

- On average, each National CSW site had formal partnerships or informal relationships with six other organizations in 2004-05. They established the greatest number of relationships with community-based organizations and colleges and universities.
- California CSW sites operating under the original grant forged even more relationships with community supporters, averaging 14 links per site in 1998-99. They established links with many local businesses, schools and community-based organizations.

### Organizations that played roles at CSWs (1998-99 and 2004-05)



*(Source: Data were reported by five of the six national sites funded under the second CSW grant.)*

**The partners that CSWs attract provide a range of supports and resources—from building materials, to interns, to administrative services—that also link the CSWs to their communities.**

Below we list a sample of ways that workshops link to their communities.

**Examples of CSW links to their communities 2002-2007**

<u>CSW site</u>	<u>Partner</u>	<u>Type of support provided to CSW</u>
<i>The partnerships noted in <b>BOLD</b> for each CSW is the primary partnership</i>		
Boston	<b>UMASS Boston COSMIC Center</b> (Center of Science and Math in Context)	Financial and HR management Mentorship Content
Boston	John D. O'Bryant Math and Science School in Roxbury	CSW space Program management Recruitment of clientele
Columbia Heights	<b>Smithsonian's National Zoological Park</b>	Program management Development Content Volunteers/Interns Fiscal agent (Financial and HR management)
Columbia Heights	Latin American Youth Center	CSW space Recruiting clientele Development
Houston	<b>The Children's Museum of Houston</b>	Financial and HR management Mentorship Development Content Volunteers/Interns
Houston	Houston Independent School District	CSW space Recruitment of clientele
New Orleans (MHICSW)	<b>My House Neighborhood Center for Learning</b>	Financial and HR management Mentorship Development Content Volunteers/Interns CSW space (once building is reopened summer of 2007) Recruitment of clientele
Miami	<b>Citizens for a Better South Florida</b>	Financial and HR management Mentorship Development Content Volunteers/Interns
Miami	Miami Dade Public Schools and Miami Dade Parks and Recreation	CSW space Recruitment of clientele



<u>CSW site</u>	<u>Partner</u>	<u>Type of support provided to CSW</u>
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The partnerships noted in **BOLD** for each CSW is the primary partnership

Miami	The Children's Fund	Funding
New Jersey	<b>Liberty Science Center</b>	Financial and HR management Mentorship Development Content Volunteers/Interns
New Jersey	Newark Public Schools	CSW space Recruitment of clientele
New Jersey	Greater Newark Conservancy	Mentorship Content Volunteers/Interns

(Source: Data were reported in April 2007 by the CSW National Coordinator.)

**Evaluator comments: CSW community links**

*CSWs have been successful at securing outside funding, in-kind donations, and volunteers. In this way, they not only strengthened ties to their communities, but carried out their mission in a more cost-effective way which substantially leveraged the NSF investment. Through connections with existing institutions, agencies, and programs the CSWs and their work have become known and valued in the broader community. Particularly when symbiotic and collaborative relationships were established, these linkages proved to be mutually beneficial. The accomplishments of the California workshops in the 1990's in this area are of particular note, since those sites drew on resources and support from an average of 14 other entities. Were potential partners drawn to work with the workshops because the number of sites in the state lent them greater "legitimacy"? Did the project director and local site directors place greater emphasis on development of partnerships during this era? Most California workshops in 1998-99 had been in existence a few years longer than the national workshops had been in 2004-05. Based on the cumulative list of partners through 2007 for the national sites, it appears that the capacity for seeking and fostering partnerships grows after sites have been operating 3-4 years.*

## **8. What level of staffing and funding is needed to run a CSW site?**

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**CSWs are operated by small teams and on lean staff budgets.**

- Established sites are typically staffed by a full-time director and one or two other paid staff (who often work part-time). In 2004-05, annual staffing costs at national sites ranged from about \$25,000 to \$81,000, with an average staff cost of \$50,000.<sup>20</sup> In addition many sites get help from a small number of volunteers such as college students and interested community members. National program staff also provide assistance in negotiating and outfitting workshops in their first year.

**Budgets vary, but it appears that the average established site can operate on a budget of roughly \$80,000-\$120,000 a year.**

- In 2004-05, the average annual budget for each of five national sites that provided budget information was \$115,899. Workshops received an average of \$77,317 (67% of the total budget) in direct funding and \$38,542 (33%) in in-kind contributions. They averaged \$68,000 in NSF funding and support.
- In 1998-99, the average California site received \$50,623 in direct funding and \$26,519 of in-kind contributions for a total budget of \$77,142 annually. They averaged \$19,769 in NSF funding.

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<sup>20</sup> In 1998-99, the average staff cost at California sites was very similar, \$47,450.

***Evaluator comments: CSW staffing and funding***

*CSWs serve their communities at a moderate cost, we think, due to several factors. There are economies afforded by a network, especially in a site's early years when they are establishing a site and developing activities. Moreover, there are many ways that supporters can augment core funding through small grants and in-kind support. Finally, the dedication of staff and volunteers also keeps costs down. We also know from the example of several California sites that CSWs can operate within the administrative structure of city youth and park agencies, which offers the possibility of long-term, stable support once grants end.*

## Methodology

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Below we describe briefly our data-collection methodology and share some lessons learned about collecting ongoing data from multiple sites of an informal science youth program such as CSW.

### Two approaches to data collection

**Study of California workshops, 1998-99:** To document the work of sites for the last year of the grant, we created a detailed form for site directors to use to report on each program over the year (June 1988-July 1999); they provided hours of programming, number and characteristics of participants, and patterns of attendance. In addition, they completed forms on staffing, community links and funding. Researchers provided guidance and clarification as site directors completed the forms.

**Study of national workshops, 2001-2005:** To use the evaluation to help build the long-term reporting and administrative capacity of the workshops, Inverness Research Associates designed a database for sites to use. The intent was that workshops would submit monthly updates on participants and programs, and annual updates on staffing, community links, and funding. Sites provided input into the content and format of the database and were trained in its use by Inverness staff. The final database was designed to collect information that was quite similar to the information collected in California. Inverness summarized site level data and provided annual and cumulative site reports back to sites and the national CSW office that could be used with funders and other interested parties.

### Lessons learned about data collection for this kind of project

**While providing sites with databases and training in using them for program documentation may be promising in some circumstances, a low-tech structured interview may be a more natural match with the culture and capacities of after-school science programs like CSW.** CSWs use almost all of their staff capacity and time merely to plan for and run programs. It was a stretch for most workshops to develop the expertise and find the time to document their work using a database provided by outside evaluators, even though some of them gave input into the design of the database. Also, investment in a database approach should be generously budgeted to provide for unanticipated challenges. CSW support staff come and go, so training and consistency is an issue; reliable computer hardware and software is not always available at some sites; other priorities at the workshops are often higher than documentation; and clarification of unclear data requires considerable evaluator and site time.

**It is difficult for sites to maintain histories of individual participation.** Sites told us that student turnover is often high, some participants cannot or will not sign in reliably, and converting sign-in sheets to formal records is laborious and prone to

error. Therefore we did not ask the workshops funded through the national grant to track individual students across programs. For many sites-funded by the national grant or not-providing participation data across time for each program was difficult and prone to error.

**Collecting data twice a year, in early summer (for school year activities) and in early fall (for summer activities) may be preferable to monthly or annual data collection.** The school year and summer programs are distinct at most sites serving youth.

In short, designing and implementing quantitative documentation systems for informal science programs like CSW is no minor task, especially where sites vary so greatly. In order to be successful, such documentation systems should minimize the burden on sites as much as possible.