



Techbridge Broad Implementation

2016-2017 Evaluation Findings from Greater Seattle and Washington, DC

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1 Introduction and 2 Evaluation Overview



1 Introduction

Techbridge’s mission is to help girls discover a passion for science, engineering, and technology (SET). Techbridge incorporates hands-on curricula and career exploration activities for girls, and provides training and/or resources to teachers, role models, and families.

In August 2013, Techbridge was awarded a five-year National Science Foundation (NSF) grant to scale up its afterschool program from the San Francisco Bay Area to multiple new locations around the United States. The objectives of this broad implementation project are to increase girls’ SET skills and career interests; build communities’ SET capacity and sustainability; enhance SET career exploration for underrepresented girls and their families; and advance research on the scale-up, sustainability, and impact of the model. Techbridge began operating afterschool programs in the Highline Public Schools, located near Seattle, WA in 2014. In 2015, Techbridge began operating programs in Washington, DC.

Education Development Center (EDC) is conducting the formative and summative evaluation of the project. This report summarizes the findings from Year 4 of the project (2016-2107) regarding the two expansion sites of Greater Seattle and Washington, DC.

2 Evaluation Overview

The following evaluation questions were established regarding Techbridge’s implementation and impact on participating girls and other stakeholders:¹

3. Techbridge’s Impact on Girls

- 3.1. What recruitment and retention strategies do expansion sites use to reach underrepresented groups? Are expansion sites successful in reaching and retaining girls from underrepresented groups?
- 3.2. What is Techbridge’s impact on participating girls at the expansion sites? How do the outcomes of girls participating in the project compare with similar girls at the same site who do not participate?

4. Techbridge’s Impact on Teachers & Schools

- 4.1. What selection process does Techbridge use to identify schools and teachers within those schools?
- 4.2. How are teachers trained and supported in the expansion sites?
- 4.3. To what degree do teachers have a leadership role in their program?
- 4.4. What is the effect of the program on participating teachers, including their interest, knowledge, and use of strategies to engage girls in SET; their awareness and promotion of SET careers; and their awareness and promotion of SET resources for girls?
- 4.5. What role do local school districts and/or school administrators have in supporting programs in the expansion sites?

5. Techbridge’s Impact on Girls’ Families

- 5.1. How do expansion sites engage girls’ families?

¹ The evaluation questions are numbered starting with “3” to match the section headings within this report containing the results for that question.

- 5.2. What is the effect of the program on participating girls' families, including their awareness of SET resources; their understanding of SET careers and career pathways; and their view of SET careers? To what degree do families encourage their daughters to participate in SET activities, and to pursue SET education and careers?

6. Techbridge's Impact on Role Models

- 6.1. How are role models recruited, trained, and supported in the expansion sites?
- 6.2. What is the effect of the program on role models' confidence and effectiveness in conducting outreach with Techbridge girls?

7. Implementation & Fidelity

- 7.1. To what extent does each new program site implement the Techbridge curriculum?
- 7.2. To what extent does each new program site implement Techbridge? How does implementation at the expansion sites vary from the original program model (fidelity and innovation)?

8. Organizational Capacity²

- 8.1. What's considered to be "working" and "not working" as the expansion unfolds?
- 8.2. What unanticipated issues and opportunities emerged that affect Techbridge's expansion? How do they affect the expansion? How does Techbridge address these issues and opportunities?
- 8.3. How does Techbridge develop monitoring, evaluation, quality control, and feedback mechanisms (and feedback loops)? How is project feedback (including evaluation results) used to improve the program?
- 8.4. What capacity-building activities occurred to enable project sustainability? How does the level of support from Techbridge's main office change over time? How and to what extent do expansion sites develop a plan for sustainability?
- 8.5. What is the role of the local advisory committees?
- 8.6. What does Techbridge need to pay attention to as it expands? What factors emerge as important for the scale-up effort (e.g., vision, resources, knowledge/skills/abilities, incentives, ownership, structure)?
- 8.7. What formal and informal communication structures evolve between the Techbridge Bay Area office and the expansion offices?
- 8.8. How is Techbridge connected to and affected by larger systems in its environment (e.g., school priorities, district policies, proximity and priorities of tech companies and educational institutions)?
- 8.9. What are the incentives for each of the stakeholders to participate (including project leadership, new program sites, teachers, role models)? Are the incentives sufficient? What are the barriers?
- 8.10. What resources do project leadership and program partners each provide and are they sufficient (including funding, equipment, space, human capital, leadership, and time)?

The evaluation utilizes mixed methods to investigate the implementation of the Techbridge expansion and its outcomes. EDC works closely with the project's research team, Colorado Evaluation & Research Consulting (CERC), to (1) develop each of the data collection tools to meet the needs of both the evaluation and

² The list of evaluation questions regarding organizational capacity were identified at the beginning of the project with the expectation that not every question would be addressed each year. This Year 4 evaluation report addresses questions 8.1 – 8.5. The Year 2 and Year 3 reports addressed questions 8.6 – 8.10.

research (when possible) and minimize the data collection burden on participants, and (2) share collected data.

Data about Techbridge’s implementation and impact were collected from girls, parents or guardians, teachers, school principals, district representatives, role models, and Techbridge staff. The evaluation team also conducted observations of selected programs, analyzed attendance records, attended Techbridge planning meetings, and reviewed relevant Techbridge documents. Table 1 shows the data collection instruments and when they were administered. A detailed description of the evaluation methodology and response rates for data instruments administered during Year 4 can be found in Appendix A.

Table 1. Evaluation Instruments and Administration Timeline

Source	Evaluation Instrument	Administration Date
Girls	Participant Pre/Post Annual Surveys	October 2016 (pre) and May/June 2017 (post)
	Comparison Student Pre/Post Annual Surveys	October/November 2016 (pre) and May/June 2017 (post)
	Participant Focus Groups	April 2016
Teachers, Schools, & District	TB Teacher Survey	May/June 2017
	TB Teacher Interviews	April 2017
	Principal Interviews	April 2017
	District Leader Interviews	April 2017
Families	Family Survey	March - May 2017
Role Models	Role Model Survey	Techbridge administered throughout 2016-2017
Techbridge Staff	TB Staff Interviews (Expansion Sites)	April 2017
Other	Dimensions of Success Ratings	December 2016 and April 2017
	TB Attendance Records	Ongoing
	Document Review	Ongoing

This annual report is organized around the guiding evaluation questions. Results from all relevant data sources are presented together for each question. In most cases, data from both Greater Seattle and Washington, DC were aggregated and the results are presented for both sites combined: (1) because the primary purpose of the evaluation is to address the evaluation questions regarding the implementation of the scale-up overall; and/or (2) to preserve the anonymity of respondents. Some results from the teacher surveys are presented separately by site.

3 Techbridge's Impact on Girls



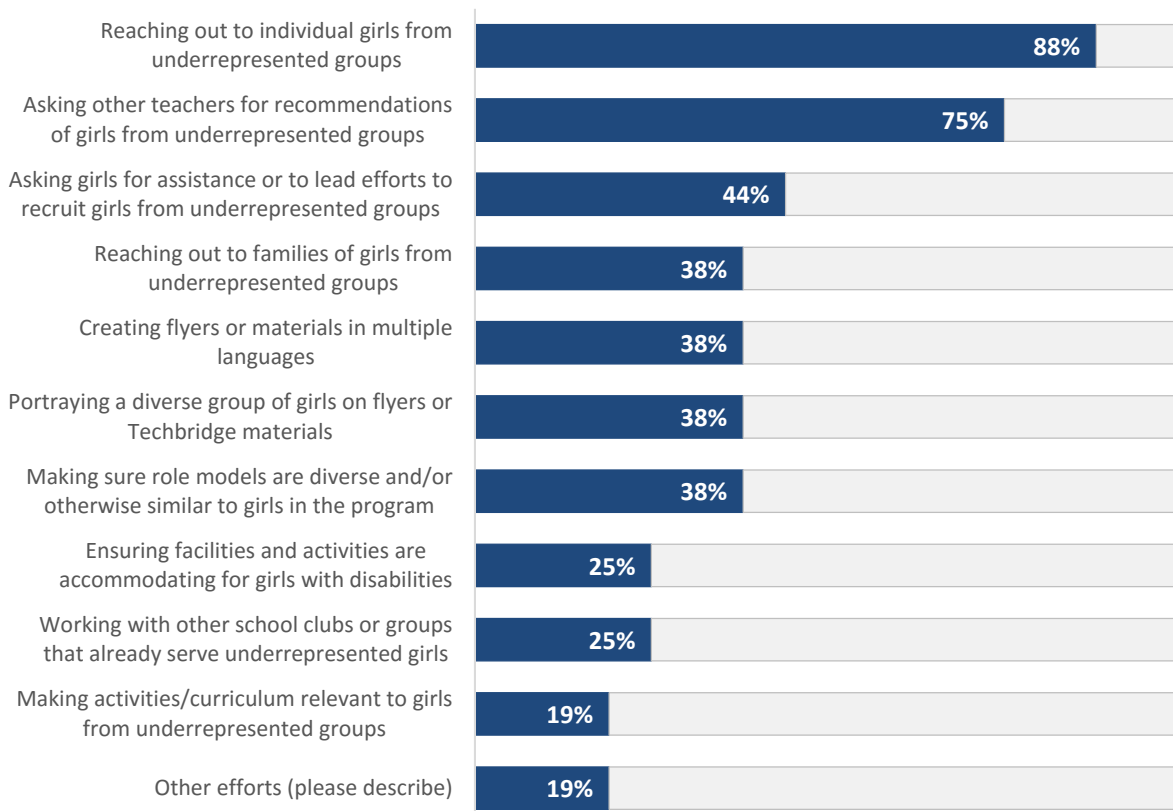
3.1 What recruitment and retention strategies do expansion sites use to reach girls from underrepresented groups? Are expansion sites successful in reaching and retaining girls from underrepresented groups?

★ Key Findings re: Recruitment and Retention of Girls

Teachers used a variety of strategies to encourage girls to join Techbridge, with personal invitations (from teachers or from fellow Techbridge students) being the most popular and effective methods. The Techbridge expansion sites again successfully enrolled girls from underrepresented groups (including low-income, racially diverse, and first generation to college). Attendance at the middle school programs increased from an average of 9 girls per program in 2015-2016 to 14 girls/program in 2016-2017. Average attendance at elementary school programs declined slightly from 21 girls in 2015-2016 to 18 girls in 2016-2017.

Teachers used a variety of strategies to recruit and retain girls from underrepresented groups, specifically girls who are from low-income families, and who are racially diverse, and/or would be first generation to college (see Figure 1). All the Techbridge teachers who responded to the survey indicated they used multiple strategies to reach underrepresented girls. The majority of teachers reached out to individual girls from underrepresented groups (88%) and asked other teachers for recommendations (75%). Just under half the teachers said they had asked girls to assist them in recruiting girls from underrepresented groups (44%).

Figure 1. Teachers reported using a variety of strategies to recruit and retain girls from underrepresented groups.



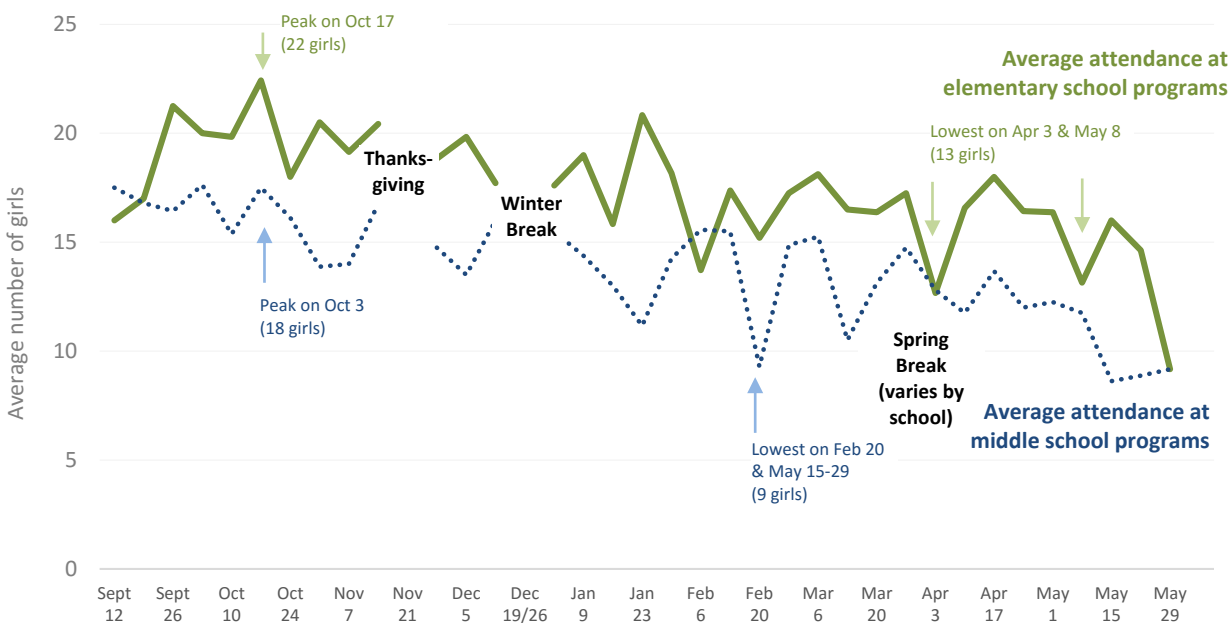
Source: Teacher Survey; n = 16

In interviews some teachers said they asked girls who had participated in the program last year to help recruit their peers by giving presentations and/or inviting their friends to attend a program. Other Techbridge teachers said they were most successful in personally recruiting girls who were in their classes.

Greater Seattle and DC were successful in reaching girls from underrepresented groups in 2016-2017. First, more than half of Techbridge girls' families were low-income: 56% of Greater Seattle and Washington, DC Techbridge girls qualified for free or reduced lunch.³ (In 2015-2016, 71% qualified for free or reduced lunch.) Second, the expansion programs almost exclusively served girls from racial and ethnic groups that are underrepresented in SET. Techbridge deliberately partnered with districts (and schools within them) which have racially and ethnically diverse populations. Finally, the majority of Techbridge participants would be the first in their immediate families to go to college.⁴ About a quarter of the Techbridge parents have less than a high school education. Fewer than 15% have earned a four-year college degree and/or advanced degree.

Looking at retention of Techbridge participants, attendance varied somewhat over the course of the year, but generally held steady until early spring. Attendance at the elementary school programs tended to be higher than attendance at the middle school programs (see Figure 2). That said, middle school attendance was higher than the previous year. In 2016-2017, each middle school program in the expansion sites served an average of 14 girls compared to only 9 girls per program in 2016-2017. Average attendance at elementary school programs in Greater Seattle and DC declined slightly from 21 girls in 2015-2016 to 18 girls in 2016-2017.⁵

Figure 2. 2016-2017 attendance at the elementary school programs in Greater Seattle and Washington, DC (n = 8)⁶ was higher and more consistent than at the middle school programs in these locations (n = 8).



Source: Techbridge attendance data

³ The Techbridge Parent Packet, which parents/guardians complete as part of enrolling their child in Techbridge, asked parents/guardians to report their income level.

⁴ It is important to note that about one third of parents did not provide information about their educational attainment.

⁵ Programs had the capacity to serve 25-30 students.

⁶ No attendance data were provided for one of the elementary schools, McMicken Heights in Greater Seattle.

Returning teachers were asked if recruitment or retention had changed now that Techbridge has been in their school and district for multiple years. Several teachers said that it had become easier to attract girls to the program now that Techbridge was established, and some middle school teachers said that they had successfully recruited girls who had attended a Techbridge program in elementary school. One teacher said:

“I think the feeder thing has had a big, has a big impact on our numbers. I think also, Techbridge sort of like developed a reputation. I’ve had girls come to me, ‘Oh, you’re the Techbridge teacher.’”

While several teachers said it had become easier to recruit students, most said that retention continued to be a challenge, particularly due to competing clubs and sports. Some teachers said they made a point of individually reaching out to girls who had missed one or more Techbridge meetings to find out why they had stopped coming and encourage them to come back.

3.2 What Girls Liked About Techbridge



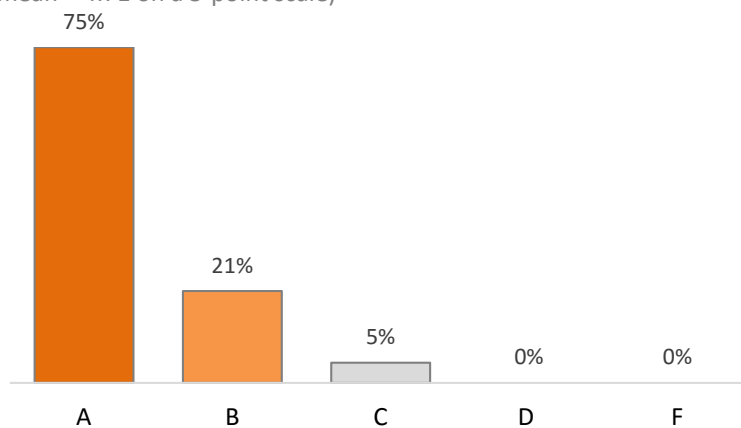
Key Findings re: What Girls Thought of Techbridge

Girls gave the 2016-2017 Greater Seattle and Washington, DC Techbridge programs high marks: 75% gave Techbridge an “A” and 21% gave it a “B.” Techbridge provided a safe space where girls felt comfortable, supported, and appropriately challenged. Girls valued the hands-on projects, the ability to learn with their peers, and the opportunities to meet SET role models and visit SET workplaces. Participants said Techbridge made learning about SET fun.

Techbridge participants were asked to grade Techbridge on a five-point scale from “A” to “F.” The vast majority of the Greater Seattle and Washington, DC Techbridge participants gave the program an A or B (96%), with 75% of them giving Techbridge an “A.” (These results were almost identical to the previous year, when 72% of girls from the two expansion sites gave Techbridge an “A” and 24% gave it a “B.”)

Figure 3. The majority of girls (75%) gave Techbridge a grade of “A.”

(mean = 4.71 on a 5-point scale)



Student Post-Surveys; n = 224

Girls gave very similar reasons for their high ratings as in past years. They explained that they gave Techbridge an “A” or “B” because they found it fun (31%); had the opportunity to learn about SET and SET careers (24%); think about future education and career options (13%); and had an opportunity to do hands-on projects (11%). Many girls said the program increased their confidence (10%) and that the program was specifically empowering to them as girls (9%). Students also said they valued the opportunity to work in teams (8%), and that they formed positive relationships with their Techbridge program coordinator, teacher, and/or role models (9%). Examples of girls’ comments included:

- “Techbridge helped me make new friends. Techbridge helped me increase my interest to technology and engineering. Techbridge is fun because we get to do different kinds of projects, we go on fun field trips.”
- “Techbridge has helped me learn about technology and making experiments. Techbridge has made the things we do fun and exciting.”
- “I’ve become more social in Techbridge. I always look forward to coming to Techbridge every week, and I’ve learned how to work in groups with girls who I didn’t really know.”
- “You learn a lot of things that include engineering, science and technology. It also changes your personality and it makes you feel more confident in yourself.”
- “Techbridge helps motivate girls that they could have a career like science engineer even though you are a girl and it also helps girls to focus on their future jobs.”
- “We went and are going on cool, exiting, and fun field trips. We got to meet amazing and hard working women. Like my amazing teacher. I have learned so much cool and helpful things.”
- “Techbridge affects every girl that joins. Techbridge helps us think about our future more. Techbridge helps us think that were not just a bunch of girls. We are girls that can change the world. We don’t let the world change us we change the world. We learn more about being a scientist or an engineer. They convinced us to put all our problems and differences beside and just have fun while it lasts.”
- “Techbridge showed me how science, engineering, and math are part of our daily life.”

A few returning girls specifically commented that their current year in Techbridge was as good if not better than their previous year(s) in the program:

- “Because they made it fun like last year, but now we have better activities!! which make it even funner [sic] than last year’s Techbridge.”
- “I gave Techbridge this grade [an ‘A’] because [our Program Coordinator] took us on field trips and I thought we were going to do the same things as last year but we didn’t and I like that we did new things.”

“I gave Techbridge an ‘A’ because it is a really fun and cool program—the way they make stuff cool, the field trips, everything. I would love to be working with Techbridge when I grow up.”

Techbridge Participant

“I gave Techbridge an ‘A’ because it is well deserved. They brought in role models who are inspiring and when we went to the movie theater to see *Hidden Figures*, it was such an inspirational experience and made me rethink what kind of career I actually wanted.”

Techbridge Participant

Girls were also asked to explain what they liked most about Techbridge. The most frequently cited response—given by half the girls—were the hands-on projects. Girls appreciated that the projects were challenging, fun and collaborative. Several girls said Techbridge provided a safe space where they felt comfortable, supported, and appropriately challenged. Girls also said they particularly liked the field trips and role models (24%), and the opportunities to work and learn with their peers (20%). Five girls specifically said sharing their accomplishments with their families during Family Nights was a high point. Girls’ comments included:

- “What I liked about Techbridge was that it gives you an opportunity to express and create. It gives you a little taste of what it would be like to create an invention. It’s like a simulation. It also gives you many opportunities to work with other people and think about your career in the future.”
- “My favorite part about Techbridge was making the spin art machines, the Family Nights and making the gingerbread houses. They all showed me that nothing was gonna be easy about engineering/building things.”
- “How we did a Maker Fair, this was my most favorite part because I got to see what others think and their creative.”
- “I got to apply skills that I didn’t know I had and I got to use them during projects with other people which ended up working out because we both were great at different skills and that helps us accomplish the task.”
- “The people. It was amazing to learn about different careers that I had not paid attention to. My classmates were great and we all tried to persevere and most of the times we succeeded.”
- “Getting to share my ideas with the class and getting feedback.”
- “What I liked most about Techbridge is the community. Techbridge has helped me open up a little more, and I feel very comfortable with people here.”
- “Field trips [because] I got to experience a virtual reality goggles and how technology changed.”
- “I like how we talked to different role models and went on field trips because it makes me more interested in engineering.”
- “I like doing challenging things to help me improve in that area.”
- “I liked Family Night because you get to show your family what you have done all year.”
- “The diversity because it’s a racist world and more diversity will bring us closer together.”
- “What I liked about Techbridge is the people and all the cool activities we do. I feel like this program will grow to all over the world.”

“I like the community most. Being around people my age who are interested in STEM and will help me and everybody else is great. It’s nerve racking at first but you learn and grow with people just like you. We are all different but we are women who want to make a difference, we are women in a safe environment. And this wouldn’t have happened if it weren’t for [my Program Coordinator], [my Techbridge teacher] and the Techbridge community—I would NOT have believed I could have a career in STEM.”

Techbridge Participant

Girls who gave Techbridge a grade of “B” or lower most commonly said they found some of the activities boring or repetitive, wanted more time to complete their projects, or wanted to have more choice in the activities. Comments included:

- “I gave it this [a ‘B’] because even though we had fun activities, some of the projects didn’t even work and I was left without a complete project. For example, we made lip balm, it wasn’t even working and not worth my time.”
- “I gave Techbridge a ‘B’ because I liked most of the stuff we did but I think it would have been better if we had gotten more time on our projects.”
- “I thought about giving Techbridge a ‘B’ as a grade because even though it was fun and all I did not [like] having to work on projects that my teacher decided on because I think it would have more meaning if we got to choose our own projects.”
- “I gave Techbridge this grade because we didn’t have enough time I feel like to complete our projects and make them the way we wanted them to be.”
- “I gave a B because I would have liked to see more different types of activities in STEM that are different.”
- “Because it was something that I was able to learn from but was boring.”
- “We sometimes do stuff people may be bored of like they’ve done it before. We should just try out new things or maybe people should ask what we should do.”

Some girls wished for more or better supplies and/or planning:

- “I gave Techbridge a ‘C’ because it didn’t have lots of supplies.”
- “I would give it a ‘B’ because even though we do tech-related activities, sometimes it’s boring because we don’t have the adequate materials. It can be a waste of time when the teachers are not in the mood and sometimes yell at the students. Since sometimes we waste time, I and many students have homework to do so then it takes up our homework time and sometimes, to me I still have a bunch of homework when I get home.”
- “They do most projects well and they have everything planned out, but they might not always be the best at it.”

Finally, a few girls said that they the activities were sometimes hard to understand:

- “I gave Techbridge this grade because the activities are fun but sometimes it gets hard.”
- “Because sometimes in Techbridge I don’t really understand what’s it’s about they do give us much information.”

3.3 What is Techbridge’s impact on participating girls at the expansion sites? How do the outcomes of girls participating in the project compare with similar girls at the same site who do not participate?



Key Findings re: Techbridge’s Impact on Girls

2016-2017 Techbridge participants from Greater Seattle and Washington, DC:

- found Techbridge’s SET activities to be engaging
- improved their understanding of and use engineering design practices
- improved their ability to persevere in the face of challenges
- felt they belong and can succeed in SET
- became more interested in SET
- became more interested in pursuing a career in SET.

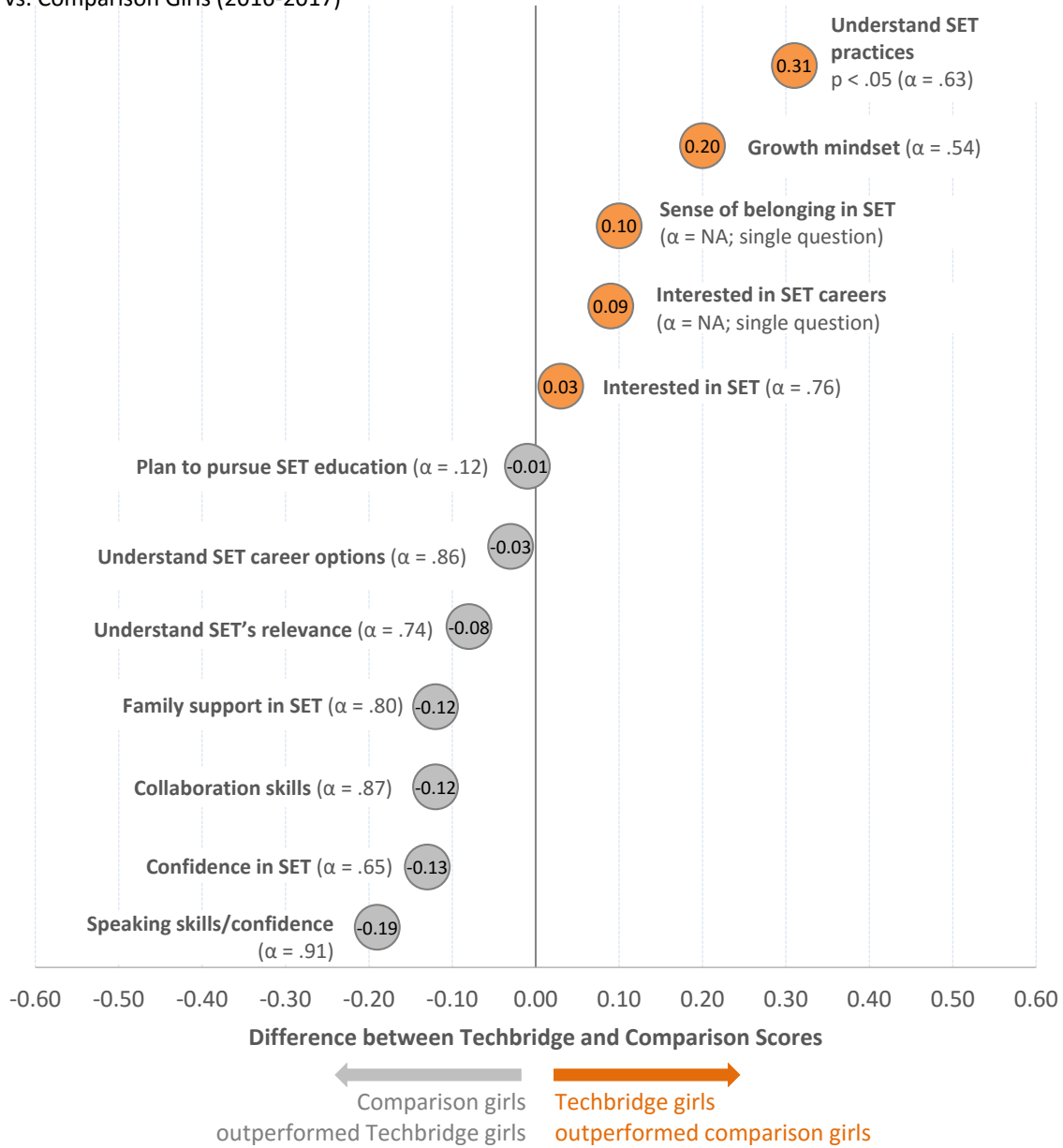
Some girls from the Techbridge expansion sites also:

- became more knowledgeable about SET careers and educational pathways
- became more interested in studying science, engineering, or technology in college
- better understand how SET is relevant and important to their lives
- reported receiving more support from their families about pursuing their interests in SET activities
- improved their teamwork skills
- became more confident about their SET abilities
- improved their public speaking skills.

In order to help assess the program’s impact, survey results from girls who participated in Techbridge in Greater Seattle or DC were compared with results from girls who attended the same schools but did not participate in the program. Figure 4 on the following page shows the pre/post survey results for the Greater Seattle and DC Techbridge girls versus the comparison girls. **At the end of the year, Techbridge girls from the expansion sites were significantly more likely than comparison students to report they understand practices commonly used in SET (such as the engineering design process) ($p < .05$).** Techbridge girls were also somewhat more likely than non-participating students to have improved perseverance (growth mindset); report a sense of belonging SET; and become more interested in SET and SET careers, although these differences were not statistically significant.

In contrast, comparison girls showed greater increases in their plans to pursue SET education; understanding of SET career options; understanding of SET’s relevance; family support in SET; teamwork skills; confidence in SET; and confidence in their speaking skills. However, none of these differences was statistically significant.

Figure 4. Differences in Pre/Post Survey Scores for Expansion Site Techbridge Girls vs. Comparison Girls (2016-2017)



Change scores were calculated as follows: [Mean Techbridge post-survey scale score – Mean Techbridge pre-survey scale score] – [Mean Comparison post-survey scale score – Mean Comparison pre-survey scale score]. The maximum possible difference was +/-12. Statistically significant differences are marked (paired independent t-tests). Internal consistency reliability scores (using Cronbach’s alpha) are shown for each scale, and are based on the post-survey responses.

Source: Matched Student Pre/Post Surveys

The following sections present findings for each Techbridge participant outcome. Related findings are presented together from the student surveys, teacher surveys, and parent surveys, as well as from the student focus groups and teacher interviews.

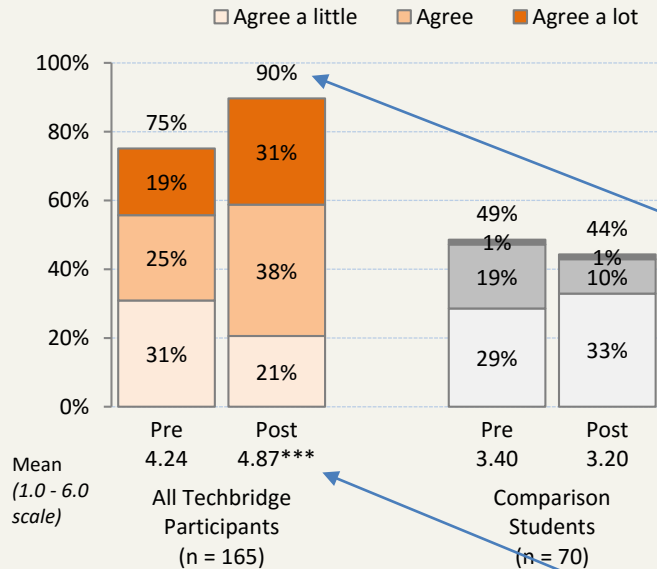
How to Interpret the Figures with Student Survey Results

Students were asked to indicate how much they agreed with each survey statement on a six-point scale from “disagree a lot” to “agree a lot.” Techbridge and comparison students’ mean change scores on each survey question were compared to determine whether Techbridge students had better outcomes than comparison students.⁷

Agree a lot	Agree	Agree a little
-------------	-------	----------------

I know how to use the engineering design process to build something

(Techbridge post-pre mean +0.82 > than comparison; $p < .001$)



If Techbridge participants’ survey scores were statistically significantly different than comparison students’ scores, the mean difference is shown, as well as the “p value” (explained below).

% at the top shows the sum of “Agree a lot” + “Agree” + “Agree a little”

Shows the mean on a 6-point scale. One or more asterisks (*) here means that the pre- and post-survey mean scores were statistically different (higher or lower) for this respondent group.

- +p < .10 (1 in 10 chance the difference is just due to chance)
- *p < .05 (1 in 20 chance the difference is just due to chance)
- **p < .01 (1 in 100 chance the difference is just due to chance)
- ***p < .001 (1 in 1,000 chance the difference is just due to chance)

⁷ The difference was calculated as follows: [Mean Techbridge post-survey score – Mean Techbridge pre-survey score] – [Mean Comparison post-survey score – Mean Comparison pre-survey score].

3.3.1 What is Techbridge’s impact on girls’ interest in SET?



Key Findings re: Techbridge’s Impact on Girls’ Interest in SET

The majority of Techbridge girls from the Greater Seattle and Washington, DC programs already had a strong interest in SET at the beginning of the year. While some Techbridge girls were less interested in SET at the end of the year, an even larger percentage of non-participating students became less interested in SET (i.e., comparison students were more likely to lose interest in SET). Although this difference was not statistically significant, Techbridge may have had a somewhat protective effect and helped reduce girls’ loss of interest in SET that research shows to be common among students in the age groups served by Techbridge.⁸ These survey results regarding Techbridge’s impact on girls’ interest in SET were very similar to last year.

Results

- At the end of the program year, Techbridge participants were somewhat less likely to “agree a lot” that they liked creating things with technology ($p < .10$), building things, computer programming, or figuring out how things work. However, while some girls’ interest in SET may have waned slightly, the vast majority of Techbridge girls still indicated they enjoyed SET at the end of the school year. For example, 98% of participants said they like building things at least a little at the end of the year (see Figure 6 on page 20).
- Comparison students’ interest in each SET topic also declined from the beginning to the end of the year, and declined more steeply than Techbridge participants’. For example, the percentage of comparison students who agreed at least a little that they like creating things with technology declined from 89% at the beginning of the year to 80% at the end of the year. In contrast, after participating in the program 92% of Techbridge girls’ agreed at least a little that they liked computer programming (although the percentage who agreed strongly decreased from 47% to 40% at the end of the year).
- All the parents who completed the parent survey agreed that their daughter was more interested in SET because of Techbridge, including 66% of parents who agreed “a lot.” One parent commented, “She’s more curious as to how things works. She would get excited with every successful invention.”

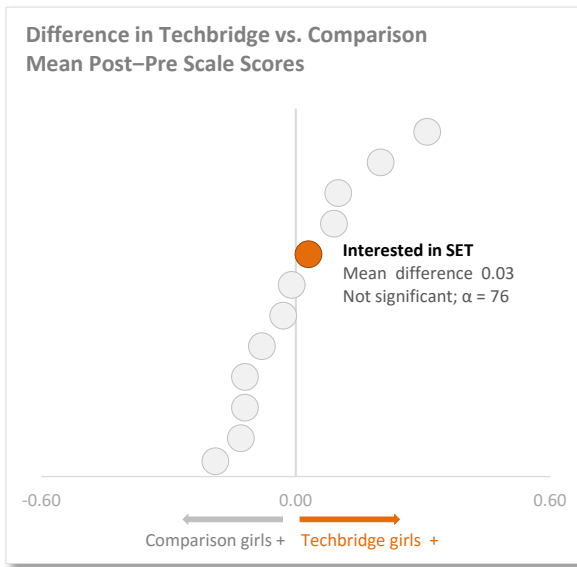
“My daughter changed her attitude a lot, showing more interest in doing small science projects and experiments she has done in class. She shows me what she has learned from her teachers. The difference I think, as a mom, is that it is a very nice educational program—both hands-on and emotional because the children feel very excited when they finish the activities and that they can observe what they have done with their own hands.”

Techbridge Parent

⁸ Archer, L., Dewitt, J., Osborne, J., Dillon, J., Willis, B., & Wong, B. (2010). “Doing” science versus “being” a scientist: Examining 10/11-year-old schoolchildren’s constructions of science through the lens of identity. *Science Education*, 94(4), 617-639.

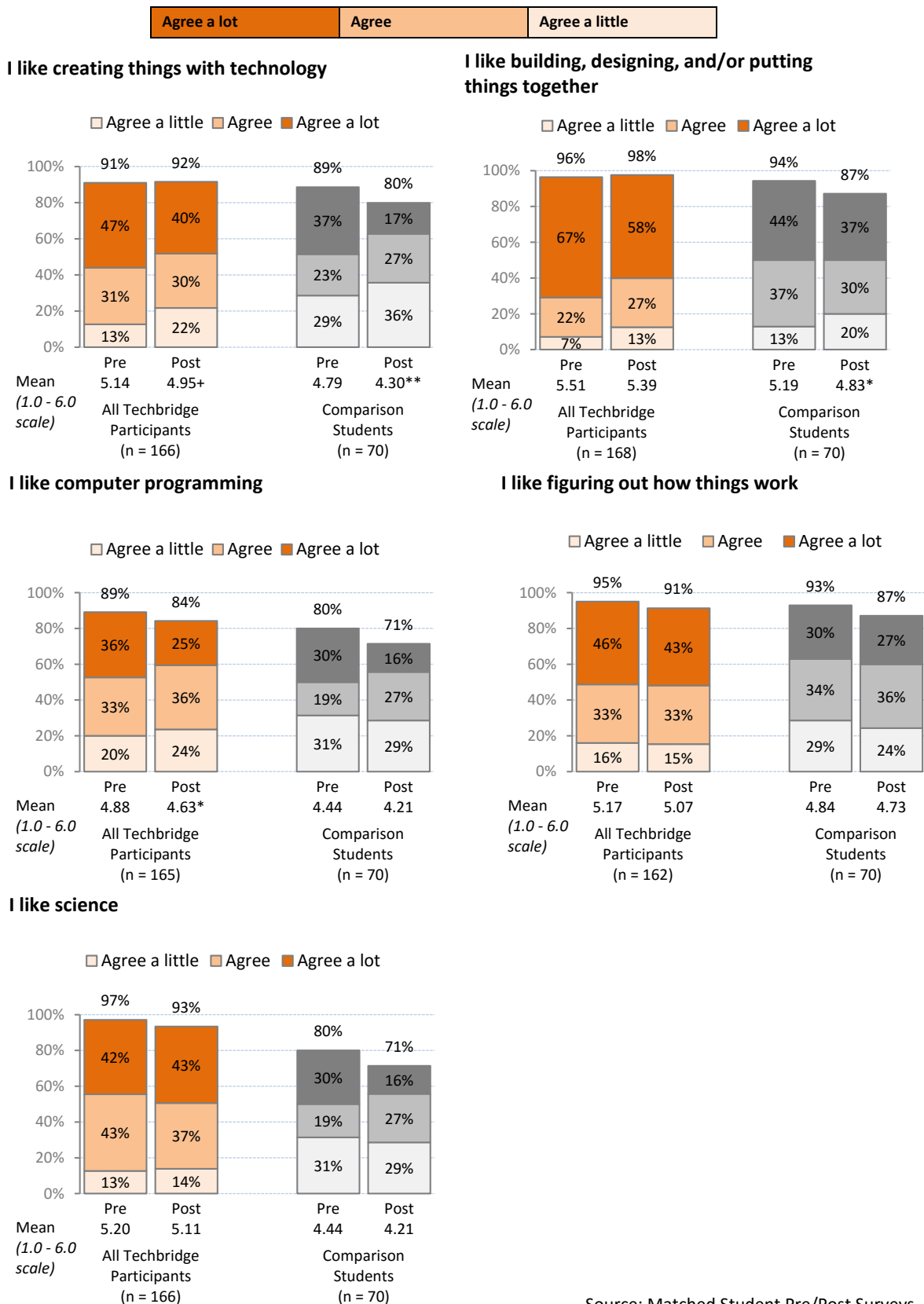
SET Interest Scale (Combined Results of Survey Questions)

Figure 5. At the end of the program, Techbridge girls had a slightly greater interest in SET compared to non-participants. The difference between the groups was not statistically significant.



Results of Individual Survey Questions re: SET Interest

Figure 6. Techbridge participants were less likely to lose interest in engineering and technology than girls who did not participate in the program.



Source: Matched Student Pre/Post Surveys

3.3.2 What is Techbridge’s impact on girls’ confidence in SET?



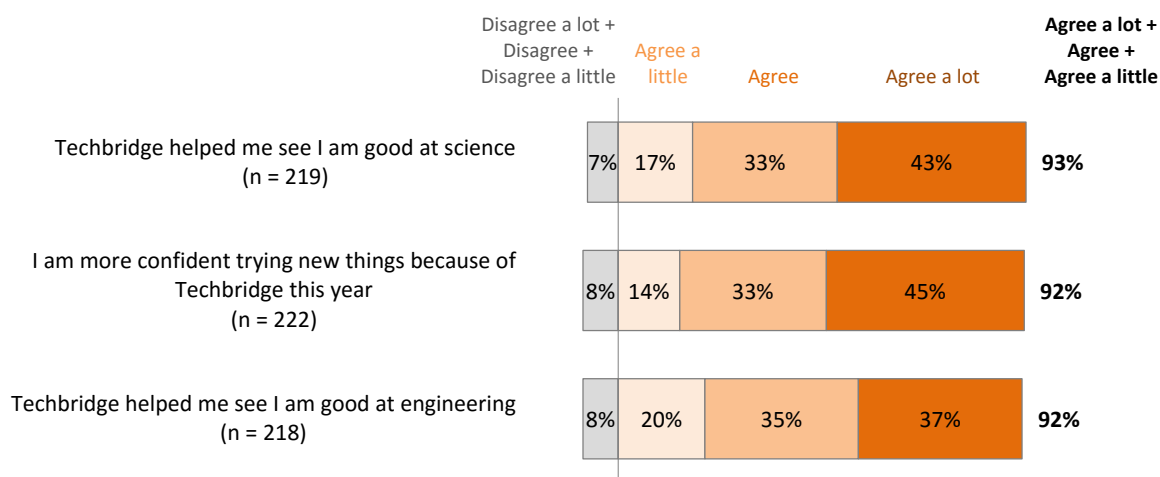
Key Findings re: Techbridge’s Impact on Girls’ Confidence

Although post-survey ratings showed a small decline in girls’ perceived abilities to do well in science and technology activities, general gains in confidence were consistently noted by girls, teachers, and families. Girls reported on the post-survey and in focus groups that Techbridge’s supportive, collaborative environment helped increase their confidence to try new things, including in SET.

Results

- Girls reported that Techbridge helped them improve their confidence in science and engineering, as well as more generally in trying new things (see Figure 7 below⁹). Three retrospective questions on the student post-survey asked students to indicate whether Techbridge had an impact on their confidence. The vast majority of Techbridge agreed that Techbridge helped them see they were good at science (93%) and at engineering (92%). The majority of girls also agreed (92%) that they were more confident trying new things because of Techbridge.

Figure 7. The majority of girls said Techbridge helped them become more confident.



Source: Student Post-Survey

- In focus groups and in response to open-ended questions on the survey, several students said the supportive Techbridge staff, teamwork approach, girls-only environment, and the hands-on, fun activities created a safe space for them to experiment and build confidence. Many students said they discovered that they were “actually good” at SET. A number of girls specifically praised their Techbridge Program Coordinator. Students said:

⁹ The combined percentages shown in the figures like Figure 7 for “Agree a lot + Agree + Agree a little” (e.g., 93%) were calculated from the original survey data. Due to rounding, adding the individual percentages shown in the figures for “agree a lot,” “agree,” and “agree little” may result in a slightly different total than shown in the figures. The combined totals shown in the figures are accurate.

“I really like this program and it gives you more strength in believing in yourself.”

“Without it [Techbridge], I wouldn’t have known that I was good at science or technology or engineering.”

“I learned that I’m good at brainstorming and designing.”

“Everyone is so kind and loving and it made me realize that I’m really good at science.”

“They [the Techbridge Program Coordinator and teacher] made me see I was not so bad at building and creating things and also helped me a lot on seeing what I can be in the future. Made me not feel embarrassed when I made a silly mistake and it made me feel proud of myself.”

“It helps me learn new things and help me find what I am good at. Also the teachers that work with me are very nice and encouraging.”

- On the teacher survey, 81% of teachers indicated that their Techbridge girls were more confident about their SET abilities to a “large” or “very large” extent at the end of the program.
- While girls and teachers reported that Techbridge helped them become more confident in SET, pre/post-survey results suggest that most Techbridge participants were already confident of their abilities to do science and technology at the beginning of the year, leaving little room for growth, at least as measured by the surveys (see Figure 9 on page 23).
- In response to an open-ended question on the parent survey inviting parents to describe how Techbridge has made a difference for their daughter, several parents said they believe their daughters were more confident in general and specifically more confident in SET. Parents commented:

“She became outgoing and [it] built her confidence,”

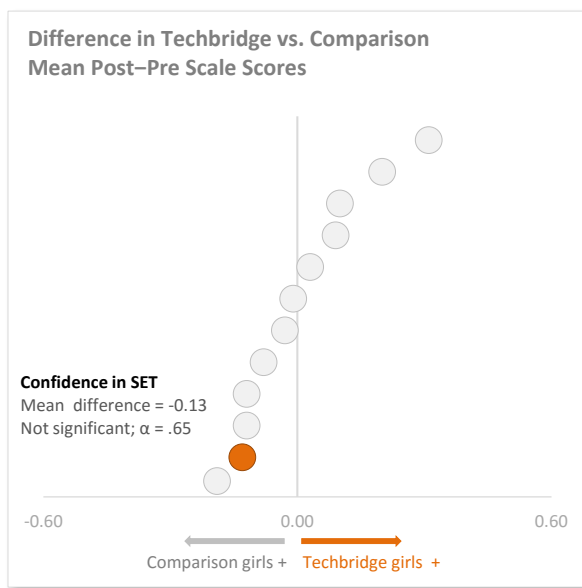
“She is a lot more confident and excited about science.”

“It helped my daughter’s communication skills and self-esteem.”

“Techbridge made a big impact in my life. [The Techbridge Program Coordinator] taught me to be confident and proud of myself. She challenged me to try harder and to do my best. Because of Techbridge, I have learned many things that will help me later in life. [The Techbridge Program Coordinator] showed me that life is NOT easy but the mistakes make you a better person and you learn more when you make mistakes. Techbridge is another home to me, it is a safe, loving community of empowering women. It’s sad to have Techbridge end for the summer, but I will leave with a lot more knowledge of STEM.”

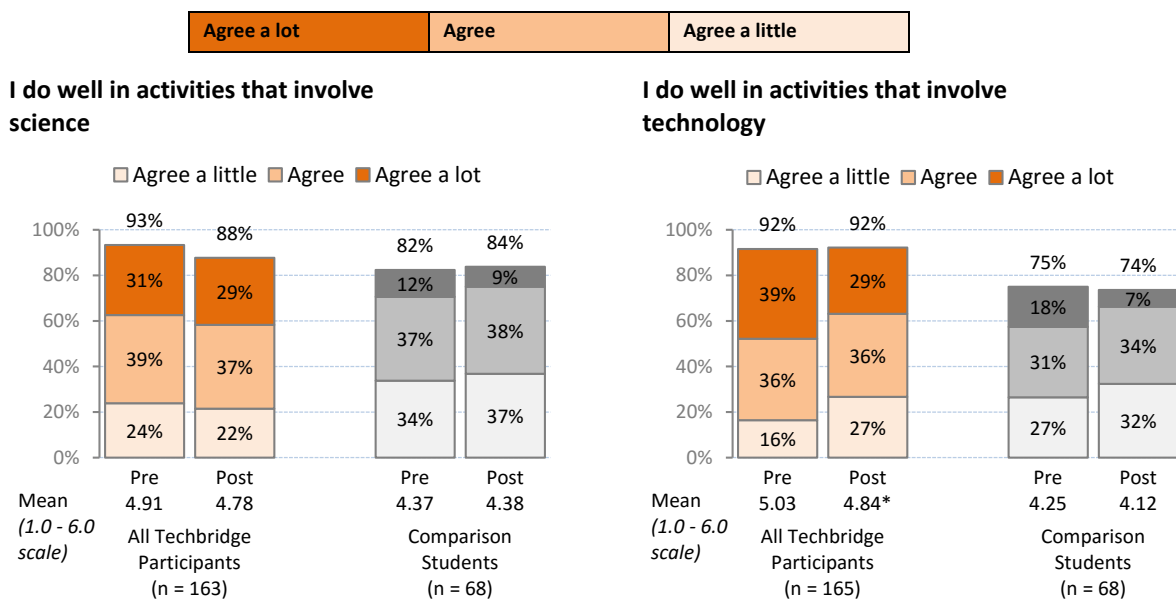
Girls' Confidence in SET Scale (Combined Results of Survey Questions)

Figure 8. The average Techbridge student's mean SET confidence scale score was 0.13 points lower than the average comparison student's. However, this difference was not statistically significant.



Results of Individual Survey Questions re: Girls' Confidence

Figure 9. Techbridge girls' self-reported confidence in science and technology declined somewhat from the beginning to the end of the year.



Source: Matched Student Pre/Post Surveys

3.3.3 What is Techbridge’s impact on girls’ understanding of SET’s relevance to their own lives?



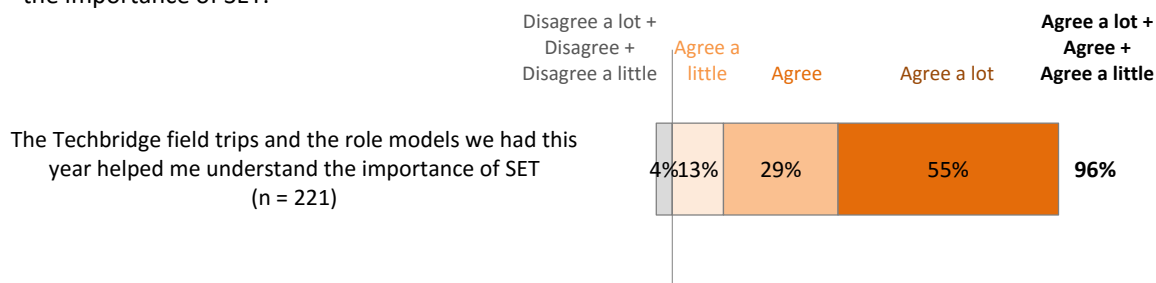
Key Findings re: Techbridge’s Impact on Girls’ Understanding of SET’s Relevance

The majority of Techbridge girls said they already understood SET’s relevance and importance prior to participating in the program, so there was little room for improvement in their survey scores. However, many girls said that doing the hands-on activities and going on field trips to SET workplaces helped them better understand the importance of SET.

Results

- Techbridge girls’ pre-survey responses suggest that most already understood SET’s relevance and importance at the beginning of the school year. For example, on the pre-survey, 95% of Techbridge girls agreed that engineers make a meaningful difference in the world, with 61% agreeing “a lot” (see Figure 12 on the following page).
- Although there was little room for improvement in girls’ pre-survey scores regarding SET’s relevance, other data sources suggest that Techbridge students gained a greater appreciation of SET’s importance through the field trips and role model visits. Almost all the students (96%) agreed that the field trips and role models helped them understand SET’s importance, with more than half the students (55%) agreeing “a lot” (see Figure 10 below).

Figure 10. 96% of girls said the field trips and role models helped them understand the importance of SET.

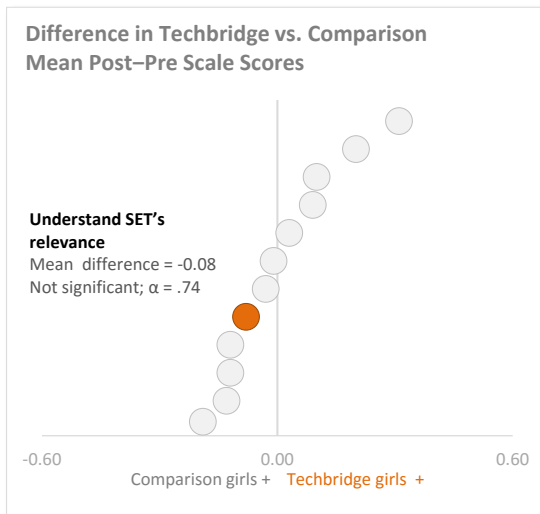


Source: Student Post-Survey

- In survey comments and focus groups, a few girls said that Techbridge helped them understand how SET is relevant. One girl explained, “Techbridge also showed me how science, engineering, and math are part of our daily life.”

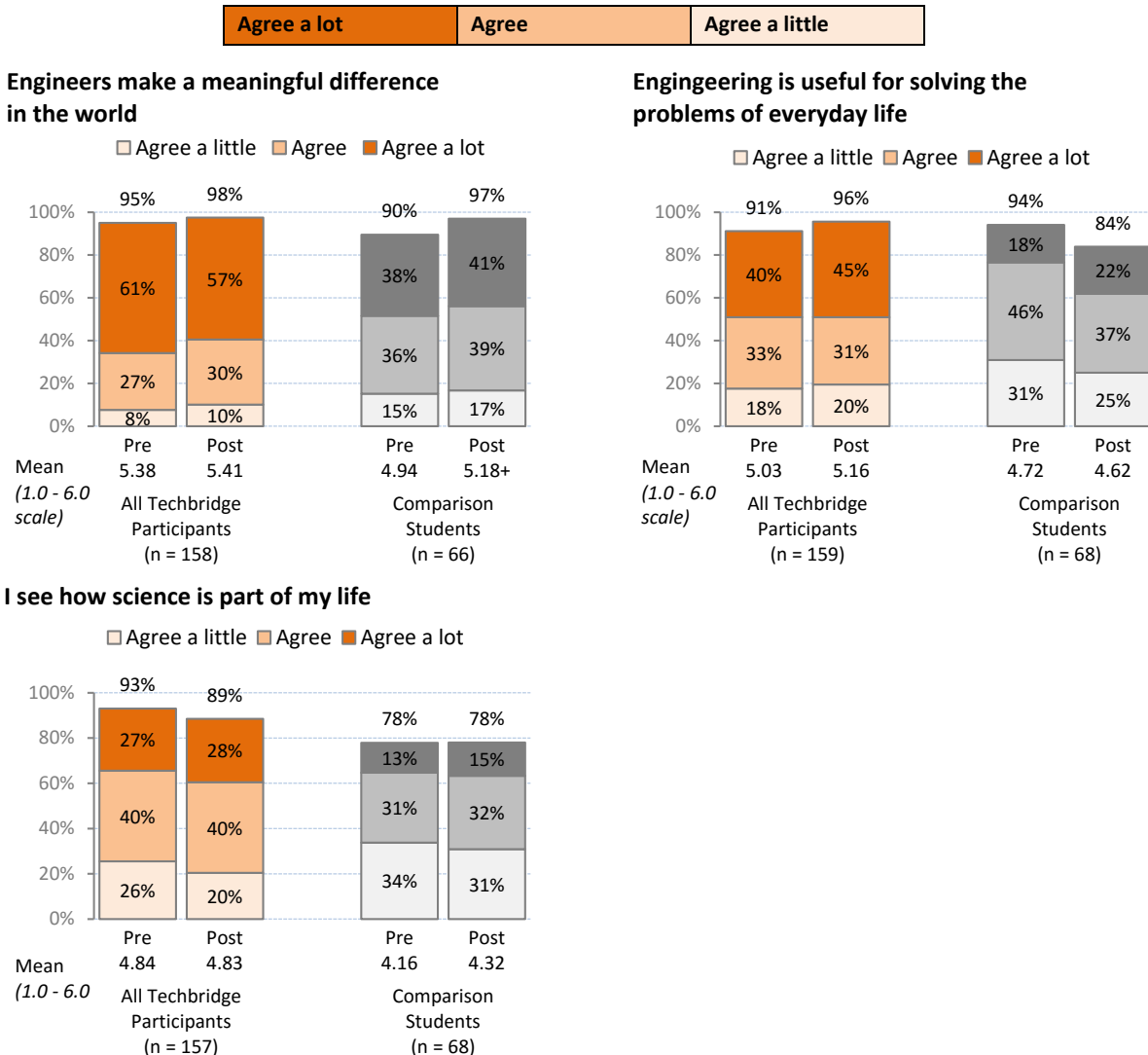
SET Relevance Scale (Combined Results of Survey Questions)

Figure 11. There was no difference between Techbridge and comparison students' mean SET relevance scale scores.



Results of Individual Survey Questions re: Girls' Understanding of SET's Relevance

Figure 12. Most Techbridge girls already understood SET's relevance and importance prior to Techbridge.



Source: Matched Student Pre/Post Surveys

3.3.4 What is Techbridge’s impact on girls’ understanding of SET career options and educational pathways?



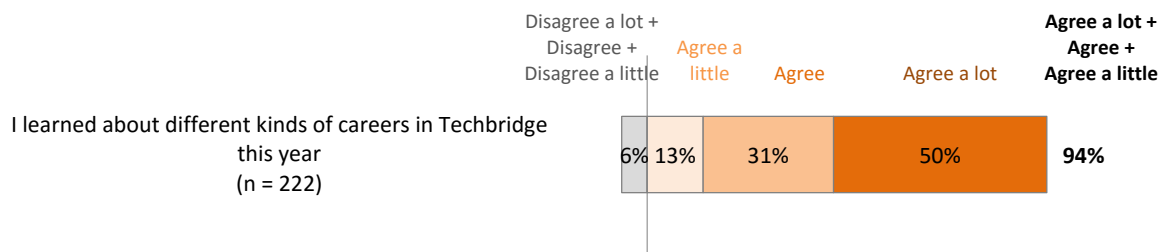
Key Findings re: Techbridge’s Impact on Girls’ Understanding of SET Career and Education Pathways

Techbridge helped girls understand various career options in SET and learn about the pathways toward these careers. Techbridge girls showed greater gains in their knowledge of SET careers and career pathways than comparison girls.

Results

- The vast majority of Techbridge girls (94%) agreed on the post-survey that Techbridge increased their knowledge about various careers, including 50% who agreed “a lot.”

Figure 13. 94% of girls said they learned about SET careers in Techbridge.



Source: Student Post-Survey

- Techbridge girls’ self-reported knowledge of science, engineering and technology careers was already high on the pre-survey, leaving relatively little room for growth on the post-survey (see Figure 15 on page 28). For example, 95% of Techbridge participants agreed on the pre-survey that they already knew what engineers do. (In contrast, only 70% of comparison girls agreed on the pre-survey that they knew what engineers do.) In spite of already entering the program with relatively high levels of knowledge, Techbridge girls still showed statistically significant increases in their knowledge of what engineers do on the post-survey because the percentage of girls who said they knew “a lot” about engineers’ job increased from 26% to 35% ($p < 0.05$). Techbridge girls also showed statistically significant gains in their knowledge of what people who work in technology do, with the percentage of girls agreeing at least “a little” that they know what technology workers do increasing from 89% to 94% ($p < .05$). Because comparison students reported less knowledge at the start of the year and made greater gains, there was no difference between the two groups’ self-reported knowledge gains regarding SET careers.
- The pre- and post-surveys asked students three questions about how much they knew about SET careers and SET career pathways. Students were instructed to select from one of four possible answer choices: “I don’t know anything about this,” “I know a little,” “I know some,” or “I know a lot.” More Techbridge students said they knew something about each topic after they had participated in the program (see Figure 16 on page 29). For example, the percentage of Techbridge students who said they know “some” or “a lot” about the type of things that people with SET careers do increased from 61% to 74% ($p < .001$). Techbridge participants made greater gains than

comparison students in their self-reported knowledge of what people who have SET jobs do as well as the kinds of classes you need to take to have a career in SET ($p < .10$).

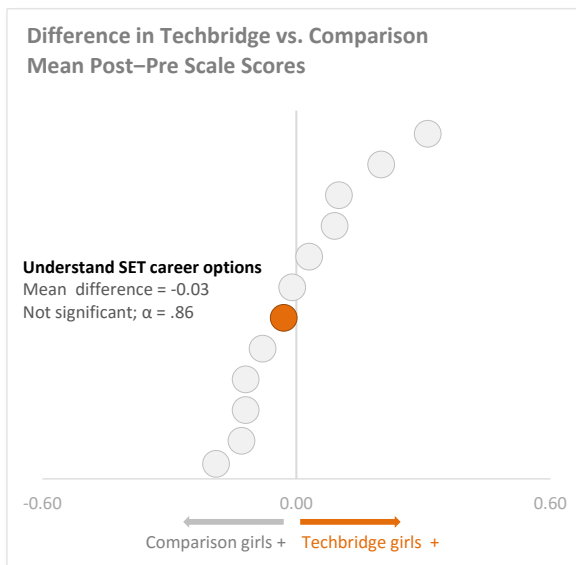
- The role model visits and field trips were particularly powerful ways for helping girls learn about SET careers and educational pathways. One girl said, “I liked the field trips because they showed the environment that STEM workers work in and how they work every day and how we can work if we were to work in the STEM industry.”
- Teachers also thought Techbridge helped girls become more knowledgeable about SET careers. The majority of teachers reported that girls became more knowledgeable about what SET workers do to a “large” or a “very large” extent (87%). However, only half the teachers (50%) said girls were more knowledgeable about what education they need for a SET career to a “large” or a “very large” extent.

“It opened my eyes to a lot more opportunities for career choices.”

Techbridge Participant

SET Career/Education Pathways Scale (Combined Results of Survey Questions)

Figure 14. At year-end, Techbridge girls had about the same change in understanding of SET career and education pathways as girls who had not participated in the program.

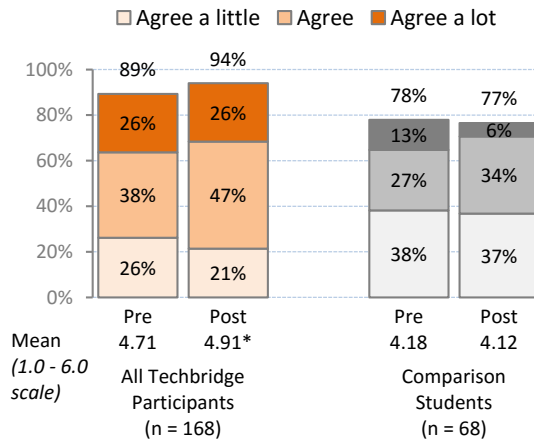


Results of Individual Survey Questions re: SET Career and Educational Pathways

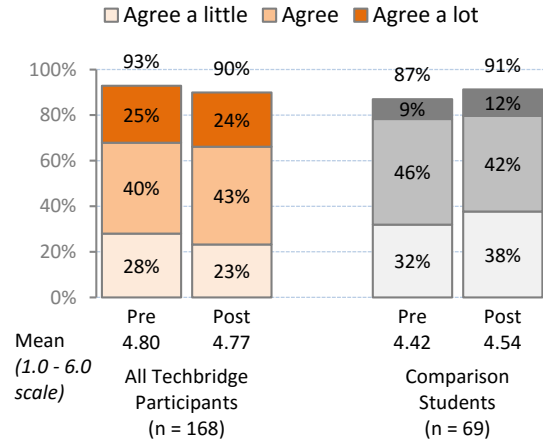
Figure 15. Techbridge girls' self-reported knowledge of SET careers and education pathways showed relatively little improvement, although girls were slightly more likely to agree at least "a little" that knowing SET would give them many career choices.



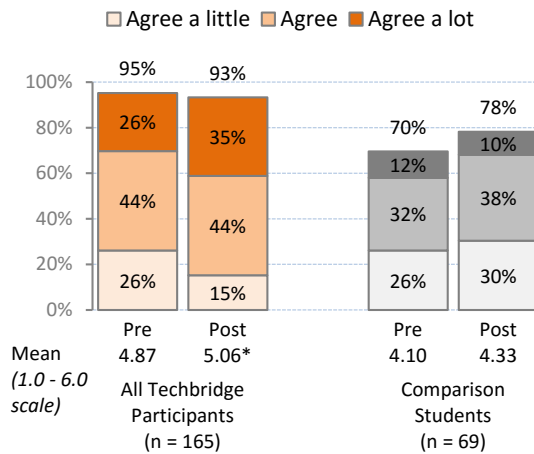
I know what people who work in technology do



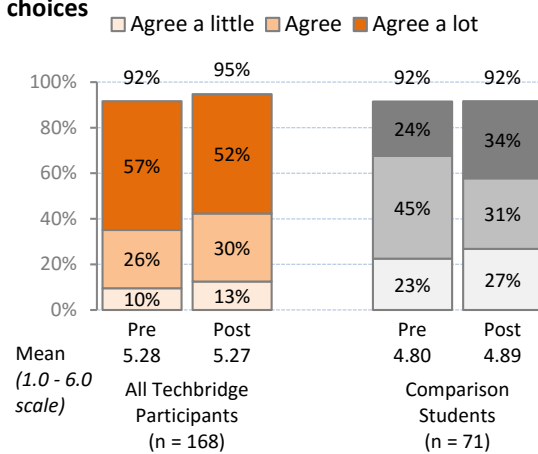
I know what scientists do



I know what engineers do

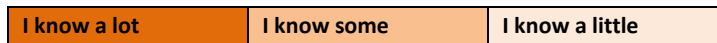


Knowing science, engineering and technology will give me many career choices



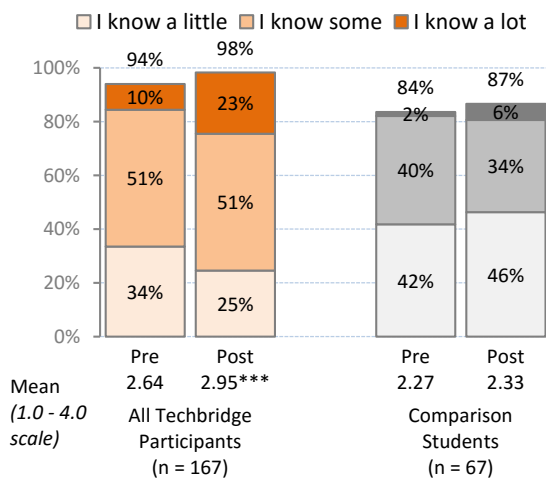
Source: Matched Student Pre/Post Surveys

Figure 16. More Techbridge girls said they understand SET careers and career pathways after participating in the program.



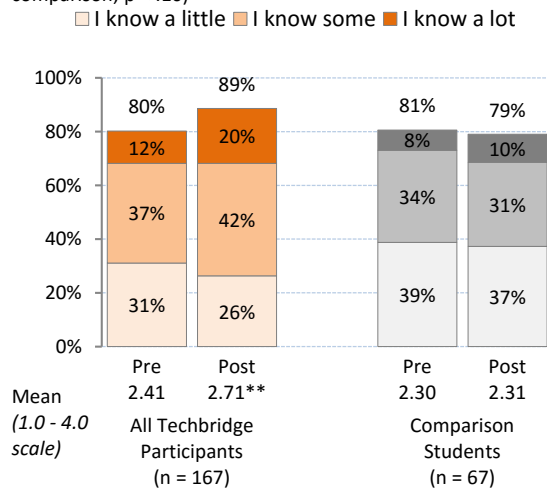
The types of things that people with careers in SET do in their jobs

(Techbridge post-pre mean +0.24 > than comparison; p < .10)

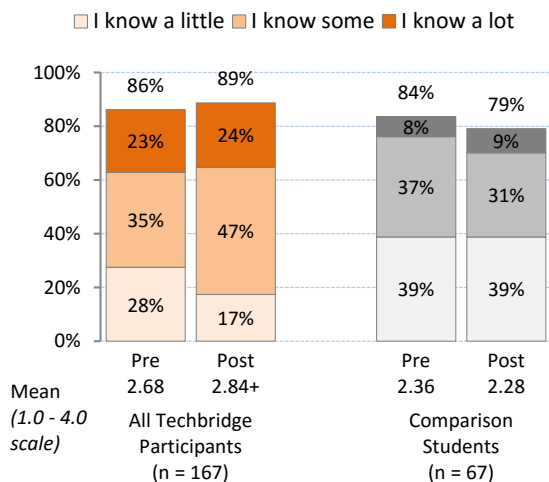


The kinds of classes you need to take to have a career in SET

(Techbridge post-pre mean +0.27 > than comparison; p < .10)



How to find information about careers in SET



Source: Matched Student Pre/Post Surveys

3.3.5 What is Techbridge’s impact on girls’ interest in pursuing a SET career?



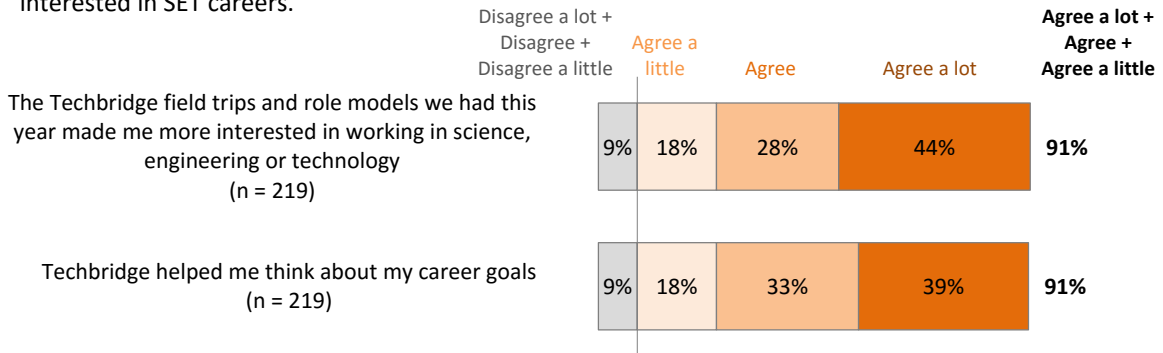
Key Findings re: Techbridge’s Impact on Girls’ Interest in SET Careers

One of Techbridge’s goals is to encourage girls to consider pursuing a career in science, engineering or technology. The total percentage of Techbridge girls who listed at least one SET-related career among their top three choices increased from 41% in the fall to 49% in the spring while the percentage of comparison students who selected SET career(s) remained unchanged. The field trips and role model visits piqued many girls’ interest in SET careers, exposing them to careers they did not know existed and helping them envision themselves doing that work.

Results

- Nine out of ten girls (91%) agreed that the Techbridge helped them think about their career goals and that the field trips and role models made them more interested in working in SET.

Figure 17. The majority of girls said Techbridge helped them become more interested in SET careers.



Source: Student Post-Survey

- After participating in Techbridge, girls were more slightly more likely to agree that they would like to have a SET career (increasing from 82% to 86%; see Figure 19 on page 32). There was no statistical difference between Techbridge participants and comparison students’ SET career interest scale scores.
- On the surveys and in focus groups, some girls said Techbridge increased their interest in SET careers:

“When we went to the field trips it made me want to do a job in engineering more.”

“[The Program Coordinator] helped me a lot and made me think twice about what I wanted to do when I grow up, so now am interested in engineering and designing and science.”

“They [Techbridge] taught us a lot about being an engineer and making us think about what we would want to do in college or as jobs when we get older.”

“Techbridge helps girls to work well and makes girls want to work in any jobs like engineering, technology and more.”

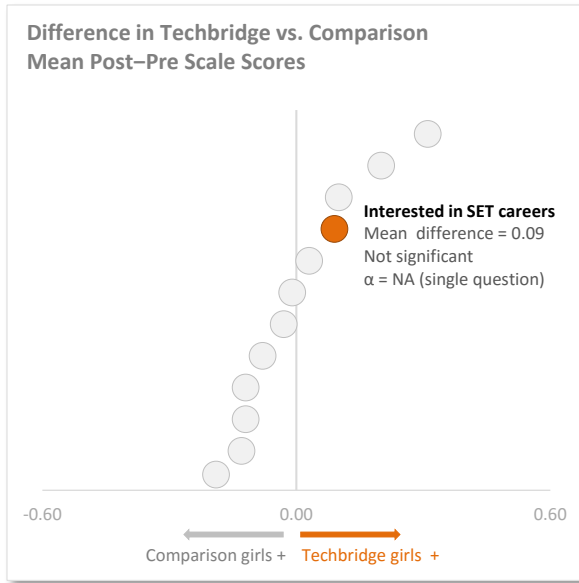
“I got interested in chemical engineering because we worked with chemicals, and I liked how we had to work and try different experiments to get it to work. So, I liked that and decided to become a chemical engineer.”

“At first, I didn’t really know what career I wanted to do, and now I kind of have an idea of what area I want to work...I used to be into being a police officer and being into the military base, but then when I got into Techbridge I started rethinking that because there’s a lot of risks to being a police officer and then a military base person. And then I figured I could still help people by giving them entertainment, like video games, movies, TV shows. And then an electrician could [work on things] like microwaves, fridges, computers, things like that.”

- Many parents reported that their daughters began talking about having a career in SET after attending Techbridge. When asked if their daughters talked about having a job in SET *before* attending Techbridge, 53% of parents said “yes.” When asked if their daughters talked about a job in SET *since beginning* Techbridge, 79% of parents said “yes.” These parent survey results were very similar to the previous year.

SET Career Interest Scale (Combined Results of Survey Questions)

Figure 18. Techbridge girls were somewhat more likely than comparison students to become interested in SET careers (although the difference was not statistically significant).

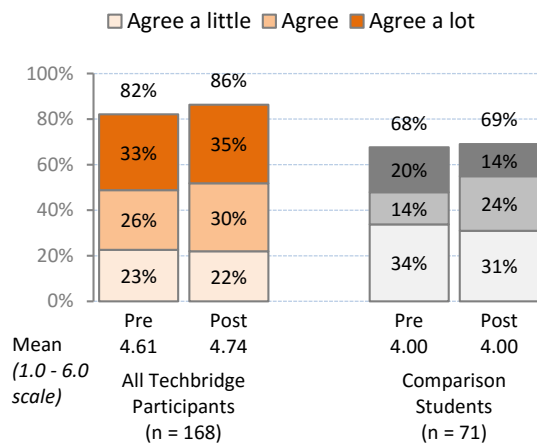


Results of Individual Survey Questions

Figure 19. More Techbridge girls said they were interested in SET careers after Techbridge.



I can see myself working in a career that involves SET

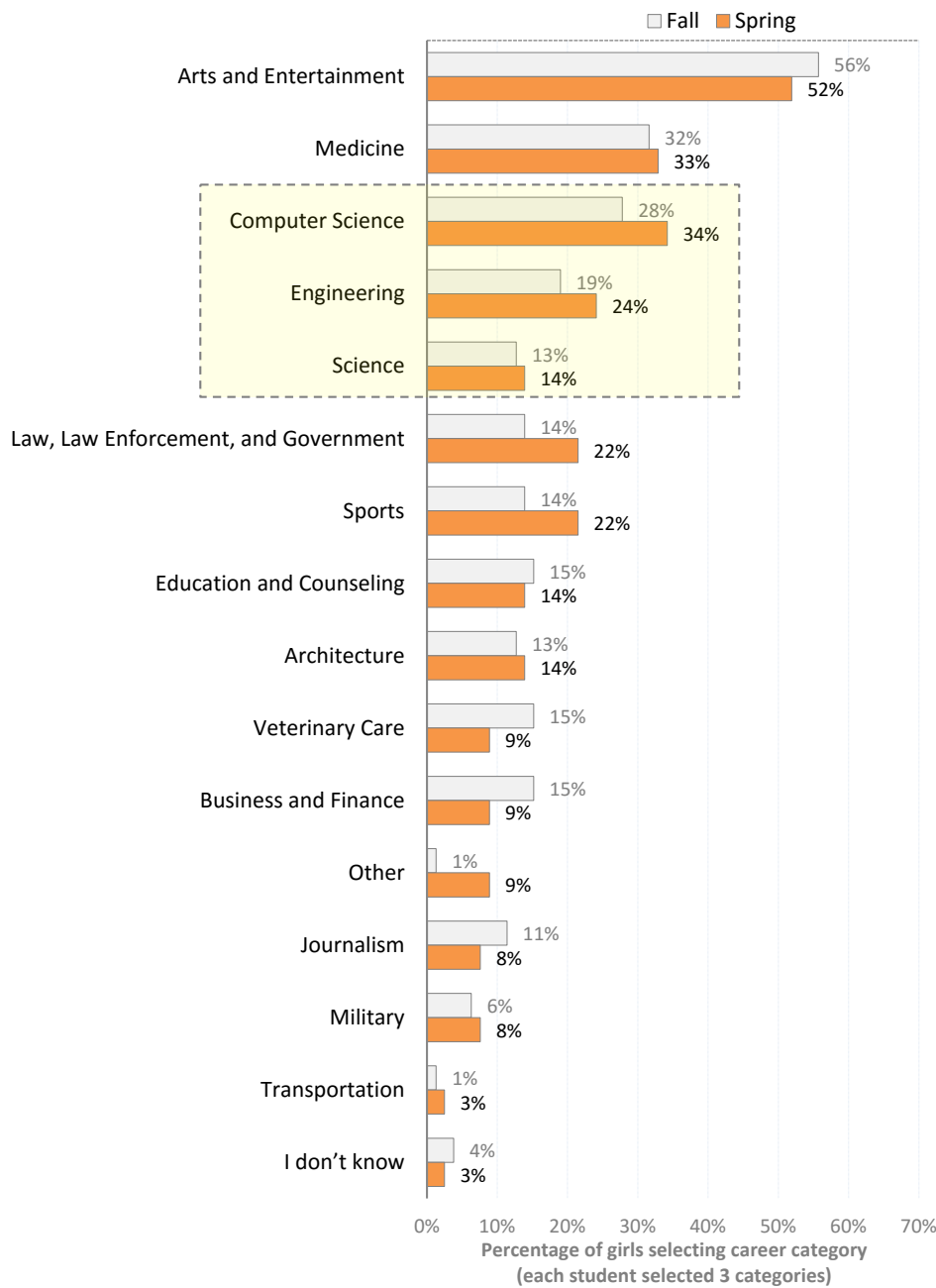


Source: Matched Student Pre/Post Surveys

The pre- and post-surveys asked students to choose three career categories they expected to have when they grow up from a list of 15 provided categories. Students were also given the options to select “I don’t expect to have a career” or “I don’t know,” or to write in a career(s). Figure 20 shows the types of careers Techbridge girls indicated they were interested in at the beginning and end of the year, in order from most to least frequently selected. More students were interested in careers in computer science, engineering and science after participating in Techbridge.

Figure 20. Computer science, engineering and science careers were amongst the most popular careers Techbridge girls said they were interested in.

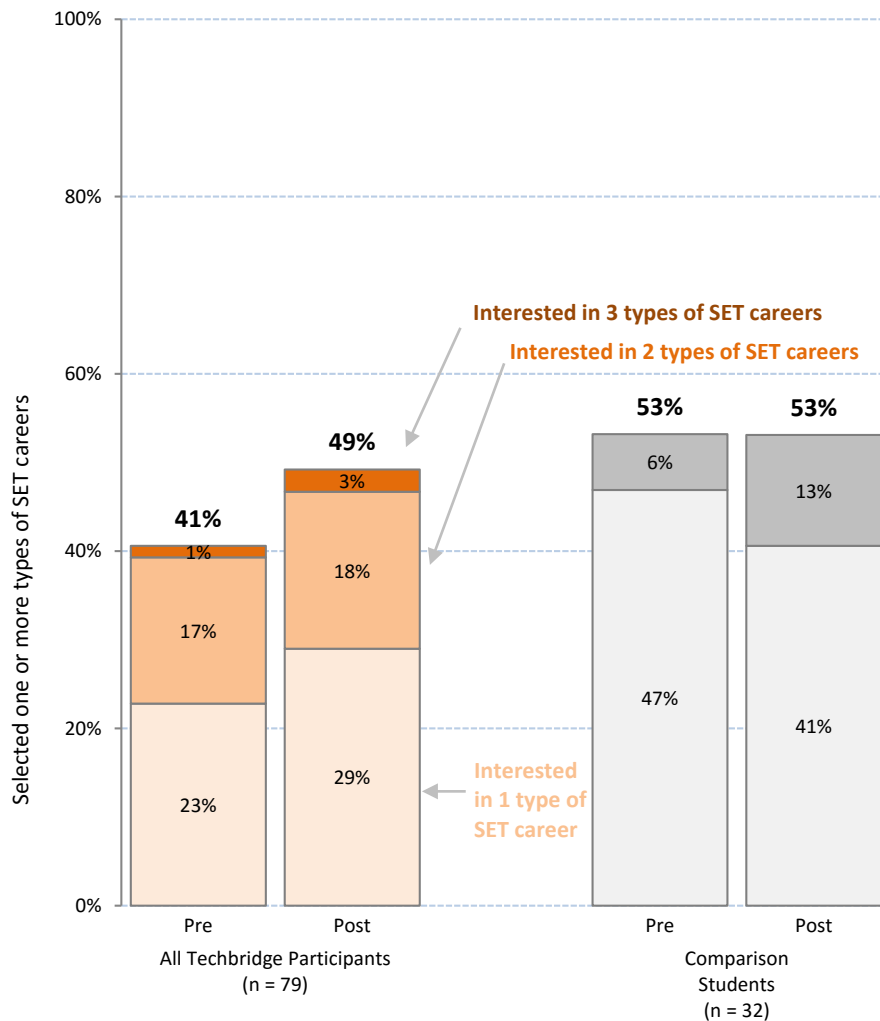
Pre- and Post-Survey Question: What kind of career do you expect to have when you grow up? Check the TOP THREE job categories you expect to have when you grow up.



Source: Matched Techbridge Participant Pre/Post Surveys; n = 79

Figure 21. When asked to pick three kinds of careers that they expect to have when they grow up, more Techbridge students listed a SET-related career in the spring (49%) than in the fall (41%) (i.e., selected computer science, engineering and/or science). In contrast, the percentage of comparison students who listed at least one SET-related career remained the same.

Pre- and Post-Survey Question: What kind of career do you expect to have when you grow up? Check the TOP THREE job categories you expect to have when you grow up.



Source: Matched Student Pre/Post Surveys

3.3.6 What is Techbridge’s impact on girls’ understanding of gender inequities in SET and strategies to ameliorate or overcome them?



Key Findings re: Techbridge’s Impact on Girls’ Understanding of Gender Inequities in SET

Similar to last year, Techbridge may have primarily served girls who already thought SET has good career options for women. Even before Techbridge, participants were almost twice as likely as comparison girls to see engineering as a good career for women. Compared to other program Techbridge elements, teachers were less likely to report that their programs talked about gender inequities in STEM or that the program had a strongly influenced girls’ understanding of gender inequities or how to overcome them. Still, many Techbridge participants said that Techbridge reinforced the message that “girls can do anything,” including SET.

Results

- The student surveys did not specifically ask students about their understanding of gender inequities in SET or strategies to overcome inequities. However, the pre- and post-surveys asked girls to indicate their agreement with the statement that “engineering is a good career for women.” The vast majority of Techbridge students already saw engineering as a good career option for women before participating in the program. At the beginning of the year, 98% of the girls agreed that engineering is a good career for women (with 70% agreeing “a lot”; see Figure 22 on the following page). Comparison students had slightly less positive attitudes, with 42% agreeing “a lot” on the pre-survey that engineering is a good career for women.

- On the surveys and in focus groups, some girls said Techbridge was empowering to them as girls:

“Now we know that women can make a difference in engineering and science.”

“They help all girls understand that we can do anything a man or a boy can do and it inspired me to work hard in what I’m good at.”

“Techbridge teaches us [that] just because we are girls, it does not mean that we would do worse than men, that men are better than us in the engineering field. We could be just as good as men and even better.”

Similarly, one parent commented on the survey, “[My daughter] learned that women can perform the same careers as women.”

- Teachers were relatively less likely to report that their program had explicitly talked about gender inequities in STEM (compared to other Techbridge program elements). Perhaps as a consequence, teachers were also less likely to indicate that Techbridge had an influence on girls’

“My daughter changed her mentality in regards to studying and doing things she thought solely men could do.”

Techbridge Parent

understanding of gender inequalities within SET compared to other student outcomes. Sixty-three percent of teacher respondents agreed said their girls had more knowledge of gender inequities in SET to a “large” or “very large” extent, and 51% of teachers said girls had learned strategies to overcome them to a “large” or “very large” extent. (These results were very similar to the previous year. In 2015-2016, 69% of teachers indicated their girls had more knowledge of gender inequities in SET and 54% indicated girls had learned strategies to overcome them to a “large” or “very large” extent.)

In an interview, one teacher said they had talked about gender inequities in STEM “a little bit” in Techbridge. She went on to explain:

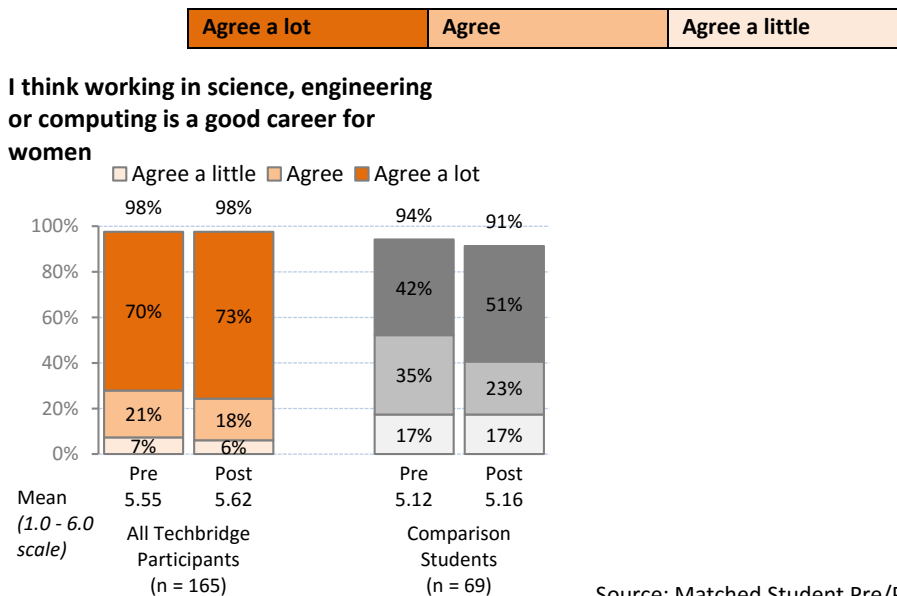
“That’s a concept, I think, that’s hard for them to wrap their head around... I think that it’s so abstract to them. Because I think if you ask most of the students what they want to do as a career, you still get sports, or ‘I want to do makeup and hair.’ I think that’s something that we have to continue to build in order for them to see that there are all these other careers out there.”

In contrast, another teacher said her program had talked about gender inequities in STEM and “they can repeat it all back to you”:

“They [Techbridge girls] know that women and particularly women of color are underrepresented in those fields. I don’t know if they would be able to articulate why. They’d be able to tell you they’re underrepresented, they’d probably would be able to say something about opportunity. Maybe the piece that they wouldn’t be able to explain is about mentorship, guidance, societal factors. I think that would be trickier for them, but they are aware that they are underrepresented.”

Results of Individual Survey Questions

Figure 22. The vast majority of Techbridge girls (70%) agreed a lot that engineering is a good career for women even before participating in Techbridge.



Source: Matched Student Pre/Post Surveys

3.3.7 What is Techbridge’s impact on girls’ understanding of processes and practices commonly used in SET, and ability to use these practices (e.g., using the engineering design process)?



Key Findings re: Techbridge’s Impact on Girls’ Understanding of SET Practices

Techbridge helped girls understand and apply various processes and practices commonly used in SET, such as the engineering design process. Like the previous year, of the various outcomes addressed by the evaluation, the Techbridge program appeared to have the greatest impact on girls’ understanding of and ability to use SET practices.

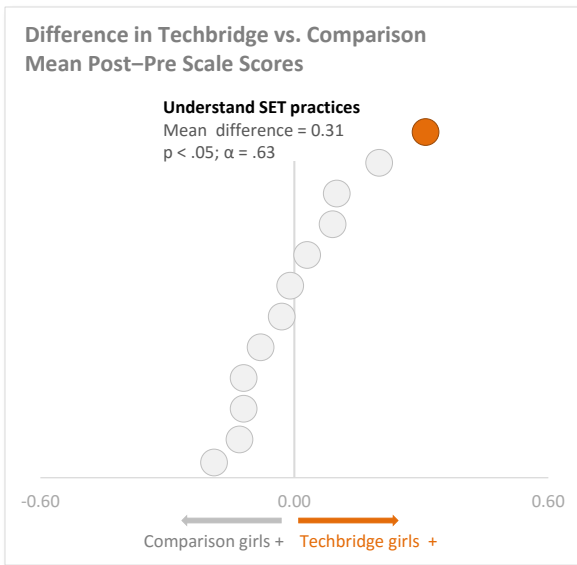
Results

- The percentage of Techbridge girls indicating they know what the engineering design process is increased from 73% at the beginning of the year to 90% at the end of the year ($p < .01$; see Figure 24 on page 39). Similarly, the percentage of Techbridge girls who agreed they know how to use the engineering design process to build something increased from 75% to 90% ($p < .001$). (In contrast, less than half the comparison girls indicated they knew what the engineering design process is or how to use it at the end of the year.) The average Techbridge student’s mean SET practice scale score was 0.31 points higher than the average comparison student’s (see Figure 23 on the next page; $p < .05$). (The results from these questions were virtually identical to those in 2015-2016.)
- In focus groups, girls were able to consistently and clearly describe the steps of the engineering design process, including that it is an iterative process. One girl explained,

“First, we think about what we’re going to do. Then we design it in our notebooks. And then we go and get all the stuff we need to make it. And then after we make it, then we show our work. And if it doesn’t really work then go back and we do it again. And then we show our work again.”
- Students seemed to appreciate the value of using the engineering design process. One girl said, “I think it’s good to plan out so you just don’t go straight in head first, but you’re also going to take the time to make...multiple prototypes of what you want and testing something out. It’s also good to have a good plan and take notes and write what you can do next time to do better.”
- Of the various student outcomes that teachers were asked about, teachers said that Techbridge had a particularly large impact on girls’ understanding of the engineering design process. Most of the teachers (81%) said the majority of their girls increased their ability to use the engineering design process to a “large” or a “very large” extent.

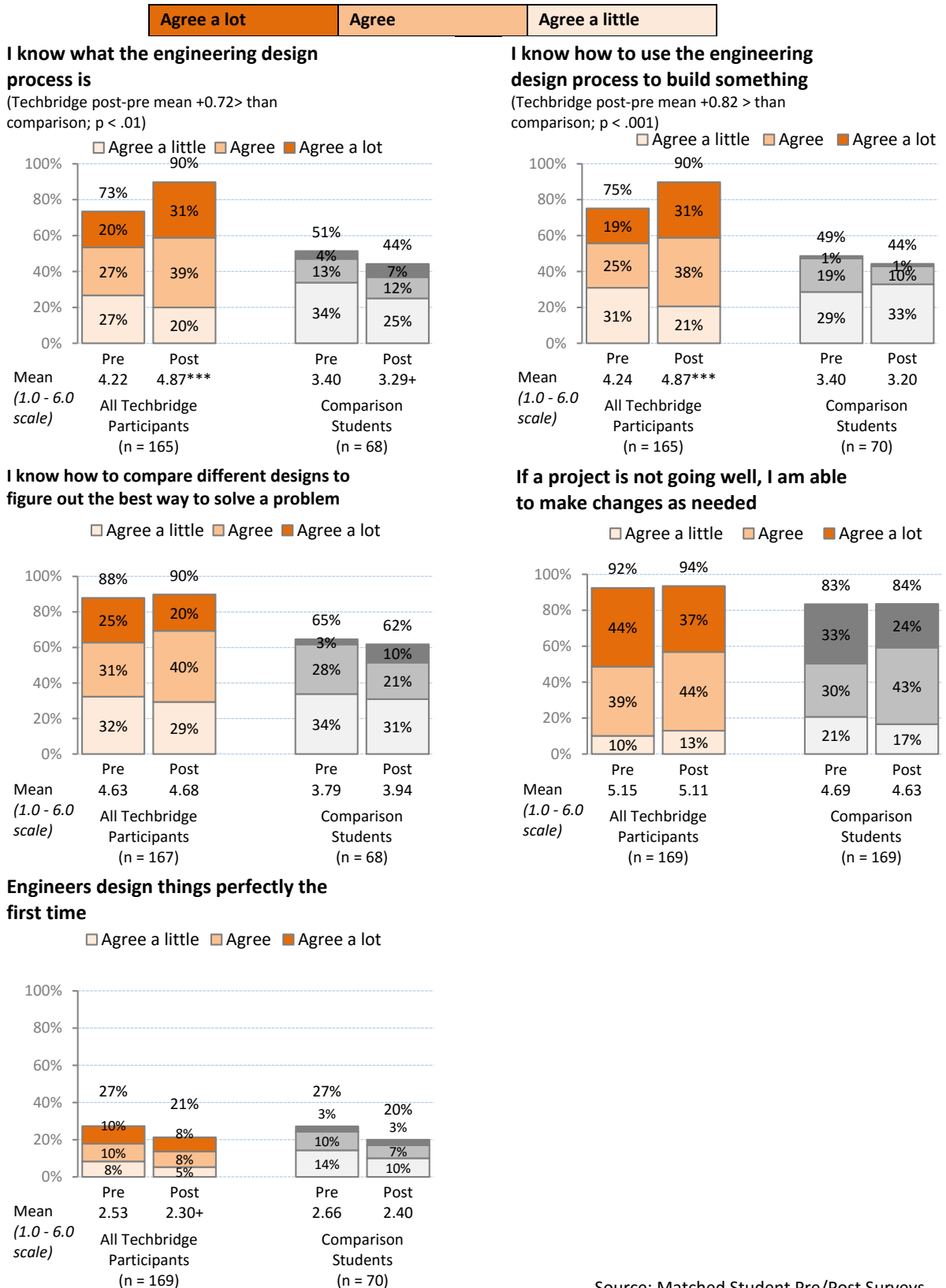
SET Practices Scale (Combined Results of Survey Questions)

Figure 23. Techbridge had a significant impact on girls' understanding of SET practices like the engineering design process.



Results of Individual Survey Questions

Figure 24. More Techbridge girls understood SET practices after participating in the program.



Source: Matched Student Pre/Post Surveys

3.3.8 What is Techbridge’s impact on girls’ growth mindset orientation, problem-solving skills, and perseverance?



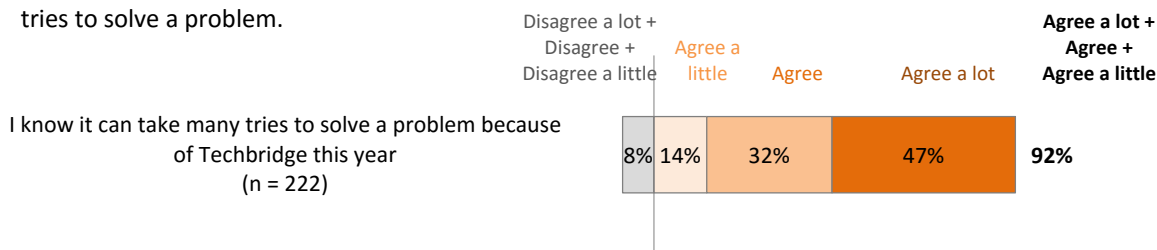
Key Findings re: Techbridge’s Impact on Girls’ Growth Mindset Orientation

Techbridge girls, teachers, and parents reported that Techbridge helped girls become better problem-solvers and to persevere in the face of obstacles. Techbridge participants were more likely than comparison students to ascribe to statements suggesting they have a growth mindset, such as understanding that intelligence is malleable (although differences between Techbridge participants and comparison students were not statistically significant). Techbridge’s emphasis on the engineering design process provides many opportunities for girls to problem-solve, struggle, and not give up. Program coordinators and teachers gently encouraged girls to be patient and persist if they felt frustrated while working on an engineering design challenge.

Results

- The vast majority of Techbridge girls said that Techbridge helped them understand the value of perseverance. A total of 92% of girls agreed that Techbridge helped them understand that it can take many tries to solve a problem, including 47% of girls who agreed “a lot” with this statement.

Figure 25. 92% of girls said Techbridge helped them understand it can take many tries to solve a problem.



Source: Student Post-Survey

- Techbridge girls’ responses to pre-survey questions suggest that many of them already had a growth mindset at the beginning of the school year (see Figure 27 on page 43). For example, on the pre-survey, 93% of Techbridge girls agreed that they learn more when they make mistakes (including 62% who agreed with this statement “a lot”). However, some participants were more likely to have a growth mindset following participation in Techbridge. For example, the percentage of participants who agreed that intelligence is immutable (“I can’t change how smart I am”), declined from 54% on the pre-survey to 34% on the post-survey ($p < .001$).
- Techbridge provides a safe space for girls to experiment, fail, and learn from failure. A number of participants said Techbridge helped them learn problem-solving strategies, as well as the value of persistence. Girls’ comments included:

“It helped me to never give up on something.”

“They [Techbridge teachers and staff] encourage girls to not give up on the first try.”

“They [Techbridge teachers and staff] help us work and help us when something is difficult. Also they give us hard tasks so they can push us to be the best that we can!”

“Techbridge challenges you so you learn how to push through even when your work is challenging. I also like when I make mistakes because I learn from them but sometimes I get upset but this year I learned to keep pushing thru because mistakes help you learn.”

“What I learned so far was that you don’t have to be afraid of thinking out of the box. And also what else I learned is how to if something doesn’t go your way, just keep on trying until you get it right.”

“You’d have to practice to get actually better at it. Nobody’s naturally good.”

“I used to get really mad [when something didn’t work]. But now if it just falls again, I just keep trying. I don’t really get as mad as I used to when we first started.”

“I learned that to do certain things you’re going to have to have patience, because it’s not going to come right away. It’s going to take time.”

“I learned that mistakes help you learn.”

- Techbridge girls rejected the notion that “Some people are naturally good at science, engineering and technology.” In focus groups, girls said:

“I don’t agree with that because...people have to learn how to do it before they assume they’re good at it. Because they can’t be born good at math and science. They have to learn how to do it. And how to get through tough questions and problems.”

“I think it’s a skill that you have to grow up and learn.”

“You’re not just born with it. It takes time and practice how to be an engineer and it takes a while to learn about engineering and stuff like that, it doesn’t come naturally.”

- Teachers said Techbridge helped girls develop a growth mindset orientation: 87% of teachers said the majority of their girls became more likely to believe that they could improve their SET abilities with time, practice, and effort to a “large” or “very large” extent; 81% of teachers said that the majority of their students actually were more persistent in the face of challenges to a “large” or “very large” extent. Teachers were somewhat less likely to report that their girls became better problem-solvers through their participation in Techbridge: 56% of the teachers said that the majority of the girls in their program are better able to construct an argument based on evidence to a “large” or “very large” extent.

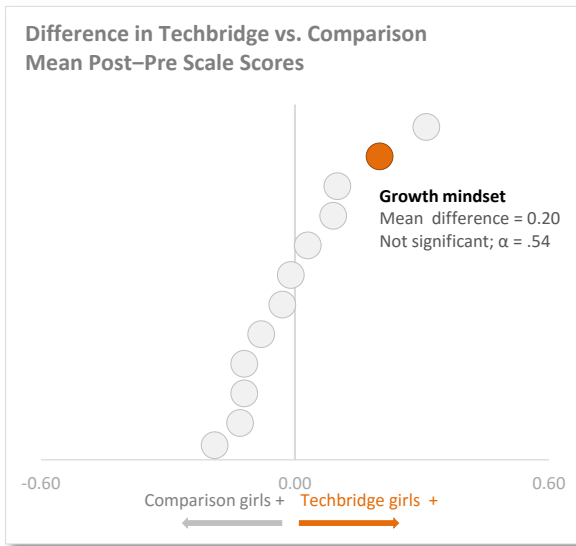
- All respondents to the parent survey reported that, because of Techbridge, their daughters believed that they can become better in SET with hard work. Furthermore, parents reported that Techbridge helped their girls become more willing to try new things (100% of parents) and less likely to give up when faced with something challenging (97% of parents). Several parents commented that their daughter had improved their problem-solving skills. One parent wrote, “It has taught her to persevere when she is presented with a problem, be more patient and communicate better.” Another parent commented, “She is more creative and has learned more about critical thinking.”

“The key area I have seen Techbridge girls demonstrate the most growth in is GRIT! Although learning science and the engineering process may appear difficult, they persevere through it. They didn’t even know the engineering process at first but learned it. At times they didn’t even know they were doing it, but they would master the lesson. Some girls finished early and help others through. Great learning process.”

Techbridge Teacher

Growth Mindset Scale (Combined Results of Survey Questions)

Figure 26. Techbridge students demonstrated more of growth mindset than comparison students.

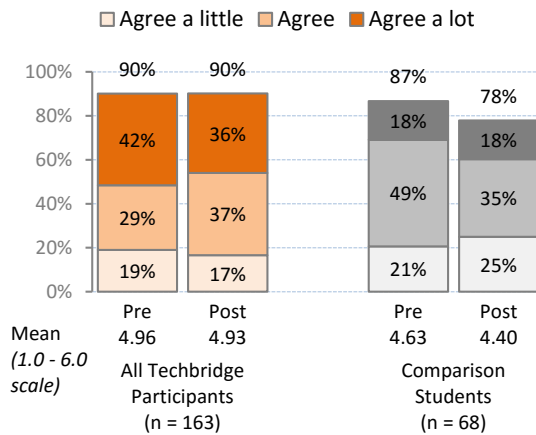


Results of Individual Survey Questions

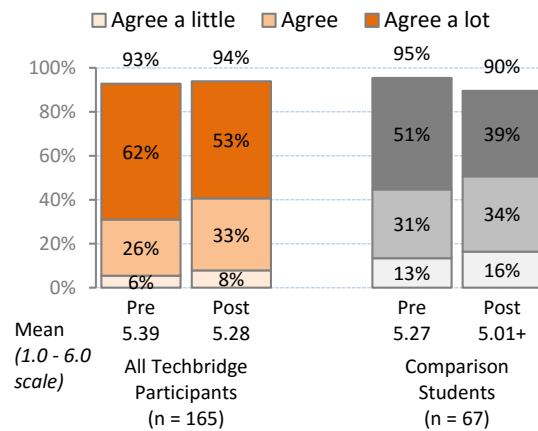
Figure 27. Girls were somewhat more likely to have a growth mindset after participating in Techbridge.



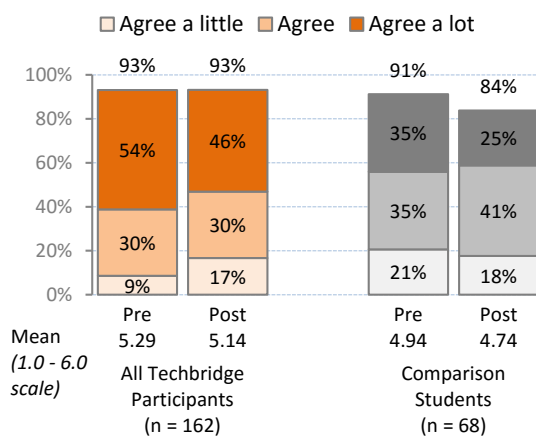
I think I learn more when a task is challenging



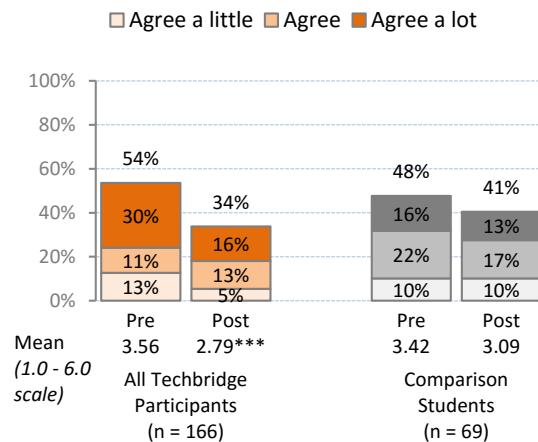
I learn more when I make mistakes



I like doing work that I'll learn from even if I make a lot of mistakes



I can't change how smart I am



Source: Matched Student Pre/Post Surveys

3.3.9 What is Techbridge’s impact on girls’ collaboration skills?



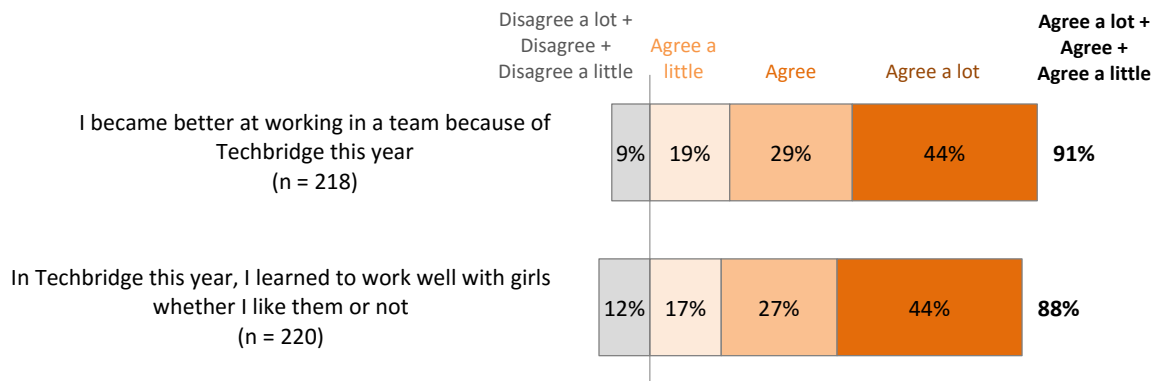
Key Findings re: Techbridge’s Impact on Girls’ Collaboration Skills

Similar to previous years, Techbridge girls’ self-reported attitudes toward teamwork and teamwork skills were very positive prior to their involvement in Techbridge and generally remained high at the end of the year. While the pre/post-survey results suggest little change in girls’ collaboration skills, many girls said Techbridge made them better at working in teams and with partners they did not know.

Results

- The majority of girls (91%) said they improved their teamwork skills because of Techbridge and that they learned to work well with other girls (88%).

Figure 28. The majority of girls said Techbridge improved their teamwork skills.



Source: Student Post-Survey

- Techbridge girls’ responses suggest that most of them already valued teamwork at the beginning of the school year: on the pre-survey, 93% of Techbridge girls agreed they like being part of team (including 48% who agreed with this statement “a lot”; see Figure 30 on page 46). Their ratings are not much different than comparison group ratings before or after Techbridge.
- Many girls said they appreciated that Techbridge emphasized group work (it was one of the reasons girls cited for liking the program although in some cases girls said it was challenging to work with girls they did not know well or get along well with, even if they knew it was to their benefit to collaborate). A few girls said Techbridge improved their collaboration and teamwork skills:

“I’ve learned how to work in groups with girls who I didn’t really know.”

“I learned that when you are in a team you work better.”

“I work better with teams and other girls. I’m not as shy because of Techbridge.”

“Sometimes it’s easier to work with the person you’re assigned to because maybe both of you come back and are able to help each other more with the problems you got.”

“I think it’s fun working together with girls because you get more ideas to build something. They can get more creative with it.”

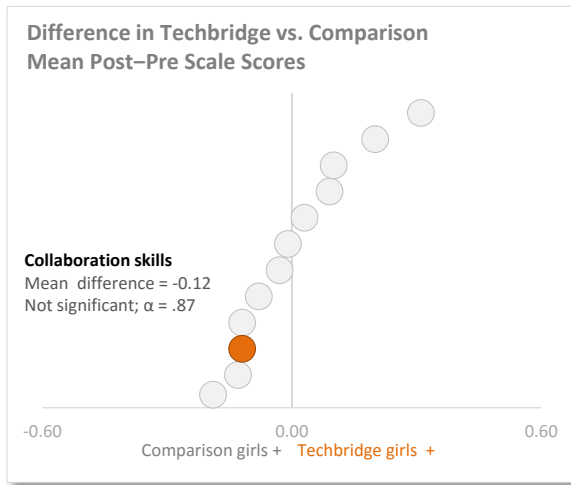
“Working with other girls is sometimes fun and sometimes stressful, because sometimes they don’t want to listen to your ideas, they just want to do it by themselves. But also it’s fun because we can learn a lot from everybody else.”

“The feedback is also important, too, because you’re getting opinions of what people think of your robot and then they’re saying you can do this and that to make it better.”

- 75% of teachers thought the majority of their girls had developed teamwork skills to a “large” or “very large” extent because of Techbridge.
- One parent commented, “Thanks to them, [my daughter] is more open to participate and work as a team.”

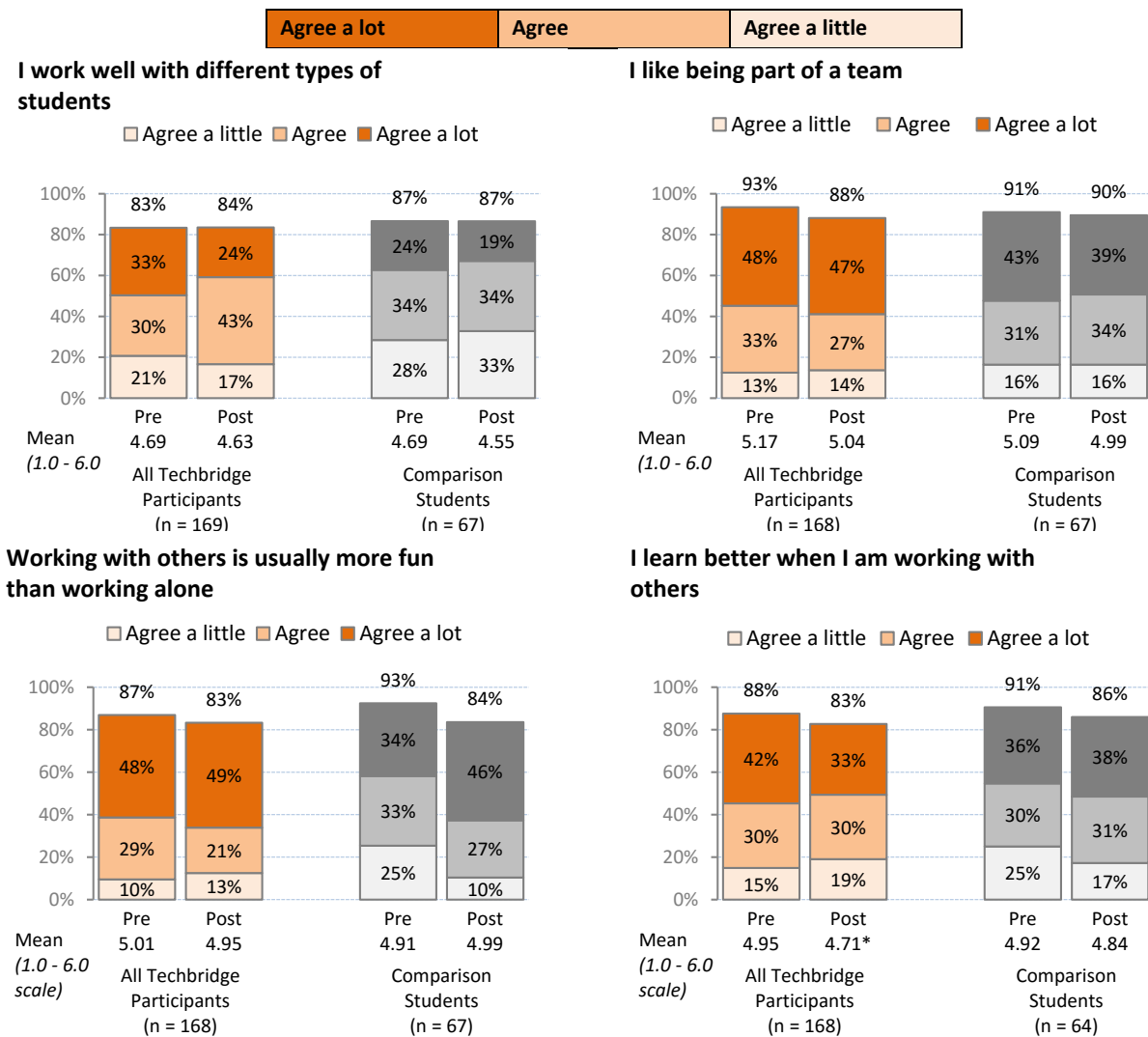
Collaboration Skills Scale (Combined Results of Survey Questions)

Figure 29. The average Techbridge student's mean collaboration skills scale score was 0.12 lower than the average comparison student's. However, this difference was not statistically significant.



Results of Individual Survey Questions

Figure 30. Girls' collaboration skills were already high and changed relatively little following Techbridge.



Source: Matched Student Pre/Post Surveys

3.3.10 What is Techbridge’s impact on girls’ speaking skills and confidence in expressing their ideas?

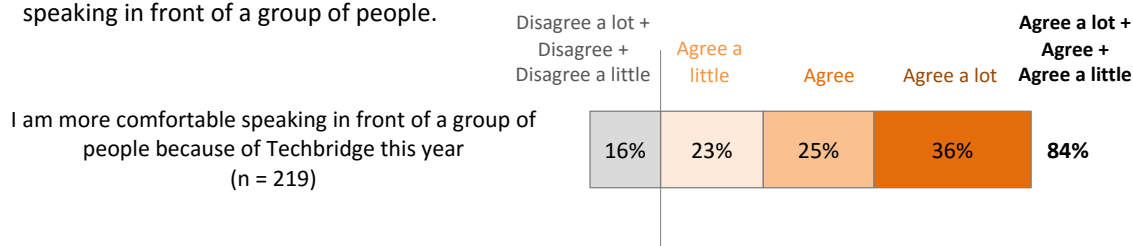
★ Key Findings re: Techbridge’s Impact on Girls’ Speaking Skills/Confidence

While some Techbridge girls reported having more confidence in public speaking situations, others did not make gains in their public speaking skills or confidence. Public speaking continues to be an area of growth for Techbridge participants. However, girls, teachers, and parents often noted that Techbridge participants become more vocal during the program, in Techbridge, and in other settings.

Results

- Compared to other program impacts—and similar to previous years—girls reported that Techbridge had relatively less influence on their speaking skills. The large majority of Techbridge girls (84%) agreed that the program helped them become more comfortable speaking in front of a group of people, but only 36% agreed “a lot.”

Figure 31. 84% of girls said Techbridge helped them become more comfortable speaking in front of a group of people.



Source: Student Post-Survey

- The majority of Techbridge girls said presenting in front of others makes them feel proud (78% on the pre-survey and 76% on the post-survey; see Figure 33 on page 49). (Slightly fewer girls said they public speaking made them feel proud than in 2015-2016, when 84% of participants said on the post-survey that speaking in front of others made them feel proud.) Although more girls said they like to speak up in class after participating in Techbridge (increasing from 66% to 69%), fewer girls said they feel like they do a good job when they present after participating in the program (declining from 87% to 84%) ($p < .10$).
- In focus groups, a number of girls said that Techbridge had helped them become more confident at sharing their ideas with others:

“At the beginning of the year I was kind of shy. I didn’t really want to speak up and stuff, and now I’m really loud with my ideas.”

“I’ve learned how to talk more with other people. Before Techbridge I was really quiet, and now I feel a little bit more comfortable talking to other people and doing this type of thing.”

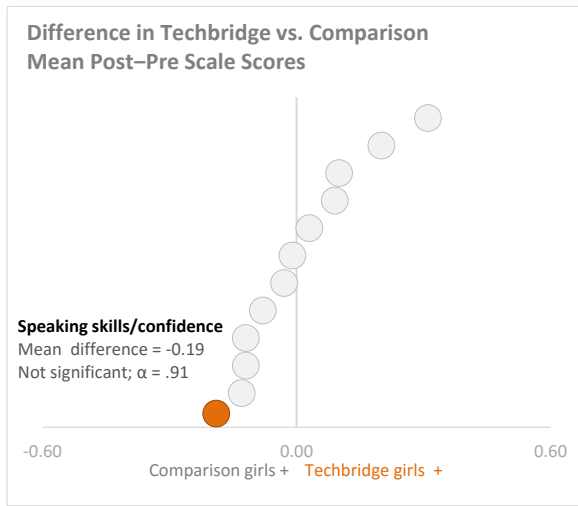
“Improvement in public speaking, confidence. It’s a lot of practice.”

“Finishing off, then emphasizes that you have to practice, practice, practice, and that even if you do practice a lot it’s okay to get nervous.”

- Similar to students, teachers were also somewhat less likely to report that girls had improved their public speaking skills versus other student outcomes: 56% of teachers said their girls were more comfortable speaking in front of a group and 50% of teachers said their girls were more likely to speak up in a group to a “large” or “very large” extent. However, in response to an open-ended question asking teachers what key areas they have seen their girls demonstrate the most growth, one teacher said, “I have seen the most growth in students’ leadership and public speaking. This was especially evident at the spring open house, which the students largely planned and ran.”
- In contrast to teachers and (somewhat) to the girls themselves, the vast majority of parents believed that Techbridge helped their daughters improve their communication and presentation skills: 97% agreed their daughter appeared more comfortable speaking in front of other people and 99% agreed that their daughters were better able to communicate her ideas to other people. Parents said their daughter was “not afraid to speak in front of around and share ideas” and “is more willing to speak in public.” Some parents said Techbridge had helped their daughters become more comfortable speaking in front of their peers: “Being able to talk more with peeps” and “She has begun to make friends and step outside of her comfort zone being surrounded by older students.”

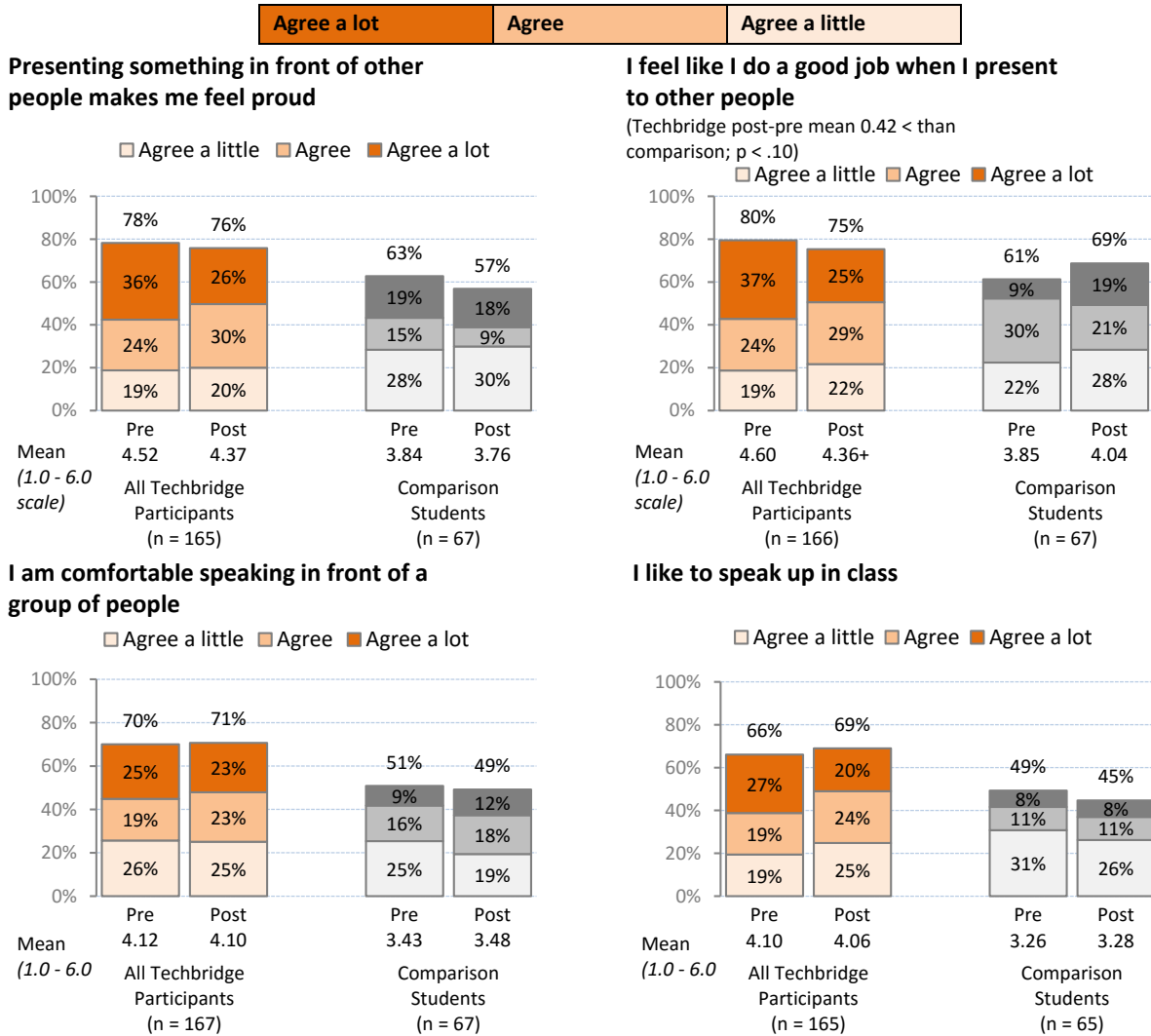
Speaking Skills/Confidence Scale (Combined Results of Survey Questions)

Figure 32. Techbridge students were less likely to report they felt confident public speaking by year-end than comparison students, although this difference was not statistically significant.



Results of Individual Survey Questions

Figure 33. Techbridge girls were somewhat less confident in their public speaking skills at year-end.



Source: Matched Student Pre/Post Surveys

3.3.11 What is Techbridge’s impact on girls’ intention to pursue SET education in high school and college?



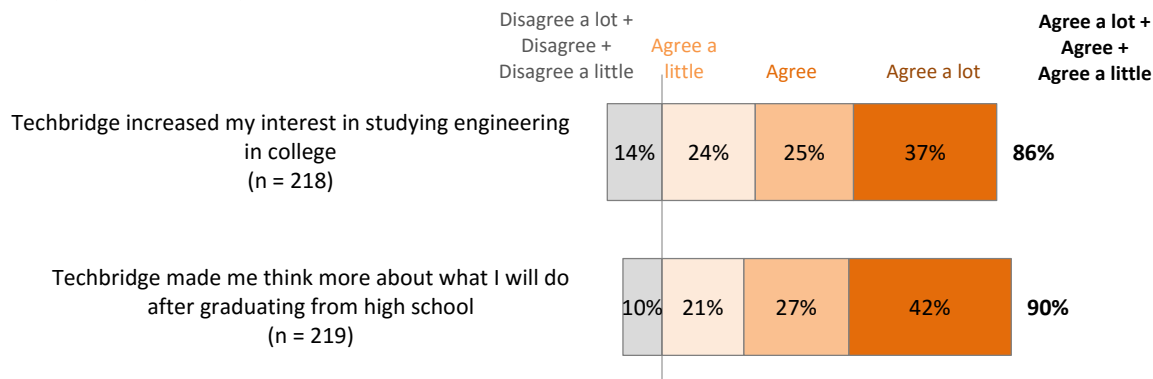
Key Findings re: Techbridge’s Impact on Girls’ Plans to Pursue SET Education

Techbridge appeared to have a small but positive impact on girls’ interest in studying SET in college. Following participation in Techbridge, 84% of participants said they planned to study engineering (vs. 79% before Techbridge). In contrast, comparison students’ reported intentions to study SET remained unchanged.

Results

- The majority of Techbridge girls (86%) said that Techbridge had specifically increased their interest in studying engineering in college.

Figure 34. 86% of girls said Techbridge increased their interest in studying engineering in college.

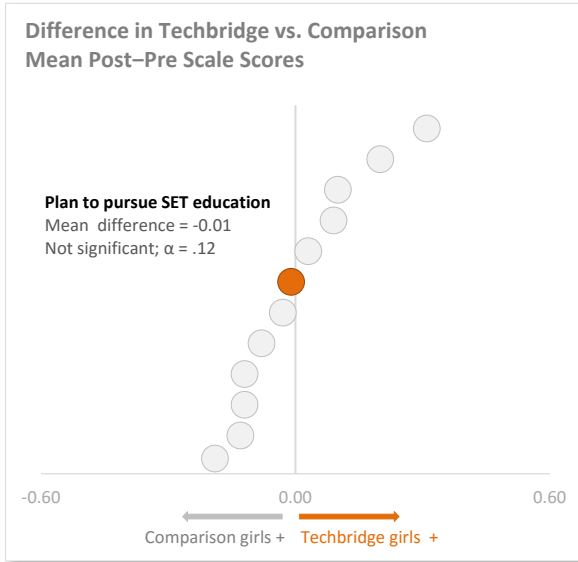


Source: Student Post-Survey

- More than three-quarters of Techbridge girls agreed they planned to study science, engineering or technology in college after participating in Techbridge (see Figure 36 on the following page). The percentage of Techbridge girls who said they planned to study SET in college increased from 79% to 84% (though this difference was not statistically significant). In contrast, comparison students’ interest in studying SET remained the same from pre- to post.
- All the parents who completed the parent survey agreed their daughters were more interested in taking SET classes in high school and college because of Techbridge, including 55% of parents who agreed “a lot.” One parent commented, “She is more interested in science and would like to study in a university.”

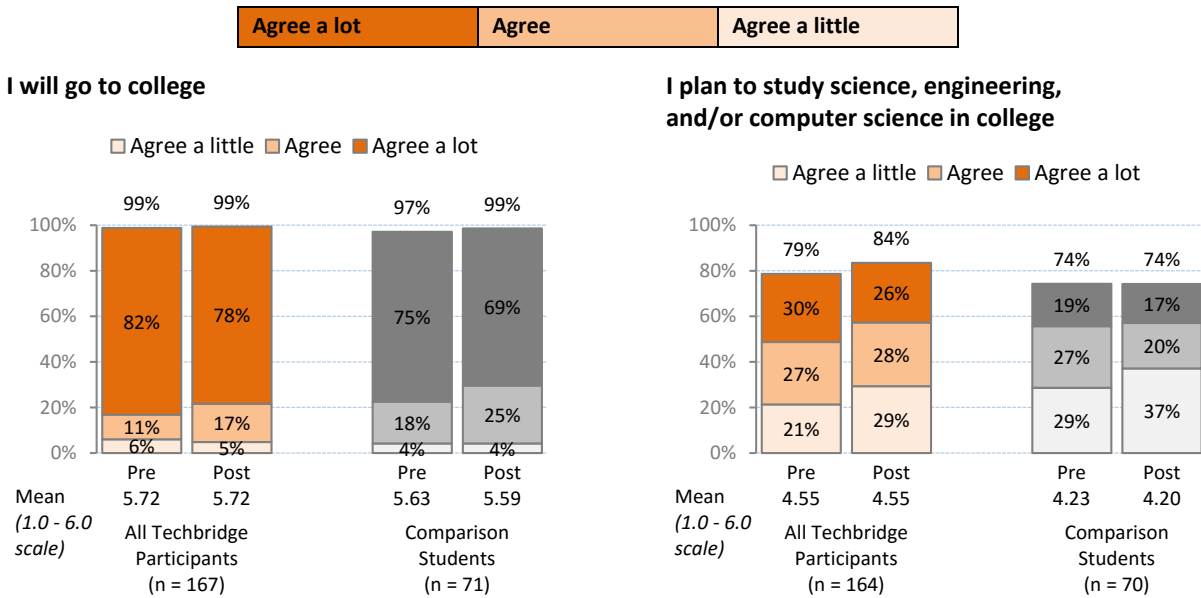
SET Education Scale (Combined Results of Survey Questions)

Figure 35. Techbridge girls and comparison girls had similar post-secondary aspirations.



Results of Individual Survey Questions

Figure 36. A slightly higher percentage of participants intended to study SET after Techbridge.



Source: Matched Student Pre/Post Surveys

3.3.12 What is Techbridge’s impact on girls’ participation in curricular and extracurricular activities (related to SET or otherwise)?



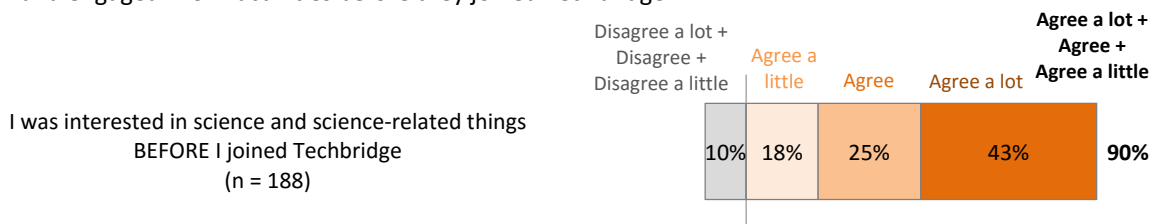
Key Findings re: Techbridge’s Impact on Girls’ Participation in SET Activities

The majority of Techbridge participants said they were already interested in science before participating in the program. A slightly higher percentage of Techbridge girls said they did science and engineering activities outside of school after participating in Techbridge. Families received the list of other SET-related programs and activities from Techbridge, and a few parents mentioned pursuing these activities.

Results

- The majority of Techbridge participants reported that they were already active SET learners before participating in the program. The vast majority of Techbridge girls (90%) said they were already interested in science and science-related things before the program.

Figure 37. The majority of girls said on the pre-survey they were already interested and engaged in SET activities before they joined Techbridge.

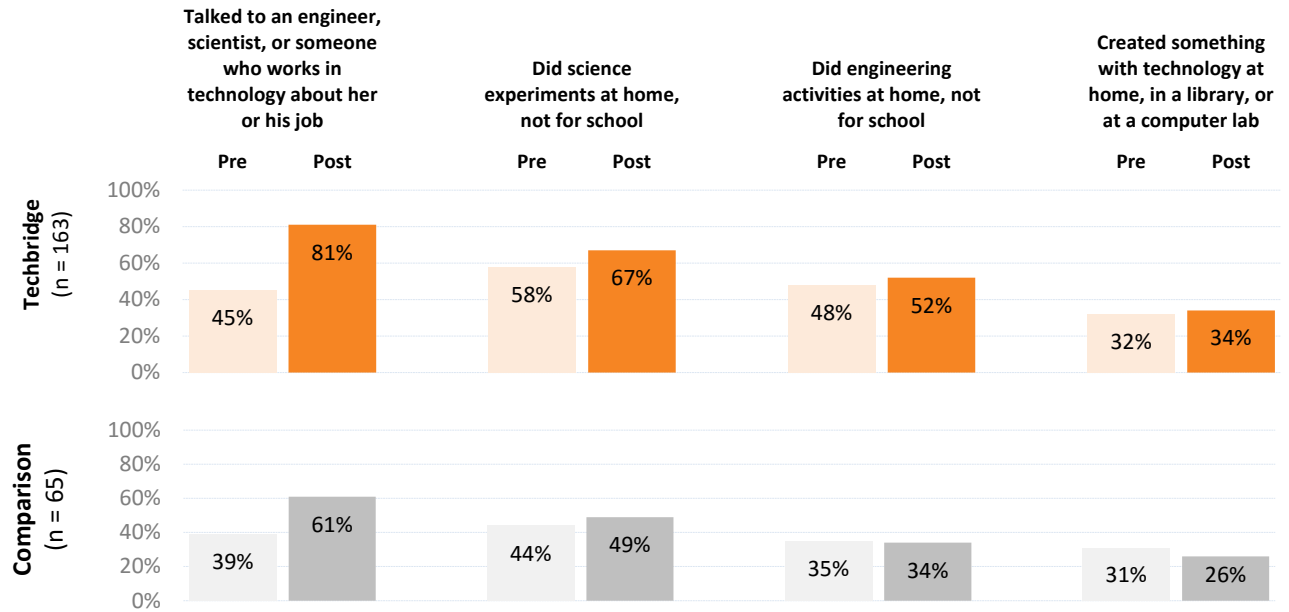


Source: Student Post-Survey

- The percentage of girls indicating they did engineering activities outside of school increased slightly from 48% to 52% following participation in the program (see Figure 38 on the following page). In contrast, the percentage of comparison girls who reported they did engineering activities remained essentially unchanged at 34%.

Results of Individual Survey Questions

Figure 38. More Techbridge girls reported engaging in various SET activities by the end of the year, though there is still room for growth.



3.3.13 What is Techbridge’s impact on girls’ sense of belonging in SET?



Key Findings re: Techbridge’s Impact on Girls’ Sense of Belonging in SET

After participating in Techbridge, girls were more likely to say that someone like them could work in engineering or technology. Many girls said they felt a sense of belonging in Techbridge, and that Techbridge facilitators played a large role in facilitating their identity as SET learners. Girls also consistently noted Techbridge as providing a comfortable and enjoyable environment, which helped them see SET as fun, interesting and achievable. Role models and field trips introduced them to real people who helped make SET careers seem more accessible.

Results

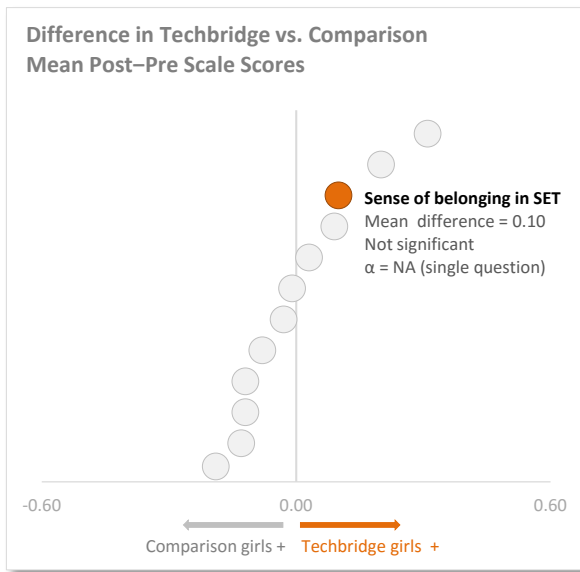
- The percentage of Techbridge girls who agreed that someone like them could work in SET was high both before and after participation in the program, with about 90% of girls agreeing that someone like them could become a scientist, engineer or work in computing (see Figure 40 on the following page). Comparison students were less likely to see themselves as belonging in SET, with 78% agreeing on the post-survey that someone like them could have a SET job.
- In focus groups and on the surveys, a number of girls talked about Techbridge’s “girl power” and how the program enabled them to potentially themselves in SET. Girls commented:
 - “Techbridge helps motivate girls that they could have a career like science engineer even though you are a girl, and it also helps girls to focus on their future jobs.”
 - “Techbridge has brought in a lot of mentors that look like me, so I think to myself if they can do it then why can’t I.”
- Teachers also believed that girls’ confidence in SET grew as a result of Techbridge: 82% of teachers indicated that the majority of their girls became more confident about their SET abilities to a “large” or “very large” extent after participating in Techbridge.

“Techbridge really opened my eyes to the world of STEM and how if we put our mind to it we (all girls in Techbridge) can work in STEM when we get older.”

Techbridge participant

SET Belonging Scale (Combined Results of Survey Questions)

Figure 39. Techbridge participants had a greater sense of belonging in SET relative to comparison students, although the difference wasn't statistically significant.

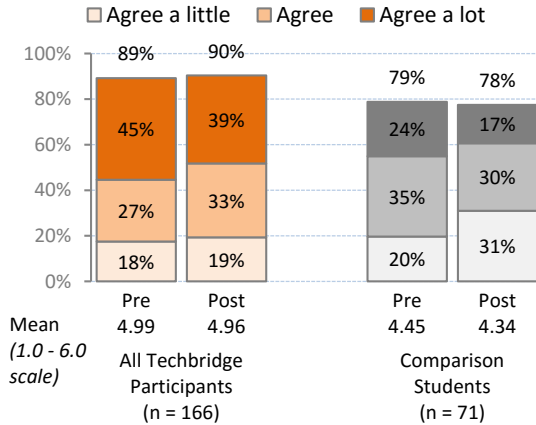


Results of Individual Survey Questions

Figure 40. Techbridge girls were more likely to envision themselves in SET than comparison students.



Someone like me could become a scientist, engineer or work in computing



Source: Matched Student Pre/Post Survey

4 Techbridge's Impact on Teachers & Schools



4.1 What selection process does Techbridge use to identify schools and teachers within those schools?



Key Findings re: Techbridge's Selection Process for School and Teachers

As described in last year's annual evaluation report, the selection process was different at each expansion site. The district partner in Greater Seattle had more input on which schools offered Techbridge. In Washington, DC, programs were offered in DC Public Schools (DPCS) and a few charter schools that Techbridge identified as a good fit. Techbridge considered factors such as the diversity of population reached by the school, having a supportive principal, and whether the school had a commitment or history of prioritizing STEM or gender equity.

Principals typically helped identify teachers to help facilitate Techbridge and looked for teachers who had SET content knowledge, were particularly interested in gender equity, and/or had good relationships with students. This school year each expansion location had two new schools at and one school that did not continue.

Identifying Schools

The selection process for schools in Greater Seattle was covered in detail in the 2015 annual evaluation report. To summarize, Highline Public Schools suggested Techbridge partner with its STEM Academy schools and then suggested one other school that it thought would benefit from the program. Highline is also focused on creating a pathway for students involved in Techbridge at their elementary schools be able to continue in middle school and then high school, which has influenced the school selection. During the second year of implementation, 2015-2016, Techbridge continued at all of the same schools and added one additional school. In the third year in Greater Seattle, a total of nine schools hosted Techbridge: two new schools were added (one elementary school and one high school) and one middle school did not continue.

In Washington, DC for the first year of implementation in 2015-2016, a Techbridge staff member and the regional Executive Director worked together to identify seven schools that they thought would be a good fit. Five were from DCPS and two were charter schools. In 2016-2017, all but one school continued to host Techbridge and two new schools were added.¹⁰

When selecting schools, Techbridge looked for schools that reached a diverse population, that had a supportive principal, and had a commitment or history of prioritizing STEM or gender equity. Table 2 (on the following page) shows data illustrating the characteristics of the schools selected to host Techbridge.

¹⁰ One of the new schools in 2016-2017 was added in January 2017 using funds from a new Boeing grant.

Table 2. Techbridge staff and district representatives considered various factors when selecting schools to participate.

Considerations when Selecting a Techbridge School	Supporting Data
Diversity of population	<ul style="list-style-type: none"> • See school demographic data covered in the student outcome section of this report (pages 9 – 11). • <i>“I think for a little over a third of our students, Spanish is their first language at home. Then our second most common language is Somalian. Then I think we have 30+ languages...We range somewhere from 82 to 86% free and reduced lunch.”</i> (Techbridge principal)
A supportive Principal	<ul style="list-style-type: none"> • <i>“[Our principal] was a science teacher. She loves Techbridge. She was going to come on the field trip today...she comes and checks in on us.”</i> (Techbridge teacher) • <i>“Admin is definitely on board. I’ve asked our administrator, ‘Can we go on these field trips?’ And she’s like, ‘Go crazy.’ She’s very pro-Techbridge. So is our assistant principal. One of science coaches supports me all the time...and the computer and technical educator guy at the district has been coming in and supporting. Both of them came to the Family Night. Overall people are like, ‘Yay, Techbridge.’ Which is nice.”</i> (Techbridge teacher)
STEM/SET as priority	<ul style="list-style-type: none"> • <i>All kids take a technology elective in fifth/sixth grade. We have one-to-one tech [for our students], so they are super comfortable.”</i> (Techbridge principal) • <i>“We should really be preparing our kids here for those tech jobs. There’s Boeing here and Microsoft. We’re really doing a disservice to our kids if we’re not preparing them for that and especially in a high poverty school that’s so diverse. I think often our kids don’t have access to learning about those types of careers or even think that that’s possible for them. Our core value here is around equity and closing opportunity gaps and this is a huge gap. Especially for girls of color, to really see themselves represented in the science and tech industry and then think, ‘Oh I can do that,’ is so important and powerful.”</i> (Techbridge principal)
Commitment to gender equity in STEM	<ul style="list-style-type: none"> • <i>“In terms of the Techbridge mission of engaging girls and empowering girls, there is a need for that. Most of our students are low-income in communities where opportunities are not rich. Having program like Techbridge is a great fit as we need to give girls more opportunities. There is a new emphasis [in our district] to ensure girls are getting equitable access to programming.”</i> (District representative)

Identifying Teachers

Principals were typically involved in recommending a teacher to be the co-teacher in the Techbridge program. They described efforts to select teachers who had positive relationships with students, knowledge and/or interest in SET, appropriate pedagogical skills, and strong classroom management skills. For example, one principal described the Techbridge teacher's commitment to equity in STEM, as well as her positive relationships with students:

"She [our Techbridge Teacher] is just bright, inquisitive, and kids love her."

Techbridge Principal

"I think she's very committed to making sure that there's equity in STEM like subjects. She develops really strong relationships with the students, which is helpful to encourage them to attend and to be productive. I think that she is a good choice, and she's very interested in it and very enthusiastic about it, so that helps."

Another principal mentioned their teacher was a good fit due to her role as a strong communicator with the students' parents, saying:

"She [the Techbridge teacher] is also the facilitator of—not only our leadership team in our school—but also the family engagement professional learning community, so the way to reach out to families. It's just a natural. She's a natural communicator with the community."

An inquiry-based teaching style was mentioned by one principal as why a teacher was a great fit. The principal described the teacher as "very comfortable with allowing students to have a little bit of disequilibrium and kind of figure things out themselves."

Once a school was selected, there were not always a large number of teachers available with the capacity to fill the role, so sometimes a teacher was urged to participate who might not otherwise opt in. One teacher explained:

"I think she makes the learning fun for the girls. She makes them want to come back, and she's very dedicated. She's been here sometimes until 5:30 waiting for kids to get picked up, and so that energy, that passion, that dedication... She's willing to do it year after year."

Techbridge Principal

"I've been with the school for going on four years now, and my principal was like, 'I need somebody I can trust,' and I was like, 'Oh, I don't know. My life is busy,' and she was like, 'No. You're the only one I have. I need you to do it,' and so that's how I ended up in Techbridge."

Another teacher said:

"An administrator emailed me and another teacher during summer and said, 'Anybody?' The other teacher had had a baby. At first, it was a process of elimination, but then I met [the Techbridge program coordinator] and it actually sounded really cool. Then we started doing it and I was like, 'This is awesome, so now I want it forever. Now I want it and nobody can take it.'"

One new teacher this year was at least slightly familiar with Techbridge and said she usually commits to help in one afterschool program. She explained:

“I’ve heard really great things about it [Techbridge] and the girls last year really enjoyed it and [the last teacher] couldn’t commit full-time... I thought it was a perfect opportunity to do every other week and still get some exposure to Techbridge and see how that goes.”



4.2 How are teachers trained and supported in the expansion sites?




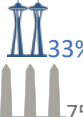








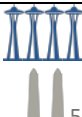

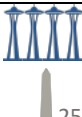














★ Key Findings re: Teacher Training and Support

Teachers had high ratings of the training and support they received from Techbridge, especially the summer training before the program began and the debrief meetings with their Program Coordinator. New Techbridge teachers rated the support as more helpful than returning teachers, though returning teachers rated collaboration with other teachers more highly. Teachers had a few specific suggestions to improve support, such as priming them with questions to ask girls as they circulated during program meetings.

Teachers praised the training and support for Techbridge. The two-day training during the summer was most highly rated, though ratings were lower compared with 2015-2016, with 3 of 10 teachers indicating it was “Moderately Helpful.” (In 2015-2016, all the teachers rated the training as “Very” or “Extremely” helpful.) Meetings with their Program Coordinator to debrief were also considered very helpful. Though there was variation in responses across the sites, there were no statistically significant differences between how teachers from Greater Seattle and DC rated the support they received.

Table 3. Teachers indicated that the initial training and debriefs with the Techbridge coordinator were most helpful.

 represents the response of one DC teacher;  represents the response of one Seattle teacher. Percentages are based on the number of respondents from that site selecting that answer choice for the item.

	Not at all Helpful (1)	Slightly Helpful (2)	Moderately helpful (3)	Very Helpful (4)	Extremely Helpful (5)
Initial teacher training during the summer (n=10) ¹¹	-	-	 33%  25%	 33%	 75%
Debriefing meetings with your Techbridge program coordinator (n=15)	-	 13%	 25%	 25%  57%	 43% 
Teacher trainings/workshops during the school year (n=13)	-	-	 11%  25%	 44%  50%	 44%  25%
Input/coaching from the Techbridge director/manager (n=12)	 17%	 17%	 17%	 33%  83%	 17%  17%
Opportunities to interact with other Techbridge teachers (n=11)	-	-	 57%  25%	 29%  25%	 14%  50%

Source: Teacher Survey

¹¹ A lower response rate for an item may indicate that the teacher did not participate in that training opportunity.

New teachers completing their first year as a Techbridge teacher rated some aspects of the support they received differently than teachers returning for their second or third years. Perhaps not surprisingly, new teachers rated most types of support higher, except for opportunities to interact with other Techbridge teachers (which was rated just slightly higher by returning teachers). New teachers' ratings were significantly higher on the helpfulness of the initial teacher training and coaching from the Techbridge director.

Table 4. New Techbridge Teachers had higher ratings of the helpfulness of support (especially the initial training and input from the Techbridge director) compared with returning teachers.

Mean on 1-5 Scale Not at all Helpful (1) to Extremely Helpful (5)	New Techbridge Teachers (1 st year)	Returning Techbridge Teachers (2 nd or 3 rd year)	Comparison (Independent samples t-test)
Initial teacher training during the summer	4.71 (n = 7)	3.00 (n = 3)	Significantly different (t = -5.9; p < .001)
Debriefing meetings with your Techbridge program coordinator	4.40 (n = 10)	3.60 (n = 5)	Not significant
Teacher trainings/workshops during the school year	4.43 (n = 7)	4.00 (n = 6)	Not significant
Input/coaching from the Techbridge director/manager	4.29 (n = 7)	2.80 (n = 5)	Significantly different (t = -2.8; p < .05)
Opportunities to interact with other Techbridge teachers	3.71 (n = 7)	4.00 (n = 4)	Not significant

Source: Teacher Survey

Teachers wrote that the most valuable aspect of the training and the support was the opportunity to “tinker,” where they got hands-on time to do the activities that the girls would be doing (mentioned in 11 of 16 open-ended survey responses). For example:

“I think it’s really important to get to experience the activities before presenting them to the girls. We get to see the struggles the girls will have and how to push them through those and we can better see the goal of the activities.”

In an interview, one teacher mentioned the importance of connecting with the other Techbridge teachers to think through how the activities might go over with their students. A teacher survey response mentioned a similar idea, “Trainings with other teachers has been very valuable, since it allows us to share what’s working, and troubleshoot problems together.”

Teachers reported that the ongoing support they received from their Program Coordinator was especially helpful, including seeing the slides, reviewing the content and key terms, and talking through the activities coming up that week.

On the survey, six teachers suggested it would be helpful to have more information on the activities in the curriculum, such as a “deeper dive into each lesson,” helpful tips regarding likely failure points or questions to prompt students, and more transparent learning goals. One teacher felt that more trainings throughout the year would be helpful, though most teachers seemed satisfied with the frequency of the trainings. For

example, one teacher said that if they were more often, she would not attend. Other suggestions included providing more support for teachers (especially new teachers) on how to plan a field trip.

One teacher wrote that the training from Techbridge has not been crucial because the program and curriculum are so organized and straightforward and the girls get into a routine where they know what steps to take and can work on their own. These factors might diminish the importance of having a highly prepared teacher.

“I think Techbridge is very straightforward. I think the PowerPoints are very straightforward. I think the projects are very clear. I think that it’s also very clear to the girls when they’re presented with a project just because they have such background because of Techbridge at the beginning and especially if they had done it the year before. Once they understand the design process, the engineering design process, the brainstorming—once they understand that, they have their notebooks and they’ll just get started. They’re like, ‘This is the problem or this is where we want to get to.’ They work through it themselves, to be honest. I don’t feel like I need in-depth training into each of the projects.”

Overall, most teachers were very complimentary of the Program Coordinators and the support they provided.

“[My Program Coordinator] is really good. She’s really, really awesome at understanding STEM to the degree that she feels confident leading girls through it. She’s pushed me along quite a lot, but she’s extremely good at it. She brings it to a whole new level, because she is a woman in a STEM career.”

4.3 To what degree do teachers have a leadership role in their program?



Key Findings re: Degree of Teacher’s Leadership in Techbridge

Teachers were mostly very satisfied with the level of leadership and decision making they had in their Techbridge program, though the role of teacher varied widely from program to program (or day to day). Teachers were generally content and appreciative of the opportunity to serve as a “supporting” teacher to the Techbridge Program Coordinator.

Most teachers (69%) were “Very satisfied (4)” with the amount of leadership and decision making they had in the program (see Table 5).

Table 5. Most teachers were very satisfied with the amount of leadership they had in the program.

	Percentage	Count
Very satisfied (4)	69%	11
Moderately satisfied (3)	19%	3
Fairly satisfied (2)	13%	2
Slightly or not at all satisfied (1)	-	-

Source: Teacher Survey (n = 16)

One returning teacher who was “Fairly Satisfied” wrote,

“I was not included in teaching or making any curriculum decisions or offered any choices for field trips. This year I was less involved, but, on the other hand, I was more familiar, so I felt I was able to strongly support my Techbridge leader and students. At the end of a long school day, being the supporter is not bad at all.”

In interviews, teachers commented on being content with a support role and satisfied with not having a high level of control or decision making. They were strategic in taking a role that was tailored to their strengths:

“I appreciate that [my Program Coordinator] is very organized and does 95% of the prep in terms of lesson and materials, but she’s always willing to listen to ideas or try something to see how girls respond. That’s where she relies on me, because I know the students.”

Teachers feeling content with a limited role came up during interviews in discussions of the new Inspire elementary school model that would entail teachers leading a program without a Program Coordinator present. One teacher considered strategies to make taking over that role go more smoothly:

“Already the day is very tough for me...if it’s circuitry, I can maybe figure it out. If it’s 20 [students] at a time, that’s a lot. Yesterday, we had 25 kids [in Techbridge] and both of us were running around to help. [Having a] choice of units for the teacher would be great—it could be something we were comfortable with and hopefully connected to what we’re doing in school.”

“I loved that somebody [the Program Coordinator] came in. I liked the way it is this year. I like being supported. They respect her more, and it gives me a break.”

Techbridge Teacher

4.4 What is the effect of the program on participating teachers, including their interest, knowledge and use of strategies to engage girls in SET; their awareness and promotion of SET careers; and their awareness and promotion of SET resources for girls?



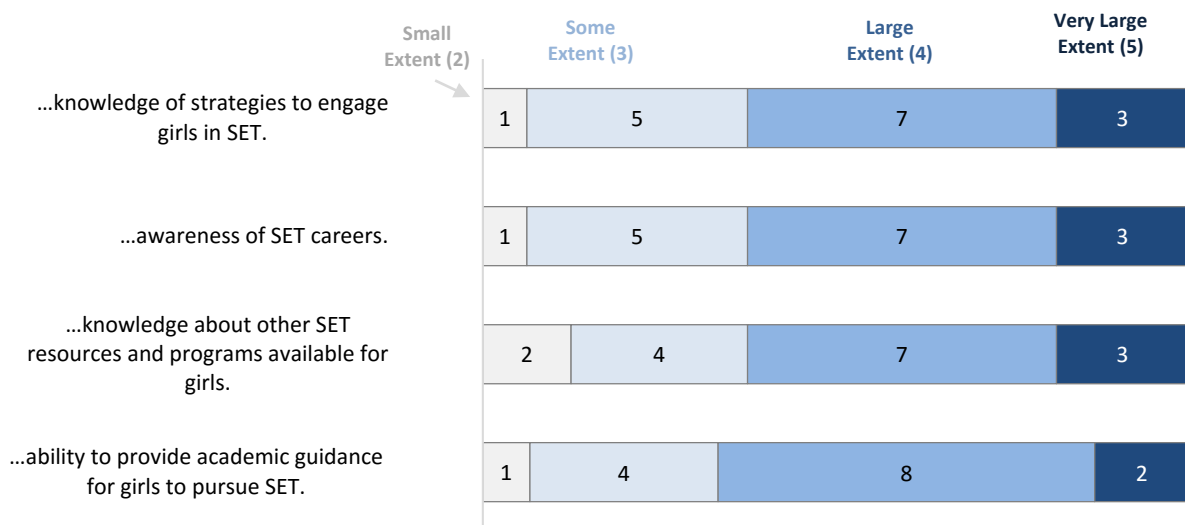
Key Findings re: Techbridge’s Impact on Teachers

Techbridge teachers were impacted by their involvement in the program, especially in their knowledge of strategies to engage girls in SET and awareness of SET careers.

Teachers indicated at least a small impact on each of the four areas measured in the teacher survey. The highest areas of impact were increases in knowledge of strategies to engage girls in SET and awareness of SET careers (see Figure 41). Even in these areas, most teachers indicated a “Large” impact as opposed to a “Very Large” impact. Teachers experienced the least growth in their ability to provide academic guidance for girls to pursue SET (the same as the previous year).

Figure 41. Techbridge increased teachers’ knowledge of how to engage girls in SET.

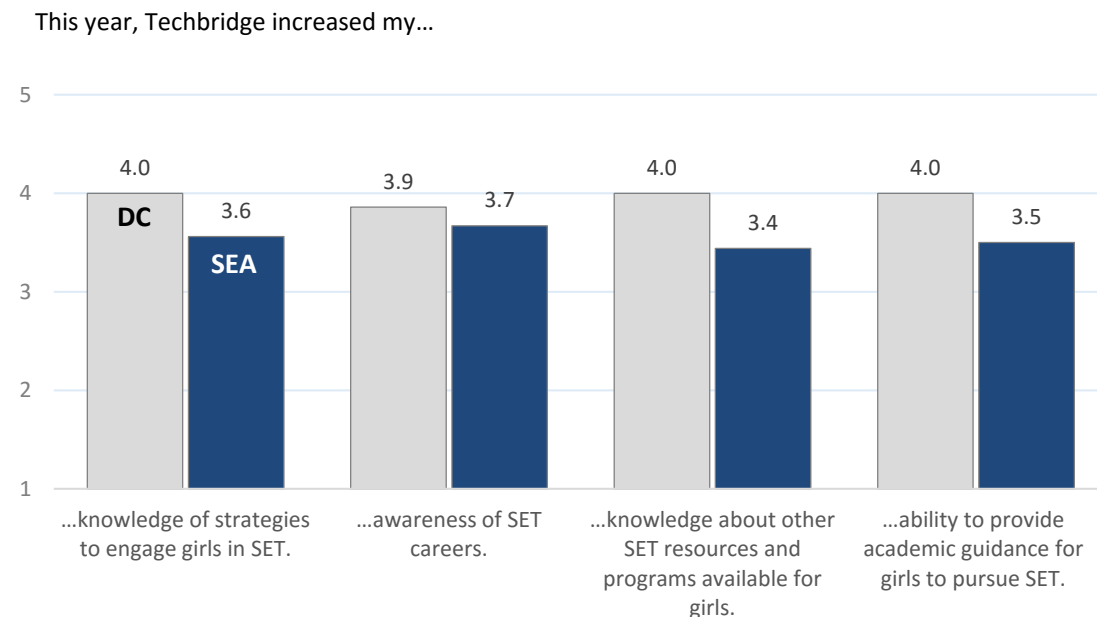
This year, Techbridge increased my...



Source: Teacher Survey (n = 15-16)

There were few differences in ratings between the expansion sites, though means from Seattle teachers were slightly lower in each area.

Figure 42. Teachers from the two expansion sites (Washington, DC and Greater Seattle) had similar ratings regarding Techbridge’s impact on their knowledge of SET.



Source: Teacher Survey (Seattle n = 9; DC n = 7)

When reflecting whether they would continue as a Techbridge teacher, one teacher elaborated on how fortunate she felt to get the training from Techbridge on how to teach STEM. She named it as the most effective training on this topic that she has ever received (see quote box below).

“I feel like I was really fortunate to get this training. Techbridge is the best professional development in terms of teaching STEM that I’ve had—undergrad, grad, or with the district—It’s the best. For me, it’s one-on-one teaching how to teach STEM. [My Program Coordinator] is modeling, coaching... There’s no replacement for that. The PD alone is worth the money that Highline spent... It’s better than the UW graduate work in teaching STEM.”

Techbridge Teacher

4.5 What role do local school districts and/or school administrators have in supporting programs in the expansion sites?



Key Findings re: Role of Districts and School Administrators in Supporting Techbridge

In Greater Seattle, Highline Public Schools continues to play an active role in supporting and shaping Techbridge. In DC, participating schools include both charter schools and DC Public Schools. DCPS conferred to address issues as needed (such as low enrollment at one program), but generally had a more “hands off” role.

Principals from most schools were involved in supporting the Techbridge program at their school. Principals’ roles varied, but included identifying a teacher partner, promoting the program, and communicating with the district. Many principals were able to attend a Family Night.

Role of the Districts

In Greater Seattle, the Highline Public Schools district has maintained an active role in the program despite recent changes in staff who were involved with working with Techbridge. The district has been highly involved in selecting the schools, and pushing for setting up “pathways” that would allow a girl to participate in Techbridge from elementary grades through high school. District representatives see Techbridge’s mission as aligned with the district’s mission of preparing students to be college and career ready, and to be exposed to opportunities that they might not otherwise have.

The Highline district partnered with Techbridge on a Race to the Top grant that reached Somali students and their families. The district has also helped arrange transportation for student participants, distributed payment to teachers, invoiced Techbridge for buses, stipends, and other costs, and worked on any contract-related addendums. District staff communicated with principals this year about changes in how much schools would be asked to contribute to have Techbridge at the school. District representatives felt they had a positive relationship with Techbridge and were appreciative of the responsiveness of the Greater Seattle Techbridge staff.

Highline would like to continue with Techbridge past the duration of this current NSF grant. The district recognizes that Techbridge is in need of more funding and that, until then, will be limited in where they are able to offer Techbridge.

In DC, Techbridge is in five DC Public Schools and the district has been less involved in selecting participating schools compared to Highline. (The remaining three programs are located in public charter schools not managed by DC Public Schools.) A district representative received monthly reports on the program at the schools they were supporting, discussed grant possibilities with Techbridge, and worked with the Executive Director to address low enrollment at one school and implemented strategies such as rescheduling the program to start during “enrichment” time during the school day. DCPS praised the Techbridge DC office for their responsiveness and collaborative nature. They felt that one challenge working with Techbridge was the higher cost compared to other afterschool programs. They would like to promote it

to more schools, but there are other options for afterschool programs that do not require school funding or participant fees. The district representative was not up-to-date on the potential for schools to continue offering Techbridge after the grant expires at the time of the interview.

Role of the Principals

The role of principals varied by site, but often included supporting the teacher, promoting the program to girls and families, helping remove any barriers, providing transportation support for field trips, and communicating with the district. Many principals were able to attend a Family Night, though fewer visited a “regular” meeting of the program.

At both expansion sites, principals mentioned they served as a spokesperson for Techbridge, spreading the word about the program and advocating for its importance and value. One principal spoke about attending a Family Night at the school and being able to see the girls present their work:

“I had a chance to see the girls’ projects and see them really talk about the work that they’ve done and how they got to the place. So it was really neat to see their kind of leadership in terms of being on this kind of stage and talking and being able to explain the work that they’ve done.”

A principal who regularly visited during Techbridge mentioned taking other teachers at the school along to show them the program so they could see the program and their students participating.

Part of a principals’ contribution was sometimes removing any barriers. For example, one principal said:

“I’ve just tried to at least make sure they [Techbridge] haven’t had to want for anything, or like facilities wise, or operations, or financially, or anything like that, so that the program is able to run as seamlessly as possible even if I can’t attend some of those after-hours activities.”

A few principals had a more limited role—where they supported the program, but not in an active way:

“I promote it. I get families and kids involved, then I don’t get in the way. If my teacher needs me, I can help. I don’t do things that keep it from thriving. “

“I go see what they’re doing. I met with people to get ball rolling. I put good people in charge of it.”

For one principal, lack of involvement this year was partially because it was the second year of the program at the school; the principal felt the program was doing well and already “knew how it worked.”

Teachers generally felt supported by their school administrators. In interviews, they mentioned principals supported their programs by providing the space for the program, supplemental materials, and funding for transportation. Most described their principals as responsive to their requests and “checked in” on the program every so often. At one school, a teacher described how the principal worked with other staff at the school to arrange all other afterschool activities around the Techbridge schedule so there were no competing activities on the day when Techbridge was offered. For example, none of the sports practiced on the day Techbridge was offered so that attendance was not compromised. At another school, the principal included a reminder during the school announcements when it was Techbridge meeting day.

5 Techbridge's Impact on Role Models



5.1 How are role models recruited, trained, and supported in the expansion sites?



Key Findings re: Recruitment and Support of Techbridge Role Models

Role models participated most commonly in an in-person training opportunity and almost all of them felt prepared to interact effectively with Techbridge participants. Role models used strategies included in the training, such as sharing personal information about themselves, describing their careers in ways that girls could understand, and making connections between their jobs and the girls' everyday lives. Some role models requested more information on the activities that would be presented the day they were visiting so they could better prepare.

Program Coordinators, supported by their Executive Directors, were primarily responsible for recruiting role models to visit the programs, typically by reaching out to SET-related companies and higher education institutions. Techbridge aimed to involve role models who were female and who reflected the ethnic diversity of participants. Recruiting role models who were similar to the girls participating in Techbridge (at least in terms of gender and ethnicity) was important to establish that people “like them” work in SET and help enable girls envision themselves working in SET. Three teachers commented that it was valuable for students to see role models are similar to themselves. For example, one teacher said, “I think real world examples of STEM careers helps the girls see that they could actually do it. I think it makes a big impact on the girls to see women who look like them working in these STEM fields.”

“[The Program Coordinator] was AMAZING. She was so supportive and responsive to all of our questions and really made the process of volunteering and coordinating super easy.”

Techbridge Role Model

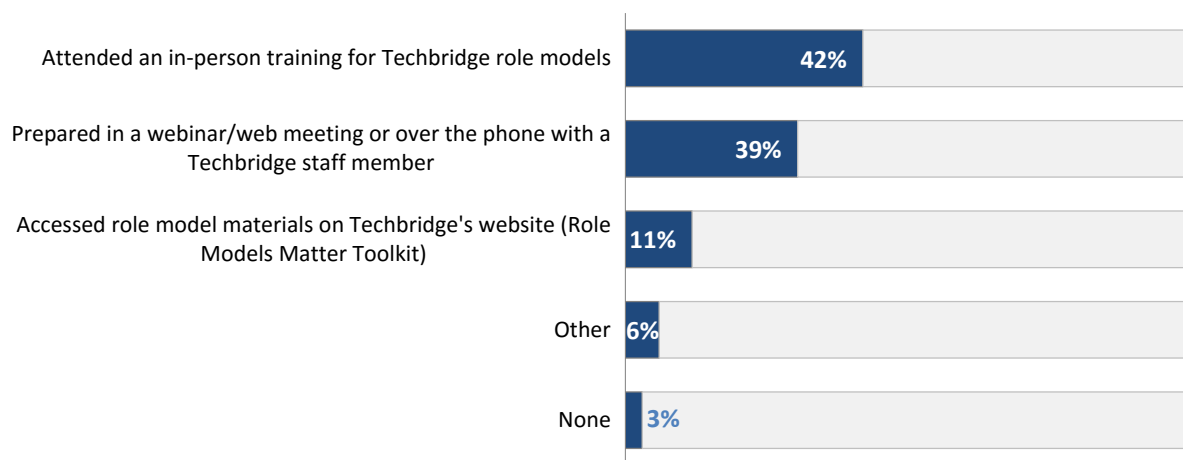
The training and support for role models included information about Techbridge and how to talk to and mentor youth shared through in-person and virtual training opportunities. Techbridge provided role models with the link to the Techbridge website which includes resources related to serving as a role model. Program Coordinators also frequently talked with role models prior to the role model visiting the program and provided details on the day's activity and agenda and any other tips.

Techbridge records of role models who visited programs and/or hosted field trips listed 161 from Seattle and 31 from DC. Administration of the role model survey this year was different from previous years. During Years 2 and Year 3, the project evaluation team sent an online survey link to all role models in the spring. This year, Program Coordinators sent a survey link to role models who visited or hosted a field trip; links were sent at various times over the course of the year. Fewer role models completed the survey this year, with 36 responses received from role models in 2016-2017, compared with 85 responding to the survey administered by EDC in 2015-2016.

Of 36 role models responding to the 2017 survey, 23 (64%) were new to Techbridge for the 2016-2017 year. Thirty had participated by visiting a program one time and six had visited at least three times. In addition, nine role models had hosted a field trip at their work or school.

Only one person indicated they had not participated in any type of training (see Figure 43). Others most commonly attended an in-person training (42%), or a webinar or phone call with Techbridge (39%). Only 11% of respondents accessed materials on the Techbridge website, a decrease from last year when 28% accessed the web-based resources. One respondent participated in both an in-person training and a webinar and one person described their preparation occurred through email exchanges with Techbridge staff prior to role model activities.

Figure 43. Of the various types of preparation that role models might have received, role models most commonly reported that they attended an in-person training by Techbridge.



Source: Role Model Survey; n = 36

All 35 respondents who participated in a Techbridge role model training opportunity indicated that it was “somewhat helpful” or “very helpful.” Role model ratings of the training were higher this school year compared to the previous year, when the majority of respondents (just over 50%) indicated it was “somewhat helpful” and 11% indicated it was “just a little” helpful.

Figure 44. All role models indicated that the Techbridge training was at least “somewhat helpful.”



Source: Role Model Survey; n = 35

When asked for feedback regarding what additional support would be helpful, three survey respondents said it would be helpful to get more information about the activity that was going to be underway on the day they were visiting. One role model said:

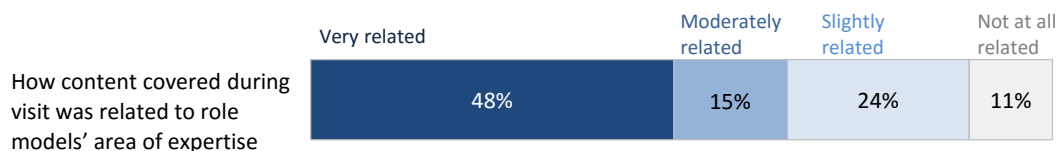
“I wanted to help with the project the girls were working on but I couldn’t answer some of their questions because I was unfamiliar with the materials.”

Other role models suggested sharing videos of past presentations by role models¹², a reminder to practice their own presentation, more examples and tips on how to engage girls, and information on what the girls were interested in. One person mentioned they did not know the role model materials were available via the website.

Six of 21 responses did not have any other suggestions. One commented, “The training material and the discussion prior to the visit was helpful and served as a good guideline. Not sure what else needs to be added.” Another said, “Everything was a positive experience for me and I felt support from Techbridge as well as the moderator (teacher) from each school that was present and helping out with the program.”

Role models were asked whether the content covered during their Techbridge visit was related to their own area of expertise. For about half of the respondents, the content was “very related” (Figure 45). However, 11% of respondents reported that the content was “not at all” related to their work (up slightly from 6% last year).

Figure 45. The content covered during a Techbridge visit was almost always related to role models’ area of expertise.

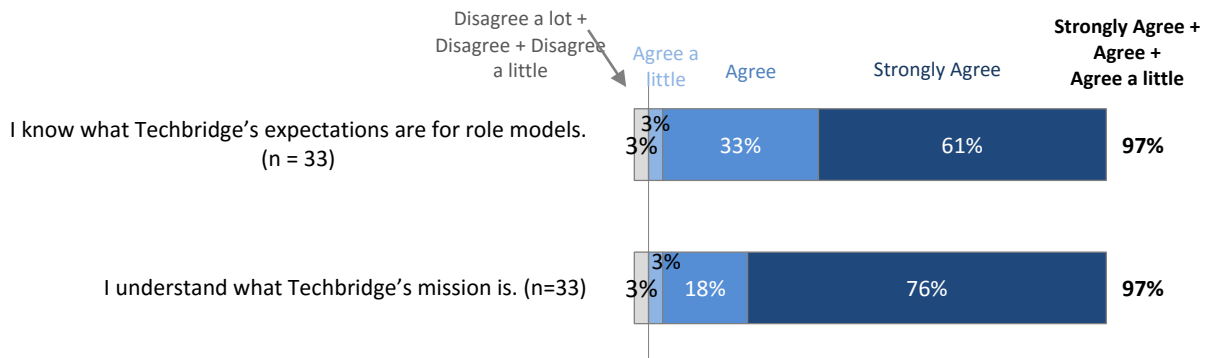


Source: Role Model Survey; n = 35

The large majority of role models indicated that they understood Techbridge’s expectations of role models and understood Techbridge’s mission (see Figure 46).

Figure 46. Almost all role models said they understood the mission of the program and expectations of role models.

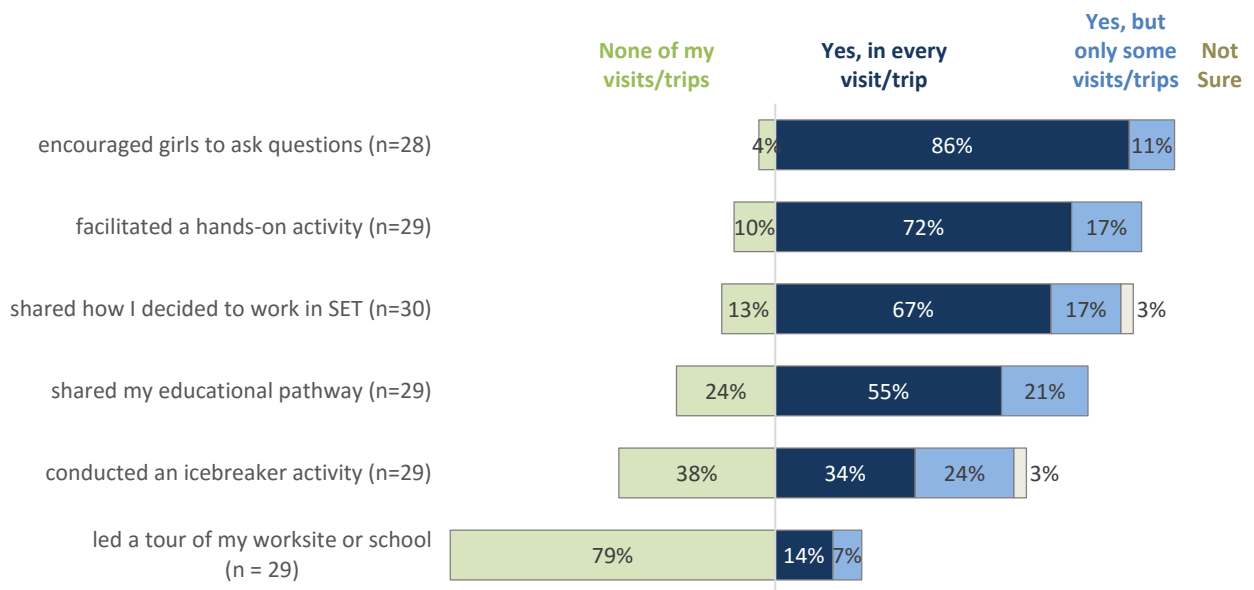
¹² Videos with excerpts of role model trainings are available on the Techbridge website for role models.



Source: Role Model Survey

The majority of role models indicated they implemented Techbridge strategies for engaging with the girls, especially encouraging girls to ask questions (97%) and facilitating a hands-on activity (86%). Role models were also likely to talk about how they decided to work in SET (67% did so at all their visits/trips) and share their educational pathway (55% did so in all visits/trips).

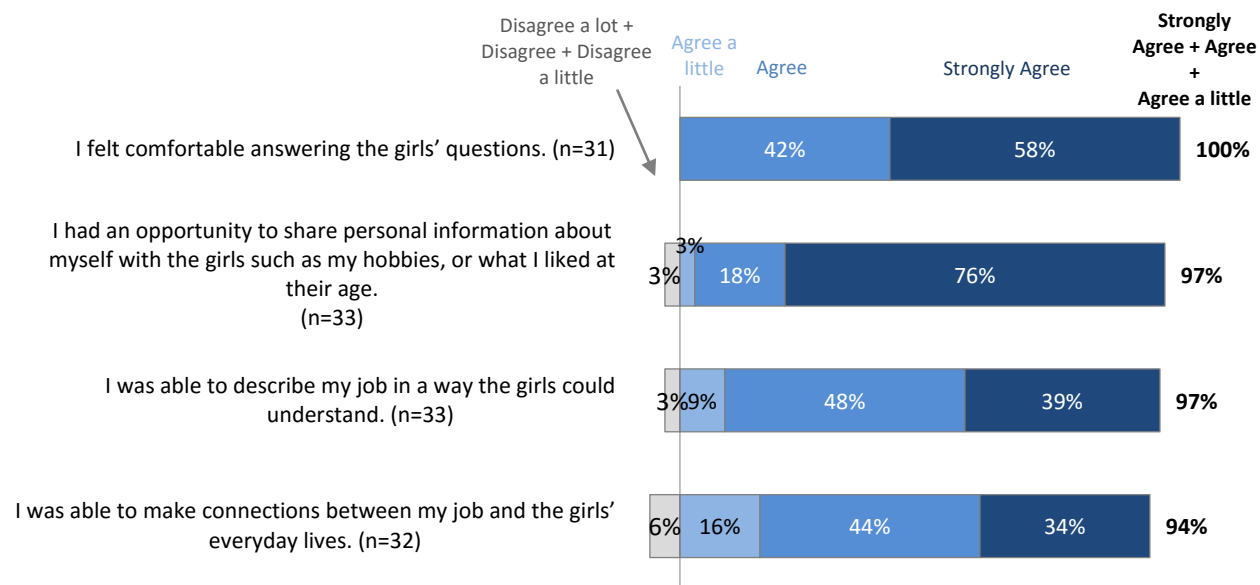
Figure 47. Role models were highly likely to implement most Techbridge strategies during visits to a Techbridge program or field trip they hosted.



Source: Role Model Survey

Every role model felt comfortable answering girls' questions and almost every role model said they shared personal information about themselves, described their careers in ways that girls could understand, and made connections between their jobs and the girls' everyday lives.

Figure 48. Role models almost all agreed that they were comfortable answering girls' questions, shared personal information about themselves and described their job in a way the girls could understand.



Source: Role Model Survey

The role models and field trips were a very important component of the career education aspect of Techbridge. On the teacher survey, six teachers mentioned this benefit of role models. According to one teacher:

“The field trips are beneficial because the students get excited around SET careers and the benefits of a SET career. While we spark that excitement during program and with role model visits, going to the place where the work happens makes it more accessible for girls.”

Other benefits teachers identified from role model visits and field trips included inspiring students to be able to envision themselves as having a STEM career. One teacher said, “Seeing themselves in the lives of role models, re-envisioning their futures, educational opportunities, broadening their knowledge, skills, and networking opportunities.”

Teachers offered recommendations on how to improve role models and field trips, including recruiting more role models who are younger and/or women of color, asking role models to facilitate a discussion of racial inequity, and more connections to women-owned businesses. They also suggested offering field trips where girls can engage in SET activities. Some teachers requested more time to coordinate field trips so the paperwork would not feel rushed. New teachers said it would be helpful to receive assistance or mentorship from returning Techbridge teachers on the logistics of field trips. Finally, a few teachers suggested having more field trips, indicating they were perceived as highly effective.

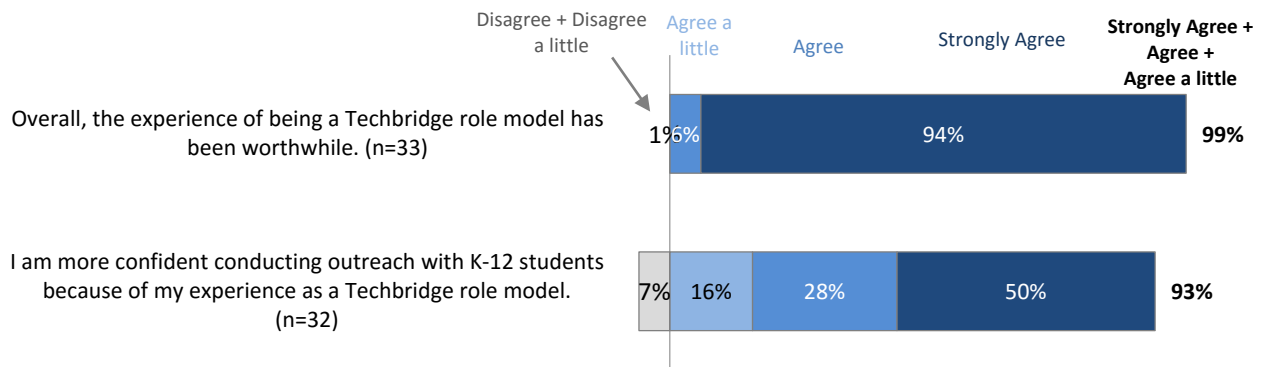
5.2 What is the effect of the program on role models' confidence and effectiveness in conducting outreach with Techbridge girls?

★ Key Findings re: Techbridge's Impact on Role Models' Confidence and Effectiveness Conducting Outreach

All but one role model agreed that serving as a Techbridge role model was worthwhile and 93% agreed they were more confident in conducting outreach due to Techbridge. Role models were interested in continuing to work with Techbridge in the future.

Role models generally offered very positive reviews of the program and their experience as a role model. As one role model said, "Seeing the girls in person was inspiring and I'm really proud to have had a small part of contributing to Techbridge's mission."

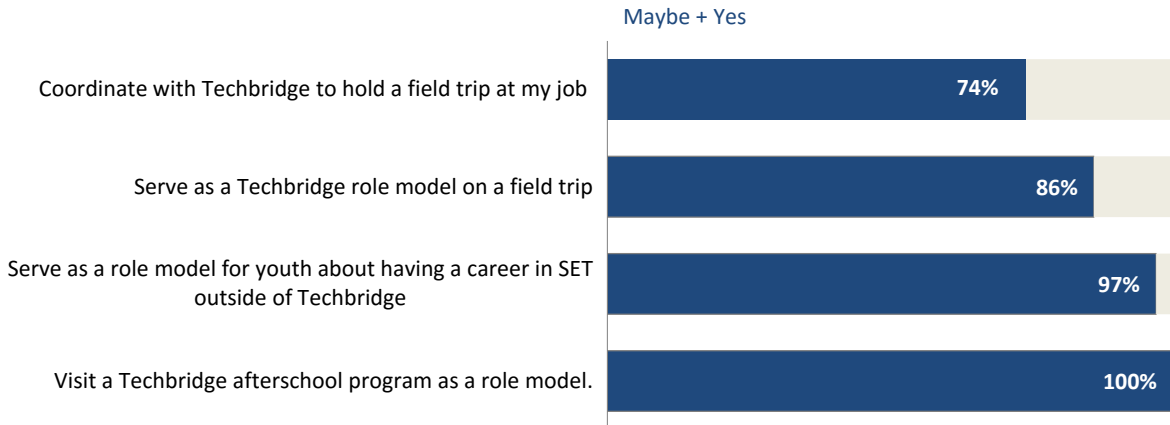
Figure 49. Role models increased their confidence in conducting outreach due to their experiences with Techbridge.



Source: Role Model Survey

All role models were open to continuing as a Techbridge role model by coming to visit a program. They were slightly less likely to be prepared to attend a field trip with Techbridge (86%) or to host a field trip at their work (74%). All but one person was ready to serve as a role model outside of Techbridge.

Figure 50. Most role models planned to serve as a role model outside of SET and host a field trip next year.



Source: Role Model Survey; n = 32

“I had a great time and learned a lot from the girls. Let’s do this more often.”

Techbridge Role Model

6 Techbridge's Impact on Families



6.1 How do expansion sites engage girls' families?



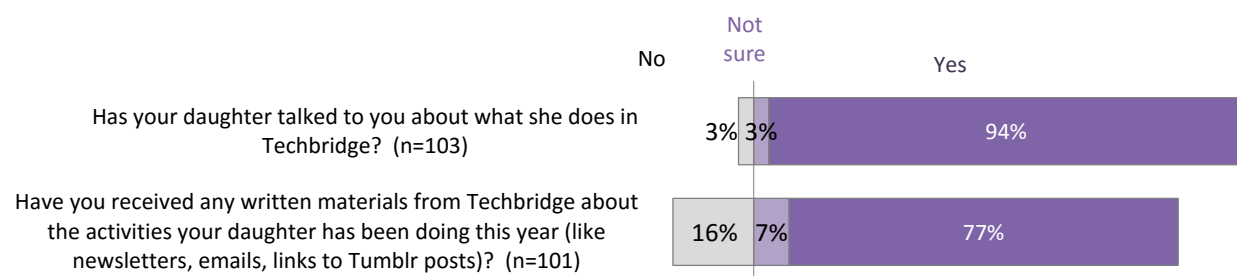
Key Findings re: Family Engagement Strategies in Expansion Sites

Techbridge continued to engage families through Family Nights, using similar strategies as in past years to encourage attendance such as having girls personally invite their parents, offering food, and inviting younger siblings to join. Techbridge also distributed resource lists to families, including SET activities to do at home and other SET-related program opportunities nearby. Program Coordinators used texting more this year to keep parents updated on what girls were doing and learning in the program and to invite parents to upcoming events. There continue to be challenges to involving some families in Techbridge, including language barriers and scheduling difficulties.

Teachers used a variety of methods used to engage families of girls participating in Techbridge: all programs reported that they shared information on Techbridge activities and created opportunities for girls to show their families what they have learned. Three quarters of the teachers shared information on why it's important to involve girls in SET, and two-thirds provided strategies on SET activities to do at home.

Techbridge sent families resources such as Techbridge newsletters, a Summer Programs Guide, and a Holiday Activity List. Almost all parents (97%) reported that their daughters talked to them about what they did in Techbridge. About three-quarters of parents (77%) indicated they received written materials from Techbridge with updates about the program.

Figure 51. Parents were more likely to learn about Techbridge activities from their daughters than from written materials from Techbridge.



Source: Parent Survey

In an open-ended question on how they used materials from Techbridge, five family representatives said that they had not received the resources. One wrote, “Didn’t receive them. How were they disseminated? Still interested in receiving them.”

Nineteen family members completing the survey said the communications from Techbridge kept them up-to-date with what their daughter was doing in the Techbridge, and gave them ideas or suggestions for talking to their daughter. Responses included:

“It kept me current with what activities Techbridge was doing and new opportunities.”

“The teacher calls and texts for updates. It has been very helpful to keep up with what she does in Techbridge.”

Ten family members indicated they learned about upcoming events and new activities through the resources:

“I was able to know there was an event happening.”

“We are checking some of them out to enroll her.”

Two respondents stated they did not use the resources.

Teachers were asked to identify successful strategies for engaging families. Six out of 14 teachers mentioned Family Nights. Teachers specified that food and personal invitations from the girls were key in getting families there. According to one teacher, joint middle school and high school Family Night was thought to be a success. In interviews, two teachers said “face-to-face interactions” or “personal contact” were successful strategies for engaging families, which included Family Night as well as taking advantage of other opportunities to talk with families, such as at program pick-up. One teacher wrote that having a Techbridge event every quarter was a successful family engagement strategy that informed the entire school community and other teachers of the importance of STEM. In interviews, teachers noted that texting (including translated texts to reach parents in their native languages), food, inviting the entire family (including activities for siblings), and personal invitations from the girls were key strategies to a well-attended Family Night.

In an interview, one teacher said girls benefit from seeing their parents engaged at the Family Nights:

“Family Night was huge. Really cool. It wasn’t just telling families about Techbridge. Girls presented and they did it together. It was really cool to see grandma working on an engineering project. I think when they [the girls] see their people work on technology, then they really see themselves in tech. It is one thing to see a role model doing it and another thing to see grandma doing it. Then that conversation will continue at home.”

A principal described Family Night in a positive way even though family engagement is often a challenge at their school:

“[Family Night is] a chance for girls to share [with their families some of the cool things they are doing. It’s a simple and genuine experience for our families. The families get to do a project together, eat together, then the kids are proud and families are proud... Family involvement is not typical of our school—that’s not how the community operates...Where poverty has an impact, it’s harder to get there, so we take what we can get.”

Three of the 14 teachers thought texting was a good strategy to engage families. Typically, Program Coordinators used texts to reach families using a web-based service such as Google Voice which allowed them to easily send one message to a large group (it was also free and did not require their own cell phones). Messages informed families of the activities girls were doing in the program as well as more logistical information on schedules, Family Nights, and field trips.

Other successful strategies included take-home activities for girls to do with their families, and translated materials and texts.

Two teachers did not feel that families were well engaged, with one citing that limited parent involvement was typical of families at their school and another teacher mentioning that parent volunteers would have been great.

Principals were not always up-to-date about how Techbridge communicated with families, though many mentioned that communicating with families was a challenge. One principal wondered whether field trips involved parents as chaperones so they could “picture their kids in the jobs of the future” and help inspire family discussions.

It is also notable that, Techbridge has implemented another grant with Highline Schools focused on family engagement during the 2016-2017 school year. The new program reached a Somali community by offering Techbridge resources in a housing complex with an established afterschool program.

Barriers

Teachers also commented on barriers to engaging families, most commonly limitations in family members’ time, identified by nine teachers. One teacher said, “A lot of families work at night.” Other barriers were language (four teachers) and transportation (four teachers).

A district representative agreed that transportation was a challenge for some families given that later buses were not automatically provided to students who attend elementary school afterschool activities. In some cases, participants could share a bus with another program, but not always. In the winter, when it gets dark early, it is hard for kids to walk home and parents cannot always pick up their child (due to needing to be at work and/or not having a car).

Other barriers identified by teachers included lack of communication and poor timing of Family Night (after a holiday).

In an interview, one teacher referenced low attendance at Family Night (typical at the school) and was thinking about informally inviting parents to stop by to see what the girls were doing in the program.

“That’s one thing that I don’t think we have figured out yet. The school has really low parent participation. ... For some reason, in elementary they [families] are here for parent-teacher conferences, everything. But by middle school... Maybe not more Family Nights, but maybe inviting parents if they had time to maybe stop through to say, ‘Well we’re doing ...’ just not so formal as a Family Night, but like, ‘Hey, this is what your daughter is working on, come see if you have time.’”

At one school, the Techbridge teacher could not think of any barriers:

“I don’t really think there were many barriers. I don’t think the parents really resisted anything. They were very supportive. They showed up to their STEM night. They came to the classroom to see the projects the students were working on. They were pretty active, and they were very visible.”

6.2 What is the effect of the program on participating girls’ families, including their awareness of SET resources; their understanding of SET careers and career pathways; and their view of SET careers? To what degree do families encourage their daughters to participate in SET activities, and to pursue SET education and careers?

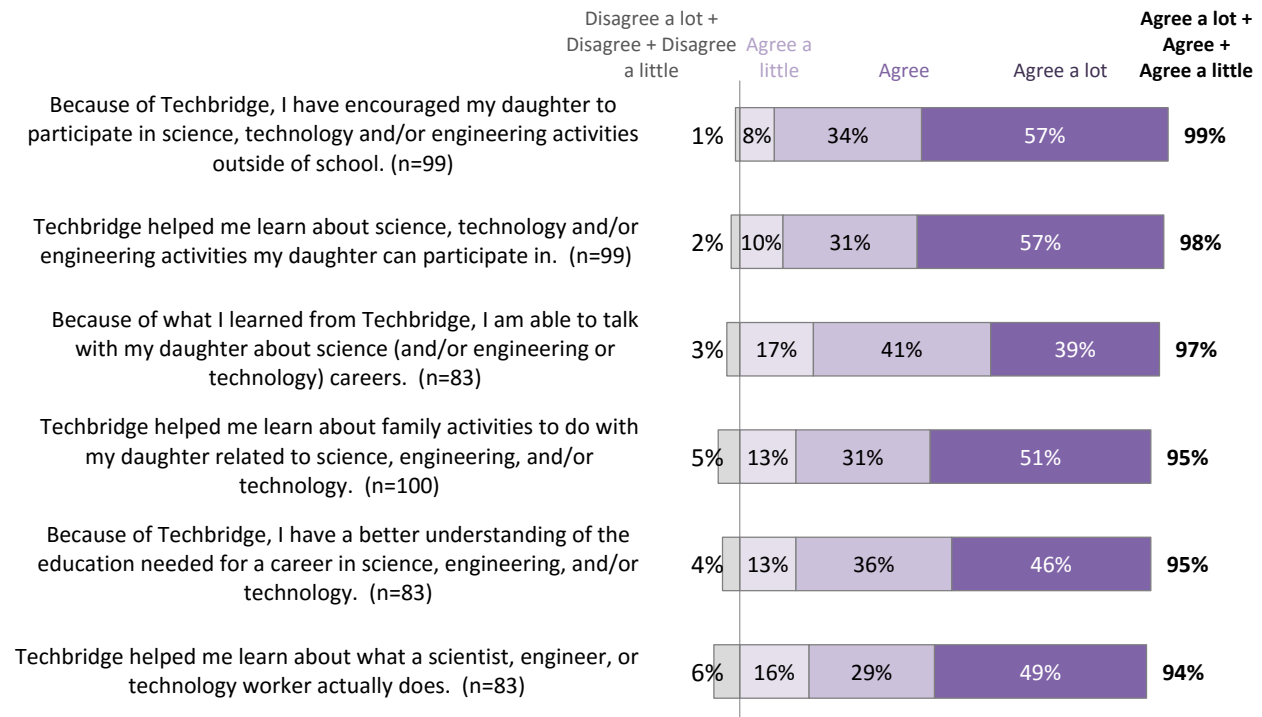


Key Findings re: Techbridge’s Impact on Participating Girls’ Families

Techbridge parents had very positive views of SET careers and they all agreed that they would support their daughter if she chooses to work in SET. Almost all parents agreed that, because of Techbridge, they are more aware of SET opportunities and that they have encouraged their daughter to participate in more SET activities. According to girls, the majority of their parents already supported their interests in SET prior to their involvement in Techbridge, but some girls reported that their parents became more supportive of them pursuing a career in SET.

Almost every parent reported that, due to Techbridge, they encouraged their daughter to participate in other informal SET activities and that Techbridge helped them learn about these types of opportunities. Ninety-seven percent of parents agreed that they were able to talk with their daughter about SET careers and 96% indicated they have a better understanding of the education needed for SET careers. Parents were also more aware of SET-related activities to do at home and what a SET worker actually does (95% and 94%, respectively).

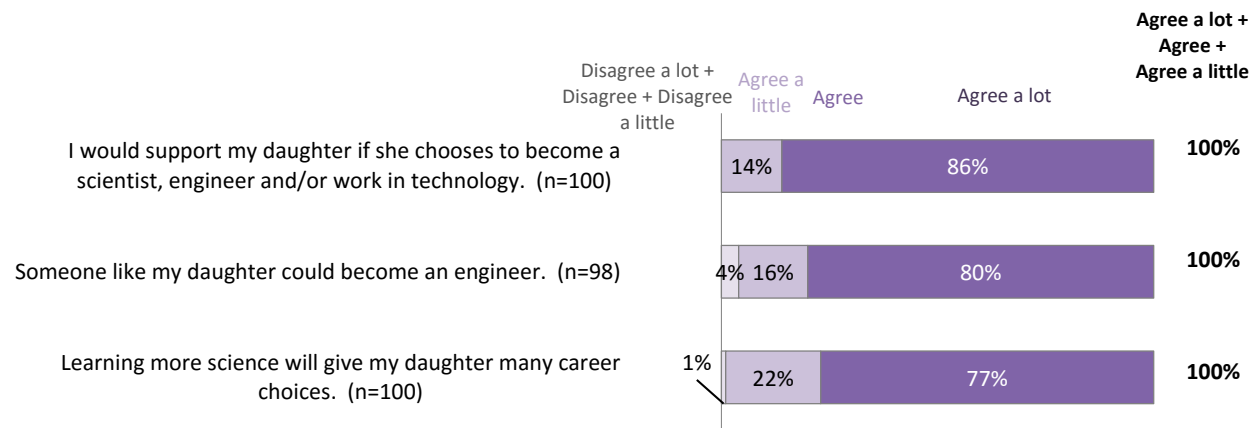
Figure 52. Parents said Techbridge helped them learn about how to support their daughter in SET.



Source: Parent Survey

Almost all parents reported positive attitudes about their daughters' potential interest in SET. Eighty-six percent of parents agreed "a lot" that they would support their daughter if she chose to pursue a SET career and 80% agreed "a lot" that someone like their daughter could become an engineer (Figure 53).

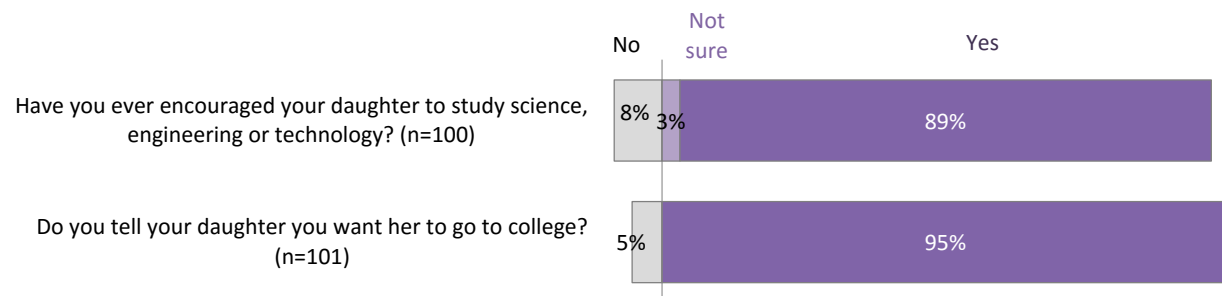
Figure 53. Parents had very positive attitudes about their daughters' interest in SET.



Source: Parent Survey

Ninety-five percent of parents said they have told their daughter they want her to go to college, and 89% said they have encouraged their daughter to study SET.

Figure 54. About nine out of ten parents say they have encouraged their daughter to study SET.


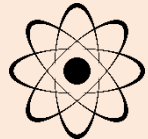



Source: Parent Survey

In response to an open-ended question asking how Techbridge had affected them as parents, a quarter of respondents offered general, positive praise or comments, such as “We have always loved it.” Other response categories were related to considering future education and career options (including SET), more awareness of SET opportunities, and doing more SET activities at home or elsewhere. Table 6, below, shows examples of responses from each of these categories.

Table 6. Families experienced different levels of impact from their daughter’s participation in Techbridge.

Percentages are from open-ended question on the Parent Survey (n=54). Responses that included more than one response category were counted under each category.

Techbridge’s Impact on Families	Relevant Quotes
<p>Considering future education and career options, including SET (22% of parent responses)</p> 	<p>“ As a family, we talk about going to college the importance of education and having a career in engineering or science and Techbridge help reinforce that interest.</p> <p>“ [My daughter] will be attending a charter school next year that has a STEM-based curriculum.</p> <p>“ Techbridge motivates her to study engineering.</p> <p>“ Thinking about reaching for higher in life. Working for NASA, becoming a doctor, go to college, and making better grades.</p> <p>“ Yes, college choice and field of study.</p>
<p>Increased Awareness of SET Opportunities (22% of parent responses)</p> 	<p>“ We were shown new things that we did not know.</p> <p>“ It helped us see that science can be fun.</p> <p>“ It has opened our eyes to encourage our daughter more with science and technology.</p>
<p>Doing more science-related activities or talking about SET at home (19% of parent responses)</p> 	<p>“ We all like doing the projects she brought home.</p> <p>“ We have to take advantage of the activities offered after school is out.</p> <p>“ We are going to more science related events.</p>
<p>Not Much/No Change (13% of parent responses)</p>	<p>“ Not right now, but interesting program for my daughter and is good for their future.</p>

Students were asked if their families had encouraged them to consider a SET career. At the end of the year, Techbridge girls were slightly more likely to report that their families encourage them to consider a SET career (increasing from 74% to 80%; see Figure 57 at the end of this chapter).

Teachers said parents were impacted by their daughter’s participation in Techbridge, including being excited or proud that their daughter was interested in the program and the opportunities it provided. Teachers commented that Techbridge helped families learn about SET themselves. One teacher talked about the experience of a parent at Family Night:

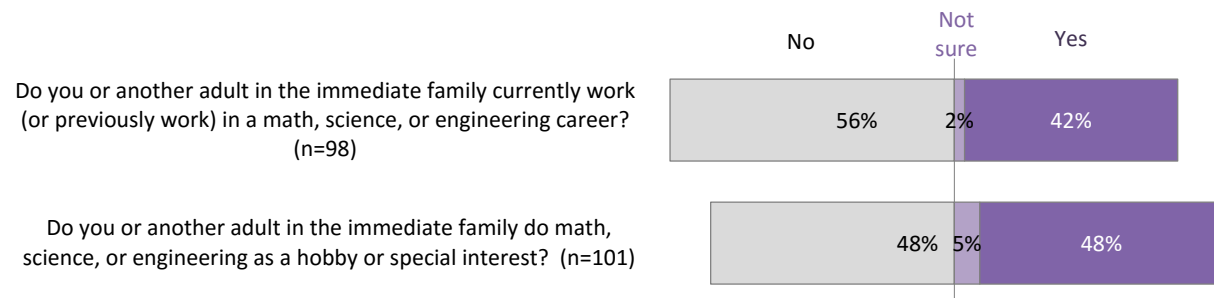
“I know for one of our girls’ moms, it was the first time she had seen computer coding. She had immigrated recently, and spoke very little English, but she managed to enter code to make a light bulb light up. She was so excited to make it work. And her daughter had underestimated her abilities, so it was cool for her daughter to see that her mom could do coding, too.”

Another teacher spoke about how Family Nights helped parents become aware of what their daughters can do and the opportunities in SET:

“They [families] love it, they feel energized and excited about career paths. I don’t think they realize that girls can do the activities we are teaching them. I know some families are starting to push the girls. When we do activities-they (the families) are in it, they are engaged, laughing, and I think that’s important for them to see, the learning and the careers that the girls could have.”

Results of Individual Survey Questions re: Impact on Girls’ Families

Figure 55. Just over 40% of Techbridge girls have family members who work in a SET-related career.



Source: Parent Survey

SET Interest Scale (Combined Results of Survey Questions)

Figure 56. At year-end, Techbridge girls were somewhat less likely than non-participants to say that their families were supportive of their interests in SET. However, the difference between the groups was not statistically significant.

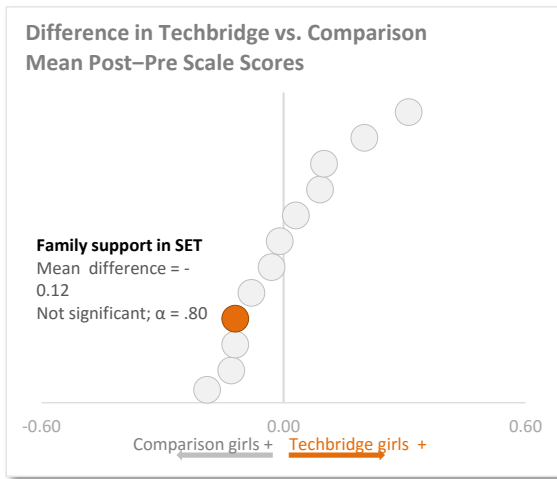
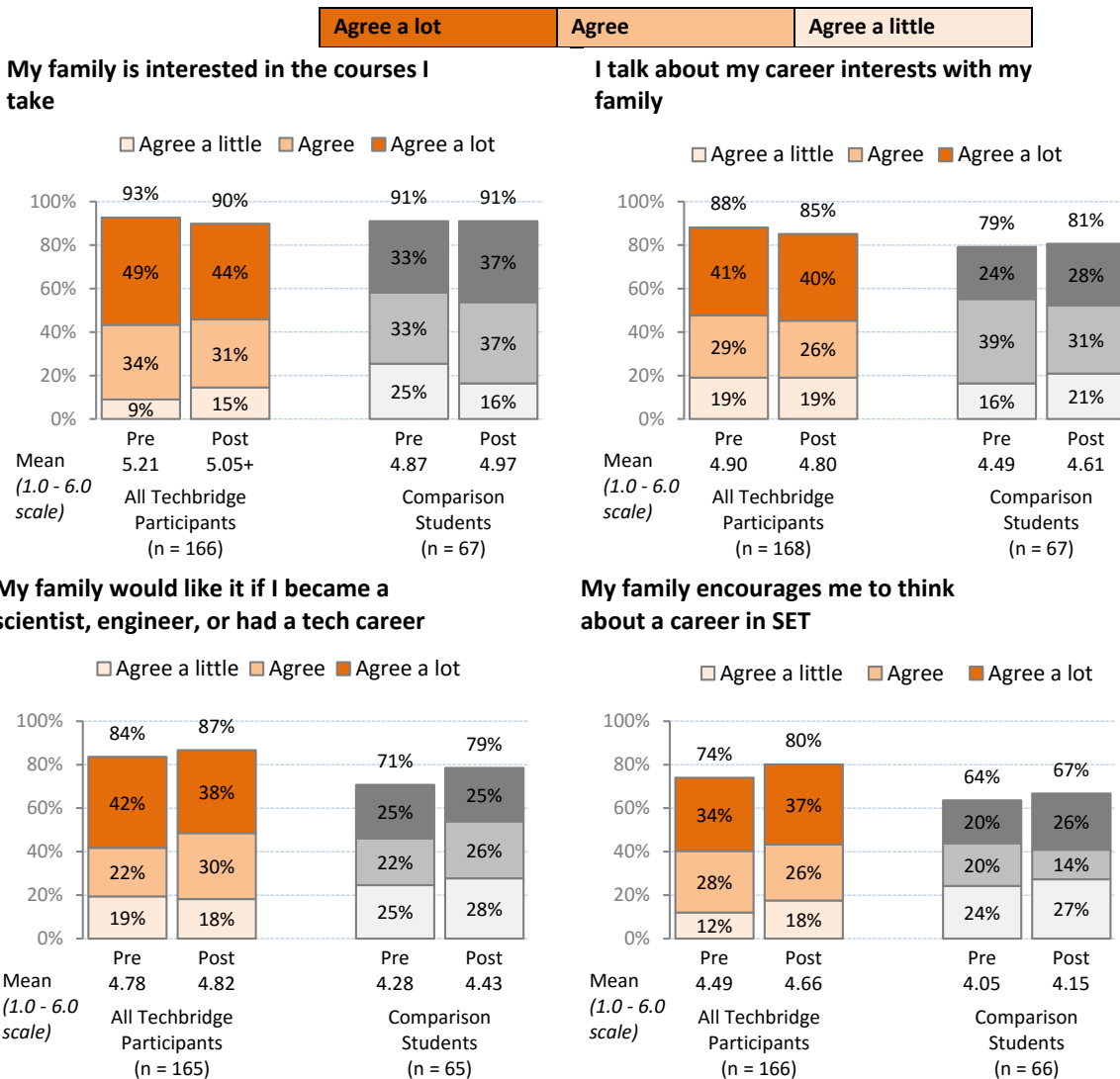


Figure 57. Some Techbridge girls reported that their families became more supportive of their interests in SET.

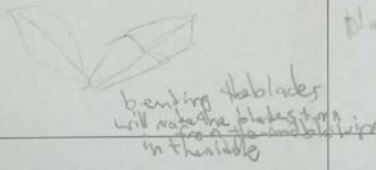


Source: Matched Student Pre/Post Surveys

7 Implementation and Fidelity

Windmill Blade Designs

Your goal is to design windmill blades that can catch the wind. Use the chart below to help design your blades!

	Blade Material	# of Blades	Shape (draw your blade design here)	Observations
1	Index cards	#5		If we bend the blade
2				
3				

In the following section, findings are presented regarding the degree to which the Greater Seattle and DC expansion sites implemented the Techbridge program model as intended.

7.1 To what extent does each new program site implement the Techbridge curriculum?

★ Key Findings re: Fidelity

Based on external observations and self-reports by Techbridge teachers and staff, the Techbridge expansion sites generally implemented the Techbridge program model with a high level of fidelity. Along with using the hands-on activities from the Techbridge curriculum, the expansion programs also used strategies that are part of the Techbridge model: consistently emphasizing the engineering design process, fostering positive relationships, and promoting a growth mindset. Programs made more connections between the activities and students' lives than in the previous year and were also more likely to talk about gender inequities in SET and how to address them. Programs showed room for growth in providing opportunities for reflection.

Observers from the evaluation and research teams used the Dimensions of Success (DoS) observation tool to observe a total of ten Techbridge expansion site programs in the fall of 2016 and/or spring of 2017.¹³ Figure 58 on the next page shows the mean ratings on the eight DoS dimensions that the evaluation/research teams and Techbridge leadership identified as being key elements of the program. Each element was rated on a scale of 1 to 4; DoS guidelines are that ratings of “3” or “4” indicate high quality.¹⁴

The ten observed programs showed **compelling evidence** (an average rating of ~4 on the DoS) of the following three dimensions:

- having positive **relationships** between the facilitators and students and amongst the students
- offering **purposeful** activities (where the activities clearly relate to STEM learning goals)
- using **materials** that were appropriate and engaging to the students.

The observed programs showed reasonable evidence (an average rating of ~3 on the DoS) of the following four dimensions:

- using **inquiry** approaches (where students had the opportunity to engage in STEM practices like observing, testing, and building explanations)
- **relevance** (showing evidence that the facilitators and students were making connections between the STEM content and activities and students' everyday lives and experiences)
- having consistent and equal **participation** of all the students throughout the activities

¹³ A total of 10 expansion site programs were observed in fall 2016 and spring 2017: 2 Greater Seattle programs in December 2016, 4 Greater Seattle programs in April 2017, and 4 Washington, DC programs in March and April 2017.

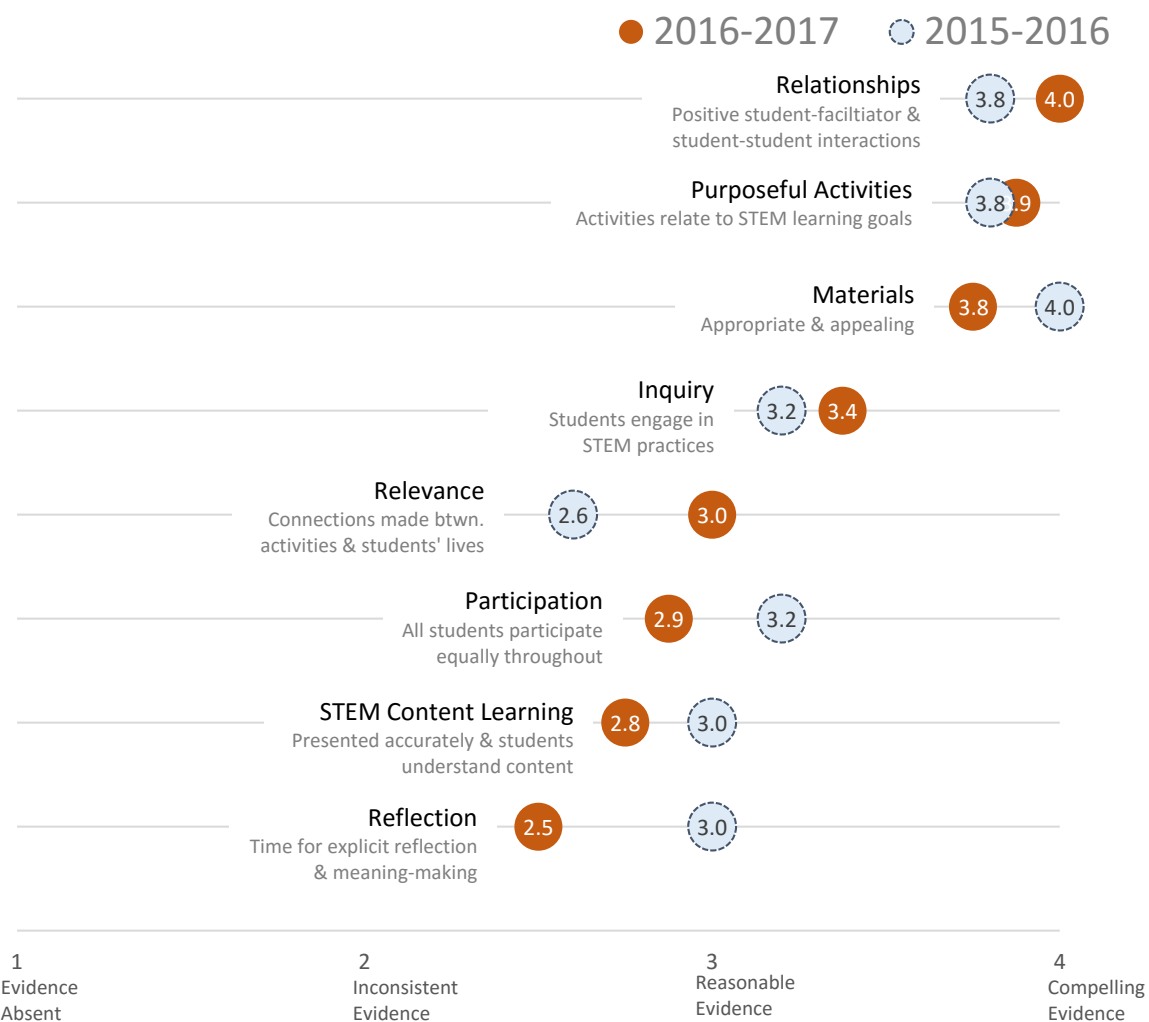
¹⁴ The July 2017 internal memo by EDC and CERC, “Dimensions of Success Observations in Greater Seattle, WA and Washington, DC,” summarizes results from all DoS observations the evaluation and research teams have conducted since the project began in fall 2014.

- **STEM content learning** (indicating STEM content was presented accurately and that students' comments, questions and performance during activities indicated they accurately understood the STEM content).

Notably, observed programs received higher ratings for relevance in 2016-2017 than the previous year, reflecting Techbridge's efforts to ensure facilitators made connections between Techbridge activities and students' everyday lives and experiences.

However, the observed programs in 2016-2017 showed inconsistent evidence (an average rating of less than 3 on the DoS) of fostering explicit time for **reflection** and meaning-making during the activities.

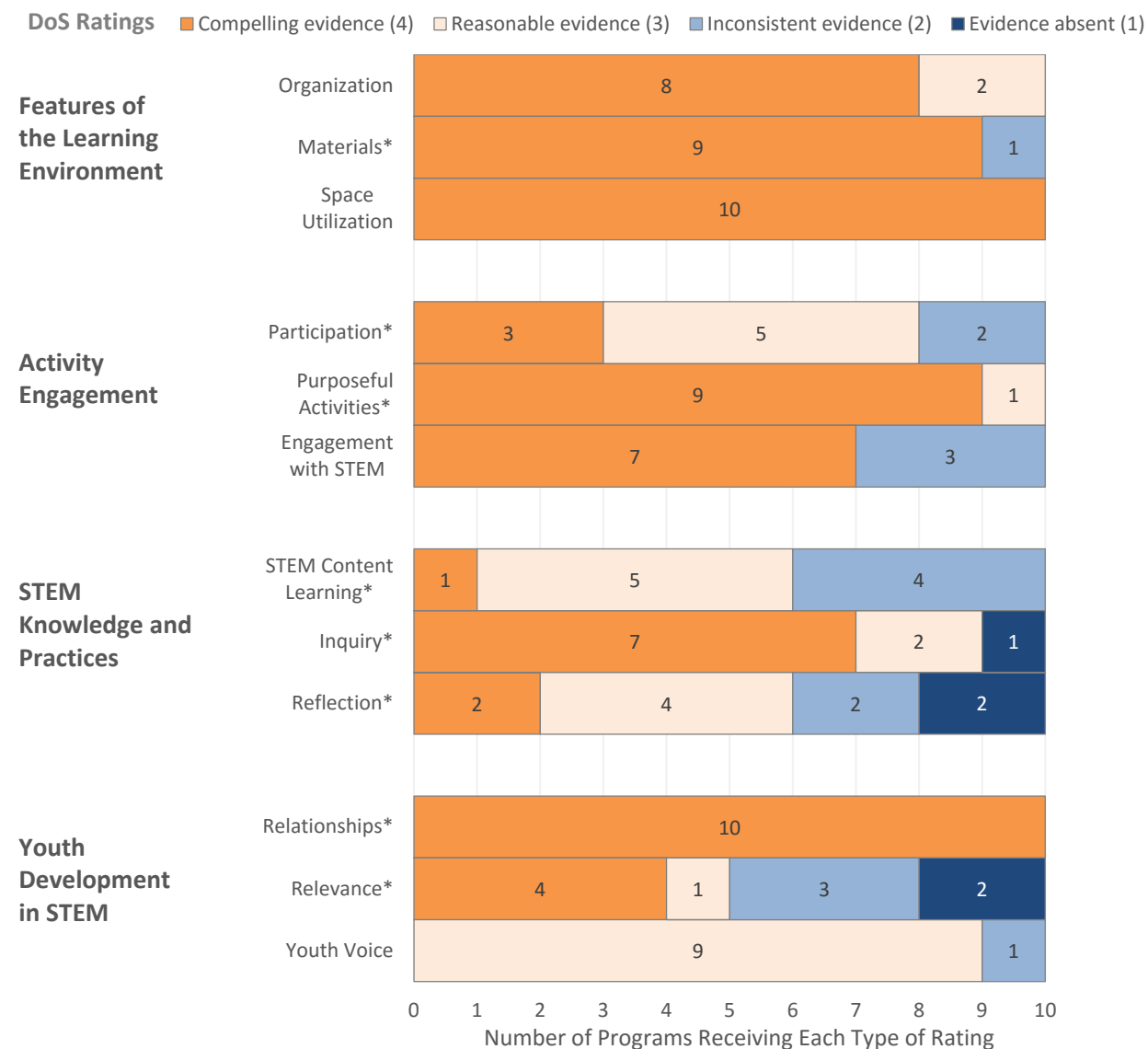
Figure 58. The figure below shows the *average* Dimensions of Success ratings for the 10 expansion site programs that were **observed in 2016-2017** and **in 2015-2016** (for comparison purposes); the eight dimensions that were identified as important elements of the Techbridge model are shown. Observed programs were consistently strong in both years in offering STEM activities with clear learning goals, good materials, and that fostered positive relationships. Observed programs made more connections between the activities and students' lives (relevance) in 2016-2017 than in the previous year but were somewhat less likely to provide time for reflection.



Source: Observations of a total of 10 expansion site programs in fall 2016 and spring 2017: 2 Greater Seattle programs in December 2016, 4 Greater Seattle programs in April 2017, and 4 Washington, DC programs in March and April 2017

The figure below shows the number of programs that received each Dimensions of Success rating. The majority of observed programs were rated as high quality (a rating of “3” or “4”). Programs received especially high ratings on “Features of the Learning Environment” and “Activity Engagement.” Ratings for “STEM Knowledge and Practices” and “Youth Development in STEM” were generally high, although varied somewhat. For example, two programs received a rating of “1” (evidence absent) for reflection.

Figure 59. The majority of observed programs were rated as high quality.

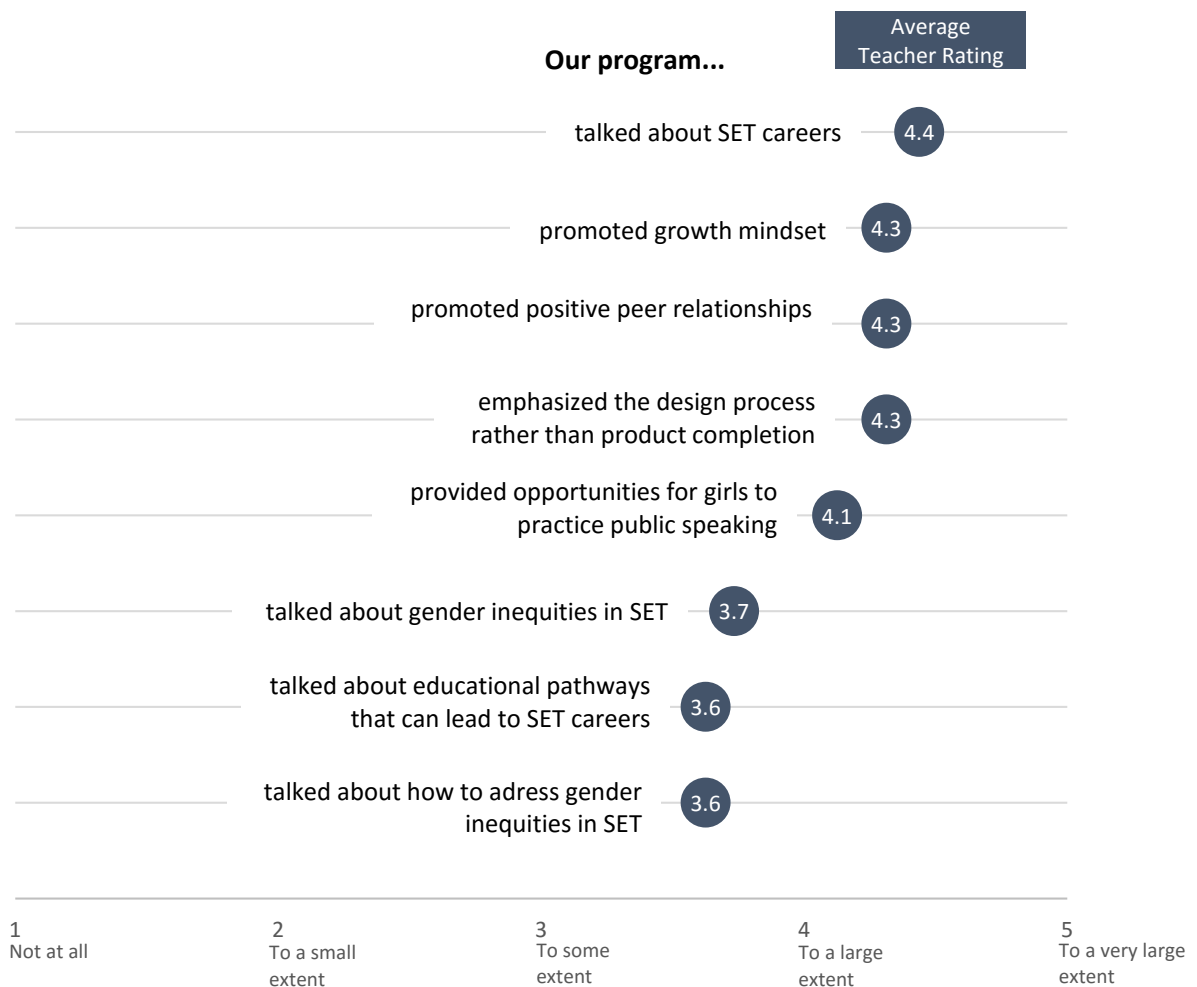


*Starred dimensions are included in the Techbridge Implementation Rubric

Source: Observations of a total of 10 expansion site programs in fall 2016 and spring 2017: 2 Greater Seattle programs in December 2016, 4 Greater Seattle programs in April 2017, and 4 Washington, DC programs in March and April 2017

Techbridge teachers were asked to describe the extent to which various Techbridge-specific elements that were not addressed in the DoS were implemented in their program (see Figure 60 below), including discussing SET educational and career pathways, the engineering design process, growth mindset, peer relationships, public speaking, and gender inequities in SET. With the exception of discussing SET education pathways and gender inequities in SET (and how to address them), the majority of the teachers said they implemented each of the Techbridge program elements either to a “large” or “very large” extent.

Figure 60. Of the various Techbridge program elements, teachers were most likely to report that their program talked about SET careers, promoted a growth mindset and positive peer relationships, and emphasized the design process. Although teachers were less likely to report their program talked about gender inequities in SET or how to address them, a greater number of teachers said their program had addressed gender inequities in 2016-2017 than in the previous year.



Source: Teacher Survey; n = 16

7.2 How does implementation at the expansion sites vary from the original program model (fidelity and innovation)?



Key Findings re: Variations to the Original Techbridge Model

As in Year 2, the expansion sites and Bay Area programs differed in staff structure and responsibilities, program implementation, and school district involvement.

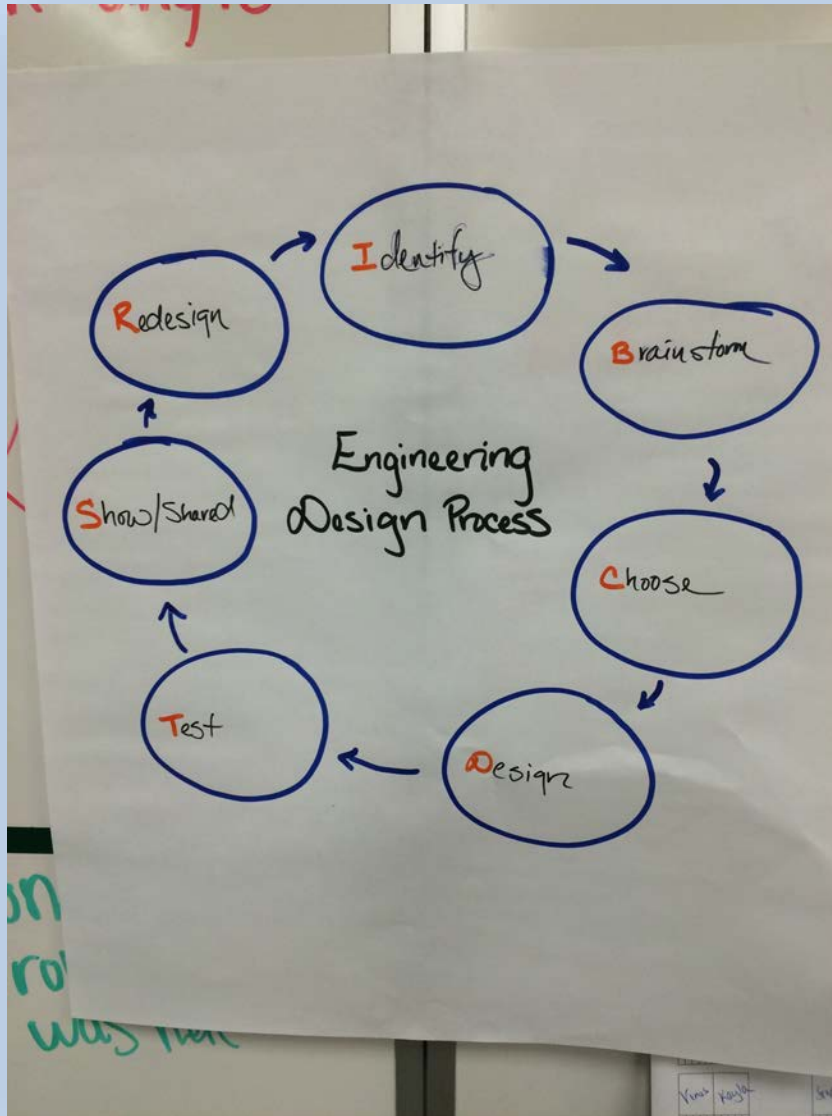
The Year 2 and Year 3 evaluation reports (covering data from the 2014-2015 and 2015-2016 school years, respectively) described the differences between the expansion sites and Bay Area programs in some detail. These differences included the number of staff in each location and the greater role that the Highline Public Schools have had in working with Techbridge to select schools.

As part of an effort to increase the reach and sustainability of its afterschool programming, Techbridge is making significant changes to its afterschool program model in 2017-2018. The changes will be implemented in all three geographic regions. The elementary model will change most significantly. Rather than a co-teaching model (where a Techbridge staff member and a teacher implement the program together), teachers will implement the program by themselves. Called “Inspire,” the elementary program will be 12 weeks instead of a full school year. Techbridge will provide a new model of training and support to Inspire teachers as well as the curriculum and all of the materials. Teachers will be encouraged to host a Family Night and plan field trips to local SET companies or higher education institutions, but Techbridge will not organize these activities.

The middle school model will continue essentially unchanged. A Techbridge staff member will co-facilitate each program with one teacher, field trips and role model visit will remain integral program components, and the program will meet weekly throughout the school year. Techbridge introduced a new community-based project to the middle school curriculum in 2016-2017, and plans to make it a larger focus of the program in the future. The role of the Program Coordinator at the middle school level has shifted slightly (and will be known as a Program Manager in 2017-2018), and will include more responsibility for serving as the liaison with school leaders.

Techbridge is temporarily suspending its high school program as it rolls out the new Inspire model and the revamped middle school program.

8 Organizational Capacity



8.1 What's considered to be "working" and "not working" as the expansion unfolds?¹⁵



Key Findings re: What's Working and Not Working with Scale Up

The expansion has stretched Techbridge's infrastructure. Staff at headquarters and expansion sites have been identifying and responding to gaps in communication and systems. Techbridge expansion site staff appreciate the efforts leadership made to communicate with them during this past year, leading them to feel more connected to the organization than in the previous year. In general, expansion site staff would like even more communication and involvement (as much as possible) in major organizational decisions (e.g., the decision to suspend the high school model, changes in staff positions).

The following findings emerged from evaluation data from Techbridge staff and partners:

- **Overall, staff from Techbridge expansion sites felt more connected to other parts of the organization than the previous year.** Staff in both the Greater Seattle and DC offices appreciated that senior leaders—including the Techbridge CEO, the Vice President of Programs, and the Director of Curriculum—visited their office and/or programs on multiple occasions. One staff member said, "It's night and day compared to last year. It feels much more that we're valued and seen and appreciated." Multiple staff also said they anticipated that the fact that the VP of Programs is based in DC rather than Oakland—a position change that happened this past year and the first time that Techbridge has had a senior leader who did not work in the main office—would help facilitate cross-site communication and sensitivity to issues specific to expansion sites. One staff member said that having a leadership position in an expansion site is a natural "facet of scale" and will "reinforce the fact that we are national."
- **"We haven't figured out a balance yet of how much decision making power to distribute to the field."** (Techbridge staff member). At least one staff member at an expansion site felt as though organizational decisions are sometimes made based on what is going on in Oakland, without equal consideration for what might be most appropriate for expansion sites. In addition, Techbridge staff commented that at times it felt like the expansion sites were responsible for work that they hoped would

¹⁵ The following evaluation questions regarding organizational capacity were addressed in the 2015 and/or 2016 evaluation reports and are either not addressed again in this report or are addressed within the other evaluation questions in this section:

- What does Techbridge need to pay attention to as it expands? What factors emerge as important for the scale-up effort (e.g., vision, resources, knowledge/skills/abilities, incentives, ownership, structure)?
- What formal and informal communication structures evolve between the Techbridge Bay Area office and the expansion offices?
- How is Techbridge connected to and affected by larger systems in its environment (e.g., school priorities, district policies, proximity and priorities of tech companies and educational institutions)?
- What are the incentives for each of the stakeholders to participate (including project leadership, new program sites, teachers, role models)? Are the incentives sufficient? What are the barriers?
- What resources do project leadership and program partners each provide and are they sufficient (including funding, equipment, space, human capital, leadership, and time)?

be done by the Techbridge main office, such as marketing, communications, and grant writing. Staff noted that this disparity was likely in part due to staff turnover and lack of capacity in Oakland.

- **“We didn’t account for what the effect would be on Techbridge as an organization.”** (Techbridge staff member). Several Techbridge staff said that scaling up the afterschool program to new geographic locations created more strain on the organization as a whole than anticipated. Informal systems that worked on a small scale in Oakland were not efficient or possible to implement in other locations. The growth put a strain on central operational systems, contributing to confusion and frustration. “Headquarters was cracking,” said one leader. Techbridge has responded in a variety of ways, including creating new staff positions, developing written manuals, and creating more robust electronic systems. The timing of the expansion sites coincided with an uncharacteristic amount of staff turnover, with positions left vacant for a period of time and onboarding of new staff at the main office, which added to the strain of incorporating expansion sites.
- **A key ingredient to the success of the afterschool model has been Techbridge’s ability to hire highly qualified staff who form strong relationships with girls, teachers, and school leaders.** As one Techbridge staff member said, “There’s something really special about people we hire. They are unique and powerful. They’re unicorns.” In late spring 2017, Techbridge announced changes to the Program Coordinator positions, renaming them “Program Managers” (with the Inspire Managers having new responsibilities for providing professional development support to elementary teachers rather than implementing the program themselves), and requiring current staff to apply for the new positions. While staff generally understood the reasons for the changes, the transition to new staffing model was somewhat bumpy and occurred during a busy time wrapping up the program at schools. Staff did not perceive that their worth and abilities were known to the organization and did not feel they were able to decide what position would be the best fit.
- **The majority of current elementary school teachers and school leaders were cautiously optimistic about the new Inspire model, although some were concerned it may be harder to recruit and retain teachers and/or that the new program will not have as much impact on girls.** The new elementary school afterschool model was appealing to some teachers and principals who thought the shorter time commitment would be more engaging to some students. However, one school leader worried, “I think one of the reasons Techbridge is impactful is building relationship over an entire year. Sometimes if you pull out too many components of program, then it isn’t successful.” One concern raised by school leaders and teachers was related to teacher workload and fatigue in their new role, especially considering that so many teachers were happy to take a supporting role to the Program Coordinator at the end of a tiring workday, as has been the case in the current model. A Program Coordinator commented that teachers who had not previously been a co-teacher might struggle with being solely responsible for the program as they had not seen a full year of the program “in action” as continuing teachers had. Additionally, the availability of funding to continue to support the program was an issue at some schools.

8.2 What unanticipated issues and opportunities emerged that affect Techbridge’s expansion? How do they affect the expansion? How does Techbridge address these issues and opportunities?

★ **Key Findings re: Unanticipated Issues**

Techbridge continued to experience staffing changes during 2016-2017 which both gave rise to new opportunities, and also put greater strains on remaining staff and systems.

Techbridge leaders estimated that they have on- or off-boarded 60 staff over the last three years. Staffing changes can create opportunities for fresh ideas to be introduced, but can also lead to confusion, distraction from ongoing work, additional work covering for vacant positions plus the time to hire and train new staff members, and the loss of important institutional knowledge. Techbridge experienced the following staffing transitions during 2016-2017:

- A new CEO/Executive Director took the reins of Techbridge in July 2016, taking over from an interim leader following the departure of founder and former CEO in December 2015. Under the new CEO’s leadership, the organization restarted its strategic planning process (which had been put on hold the previous year), and relocated its headquarters to a new office in Oakland, CA.
- Two part-time Program Coordinators were hired to lead programs in Greater Seattle and DC.
- A new Washington, DC Executive Director was hired in February 2017.
- The Chief Operating Officer departed at the end of April 2017.
- Both full-time Washington, DC Program Coordinators left the organization in summer 2017.
- There continued to be turnover and vacancies in the development staff in the Oakland office, which affected the organization’s ability to fundraise.

8.3 How does Techbridge develop monitoring, evaluation, quality control, and feedback mechanisms (and feedback loops)? How is project feedback (including evaluation results) used to improve the program?

★ **Key Findings re: Using Data**

Techbridge is beginning to implement systems to help monitor program quality.

Techbridge implemented a scorecard in 2016-2017 to track program metrics on a quarterly basis, including the number of role models, field trips, participants enrolled and participant attendance by school. The

scorecard is a Google spreadsheet, which allows multiple staff to enter and monitor the information in real time.

Techbridge has used an internally created observation rubric to monitor program quality and provide feedback, although its use has not been standardized across locations. Staff are considering using the DoS tool to observe programs next year.

The evaluation team generated several reports throughout the year, including student pre-survey results for each expansion site program (December 2016), a report with the results of all DoS observations to date (July 2017), and a report with preliminary 2017 site visit results (July 2017). The evaluation and research teams met with Techbridge staff to review and discuss evaluation findings.

8.4 What capacity-building activities occurred to enable project sustainability? How does the level of support from Techbridge’s main office change over time? How and to what extent do expansion sites develop a plan for sustainability?



Key Findings re: Sustainability

Sustainability has become a key concern of Techbridge as a whole and is part of the reason for changes in the afterschool model. The loss of two major funders created financial pressures and changes in the Oakland-based development staff meant that fundraising for the expansion sites has taken more time to develop than originally anticipated (though expansion sites have applied for and received local grant funding with some assistance from the main office). Techbridge is continuing to pursue other funding sources.

Techbridge as a whole is facing financial challenges, in part because two large private foundations that provided significant funding to the organization for many years “sunsetted” their operations within the last two years. Changes in Techbridge staff have also meant that fundraising and development have been delayed or taken more time. Some staff suggested that it would be helpful for expansion site leaders to receive additional training in fundraising and development.

The amount Techbridge asks schools to contribute to their program was considered high by at least one school administrator and may be prohibitive to schools with budget issues.

“The challenge with Techbridge is that the cost is too much. It’s unaffordable for what it is—only one hour, or an hour and a half once a week...Compared with other afterschool programs, it’s very expensive.”

One Techbridge leader said that while a number of schools and other organizations have expressed interest in hosting Techbridge, “We couldn’t meet demand because the program is too darn expensive.” In an effort to make Techbridge’s elementary afterschool model more cost effective, the organization will be rolling out a more streamlined program for elementary school girls (described in the previous chapter).

Although Techbridge faces financial challenges, both expansion sites secured additional funding for the 2016-2017 year. Washington, DC received funding from Boeing to add a half-year program at an additional elementary school. The Greater Seattle staff and Advisory Board organized a *Hidden Figures* publicity and fundraising event attended by about 200 girls, their families, and other members of the community. The Greater Seattle Area Executive Director collaborated with the Highline Public Schools on their Race to the Top renewal application which included a plan to implement a pilot family engagement program with the Somali Youth and Family Club (SYFC) in 2016-2017. The Highline school district funded a one-week summer program in August 2016. However, Techbridge leaders report that school funds are “tenuous” in the current funding climate. Greater Seattle may explore the possibility of expanding into one or more neighboring school districts to expand its reach and diversify its base.

8.5 What is the role of the local advisory committees?



Key Findings re: Advisory Committees

Both Greater Seattle and Washington, DC established advisory councils that will have a role in helping to secure local sources of support. The composition and responsibilities of the councils are still evolving.

The Executive Directors of Greater Seattle and Washington, DC have recruited and formed advisory councils whose primary role is to help them recruit local supporters (e.g., role models and field trip sites) and develop a local funding base.

The membership and responsibility of the councils have been evolving. Greater Seattle has a seven-member council (down from 11 members at its inception) and DC has five members. One member of each council also serves on Techbridge’s national board. Techbridge is in the process of formalizing council member expectations, defining clearer roles, and creating written agreements with each member.

9 Summary



9.1 Areas of Consideration

The following recommendations were offered by girls, parents, teachers, school leaders, role models, and Techbridge staff, or emerged based on findings from Techbridge's third year of implementation at sites outside of the Bay Area.

Girls



Girls recognize that some of the aspects that make Techbridge challenging (such as difficult activities, continuing to problem-solve after repeated set-backs, and working with girls whom they might not otherwise) were also very valuable learning experiences and were often the lesson in itself (aside from the SET skills and knowledge gained). However, it is also important that the program remain “fun,” to keep girls participating and engaged and effectively increase their interest in SET. Finding a balance between these two areas is key.

Teachers



Provide more guidance to teachers on how to provide academic guidance for their girls to pursue SET. For the third year in a row, this area had the lowest increase of impact.



With the revision of the program at the elementary level (the Inspire model), consider how to effectively prepare teachers and minimize the burdens of running the program without a Program Coordinator present, including helping teachers identify volunteers (older students, parents, role models or others) to be present in the program with a more hands-on role.



Attempt to standardize the teacher training model so that Techbridge teachers are receiving more similar training and support across regions. There were regional differences in ratings and it would be helpful to know what worked well from each site and apply it to all sites.



Consider new methods and/or content to train or support teachers who have already been working with Techbridge for at least a year. Returning teachers did not find the current model of teacher training as valuable as teachers who were new to Techbridge.



Add optional training opportunities that Techbridge teachers could join if they would like. A few teachers suggested more support, including suggestions for more opportunities to connect with other Techbridge teachers. However, a majority of teachers were very happy with the amount of training they were receiving and resistant to more, so it is important any additional training be optional.

Field Trips and Role Models



Make sure all role models receive the link to web-based role model resources and guidebook as a number of role models were not aware of their existence.



Send role models an overview of the activity that will be conducted during the day of their visit, including the concept, questions to ask the girls, and other suggestions of how to support the learning.



Continue to work on recruiting role models who are women of color. Teachers (and girls themselves) noted that it is especially powerful for girls to see and interact with women who share their backgrounds and experiences.

Families



Create a standard texting model, with an administrator creating a contact list and pre-scheduling messages on Family Nights, field trips, and arranging other messages with SET content, questions to ask your daughter, etc.



A small portion of families said they did not receive information from Techbridge, such as the Holiday Activity List or the Summer Program Guide, even though they were very interested in these materials.



Invite parents to stop by the program more frequently for an informal, optional visit to see what the girls are working on to help reach the parents that have trouble making it to the longer Family Nights.



Encourage parents to participate in field trips.

Techbridge Model, Curriculum, and Scale-up



Stakeholders believe that the long duration of the program (typically with weekly meetings from September to May) is a distinguishing characteristic of the Techbridge model that increases the impact on participating girls. With the introduction of the 12-week Inspire model, consider how to maintain a high level of impact on the girls (and increase the likelihood that they will enroll in a middle school Techbridge program), such as conducting follow-up activities or check-in throughout the school year.



Strategic practices were successful in increasing the number of girls retained in middle school Techbridge programs (attendance increased an average of nine girls per program from last year). Putting systems in place that provide means to track effective strategies and share across all sites would be valuable.



Continue to provide girls with many opportunities to design and create during activities, which were shown again to be important aspects of the curriculum.



Provide more information and resources to girls and families on education pathways toward a career a SET. According to teachers, girls are very aware of the career opportunities in SET, but not as much information was shared on educational tracks to obtain those careers.



As DC and Seattle are seeking to provide a Techbridge experience that would be offered for students throughout their K-12 education (available to them in elementary, middle and then high school), consider how to investigate cumulative program outcomes on girls who participate in Techbridge for multiple years as they should theoretically experience a much higher level of impact (i.e., conduct longitudinal research).



Consider ending the program earlier since there is a stark decline in attendance in late May.



More consistency is needed in data gathered in each site: there was a low response rate to the role model survey as a whole, the family survey in DC, and the comparison group of students was small (especially in DC).

9.2 Conclusion

In summary, Techbridge deepened its roots in both Greater Seattle and Washington, DC, implementing eight afterschool programs for elementary and middle school girls in Washington, DC and nine programs in Greater Seattle, WA in 2016-2017 (one more at each site than the previous year). While a few schools and teachers were new this year, returning schools and returning teachers continued to be involved and praised the Techbridge model. As in previous years, the programs were able to recruit a diverse group of girls to participate. Notably, participation at the middle school level increased from the previous year when many middle schools struggled with recruitment and retention.

Techbridge's supportive learning environment and hands-on SET activities gave girls opportunities to become more confident in themselves and their SET abilities. A number of participants said the Techbridge curriculum, role model visits, and field trips helped them learn about careers in SET that they had not previously heard of, and motivated them to consider pursuing a SET career. As in past years, the program appeared to have an especially strong influence on girls' understanding of practices and process commonly used in SET, such as the engineering design process. Although the differences were not statistically significant, Techbridge girls were also somewhat more likely than non-participating students to have a growth mindset; report a greater sense of belonging in SET; and become more interested in SET and SET careers.

Girls, families, teachers, role models, and school leaders all rated Techbridge highly, felt it was a very valuable program, and were eager to see it continue.

2016-2017 was another year of changes and staff transitions at Techbridge which have created opportunities and placed stresses on the organization's internal systems. Two important decisions have put a revised plan in place for 2017-2018. First, Techbridge will not expand to a third geographic location as originally planned in this AISL grant, and instead will focus on strengthening the expansion sites and central systems. Secondly, Techbridge decided to change its elementary school model to one that could potentially reach more girls while requiring less Techbridge staff time. The majority of current elementary school teachers and school leaders were cautiously optimistic about the new Inspire model, although some were concerned it may be harder to recruit and retain teachers and/or that the new program will not have as much impact on girls. Techbridge is poised to maintain the momentum of the program and build on previous successes, including taking advantage of lessons learned over two or three years of implementation in each site with now more experienced staff and teachers, supportive schools, and committed role models.