Summer Science Project

EVALUATION FINDINGS 2014

PARTNERSHIP FOR CHILDREN & YOUTH

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ACKNOWLEDGEMENTS

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SUPERHERO
IN TRAINING

ABOUT THE SUMMER SCIENCE PROJECT

The Summer Science Project supported the availability and quality of summer and science, technology, engineering, and mathematics (STEM) learning programs in Oakland, Concord and San Jose, California. The project was led by the Partnership for Children and Youth (PCY) and Techbridge, in collaboration with four project communities, which included Oakland, Mt. Diablo, Franklin-McKinley, and San Jose Unified School Districts.

Summer Science combined the resources and experiences of PCY's Summer Matters Campaign and Techbridge's informal STEM education curriculum to build the capacity of expanded learning staff to lead hands-on summer and science programming for 3rd-5th grade youth. Through this initiative, project communities received hands-on curriculum, professional development, and coaching around best practices to engage youth in summer and STEM.

Summer 2014 was the final year of the three-year project. As part of this final year, project leadership at both PCY and Techbridge focused some efforts on setting programs up for continued success. Project leadership supported programs to find, modify and create their own summer science curricula and prompted programs to take on more autonomy in setting their own program plans and monitoring their own programs.

Programmatic Elements

The Summer Science Project supported summer STEM programming through:

- **Training:** From fall 2013-spring 2014, PCY and Techbridge conducted a series of Summer Quality and STEM professional development opportunities. This series included four trainings (16 hours) of STEM specific training for program staff at Oakland, Mt. Diablo, Franklin-McKinley, and San Jose Unified School Districts. These trainings addressed teaching strategies that promote inquiry-based, hands-on STEM.
- **Coaching:** Each project community received up to 80 hours of district and/or site-based coaching in the months leading up to and following summer programming. Coaching focused on best practices to engage youth in high-quality summer and STEM programming and ranged from providing resources to co-facilitating summer training. In summer 2014, PCY and Techbridge continued to train onsite, certificated teachers to serve as STEM Coaches for participating program staff.

  Site-based coaching is an integral component in ensuring that line staff feel confident, prepared, and able to lead high-quality STEM programming in summer. STEM Coaches were onsite daily, in most cases, to provide instructional coaching to support both the preparation and delivery of STEM lessons. Coaching also included one or two formal observations of each staff member leading an informal STEM activity. All observations were accompanied by a debriefing

session between the instructional coach and the program line staff to review written feedback based on the STEM coaching rubric.

- **Quality Assessment:** Quality coaching in spring 2014 was followed by onsite quality assessment site visits using the Comprehensive Assessment of Summer Programs (CASP) Site Observation Tool and the Summer Learning Program Quality Assessment (SLPQA).

Partner Agencies

The Summer Science Project was a collaborative project of:

- **Partnership for Children and Youth (PCY):** In 1997, a group of concerned government, philanthropy and business leaders decided to do something about the persistent poverty and barriers to success faced by children and youth in Bay Area communities. The Partnership for Children and Youth was created to connect schools and their community partners in these underserved communities with available public and private resources, and to improve the effectiveness of funding streams and services for low-income children. PCY works around three key initiatives: Expanded Learning, Community Schools, and Policy and Advocacy. PCY ignites systems of collaboration, leadership and continuous learning among school districts, government agencies and community-based organization serving low-income children and youth by supporting community school, after school and summer partnerships through training, assessment, planning, policy and advocacy.
- **Techbridge:** Founded by Chabot Space & Science Center with support from the National Science Foundation, Techbridge was launched in 2000 to expand the academic and career options of girls and to help increase the representation of women and underrepresented youth in STEM. Building on 12 years of success, Techbridge spun off as an independent nonprofit organization in 2011. Techbridge has reached over 4,000 girls in the Bay Area through after school and summer programs for girls that offer innovative hands-on projects, role models and worksite visits, and academic and career guidance. Through partnering with school districts and community-based organizations, Techbridge has helped engage thousands more girls and boys in STEM.
- **Oakland Unified School District After School Programs Office:** The OUSD After School Programs Office oversees 76 state and federally funded elementary, middle and high school programs, supporting the implementation of quality academic and enrichment expanded learning time programs in close partnership with 15 community organizations to over 16,000 children and youth over the course of the school year.
- **Mt. Diablo CARES:** Mt. Diablo CARES administers elementary, middle and high school programs at 16 school sites with support from 23 community partners. The program is the result of an ongoing collaboration between the Mt.

Diablo Unified School District, City of Concord Parks & Recreation, and Bay Area Community Resources. CARES is supported by several funding sources including grants from state and city initiatives.

- **Franklin-McKinley School District/ Washington United Center:** Franklin-McKinley includes 19 schools that serve over 10,000 elementary and middle school students. In partnership with the CORAL (Communities Organizing Resources to Advance Learning) after school program of Catholic Charities of Santa Clara County, Franklin-McKinley offers literacy, resiliency, and enrichment activities with support from state and foundation initiatives and funding. CORAL also provides after school programming at Washington United Youth Center in San Jose, offering homework club, sports and cultural activities. Catholic Charities of Santa Clara County has been serving individuals and families for more than 50 years.

Participating Sites

In summer 2014, Summer Science programming was implemented at the following elementary schools:

Mt. Diablo Unified	Oakland Unified	Franklin-McKinley/ San Jose Unified
• Cambridge	• Allendale	• Robert F. Kennedy
• Delta View	• East Oakland Pride	• Washington United Youth Center
• El Monte	• Global Family	
• Fair Oaks		
• Ygnacio Valley		

Summer Science Project Goals

The Summer Science Project has six established goals. The project was effective in changing staff and youth attitudes, beliefs and knowledge and developed a top-notch system of technical assistance. Moreover, project leadership evolved how the project fit into California's developing summer and STEM initiatives and effectively showcased the high quality work done by participating programs.

TABLE 1: PROGRESS TOWARD PROJECT GOALS

Project Goals	Progress Toward Goal
Launch Summer Science sites in 3 communities serving at least 900 youth with 120 hours of programming.	◐*
Increase participating youths' interest and confidence in STEM learning.	●
Strengthen line staff's ability and confidence to teach science lessons in summer and after school.	●
Develop a replicable and sustainable system of technical assistance for summer STEM programs in other communities in California.	●
Define how this system integrates with California's developing STEM in OST initiatives.	●
Prepare Bay Area summer programs as showcases for high quality STEM education.	●

Key	
●	Complete
◐	Partial Completion
○	Not Yet Started

* See discussion below.

In many ways, the project met or exceeded the first goal: it went from 2 to 3 communities in Year 2 and sustained these three communities for Year 3. The project also served over 1,100 youth in Year 3, exceeding the target number of youth served. Moreover, the participating projects provided science programming every day for 4 weeks during the summer. The average hours of programming per youth, however, fell about 5% below the 120 hour goal. This gap reflects the strain on program budgets as providers attempt to deliver as many hours as possible, provide adequate STEM materials and invest in

professional development. On the positive side, average daily attendance per child reached 85%, which is higher than at most summer learning programs, reflecting high levels of engagement and dosage per child.

While the average hours of programming per youth fell slightly below the 120 hour goal, programs were able to provide a consistent, frequent summer science experience for a great many youth in the summer.

Lessons Learned

As the Summer Science Project concluded its third and final year, the Project compiled key lessons learned beyond the project goals. First, it required a significant investment to sustain a project of this nature. Participating programs needed to bring a certain level of readiness and structure; Project leadership needed to right-size the curricula front line staff used offering enough guidance but not too much; and the Project needed to provide significant time and resources in technical assistance, planning, assessment and training.

Second, it was important to partner the approach and content of *science* with a focus on *quality*. They are natural partners, and may even be necessary partners.

Third, participating programs reaped many additional, and some unexpected, benefits through their participation in the Project. These additional effects of the initial investment include stronger staff, improved program quality beyond the science activities themselves, and improved connections to the school day. These benefits are notable in large part because theses are the very areas in which programs often struggle.

See 'Lessons Learned' starting on page 26 for the full discussion of these findings.

See Appendix A for information on the data sources for this report.

FINDINGS: EVIDENCE OF PROGRESS TOWARD PROJECT GOALS

Launch Summer Science sites in 3 communities serving at least 900 youth with 120 hours of programming.

In summer 2014, Summer Science served 1,173 youth at 10 sites in the Oakland Unified and Mount Diablo Unified Districts, and in the South Bay (Franklin-McKinley District and the Washington United Center serving students from San Jose Unified School District) with an average of 115 hours of programming.

In Oakland Unified:

- Programming ran from June 23 – July 18, 2014 from 8:30AM-4:00PM daily, with the exception of field trips for a total of 143 hours.
- A total of 358 youth were served.
- Nearly nine in ten (87%) of all participants attended daily. Participants participated in 125 hours of the summer learning program, on average. These hours included, but were not limited to, science activities.

TABLE 2. ATTENDANCE BY SITE: OAKLAND UNIFIED SCHOOL DISTRICT

Site Name	Total Served	Average Daily Attendance (youth per day)	Average Hours Attended (hours per youth)
Allendale	127	107	120
East Oakland Pride	125	109	124
Global Family	106	98	132

Source: Cityspan attendance system data and additional supplied by the sites, September 2014.

In Mt. Diablo Unified:

- Programming ran from June 23 – July 18, 2014 from 8:00AM-2:00PM daily, with the exception of field trips for a total of 114 hours.
- A total of 583 youth were served.
- Eight in ten (80%) of all participants attended daily. Participants participated in 91 hours of the summer learning program, on average. These hours included, but were not limited to, science activities.

TABLE 3. ATTENDANCE BY SITE: MT. DIABLO SCHOOL DISTRICT

Site Name	Total Served	Average Daily Attendance (youth per day)	Average Hours Attended (hours per youth)
Cambridge	124	111	102
Delta View	123	97	89
El Monte	109	81	84
Fair Oaks	103	82	90
Ygnacio Valley	124	97	89

Source: Afterschoolattendance.net data and additional supplied by the sites, September 2014.

In CORAL's Franklin-McKinley/Washington United Center sites:

- Programming ran from June 23 – July 18, 2014 from 8:30AM-4:00PM daily, with the exception of field trips for a total of 143 hours.
- A total of 232 youth were served.
- Nine in ten (92%) of all participants attended daily. Participants participated in 129 hours of the summer learning program, on average. These hours included, but were not limited to, science activities.

TABLE 4. ATTENDANCE BY SITE: FRANKLIN-MCKINLEY SCHOOL DISTRICT AND WASHINGTON UNITED CENTER

Site Name	Total Served	Average Daily Attendance (youth per day)	Average Hours Attended (hours per youth)
Robert F. Kennedy	160	150	134
Washington United Youth Center	72	64	127

Source: Cityspan attendance system data and additional supplied by the sites, September 2014.

Increase participating youths' interest and confidence in STEM learning.

Youth post-test surveys measured the extent to which participants report ***interest and engagement with science*** as a result of the summer science program. The great majority of youth reported that the program positively influenced their attitudes toward STEM learning with 91% reporting that the summer science program made science more fun and 89% indicating science was more interesting. The program also impacted students' interest in future science learning with 83% reporting that the program made them want to learn more about science and 82% indicating that they are more excited to learn about science in school.

Notably, a larger percentage of youth reported that the program made them more excited to do science activities in 2014 compared to 2013.

TABLE 5: YOUTH INTEREST & ENGAGEMENT WITH STEM

Youth Survey Question	% Yes	
	2013	2014
The summer science program made science more fun.	91%	91%
The summer science program made science more interesting.	88%	89%
The summer science program made me more excited to do science activities.	81%	86%
I enjoy learning science in school.	84%	84%
The summer science program made me want to play more with science toys.	82%	84%
The summer science program made me want to learn more about science.	83%	83%
The summer science program made me more excited to learn about science in school.	80%	82%

Source: Youth Surveys, summer 2013 (n=524) and summer 2014 (n=728); % Yes represents the proportion of youth who answered "Yes" to this question.

Students ***gained knowledge and skills that they found relevant to their lives***. Nearly all youth (93%) reported that the summer science program taught them new things, 80% indicated that the activities taught them things that mattered to them and 77% even shared what they learned with their families.

On the other hand, summer participants were less likely to report that they did science activities when they weren't in their summer program, with a little over half (52%) of youth reported doing so.

Compared to 2013, youth were less likely to report that the science activities taught them things that mattered to them or that they shared with their families. Conversely, youth were more likely to report that they do science activities outside the summer science program compared to 2013.

TABLE 6: YOUTHS' KNOWLEDGE AND SKILLS IN STEM TOPICS

Youth Survey Question	% Yes	
	2013	2014
The summer science program taught me new things.	93%	93%
The summer science activities taught me things that matter to me.	86%	80%
The summer science program taught me things that I shared with my family.	82%	77%
I do science activities when I am not in my summer science program.	48%	52%

Source: Youth Surveys, summer 2013 (n=524) and summer 2014 (n=728); % Yes represents the proportion of youth who answered "Yes" to this question.

The above findings regarding increased interest, knowledge and skills are even more significant given that some of these youth struggled with science as indicated by reported levels of ***confidence*** in their ability to engage in STEM learning. Students are able to maintain interest in a subject for which they acknowledge they must work hard and persevere to succeed. Over 8 in 10 (82%) reported that science makes them think. Just under three-quarters (72%) of youth felt they were good at science and 67% said that science is easy. These responses are roughly the same as in the prior summer.

TABLE 7: YOUTHS' CONFIDENCE IN STEM ABILITIES

Youth Survey Question	% Yes	
	2013	2014
Science makes me think.	84%	82%
I am good at science.	73%	72%
Science is easy.	63%	67%

Source: Youth Surveys, summer 2013 (n=524) and summer 2014 (n=728); % Yes represents the proportion of youth who answered "Yes" to this question.

Familiarizing youth with ***STEM careers*** was an additional objective of the curriculum. However, fewer youth in 2014 (69% compared to 81% in 2013) knew what scientists do. This may reflect the transition from a curriculum created solely by Techbridge and a curriculum created by the sites themselves. However, a greater proportion (57% compared to 51% in 2013) reported that they want a job in a science field when they are older.

TABLE 8: YOUTHS' INTEREST IN STEM CAREERS

Youth Survey Question	% Yes	
	2013	2014
I know what scientists do.	81%	69%
The summer science program made me want a science job when I am older.	51%	57%

Source: Youth Surveys, summer 2013 (n=524) and summer 2014 (n=728); % Yes represents the proportion of youth who answered "Yes" to this question.

Youth gave the program high marks for ***quality***. Nearly all (94%) reported that the summer science program had fun science activities, a big leap from 85% in 2013. Moreover, 95% indicated that the program had nice instructors, up slightly from 2013.

TABLE 9: YOUTHS' PERCEPTION OF PROGRAM QUALITY

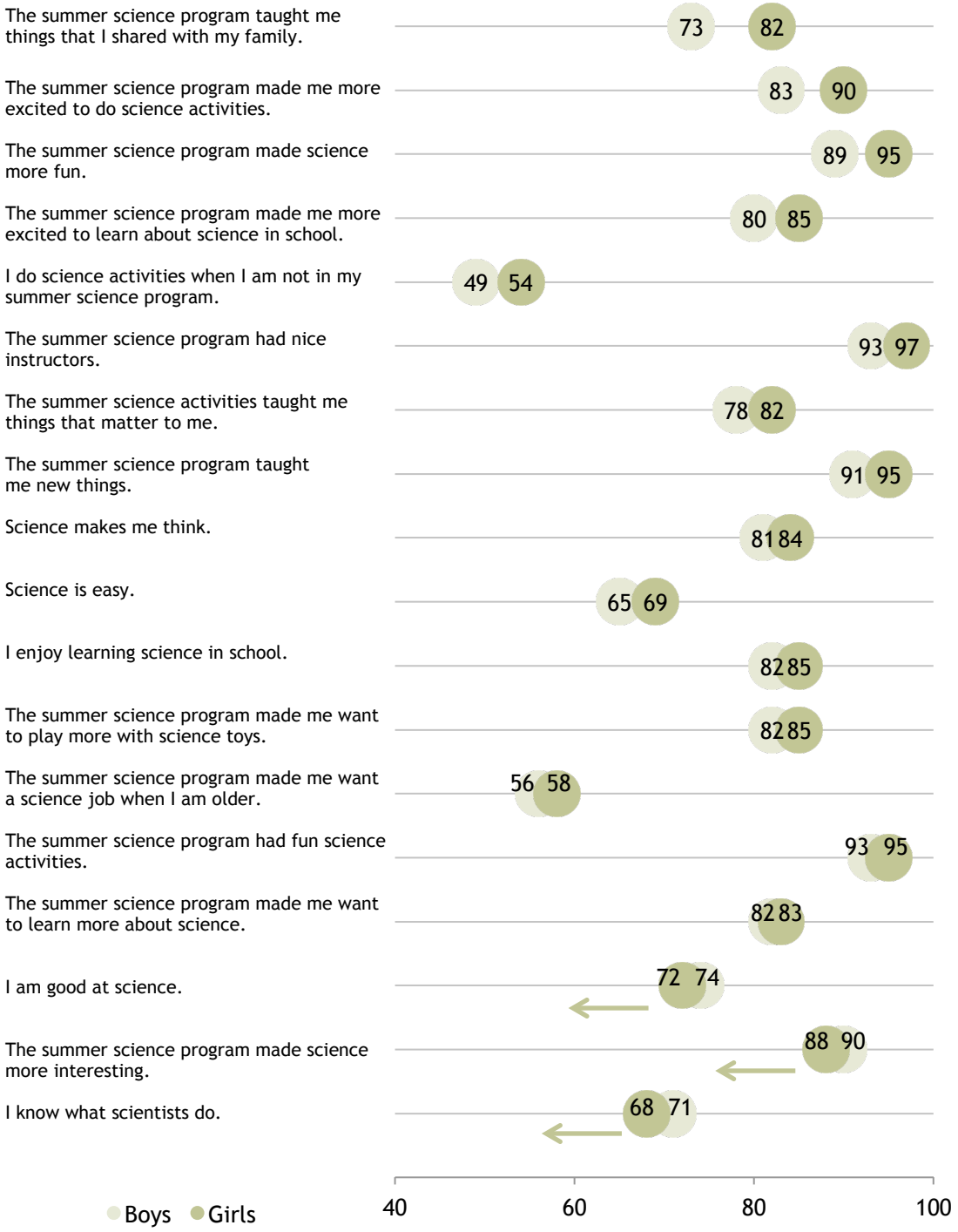
Youth Survey Question	% Yes	
	2013	2014
The summer science program had nice instructors.	91%	95%
The summer science program had fun science activities.	85%	94%

Source: Youth Surveys, summer 2013 (n=524) and summer 2014 (n=728); % Yes represents the proportion of youth who answered "Yes" to this question.

Of particular interest is the ***impact of the summer science program for girls***. Youth survey results revealed that for many items girls scored as high or higher than boys. While 73% of boys reported that the summer program taught them something that shared with their family, 82% of girls reported this. Similarly, while 83% of boys reported that the summer science program made them more excited to do science activities, 90% of girls reported this.

Girls were less likely than boys to report that they know what scientists do, that they are good at science or that the summer program made science more interesting. However, in each case, the differences were slight and were not statistically different (Figure 1).

FIGURE 1: YOUTH ATTITUDES TOWARD SCIENCE LEARNING BY GENDER

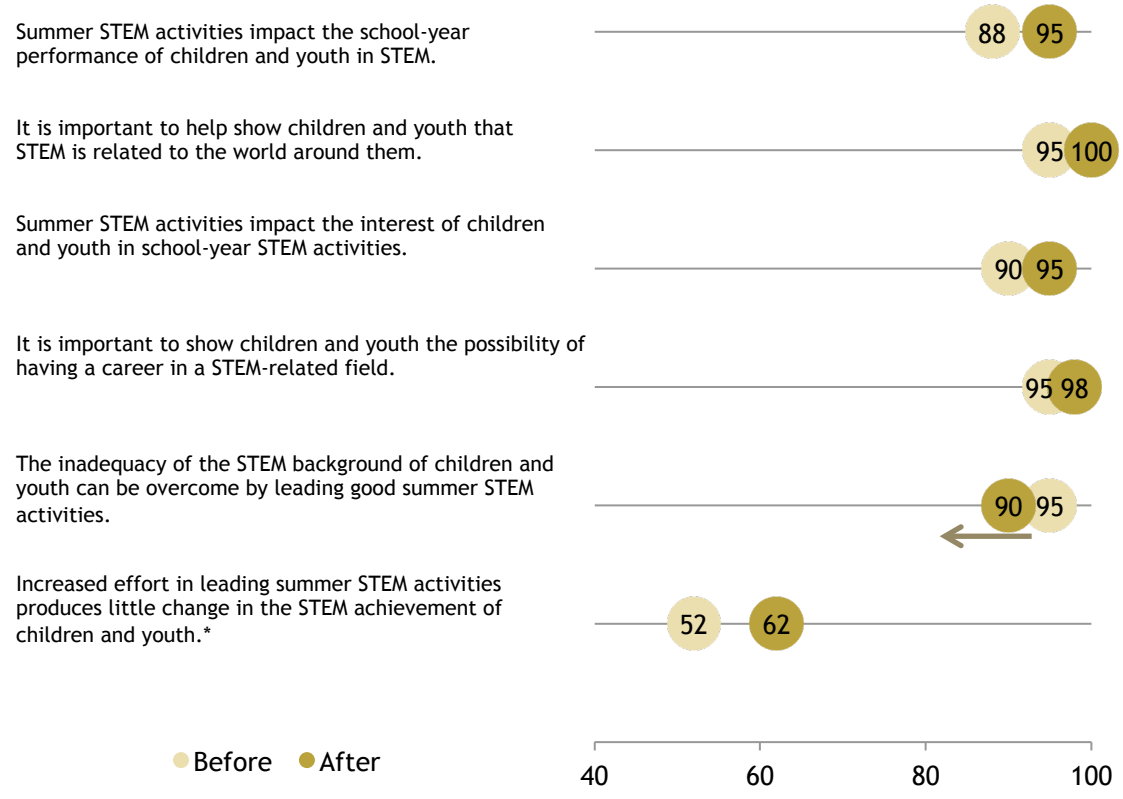


Source: Youth Surveys, summer 2014 (Boys, n=382; Girls, n=325); % Agree represents the proportion of youth who answered "Yes" to this question.

Strengthen line staff's ability and confidence to teach science lessons in summer and after school.

Summer staff began and ended the summer program with a strong **belief in the benefit and importance of Summer STEM learning**. For example, at both the pre and post survey over 90% of staff felt that summer STEM activities impact the interest of children and youth in school-year STEM activities. Over 95% at both pre and post survey thought it was important to show children and youth that STEM is related to the world around them. However, 62% of staff reported that increased effort in leading summer STEM produced *little* change in the STEM achievement of youth, the opposite of what the project hoped to achieve. It is possible that staff did not read this question carefully enough when completing the survey.

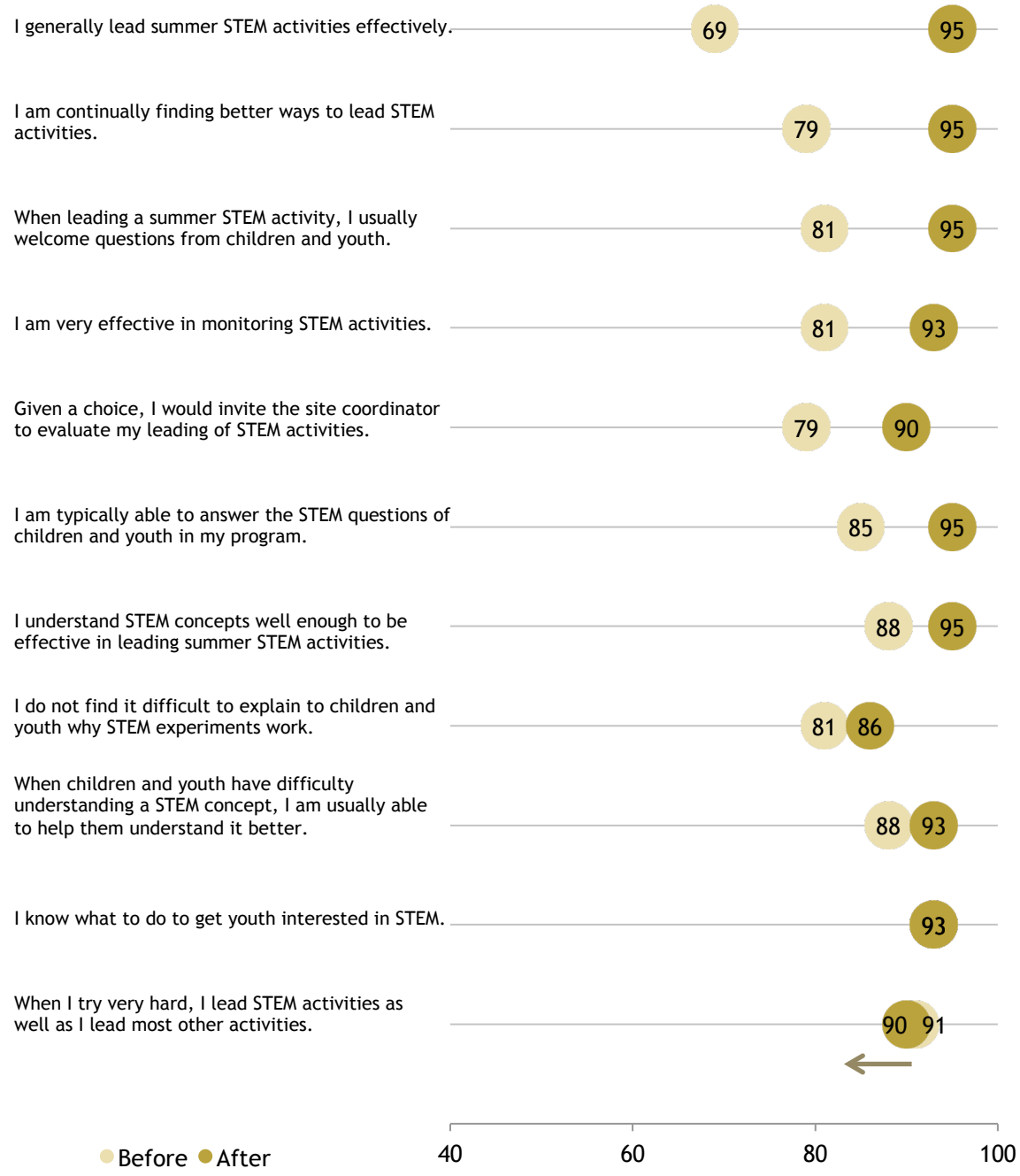
FIGURE 2: STAFF BELIEF IN THE BENEFIT/IMPORTANCE OF SUMMER STEM



Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question. *This item is negatively stated so the desired outcome is for agreement with this item to decrease, which it did not.

Staff participated in four half-day trainings before summer session. During the summer program, sites also had access to instructional coaches. **Staff members' confidence in their ability to lead STEM activities increased, and in some cases quite dramatically**. For example, staff who reported that they could effectively lead summer STEM activities increased from 69% to 95%.

FIGURE 3: STAFF SENSE OF SELF-EFFICACY LEADING STEM ACTIVITIES

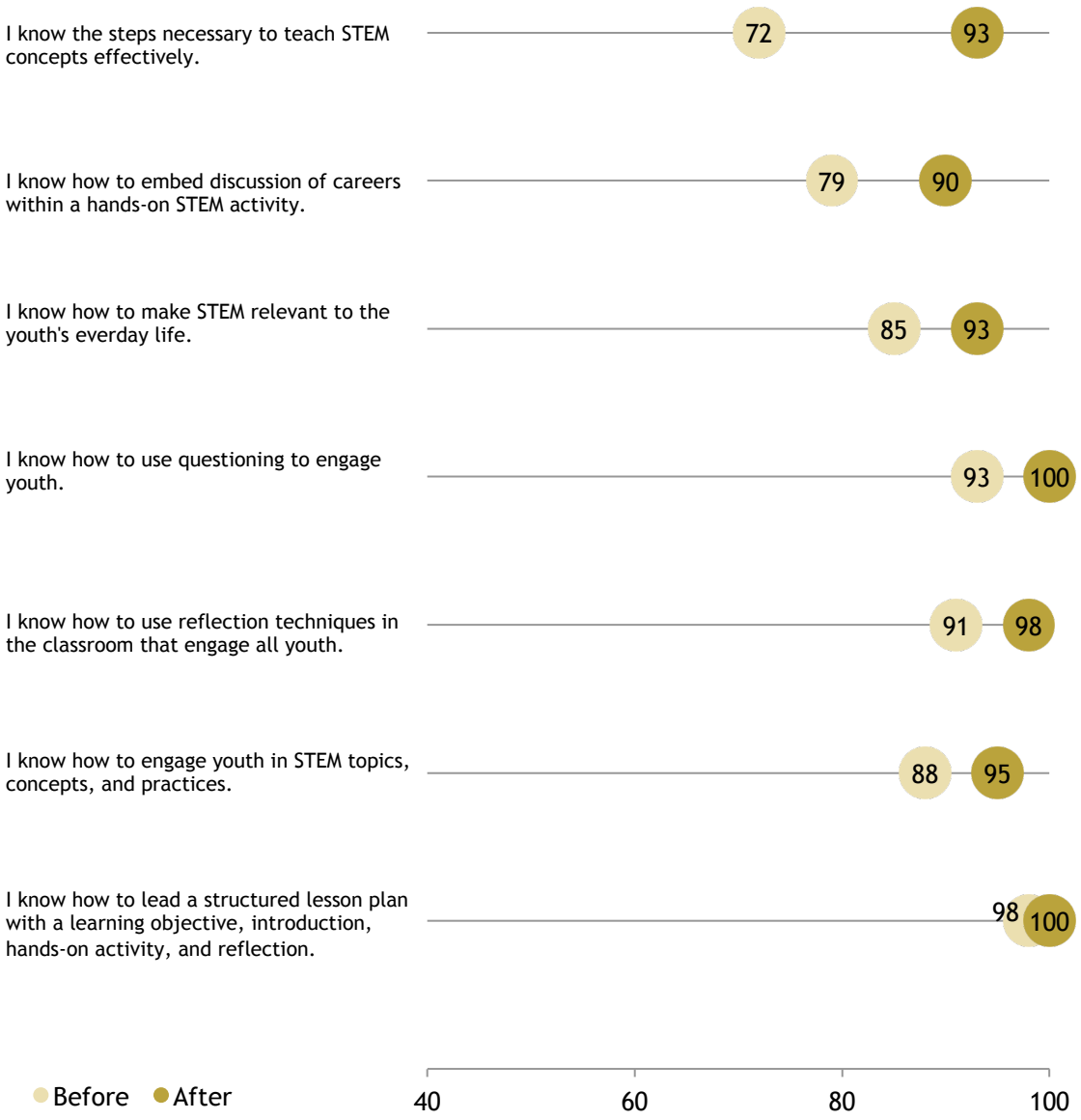


Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Staff reported an increase in the **use of specific STEM teaching skills** including reflection techniques, making STEM relevant to youth's everyday life and embedding discussion of careers within an activity. While only 72% of staff reported that they knew the steps necessary to teach STEM concepts effectively before the summer session, 93% did so at the end of the summer. Similarly, while only 79% knew how to embed discussion of careers within an activity prior to summer, 90% did so by the end of the summer.

Moreover, the successful application of these techniques was reflected in the positive youth survey results discussed in the previous section.

FIGURE 4: STAFF USE OF STEM TEACHING SKILLS

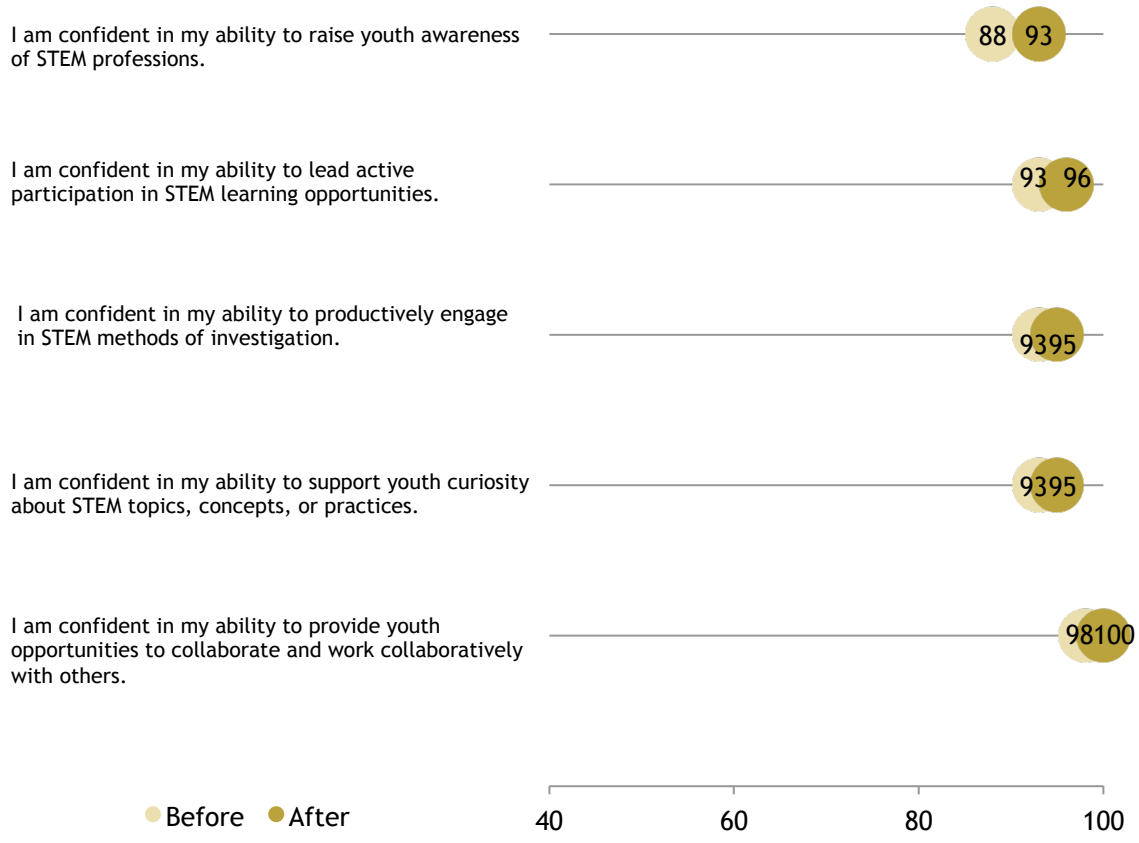


Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Though their knowledge was high at the beginning of the program staff experienced increased **confidence leading topic specific activities**. Over 9 in 10 (93%) staff reported feeling confident in their ability to raise awareness of STEM professions. Similarly, over 9 in 10 (95%) reported that they feel confident in leading youth through the methods of investigation, in supporting active participation and in supporting youth curiosity. Moreover, 100% of staff felt confident in their ability to provide opportunities for youth to collaborate.

Notably, all staff rated themselves very high at the start of the summer. The large proportion of staff returning to the summer STEM programs for a third year, along with the substantial amount of pre-summer training, likely positively influenced the "Before Summer" ratings.

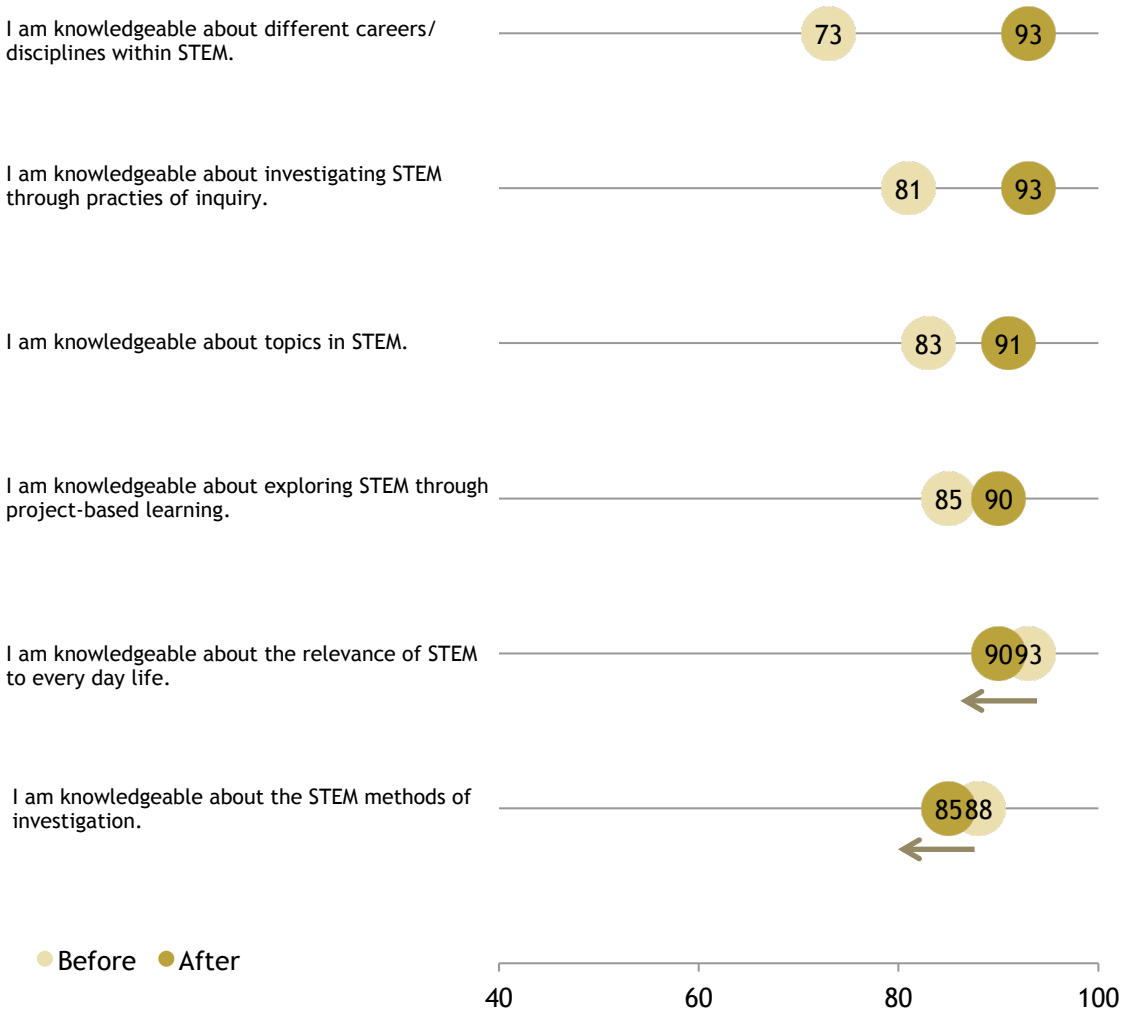
FIGURE 5: STAFF CONFIDENCE FACILITATING STEM ACTIVITIES



Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Staff reported that their knowledge regarding **specific STEM careers** improved over the summer. Staff knowledge about different STEM careers increased from 73% to 93%. There was a slight decrease in the proportion of staff who felt knowledgeable about the STEM methods of investigation. This is slight, and may reflect the fact that the more staff know about STEM methods, the more they understand the breadth of what they don't yet know.

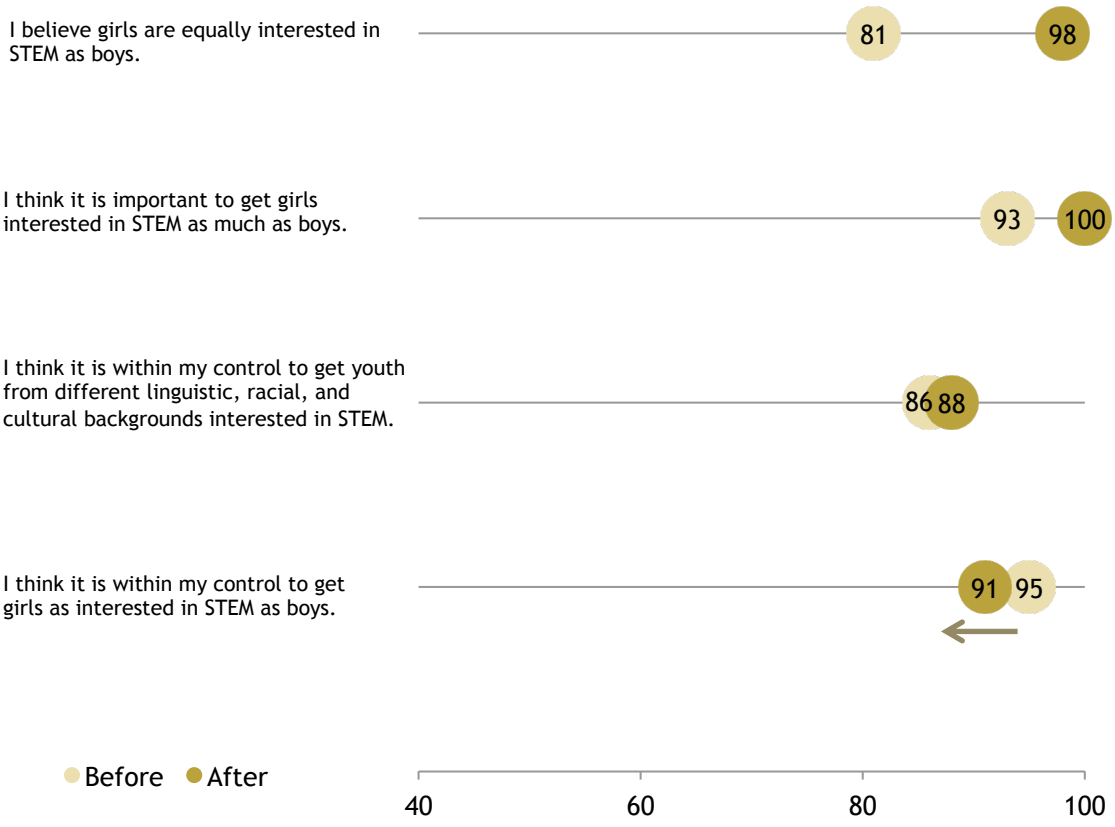
FIGURE 6: STAFF KNOWLEDGE OF STEM CURRICULUM TOPICS



Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

One of the more intriguing findings was the change in staff perceptions regarding **girls' interest in STEM activities** as compared to boys. Before the summer began, 81% agreed that girls are equally interest in STEM as boys and by the end of the summer agreement with that statement increased to 98%. Youth survey results back up the observations of staff with girls indicating equal or greater interest than boys in STEM (see Appendix B).

FIGURE 7: STAFF OPINION REGARDING DIVERSITY AND GENDER EQUALITY IN STEM LEARNING



Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Overall, staff members were extremely satisfied with the **quality of STEM summer program training** and its impact on their teaching skills. They reported that the activities and strategies they learned had a positive impact on the youth participants. Moreover, these ratings of their experience of the training and of their teaching skills improved or stayed steady compared to staff rating in summer 2013. With many staff returning in Year 3, this may indicate that the training continued to build confidence and skills even among returning staff.

TABLE 10: IMPACT OF STEM TRAINING ON TEACHING SKILLS

Staff Survey Question	% Agree	
	2013	2014
I implemented activities that increased youths' confidence in STEM.	88%	93%
I feel more confident leading STEM activities in the summer.	88%	93%
I implemented activities that increased youths' interest in STEM.	91%	91%
I learned strategies to increase youths' interest in STEM.	84%	88%
I feel more confident leading STEM activities in afterschool.	81%	88%
I learned strategies to increase youths' confidence in STEM.	84%	81%

Source: Staff Post-Summer surveys September 2013 (n=33) and July 2014 (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Staff reported that the training topics were relevant, facilitators were knowledgeable and responded to questions and the sessions were well organized.

TABLE 11: QUALITY OF STEM TRAINING

Staff Survey Question	% Agree	
	2013	2014
Facilitators were knowledgeable of the topics presented during sessions.	94%	91%
Facilitators were responsive to questions asked/follow ups needed.	88%	91%
Facilitators presented relevant topics applicable to my summer program.	91%	88%
Facilitators presented relevant topics applicable to my afterschool program.	79%	86%
The Summer STEM Project Trainings were well organized.	94%	86%
I am satisfied with the Summer STEM Project Trainings.	88%	86%

Source: Staff Post-Summer surveys September 2013 (n=33) and July 2014 (n=43); % Agree represents the proportion of staff who answered "Agree" or "Strongly Agree" to this question.

Develop a replicable and sustainable system of technical assistance for summer STEM programs in other communities in California.

In Year 3 of the Summer Science Project, PCY and Techbridge continued to align the goals of the Summer Matters Campaign and to the STEM components when providing technical assistance (TA) to partner communities. Advance planning and coordination of TA continued to support smooth project logistics and strong implementation by all partner agencies.

The Project maintained the following improvements from prior project years:

- Implementation of a year-round comprehensive project calendar.
- Establishment of summer program quality teams at the district, site, and organizational level to include 2-4 key stakeholders involved in the planning, implementation, and assessment of the Summer Science Project. Team members may have included a Site Administrator, After School Staff, Program Partner, Academic Liaison, and/or department head.
- Early launch of summer planning and project kick-off meetings, which took place in October 2013 in all communities.
- Clearly defined roles and training requirements for line staff, coordinators, and STEM Coaches including role descriptions and key responsibilities.
- During line staff trainings for participants, over 60% of the time was used to practice and receive feedback from their peers and trainers on their ability to lead STEM activities.
- Transferring coaching duties fully to communities with onsite teachers providing all site-based instructional coaching.
- Continuing guidance to communities around creating a management system for all STEM activity supplies.

From Year 2 to Year 3, the Project made a key change to the curricula used by Project sites. Each site was encouraged to develop their own curriculum, drawing on what they had used and learned in prior years of the Project, on curricula available online, and on their own knowledge, experience and ideas.

- Program staff used “Fetch,” an online curriculum available through PBS.org. Program staff had felt that the curriculum used in Years 1 and 2 was sometimes too complicated for both staff and youth. “Fetch” was offered as a high quality option that would include less complicated science concepts.
- Techbridge staff facilitated the programs through the development of their curricula. As part of the pre-summer staff training, Techbridge staff drew on common activities submitted by multiple sites to train all sites’ staff to effectively facilitate science activities.

Similarly, from Year 2 to Year 3, the Project made a key change in how TA was provided to sites. Project leadership required more of programs in terms of planning and support to staff, with the Director of Technical Assistance at PCY serving as a mentor rather than a direct facilitator of planning and implementation.

Define how this system integrates with California's developing STEM in OST initiatives.

PCY continued its efforts to partner and advance systems to support summer and STEM programming in expanded learning time in many ways over the past year. In the spring, PCY staff participated in a science forum during the Best of Out-Of-School Time (BOOST) conference. This forum aimed to disseminate research findings about the state of science education in California's state-funded after school programs and to develop recommendations for the future of after school STEM. Additionally PCY was involved in the planning of the annual California STEM Symposium in San Diego in fall 2014, helping to develop an expanded learning strand. PCY staff also facilitated a workshop with representatives from the Summer Science Project communities. In this workshop, participants learned from the Summer Science Project and discovered a sustainable approach to assess, plan, and implement high-quality STEM in their expanded learning programs.

Prepare Bay Area summer programs as showcases for high quality STEM education.

The Summer Science communities were highlighted this summer through media, reports, and site visits from funding partners and an array of other stakeholders interested in summer learning and STEM Education (e.g., representatives from the S.D. Bechtel Jr. Foundation, the Noyce Foundation, Expanded Learning Monterey County Office of Education, The Tech Museum of Innovation (San Jose), San Jose State University, and Mt. Diablo Unified School District).

LESSONS LEARNED

As the Summer Science Project concluded its third and final year, the Project compiled key lessons learned. First, we outline what it takes to implement high quality science learning in summer: what networks may need to be ready, how to right-size science curricula, and what tools and structures support success.

Second, we describe the importance of partnering the approach and content of *science* with a focus on *quality*. They are natural partners, and may even be necessary partners.

Third, we summarize some of the additional – and sometimes unexpected – benefits that emerged for the participating networks as a result of the investment in summer science and quality. These additional effects of the initial investment include stronger staff practices, improved program quality beyond the science activities themselves, and improved programmatic connections to the school day. These benefits are notable in large part because these are the very areas in which programs often struggle.

What it takes to implement high quality science learning in the summer

Based on the success of the Summer Science Project, it takes at least the following to implement high quality science learning in summer:

- A level of readiness and interest among participating programs;
- Right-sized curricula;
- A significant investment in TA and coaching;
- Steady funding; and
- School and community partnerships at several levels.

Readiness: The Project fit into existing structures and initiatives that already demonstrated an interest in science and quality.

While the Summer Science Project was a new initiative, it did not occur in a vacuum. Rather, it fit into the larger picture of the statewide Summer Matters campaign, an existing partnership between one of the networks and Techbridge, and existing program quality initiatives. In other words, the ground was already fertile for implementation of this project.

- Partnership for Children and Youth (PCY) was already driving the statewide Summer Matters campaign, a campaign to a) raise awareness of the significance of summer learning loss and b) promote summer learning that provided academic enrichment in a youth development context as alternatives or additions to traditional summer school. Through this campaign, PCY already had a focus on summer and had experience coordinating organizations to run high quality summer programs. PCY knew what it would take to implement an initiative in summer.
- In addition, one of the networks – Oakland Unified School District (OUSD) – was chosen to participate because the District was already looking for a way to transform summer school into summer learning programs. Moreover, OUSD programs also were deeply familiar with program quality assessment and continuous quality improvement.
- The other District chosen the first year, Mt. Diablo Unified School District (MDUSD), had a proven capacity to implement summer programming and new projects more generally.
- Techbridge already had experience working with expanded learning staff through its work in Oakland and elsewhere. Moreover, it had curricula from its own programs from which Techbridge staff could develop a 4-week summer science curriculum.

Right-sized Curriculum: The Project found an approach that balanced prescriptive instruction and training in inquiry-based instruction.

Techbridge staff found it particularly challenging to right-size the instructions for summer program staff with no special training in science. On the one hand, the curriculum needed to include clear guidance about how it would be facilitated for staff who wouldn't feel comfortable improvising from their own knowledge. On the other hand, good science education is open-ended: participants are able to follow up on new ideas and pose new questions over the course of the activity. As one Techbridge staff said, "It was hard for me to understand how to give guidance to the facilitator in a way that is just enough guidance for them, but also still makes it open-ended. [We needed] to put some constraints [on the lesson plans] and I think I didn't know how to write that balance."

Starting in Year 2, the Project required sites to have instructional coaches. Mt. Diablo had instructional coaches in Year 1, which was so successful that this element became

mandatory for all three communities. The instructional coaches, certificated teachers although not necessarily science teachers, visited program classrooms and provided feedback to summer staff on their classroom practices. This support was essential to helping staff find the balance between the prescriptive lesson and a more open-ended, inquiry-driven approach.

By the end of the three years, program staff were able to develop their own curriculum for their site, building from their experience of the previous two years and from resources provided by Techbridge. Techbridge staff would have preferred that the programs get more involved in curriculum planning and design starting in Year 2. Ideally, the Project would have been able to plan an "I do, we do, you do," model of increasing autonomy on the part of the networks. "Had we known what Year 3 was going to look like, Year 2 would have looked very different. We didn't do more to build their capacity and to make them more independent of us."

However, some of the impetus for keeping the curriculum the same from Year 1 to Year 2 came from PCY and Project leadership. As PCY staff stated, "We felt that people needed to get more mastery with the experience to feel success with it. I think [some folks] needed Year 2 to realize, 'I can be a STEM facilitator' and that distinction may not have been made if [we had] changed the curriculum."

Technical Assistance Support: The Project included a significant investment in technical assistance for planning, instructional coaching, quality assessment and continuous learning.

The Project included a significant investment in high quality, tailored technical assistance from a key PCY staff. This staff person, the Director of Technical Assistance (Director of TA), provided support from the initial planning on the part of the networks, through staff training in the spring, through summer program implementation, and finally through the fall through Project debriefs and analysis of community reports. One program stated, "I want to make sure we really emphasize how important the TA support was for the planning. To have someone outside of your team hold that space for you, to keep you on task, to remind you of your goals, to keep you on your due dates, I think [the importance of that] can't be overstated."

Some key elements to the Director of TA's support for programs included:

- Making the instructional coaches a mandatory part of Summer Science;
- Holding monthly planning and coaching meetings year round;
- Conducting summer debriefs each fall to consolidate lessons learn and inform planning for the following summer;
- Creating a planning calendar – and holding sites accountable to meeting the planning deadlines.

Moreover, the TA allowed for a tailored approach for each site or District. As one program staff said, "All of the coaching, all of the TA was customized to our site, it was not just one script. Every site has its unique thing."

Steady Funding: Committed funding for at least three years would have allowed the Project to confidently plan ahead.

The Project itself did not have three years of committed funding from the start, which contributed to on-going challenges. While the Project was able to build on prior years, it was not able to plan more than one summer at any given time.

Having committed, multiple year funding may have allowed Project staff to plan a more smooth transition of the curriculum from one year to the next. If the funding had been secure, it is possible that programs would have begun to have more ownership over their lesson plans starting in Year 2. Certainly Techbridge staff feel they would have done so in retrospect.

Moreover, the funding amounts shifted from year to year and programs had little time to adjust their budgets to account for this change. As one staff at PCY stated, "From a project management view, it would be much better to have had a 3-5 year commitment from the funders before we started the project. That was extremely challenging and I think it slowed the project." The Director of TA added, "It shifted the model, or fast-forwarded the model sometimes because of how much funding or not knowing [how much]."

Notably, the actual investment in Summer Science was not small. Total investment from the Bechtel and Noyce Foundations ran to $350,000 annually, not including match funds provided by the programs themselves nor general operating funds contributed by Techbridge to sustain the last year of the Project.

Partnerships: The Project succeeded because of its diverse partnerships. The diverse partnerships were also a measure of the Project's success.

In order to provide high quality science in summer learning programs, the Project pulled together science experts, technical assistance experts, schools and school districts, as well as the community-based organizations running the programs themselves. Together, they brought a mix of science content, youth development, instructional coaching, a focus on quality and continuous improvement, and on-going accountability and support. These diverse actors were each necessary to the success of the Project.

By Year 2, Techbridge and PCY had more clearly defined their respective roles. Techbridge, an expert in science content in expanded learning time, focused on the curriculum, trained staff in science practices and supported the instructional coaches.

Meanwhile, PCY staff, experts in program quality, summer programming and continuous quality improvement, refined their role. They provided TA and training on youth development and classroom management, supported the instructional coaches, facilitated gatherings of the programs' leadership and hosted end-of-summer reflections with participating sites. These reflections generated lessons learned that immediately influenced planning for the following year.

The partner school districts and their community-based organization partners provided experienced youth workers and program managers and the districts provided instructional coaches. Notably, the opportunity to work with instructional coaches strengthened the relationships between the expanded learning time programs and their school day partners (see below).

Part of the success of the project was the addition of new partnerships in Year 2. Building on the success of Year 1, the Project added a third Network in the South Bay. This partnership leveraged existing expertise in the South Bay: a well-known community-based provider, a designated STEM school and an additional TA provider who was already an expert in the expanded learning time STEM field.

Program *quality* and the approach and content of *science* were natural – and perhaps even necessary – partners.

The Summer Science Project was, in reality, a two-fold initiative. In addition to providing science in summer learning programs, the Project stressed point-of-service program quality assessment and continuous quality improvement. Project sites assessed program quality using a pilot observation tool combining the Program Quality Assessment tools from the Weikart Center and the Comprehensive Assessment of Summer Programs (CASP) developed by the National Summer Learning Association. Moreover, much of the TA from PCY was focused on program quality as measured by this tool. This simultaneous approach may have been a lot for programs to take on all at once. In the end, the combination paid off.

Through this Project, PCY found that science and quality assessment complement each other well. Science activities demand high quality point-of-service program practices such as a guiding question or goal, youth-led planning, collaboration, inquiry, active, hands on learning, concrete products or performances, and closing reflections. As one staff at PCY stated, "I think STEM was a good vehicle for showing what project-based learning and active and engaged learning can be. The other Summer Matters communities didn't have that solid hook [of science] so when we talked about doing active and engaged learning, it took some of them longer." Another PCY staff put it succinctly: "STEM made [summer] come to life."

The Project had to overcome the initial resistance to a concurrent focus on program quality. Staff were apprehensive about being observed and receiving feedback. Yet, after the first summer, many staff felt exactly the opposite. PCY staff suspect this may be a natural and necessary process. "Every single first year, [programs] are resistant to the process of being observed. So, they were resistant to the initial planning, resistant to the observation process, and then to receiving the data. And almost across the board, the moment the data was received and discussed, they flipped the switch, 'Oh, I get this, this is going to be really, really helpful.'"

Conversely, science activities quickly expose weaknesses in program practices, making a simultaneous focus on point-of-service quality necessary. Compared to standard activities, science activities can include extensive materials, complex projects, and carefully sequenced or scaffolded segments. Given the complexity of these activities, they can quickly expose weak spots in classroom management and program practices. As one PCY staff stated, "I assumed there was a lot of foundational youth development practices [such as leading reflections] already in place. [Those skills] fall apart when you are doing STEM. You will see [weak spots] faster, because you have to have a debrief, you have to have learning goals. You will sink if you don't have certain things, so that was a big 'ah ha!' [moment]."

Beyond Science in Summer: The Summer Science Project improved staff retention and engagement, strengthened program quality globally and engaged school day staff.

The investment in summer science programming linked with a focus on quality had positive effects beyond the goal of the initial investment. These effects include stronger staff retention and engagement, improved program quality in the rest of the summer program and in the school year, and improved connections to the school day. These benefits are notable in large part because these are the very areas in which programs often struggle.

Staff Retention, Staff Confidence: The Project positively affected staff above and beyond being trained in science instruction.

Staff retention and staff development are on-going challenges for expanded learning time programs where staff turnover rates run close to 50% annually. Although efforts have been made to professionalize the field and provide pathways for on-going staff development, youth work lags far behind teaching, social work and other professions. While not specifically designed to do so, the Summer Science Project positively impacted staff retention, confidence and engagement.

First, staff stayed. Multiple stakeholders noted that staff returned to the project year over year. During the post-summer debrief, all program staff strongly agreed that the Project enabled them to retain staff. They characterized this retention as a mutually reinforcing relationship between two different factors. Staff were more likely to stay with the expanded learning time program if they also had a job during the summer, rather than being without work between school years. Yet more importantly, program leaders shared that the quality of the Summer Science Project experience – the training, coaching and experience of providing high quality activities – kept staff coming back. As one member of the focus group said “I feel like the job is going to get their foot in the door, the quality is going to keep them.”

Second, staff gained confidence and skills. Program leaders wrote that “having support and training opportunities” and “professional development training, career path for staff” were key outcomes of the Project. One staff wrote that as a result of the Project, she now understands quality to mean “staff taking ownership within the program and being self motivated. Also, staff growing in current position and being promoted within the team. Also, staff excelling in school year positions because of what they learned from their summer experience.”

Another program staff shared that, “I was particularly proud of my staff this year. All of the staff at point in time or another had gone through the Techbridge training. They had gained a great deal of confidence in presenting lessons, so not only were they presenting science in a fabulous way, not only were they able to present science in a positive, fun, and engaging way, they were able to present their art, they were able to present

enrichment, garden, in an intentional manner." Techbridge staff agreed. "It was a great project. All of the folks left feeling really good about their experience and really empowered. I think we saw a lot of great staff development."

Third, for one program, the Project showed them the importance of increasing preparation time (prep time) for their staff. In order to implement high quality programs, staff require additional planning and prep time than most expanded learning programs can easily budget. As a lesson learned from the summer debrief after Year 2, one program adjusted their administrative practices to provide staff with additional planning time. As a staff member from PCY stated, the lack of prep time is a problem that "spans after school and summer, but when you're with kids a lot longer [in summer], it'll show up faster if you didn't prep, or if somebody else did it for you and you have no idea what they put in the packet."

When staff feel part of an effective team, they may be more likely to stay with an organization. Evidence from multiple stakeholders indicates that the Project helped staff feel part of a successful team. Program staff reported that they "saw unity in [their] staff team [because] of this project" and that the Project built "a community with the staff." Finally, one staff shared that her success was "[her] team that worked at the sites, because they really came together. [They came from] 22 different school sites, so they really built the team within themselves." Moreover, she stated that this team building "also impacted the way the youth participated, because they saw the unity within the adults, then they became a unit as well."

Quality Programming Year-Round: The quality assessment process, integral to the Summer Science Project, also impacted the quality of summer and school year programming more generally.

A focus on quality helped the Summer Science Project succeed, as described above. However, the impact of the quality assessment process flowed far beyond the science activities themselves. Staff from across the Project described how the focus on quality impacted entire programs, creating a culture focused on quality across summer and the school year.

One program staff reflected, "Their [her staff's] quality from the summer actually impacted [raised] their expectations for the school year. My whole staff for the school year – I didn't have to pump them up …they already know [what it takes to have quality programming]." Another staff mentioned that youth now feel welcomed with caring adults and participate in engaging activities, language drawn from the Program Quality Assessment. Several staff mentioned additional elements of quality programming that came out of the Summer Science Project, including using lesson plan templates and unit plans, including debriefs and reflections in activities, having a theme-based program, and improved organizing and scheduling for the programs.

Program staff learned the importance of planning activities and lessons through their experience with the Summer Science Project. One program staff said, "I think we learn

from the summer. The after school program also benefits from the support that we got, which we're just trickling down to our regular after school program." In particular, staff mentioned that they continue to plan as intensely during the school year as they had been asked to do for summer. "Most of the staff that were from summer, they are also our after school staff, so they know how necessary it is to plan out their class because the quality of the class. If they're not going to plan it out, it's going to be a mess."

Participating programs noted that the Summer Science Project had an impact on their approach to program quality throughout their organization. One program staff wrote that "intentional learning has become the standard" while another program staff member wrote that they now have a 3-year quality improvement plan with both short and long term goals because of their participation in this Project.

Connection to the School Day: Relationships between the expanded learning time providers and their host schools have flourished.

School-based expanded learning time programs frequently lament how difficult it is to connect with the school day staff, to align academics and goals, to even be kept informed about school day events, policies and training. The Summer Science Project was able to turn this trend around by demonstrating to school day staff the quality of the summer instruction and by filling a valuable need for the school: science instruction.

Staff instructional coaches and summer school teachers were able to see the high quality work of the summer programs and convey that to their school day colleagues. As one program stated "the teachers that were there for summer are the same teachers now for the school year. They are excited about what we did in the summer and they still talk about how the kids were doing. [They also know] that the after school program has adopted things we did in the summer."

School day staff were able to see that the summer program staff were filling in an important gap in school day instruction. "A lot of teachers see that we're filling in for a lot that they don't get to do with their kids anymore, because [there is so much they] need to do during the school day. So a lot of them really support the idea that we come in to do this, these kind of activities with their kids."

As a result of the success, OUSD and MDUSD are planning to model their summer learning programs on the Summer Science Project. As an OUSD staff wrote, "This initiative is helping to shape OUSD's supports for summer." PCY staff elaborated that both Districts "looked at what the Summer Science Project did, in terms of project-based learning that also integrated academics, and they saw that the kids wanted to come and be there and they wanted that across the board in [their Districts] for summer. Specific principals talked to us about that on site visits, 'Oh, if I did it this way, our attendance numbers would go up because these kids actually want to be here, as opposed to my remedial kids who drop off partway through the summer because who wants to do that all summer, right?' The modeling allowed people to see the potential and that was powerful."

Conclusion

This investment in Summer Science coupled with quality assessment and strong technical assistance appears to have propelled programs toward a higher standard of quality, staff retention and development, and school day partnerships. As these are three key challenges – if not *the* key challenges – facing expanded learning time programs, it would seem that PCY, Techbridge and the three District's networks have found the secret to program success. Although this Project required a significant investment, these additional benefits indicate that the return on the investment may be invaluable.

Limitations

There are some limitations to this evaluation. First, no direct program observation data were collected for this report. While the CASP and SLPQA were used to conduct observation visits and support program improvement, those visits were not conducted by external evaluators for the purposes of this report. Therefore, there is no external assessment of program implementation and of program quality. Second, much of the data on the implementation of the program came from those that had planned and developed the programs, not from stakeholders far from the Project's vision. No data was collected from parents. Youth and front line staff completed surveys, but no youth and very few front line staff had a chance to provide in-depth, qualitative feedback on the Project.

The evaluation team, however, did conduct an informal observation of one of the MDUSD programs. What was observed there is consistent with the observations made by various Project staff during interviews and focus groups. Moreover, the themes mentioned by diverse stakeholders: Techbridge, PCY and Program Leadership from 4-5 community-based organizations across three communities, collected at three different times (two interviews and a focus group) were strongly consistent.

It remains to be seen how programs will continue to sustain their strong program culture, their focus on quality, staff development and retention, and connections to the school day. Because program staff have now seen the benefit of being intentional about planning, quality and science, and know what it takes to do so, the Summer Science Project has set them up for on-going success.

Suggestions for Further Study

Previous evaluations have found evidence that, when programs commit to participate in any structured, intentional program improvement process, program quality improves.[1] However, the reported gains in the Summer Science Project suggest that the benefits to participating programs go beyond what we have seen in other projects and include improved point-of-service quality, staff retention and engagement, and connections to the school day. While the generous investment in training and year-round technical assistance was partially responsible, we hypothesize that having *science* at its heart catapulted the project to such success.

Two factors integral to science as a topic area seem connected to the ultimate success of the project: first, most after school staff are scared of science and second, science is a core, relevant subject for school day staff.

After school staff rarely have special science training. Moreover, the very interest in and urgency of initiatives to build and improve science education speaks to how poorly it has been conducted in the recent past, the years in which most after school staff were themselves in school. Moreover, science is seen as a hard subject, one which many people shy away from. We hypothesize that this very challenge became an asset in this project. In order to improve program quality in science classes, staff may have felt compelled to plan carefully because they were so unfamiliar (or feared they were) with the material. While after school staff may be able to improvise from general principles (opening activity, small group work, presenting to the class, closing reflection) for a writing or art activity, they may not feel capable of doing so in science. This fear motivates them to develop or follow a plan. Their planning, in turn, enables them to conduct strong lessons and to learn how planning supports high quality instruction.

We hypothesize further that the exhilaration of overcoming this fear may have contributed to staff engagement and, ultimately, retention. From youth development research, we know that taking risks and overcoming challenges, and taking on something just at the edge of one's zone of proximal development, creates engagement. So, too, for staff. This is another example of how the fear or lack of confidence in science may have converted into an asset of this project. As staff were able to overcome the challenge of providing science instruction, they felt a sense of pride and accomplishment that spilled over into their work as a whole, thereby keeping them engaged and committed to their jobs in out-of-school time.

Finally, science is capable of attracting the interest of school day teachers more readily than other supports for quality such as improved art or sports programs or support for English Learners. Science is a core academic subject connected to achievement measures, and, in the past several years, the interest in and support for science education

[1] Through our work with the local after school networks program improvement initiatives and professional development programs, we have found that programs frequently cite "intentionality" as the key to program improvement, whether the improvement is related to tools and strategies for improving services to English Learners, guidance on high quality point-of-service program practices, or creating a summer culture.

has rung out loud and clear. Science is sexy, science is urgent, science is on everyone's mind. These factors, we speculate, helped school day staff see the value of the science project and provided the context in which school day staff felt they could and should champion the project.

While the scope of this evaluation could only hint at these connections, we hope that future studies will explore the relationship between science and out-of-school time quality improvement more thoroughly. We have an urgent need for science education. Fortuitously, science education may also help programs set themselves up for success by improving point-of-service quality, staff engagement and school day relationships. By adopting science curricula, partnered with high quality staff training and coaching and a continuous focus on quality, programs may have one of the best means of strengthening their programming for youth in ways that promote positive youth outcomes.

APPENDIX A: DATA SOURCES

1. Youth Survey

The youth post-test measures the extent to which participants report increased interest and engagement with science learning as a result of program participation. The youth post-test was administered during the final week of programming. A total of 728 youth completed the survey.

2. Staff Pre-Post Survey

The staff pre-post survey measures assessed change in self-efficacy in leading informal science activities. The survey also measures self-reported confidence and knowledge of the topic areas covered in the Techbridge-led trainings held in Spring 2013. The pre-test was administered during the training sessions; the post-test was fielded at the end of the summer. Forty-one staff completed a pre and post-test and are included in the results showing change between these two assessments. Post-test items regarding feedback on the training sessions included all 42 staff who completed a post-test.

3. Interviews with Key Project Staff

The evaluation team conducted two 2-person interviews with key staff from Techbridge and Partnership for Children and Youth (PCY), including PCY's Director of Technical Assistance. These interviews explored the landscape of the Summer Science Project, changes and decisions made over the course of the three years, and lessons learned with an eye toward understanding what it takes to implement a project such as this one.

4. Focus Group with Program and Site Leadership

As part of the annual summer debrief, the evaluation team conducted an interactive focus group with program and site leadership in attendance. Just over 20 staff participated and provided insight into the nature of summer science success, the large effects that the Project has had on staff, partnerships, and school-year programs, and how their definition of "quality programming" has changed through this Project.

APPENDIX B: YOUTH SURVEY RESULTS BY GENDER

		Male	Female	Total
Youth Outcomes	Youth Survey Item	n = 382	n = 325	n = 728
Youth interest & engagement with STEM	The summer science program made science more fun.	89%	95%	91%
	The summer science program made science more interesting.	90%	88%	89%
	The summer science program made me more excited to do science activities.	83%	90%	86%
	I enjoy learning science in school.	82%	85%	84%
	The summer science program made me want to play more with science toys.	82%	85%	84%
	The summer science program made me want to learn more about science.	82%	83%	83%
	The summer science program made me more excited to learn about science in school.	80%	85%	82%
Youth knowledge & skills in STEM topics	The summer science program taught me new things.	91%	95%	93%
	The summer science activities taught me things that matter to me.	78%	82%	80%
	The summer science program taught me things that I shared with my family.	73%	82%	77%
	I do science activities when I am not in my summer science program.	49%	54%	52%
Youth confidence in STEM abilities	Science makes me think.	81%	84%	82%
	I am good at science.	74%	72%	72%
	Science is easy.	65%	69%	67%
Youth interest in STEM careers	I know what scientists do.	71%	68%	69%
	The summer science program made me want a science job when I am older.	56%	58%	57%
Youth perception of program quality	The summer science program had nice instructors.	93%	97%	95%
	The summer science program had fun science activities.	93%	95%	94%

APPENDIX C: YOUTH SURVEY RESULTS BY COMMUNITY

		Franklin-McKinley /San Jose	Mt. Diablo	Oakland	Total
Youth Outcomes	Youth Survey Item	n = 194	n = 279	n = 234	n = 728
Youth interest & engagement with STEM	The summer science program made science more fun.	93%	89%	93%	91%
	The summer science program made science more interesting.	86%	88%	92%	89%
	The summer science program made me more excited to do science activities.	87%	81%	92%	86%
	I enjoy learning science in school.	81%	77%	94%	84%
	The summer science program made me want to play more with science toys.	85%	80%	87%	84%
	The summer science program made me want to learn more about science.	85%	77%	88%	83%
	The summer science program made me more excited to learn about science in school.	82%	76%	90%	82%
Youth knowledge & skills in STEM topics	The summer science program taught me new things.	92%	93%	95%	93%
	The summer science activities taught me things that matter to me.	79%	75%	87%	80%
	The summer science program taught me things that I shared with my family.	78%	69%	86%	77%
	I do science activities when I am not in my summer science program.	43%	39%	74%	52%
Youth confidence in STEM abilities	Science makes me think.	78%	80%	89%	82%
	I am good at science.	63%	65%	88%	72%
	Science is easy.	57%	67%	75%	67%
Youth interest in STEM careers	I know what scientists do.	66%	62%	81%	69%
	The summer science program made me want a science job when I am older.	48%	50%	72%	57%
Youth perception of program quality	The summer science program had nice instructors.	94%	95%	96%	95%
	The summer science program had fun science activities.	94%	92%	96%	94%

APPENDIX D: YOUTH SURVEY RESULTS BY COMMUNITY, SITE & GENDER

Franklin-McKinley School District, Washington United Center		Robert F. Kennedy Elementary		Washington United Youth Center	
		Male	Female	Male	Female
Youth Outcomes	**Youth Survey Item**	n = 78	n = 55	n = 36	n = 25
Youth interest & engagement with STEM	The summer science program made science more fun.	94%	98%	86%	92%
	The summer science program made science more interesting.	87%	84%	91%	88%
	The summer science program made me more excited to do science activities.	86%	93%	81%	88%
	I enjoy learning science in school.	81%	85%	78%	76%
	The summer science program made me want to play more with science toys.	83%	91%	81%	84%
	The summer science program made me want to learn more about science.	90%	84%	83%	80%
	The summer science program made me more excited to learn about science in school.	84%	91%	72%	68%
Youth knowledge & skills in STEM topics	The summer science program taught me new things.	89%	94%	92%	96%
	The summer science activities taught me things that matter to me.	73%	85%	80%	76%
	The summer science program taught me things that I shared with my family.	66%	84%	94%	79%
	I do science activities when I am not in my summer science program.	36%	46%	36%	54%
Youth confidence in STEM abilities	Science makes me think.	81%	83%	77%	64%
	I am good at science.	75%	51%	51%	76%
	Science is easy.	54%	51%	64%	71%
Youth interest in STEM careers	I know what scientists do.	71%	64%	67%	63%
	The summer science program made me want a science job when I am older.	62%	38%	31%	52%
Youth perception of program quality	The summer science program had nice instructors.	94%	96%	89%	96%
	The summer science program had fun science activities.	92%	95%	97%	96%

Mt. Diablo Unified School District		Cambridge		Delta View		El Monte		Fair Oaks		Ygnacio Valley	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Youth Outcomes	Youth Survey Item	n = 24	n = 36	n = 38	n = 32	n = 23	n = 27	n = 26	n = 17	n = 31	n = 25
Youth interest & engagement with STEM	The summer science program made science more fun.	88%	97%	87%	91%	96%	96%	96%	94%	61%	88%
	The summer science program made science more interesting.	96%	92%	79%	81%	96%	89%	96%	94%	77%	88%
	The summer science program made me more excited to do science activities.	92%	100%	74%	84%	74%	74%	85%	82%	65%	84%
	I enjoy learning science in school.	92%	89%	76%	72%	65%	73%	92%	65%	61%	76%
	The summer science program made me want to play more with science toys.	100%	86%	75%	87%	74%	70%	69%	94%	71%	80%
	The summer science program made me want to learn more about science.	92%	92%	59%	81%	78%	70%	85%	94%	55%	68%
	The summer science program made me more excited to learn about science in school.	92%	89%	66%	78%	61%	70%	88%	88%	58%	72%
Youth knowledge & skills in STEM topics	The summer science program taught me new things.	88%	100%	92%	94%	96%	89%	92%	100%	80%	96%
	The summer science activities taught me things that matter to me.	67%	77%	82%	78%	55%	77%	92%	82%	55%	80%
	The summer science program taught me things that I shared with my family.	71%	61%	61%	81%	61%	81%	73%	88%	45%	80%
	I do science activities when I am not in my summer science program.	43%	36%	37%	56%	17%	26%	42%	35%	42%	48%
Youth confidence in STEM abilities	Science makes me think.	88%	89%	81%	84%	70%	88%	73%	71%	61%	83%
	I am good at science.	63%	58%	76%	59%	70%	73%	62%	59%	71%	68%
	Science is easy.	67%	69%	68%	56%	78%	67%	73%	59%	61%	72%
Youth interest in STEM careers	I know what scientists do.	65%	67%	74%	59%	39%	56%	77%	71%	53%	58%
	The summer science program made me want a science job when I am older.	63%	78%	38%	31%	39%	42%	50%	65%	47%	52%
Youth perception of program quality	The summer science program had nice instructors.	96%	94%	86%	91%	96%	100%	100%	100%	93%	100%
	The summer science program had fun science activities.	96%	97%	97%	84%	91%	93%	96%	100%	81%	84%

Oakland Unified School District		Allendale		East Oakland Pride		Global Family	
		Male	Female	Male	Female	Male	Female
Youth Outcomes	Youth Survey Item	n = 36	n = 30	n = 26	n = 34	n = 64	n = 44
Youth interest & engagement with STEM	The summer science program made science more fun.	100%	100%	84%	91%	89%	95%
	The summer science program made science more interesting.	100%	100%	92%	82%	90%	89%
	The summer science program made me more excited to do science activities.	97%	100%	88%	79%	88%	100%
	I enjoy learning science in school.	100%	100%	84%	97%	87%	98%
	The summer science program made me want to play more with science toys.	100%	97%	72%	65%	87%	93%
	The summer science program made me want to learn more about science.	97%	100%	85%	62%	85%	98%
	The summer science program made me more excited to learn about science in school.	100%	100%	85%	85%	81%	95%
Youth knowledge & skills in STEM topics	The summer science program taught me new things.	100%	100%	100%	94%	89%	93%
	The summer science activities taught me things that matter to me.	97%	100%	77%	62%	86%	95%
	The summer science program taught me things that I shared with my family.	94%	97%	81%	79%	78%	91%
	I do science activities when I am not in my summer science program.	92%	83%	56%	59%	73%	77%
Youth confidence in STEM abilities	Science makes me think.	94%	100%	81%	79%	89%	91%
	I am good at science.	97%	100%	72%	91%	83%	89%
	Science is easy.	72%	86%	65%	74%	67%	86%
Youth interest in STEM careers	I know what scientists do.	100%	100%	62%	62%	78%	82%
	The summer science program made me want a science job when I am older.	83%	90%	42%	53%	73%	84%
Youth perception of program quality	The summer science program had nice instructors.	100%	100%	92%	100%	89%	98%
	The summer science program had fun science activities.	100%	100%	96%	100%	89%	98%

Reported proportion of youth who responded "Yes" to each of the survey items listed above.
Source: Summer Science Youth Survey, Summer 2014

APPENDIX E: STAFF SURVEY RESULTS BY COMMUNITY

Staff Belief in the Benefit/Importance of Summer STEM

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
The inadequacy of the STEM background of youth can be overcome by leading good summer STEM activities.	88%	100%	100%	100%	100%	94%	95%	90%
Increased effort in leading summer STEM activities produces little change in the STEM achievement of youth.*	86%	71%	65%	69%	31%	59%	52%	62%
It is important to show youth the possibility of having a career in a STEM-related field.	100%	100%	94%	100%	94%	100%	95%	98%
It is important to help show youth that STEM is related to the world around them.	100%	100%	100%	100%	94%	100%	95%	100%
Summer STEM activities impact the school-year performance of youth in STEM.	100%	100%	88%	88%	94%	100%	88%	95%
Summer STEM activities impact the interest of youth in school-year STEM activities.	100%	100%	93%	94%	94%	94%	90%	95%

* This item is negatively stated; the desired outcome is for agreement with this item to decrease.

Staff Use of STEM Teaching Skills

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
I know how to embed discussion of careers within a hands-on STEM activity.	75%	100%	82%	100%	76%	88%	75%	90%
I know how to use questioning to engage youth.	100%	100%	88%	100%	94%	100%	93%	100%
I know how to lead a structured lesson plan with a learning objective.	100%	100%	100%	100%	100%	100%	98%	100%
I know how to use reflection techniques in the classroom that engage all youth.	100%	100%	82%	94%	94%	100%	91%	98%
I know how to engage youth in STEM topics, concepts, and practices.	100%	100%	88%	100%	82%	100%	88%	95%
I know how to make STEM relevant to the youth's everyday life.	100%	100%	93%	100%	76%	94%	85%	93%
I know the steps necessary to teach STEM concepts effectively.	88%	100%	81%	94%	59%	100%	72%	93%

Staff Sense of Self-efficacy in Leading STEM Activities

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
I am continually finding better ways to lead STEM activities.	63%	100%	88%	100%	81%	100%	75%	95%
When I try very hard, I lead STEM activities as well as I lead most other activities.	88%	86%	94%	100%	88%	94%	91%	90%
I am very effective in monitoring STEM activities.	88%	100%	88%	94%	75%	100%	81%	93%
I generally lead summer STEM activities effectively.	88%	100%	85%	100%	73%	100%	69%	95%
I understand STEM concepts well enough to be effective in leading summer STEM activities.	100%	100%	94%	100%	76%	100%	88%	95%
I do not find it difficult to explain to youth why STEM experiments work.	75%	86%	100%	100%	75%	81%	81%	86%
I am typically able to answer the STEM question of youth in my program.	71%	100%	94%	100%	88%	100%	85%	95%
Given a choice, I would invite the site coordinator to evaluate my leading of STEM activities.	75%	100%	94%	100%	73%	100%	79%	90%
When youth have difficulty understanding a STEM concept, I am usually able to help them understand it better.	100%	100%	94%	94%	88%	100%	88%	93%
When leading a summer STEM activity, I usually welcome questions from youth.	88%	100%	93%	100%	88%	94%	81%	95%
I know what to do to get youth interested in STEM.	100%	100%	94%	100%	88%	94%	93%	93%

Staff Confidence Facilitating STEM Activities

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
I am confident in my ability to raise youth awareness of STEM professions.	100%	100%	94%	100%	81%	94%	88%	93%
I am confident in my ability to lead active participation in STEM learning opportunities.	100%	100%	94%	100%	94%	100%	93%	96%
I am confident in my ability to productively engage in STEM methods of investigation.	100%	100%	94%	100%	94%	100%	93%	95%
I am confident in my ability to support youth curiosity about STEM topics, concepts, or practices.	100%	100%	94%	100%	93%	100%	93%	95%
I am confident in my ability to provide youth opportunities to collaborate and work collaboratively with others.	100%	100%	94%	100%	100%	100%	98%	100%

Staff Knowledge of STEM Curriculum Topics

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
I am knowledgeable about different careers/disciplines within STEM	100%	100%	65%	100%	69%	94%	73%	93%
I am knowledgeable about investigating STEM through practices of inquiry.	100%	100%	88%	94%	63%	100%	81%	93%
I am knowledgeable about topics in STEM.	100%	100%	81%	94%	81%	94%	83%	91%
I am knowledgeable about exploring STEM though project-based learning.	88%	100%	82%	94%	88%	94%	85%	90%
I am knowledgeable about the relevance of STEM to every day life.	100%	100%	94%	94%	94%	93%	93%	90%
I am knowledgeable about the STEM methods of investigation.	88%	100%	94%	82%	82%	88%	88%	85%

Staff Opinion Regarding Diversity and Gender Equality in STEM Learning

	FMSD/SJUSD (n = 7)		MDUSD (n = 17)		OUSD (n = 17)		Total (n = 41)	
Staff Survey Item	Before Summer	After	Before Summer	After	Before Summer	After	Before Summer	After
I believe girls are equally interested in STEM as boys.	88%	100%	75%	100%	88%	94%	81%	98%
I think it is important to get girls interested in STEM as much as boys.	100%	100%	88%	100%	94%	100%	93%	100%
I think it is within my control to get youth from different linguistic, racial, and cultural backgrounds interested in STEM.	100%	100%	75%	88%	94%	94%	86%	88%
I think it is within my control to get girls as interested in STEM as boys.	100%	100%	94%	88%	94%	100%	95%	91%

Proportion of staff responding "Strongly Agree" or "Agree" with survey items listed in the tables above.
Source: Staff Pre-Summer (May 2014) and Post-Summer (July 2014) Surveys, (n=43)

Impact of STEM Training on Teaching Skills (Post-Summer Only)

Staff Survey Items	FMSD/SJUSD (n = 7)	MDUSD (n = 17)	OUSD (n = 18)	Total (n = 42)
I implemented activities that increased youths' confidence in STEM.	100%	94%	100%	93%
I feel more confident leading STEM activities in the summer.	100%	100%	100%	93%
I implemented activities that increased youths' interest in STEM.	86%	100%	94%	91%
I learned strategies to increase youths' interest in STEM.	86%	94%	94%	88%
I feel more confident leading STEM activities in afterschool.	86%	94%	100%	88%
I learned strategies to increase youths' confidence in STEM.	86%	76%	94%	81%

Quality of STEM Training (Post-Summer Only)

Staff Survey Items	FMSD/SJUSD (n = 7)	MDUSD (n = 17)	OUSD (n = 18)	Total (n = 42)
Facilitators were knowledgeable of the topics presented during sessions.	86%	100%	94%	91%
Facilitators were responsive to questions asked/follow ups needed.	86%	100%	94%	91%
Facilitators presented relevant topics applicable to my summer program.	71%	100%	94%	88%
Facilitators presented relevant topics applicable to my afterschool program.	71%	94%	94%	86%
The Summer STEM Project Trainings were well organized.	86%	88%	94%	86%
I am satisfied with the Summer STEM Project Trainings.	86%	88%	94%	86%

Proportion of staff responding "Strongly Agree" or "Agree" with survey items listed in the tables above.
Source: Staff Post-Summer (July 2014) Surveys, (n=43)