University of California
Agriculture and Natural Resources | 4-H Youth Development Program

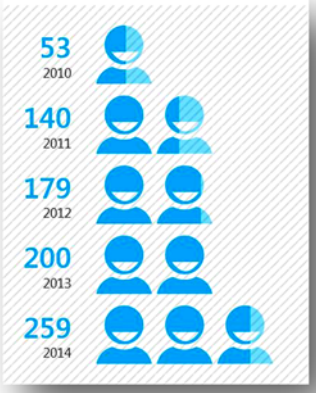
Cumulative 5-Year Final Report of the 2009-2014 California 4-H Sustainable Communities Project

(Funded by USDA NIFA—Children, Youth, and Families At Risk [CYFAR])

California's future depends on educated, engaged, and resilient youth who are able to make positive contributions to society. As young people prepare for their future careers, higher education, and participating in their communities, they will need opportunities to deepen their understanding and application of core practices in science and health. One promising method to engage youth is by utilizing long-term, positive youth development (PYD) approaches with school age (K-6) youth where teenagers serve as cross-age teachers and role models.

The 4-H Sustainable Communities Project implemented this long-term approach in partnership with organizations in three California communities: Sacramento, Borrego Springs, and Winters. Programs utilized promising approaches that incorporated sustained participation of youth, well-prepared staff, partnership with families and community organizations, and emphasis of community-based resources that showcased unique community assets.

Youth K-6th Grade



The goal was to support racially diverse K-6th grade youth from low socio-economic backgrounds in developing knowledge, skills, attitudes, and behavior necessary for fulfilling contributing lives. The core focus was development of science and environmental attitudes, interests, and behaviors, in addition to youth development outcomes. A secondary focus was empowering teenagers to grow their confidence and leadership abilities by acting as facilitators of science, environmental, and gardening activities.

During the five year intensive project, 831 K-6th grade youth participated in science and gardening programs facilitated by 138 teenagers.

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Steven Worker, 4-H Science, Engineering, and Technology Coordinator

Community Program Descriptions

Sacramento

Marianne Bird, 4-H Youth Development Advisor

In Sacramento, the target audience was K-6th grade youth within an ethnically and racially diverse school in a low-income community. Over 65% of students qualified for free or reduced-price lunch. Two-thirds of the student population were non-white and many were English language learners. For financial or cultural reasons, these students often missed opportunities that enhance academic outcomes and the development of life skills. Four programs were implemented:

⇒ Youth Experiences in Science (YES) Project reached 1st-3rd graders with weekly science education, facilitated by trained teenagers, where snails and bubbles and worms provided the basis for observation, comparison, and organization—all science processes.

⇒ 4-H On the Wild Side Project reached 4th-6th grade students with environmental education through an overnight camping experience. Youth rotated through teen-led activities to learn about the natural world.

⇒ 4-H Water Wizards reached 4th-6th grade youth with a 12-week science education project focusing on water and its importance to the planet. Students participated in hands-on learning experiences that encouraged inquiry, and were taught basic information about water and encouraged action on a water issue.

⇒ The Golden Empire Garden Club utilized the Junior Master Gardener curricular materials and met monthly after school. The school garden became a classroom for 3rd-6th grade participants who also benefitted from field trips to UC Davis and Soil-Born Farms.

Community partnerships included the California State University, Sacramento Science Education Equity Program and Department of Biological Science; Sacramento START after school program; Golden Empire Elementary School; American River Water Education Center; UC Davis School Garden Tours; and Soil Born Farms.

Borrego Springs, San Diego County

Sue Manglallan, 4-H Youth Development Advisor

In Borrego Springs (San Diego County), the target audience was fifth grade students in Borrego Springs Elementary School who were mentored by high school teens. Borrego Springs is a rural and isolated desert community; 79% Hispanic and 96% of the student were eligible for free and reduced lunch. A secondary audience was parents who utilized the family resource center and who were primarily from Spanish speaking low-income families. Two services were implemented:

⇒ Fifth grade youth were reached through garden-based science afterschool program mentored by teens recruited and trained to serve as teachers. Connections were made to science and agriculture through field trips to the University of California Desert Research & Extension Center and through participation at 4-H State Leadership Conferences held on University of California campuses.

⇒ Two family resource centers were established and installed with computers and internet access. At these centers, youth received homework assistance, while parents received education in language, nutrition, library services, citizenship, and basic computer skills. The Superintendent of the school district was a champion of this work and helped garner local community support.

Community partnerships included the Borrego Springs School District, the local Rotary who provided the rent for the two family resource centers, the Ecumenical Council, My Balance Council, Civic Foundation, Jewish Community Services, and San Diego County Luback Library Literacy Group.

Winters, Yolo County

Joyce Gutstein and Megan Harns, John Muir Institute of the Environment, UC Davis;
Marcel Horowitz, 4-H Youth Development and Nutrition Advisor

In Winters (Yolo County), the target audiences were Latino K-3 youth and teenagers from socio-economically disadvantaged backgrounds at a local housing site and elementary school. Youth were from families with high technical proficiency in areas such as agriculture, machinery, and cooking with great hopes for their children. The program consisted of three components:

⇒ "Nature Club," an after-school program designed for K-3rd grade youth, met once a week bringing together community youth and teens with undergraduate mentors from UC Davis to engage in gardening, learning science, and improving the local environment.

⇒ UC Davis undergraduates were trained with the City of Winters After-School Program partner site to help organize a 36 week long curriculum unique to each grade (1, 2, and 3) for the after school site's weekly Science Fridays. This curriculum includes the 4-H Youth Experiences in Science (YES) modules .

⇒ Establishment of the Putah Creek 4-H Club to connect youth to other 4-H events and opportunities.

Community partnerships included the Yolo County Housing, City of Winters After-school Program, and the UC Davis John Muir Institute of the Environment. Yolo County Housing and the City of Winters After-School Program provided access to youth who traditionally are underserved by 4-H, and by science programming in general, as well as created opportunities for their staff to train and co-facilitate youth activities with undergraduate interns for the betterment of both groups' skill sets.

Project Evaluation

K-6th grade youth participants responded to a brief survey annually using "clickers" - a remote control device that recorded each child's multiple-choice responses. Three different surveys were used—one in 2010, another in 2011 and 2012, and the final survey in 2013 and 2014. The scores were standardized[1], and in general, the reliability improved as the instruments changed.

Youth Outcome: positive interest towards science

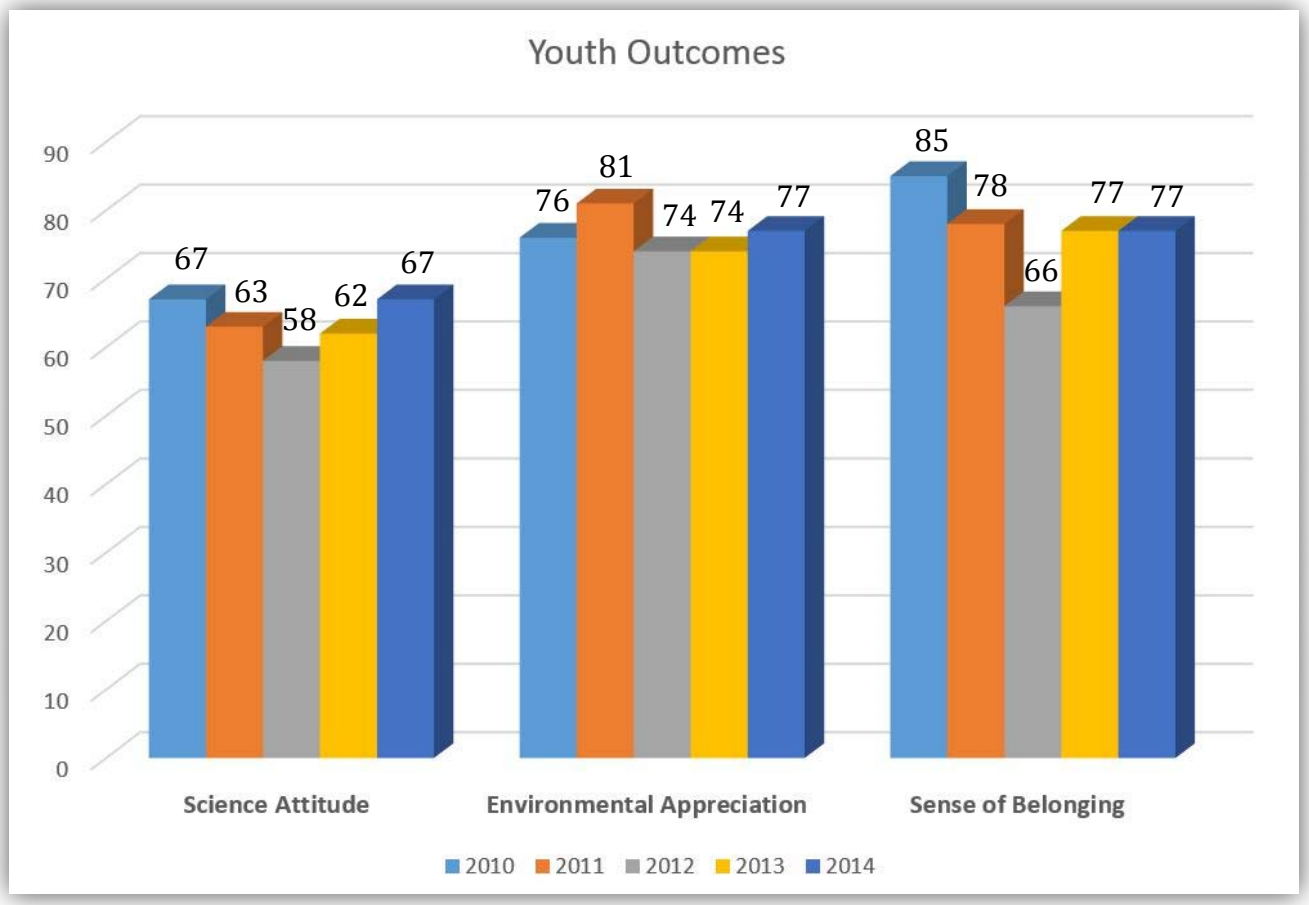
Youth responded highly to the practices of science, including observing how things are made or invented, experimenting and testing ideas, and being excited about new discoveries. This is a positive sign in helping youth improve their attitudes towards science and technology. This finding is tempered somewhat by the fact that science interest appeared to decrease as grade levels increased; younger youth responded more favorably to science than did the older youth. In addition, youth responded less favorably to questions that used the term "science" specifically (e.g., liking science, using science procedures), but positively to questions involving science practices (e.g., getting excited about new discoveries). This contradictory finding may indicate a complex relationship between the youth participants and their experience with science at school, in this program, and society.

Youth Outcome: appreciation for the environment

Youth reported that the program helped them learn about the environment. In addition, youth reported high levels of caring about the Earth, and awareness of environmental issues in their community; they believed people should protect the environment, and that they did things to help the environment. While young people care about the Earth and want to see the environment protected, they felt less favorably towards the belief that what they do every day can have an impact on the environment.

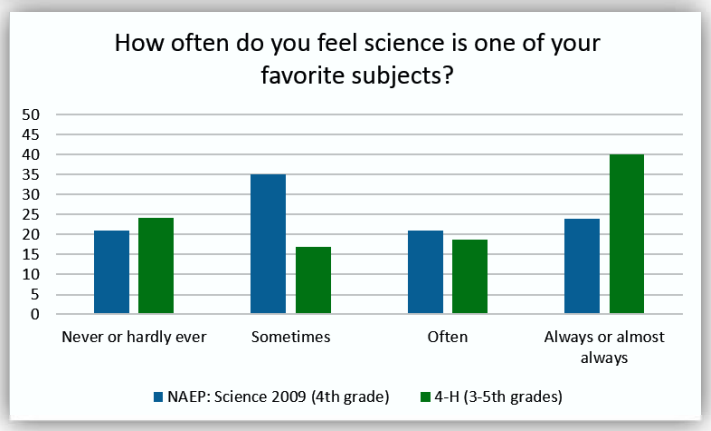
Youth Outcome: a sense of belonging in the program

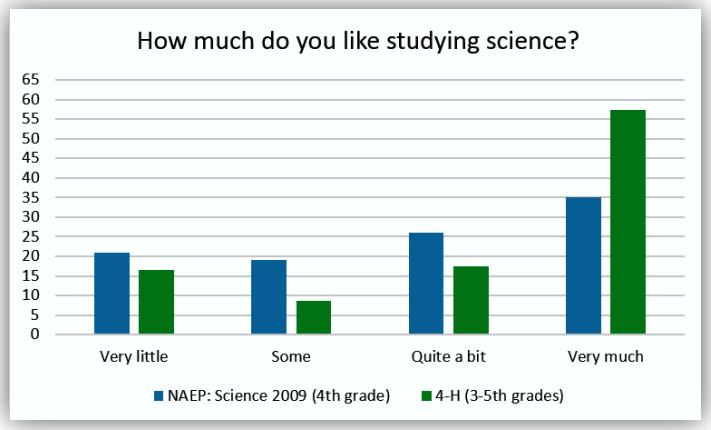
Youth reported positive relationships and a sense of belonging in the program. Youth agreed that they felt comfortable in the program, were treated with respect by teens, and felt the teens were good role models.



Comparison with National Data

In 2014, two questions were compared with their equivalent on the National Assessment of Educational Progress (2009): 4th Grade Science, a national representative sample of U.S. students. The graphs on the right demonstrate a favorable comparison for the 4-H CYFAR programs. Both charts revealed a statistical significance difference when comparing proportions (studying science, chi-square=11.13, p=0.01; favorite subject, chi-square=10.53, p=0.01).

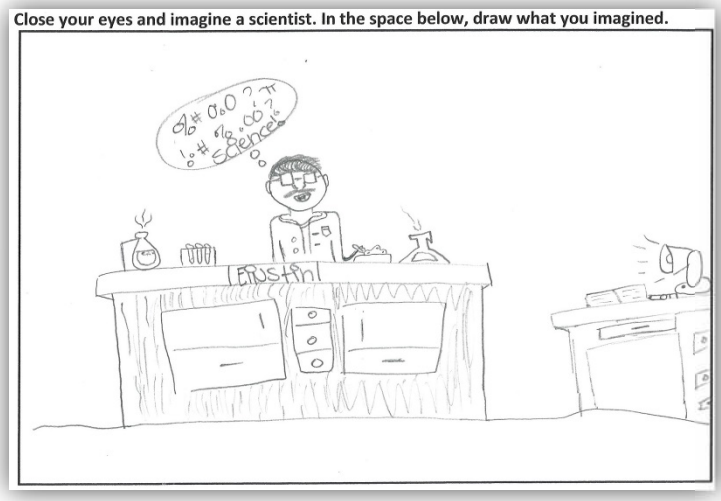


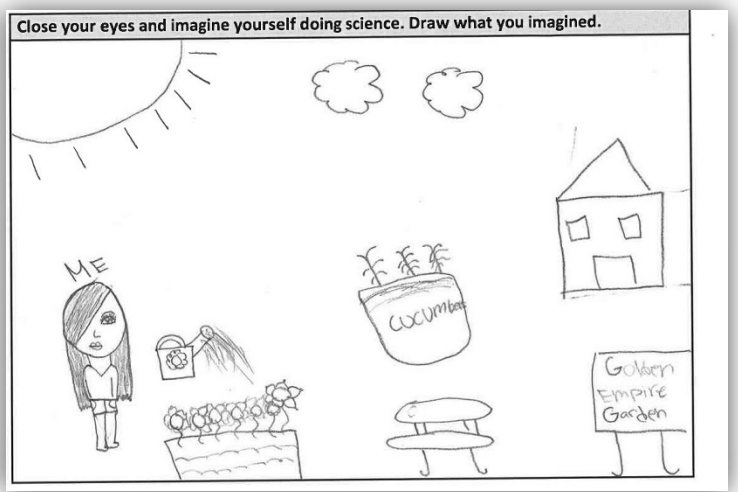


Perceptions of Scientists through Drawings

Youth drawings were used to assess pre and post perceptions of science. Drawings were scored on a validated rubric where higher scores represented more stereotypical imagines of scientists/science. In 2011, 2012, and 2013, youth were asked to "Draw a Scientist" while in 2014 the post-test prompt was changed to "Draw Yourself Doing Science." Paired t-tests revealed no statistically significant differences between the means of the pre-test to post-test in 2011-2013 but a difference in 2014 (n=58, p<0.001). Likely, in 2011-2013, the instruments were not sensitive enough to measure the contributions of the program to children's perception of scientists. But in 2014, when pre-test drawings of scientists were compared to post-test drawings of themselves doing science, many youth drew non-stereotypical images that included themselves gardening, exploring bubbles, and doing other program activities. Having youth draw **themselves doing science** better captured the individual and personal meanings ascribed towards science within their cultural and social experiences.

DRAW A SCIENTIST VS. DRAW YOURSELF DOING SCIENCE





Teenagers as Teachers and Role Models

Local adult and college students mentored teens who encouraged children to engage in scientific reasoning in a more friendly and culturally-relevant manner. Teens led science and gardening activities that honored the interests and abilities of the children while intentionally connecting them to community values. In this role, teens underwent tremendous growth. Between 2013 and 2014, thirty-three teenagers participated in semi-structured interviews. Emerging themes pointed towards teenagers improving their confidence by being placed in a central "teacher" role. For most teens, serving in the teacher role was new, unfamiliar, and had the consequence of improving the confidence and self-efficacy of teens who served in such a role. Teens reported a sense of pride and accomplishment; they relied on their peers, and had strong learning outcomes in planning and teaching. Overall, teens improved their competence and confidence to facilitate science and gardening curriculum with younger youth.

"I'm more comfortable with public speaking. It used to make me… public speaking still makes me nervous but I used to be extremely nervous about getting up in front of anybody to give a presentation or anything, and I'm more comfortable with that now, definitely." - Teen Leader in Sacramento

"When I used to be smaller, I wouldn't really participate in nothing, I was too shy. But now I've learned how to like talk to different people I don't know and teach them a lot of different things ." - Teen Leader in Winters

Sustainability—Science and Health through Garden-Based Learning

In 2013, the primary project staff convened for a full day meeting to develop a Common Program Model which emphasizes science and health education with racially and ethnically diverse K-6th grade students facilitated by teen and adult volunteers using the garden as a focal point. The program model reflects years of efforts, lessons learned, and a consensus vision for moving forward to reach new, vulnerable, and ethnically diverse communities in California. This model is currently being refined and will serve as a foundation for replication to other California communities.

[1] Scales were standardized using the Percent of Maximum Possible (POMP) technique (lowest possible score=0 and highest possible score=100).

Steven Worker, 4-H Science, Engineering, and Technology Coordinator

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