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Expanding Access and Inclusion in STEM through Culturally Responsive Family Engagement

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Not all youth have equal access to computer science education. Similarly, not all youth have access to family and community members to help them make a meaningful connection to science, technology, engineering and math (STEM). Given the power and influence of technology across society, it is critical that all youth be included and have **access to STEM and computer science, especially for girls and youth of color** who are underrepresented in these fields.

Across STEM ecosystems and out-of-school organization and networks, stakeholders have an incredible opportunity and responsibility to ensure that girls and youth of color who are underrepresented have a role as *creators* of technology, and not just its consumers. Currently, only 19% of computer science workers are female, while 9% of computer science workers are Black and Latino males and 4% are Black and Latina women of color.¹ Yet diversity in the technology industry is essential to innovation and the creation of products and services that are everywhere in all of our lives.

What can we do differently to improve access to and inclusion in technology?

INCLUDE FAMILIES! The STEM Next Opportunity Fund Family Engagement Initiative believes that culturally responsive family engagement shouldn't be an optional add-on to STEM investment strategy or programming. Rather, we believe that family engagement should be an integral, strategic lever that foundations and organizations utilize to achieve maximum impact with their core activities.

The research is clear and consistent: Families are among the biggest influence on youth outcomes, including in STEM, and especially for girls.² Importantly, **families don't need to be STEM experts themselves or to have a STEM background** in order to support youth in STEM. Families can play a variety of roles as *learning partners* that support youth interest, skill building, persistence in STEM.³ Youth benefit from families – and advocates for families – that *encourage* them to pursue STEM, that act as *brokers* for STEM experiences, and that help them *navigate* pathways to STEM studies and careers.

Informal STEM programs are perfectly placed to support parents and caregivers to encourage, broker and navigate. If we want our efforts to improve access and inclusion to take root, we have to also nurture and be responsive to the environment in which youth grow and thrive. Brokering and navigating, in particular, are roles that may come more easily to families with a STEM background. Informal STEM programs that fully engage families as learning partners can help all families to fill these roles.

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What is culturally responsive family engagement and why is it important?

Culturally responsive family engagement is both a strategy and a process that maximizes the unique strengths, interests, needs, and complexities of communities who are underrepresented in STEM. As an approach to equitable and inclusive education, culturally responsive STEM is sensitive to the historical disparity of power and privilege between providers and program participants, particularly with respect to cultural differences across race, language, religion, geography, language and nationality.

By flipping the approach, culturally responsive family engagement intentionally taps into family culture and history to develop curriculum that is engaging and meaningful, while also avoiding essentializing cultures.⁴ Non-dominant communities have traditionally been expected to assimilate and respond to the cultures of schools and informal STEM learning centers, such as museums or afterschool clubs. Culturally responsive programs aim to “move from research and practice *on* families (based on a tradition of pathologizing them as part of the problem) to research and practice *with* families, that builds from their knowledge, experiences, and priorities for change.”⁵ A key to culturally responsive practice is self-reflection and a willingness to acknowledge what we don’t know about another community’s languages, values, customs, local history, ways of knowing, and ways of communicating.⁶

Two Programs, One Overarching Commitment to Culturally Responsive Programming

In this STEM Next Opportunity Fund Case Study we highlight best practices and lessons learned from two programs - [Techbridge Girls](#) and [Code Next](#) - that serve communities with important cultural differences across race/ethnicity, religion, geography, language and immigration status. This case study offers insights for both practitioners and funders of STEM programs.

Techbridge Girls is a national non-profit organization whose mission is to excite, educate, and equip girls by delivering high quality STEM enrichment programming to girls from low-income communities, who are often girls of color.⁷ Code Next is a novel, cross-sector partnership between Google and MIT that provides out-of-school technology learning experiences to Black and Latinx⁸ communities. Both organizations leverage family engagement as a tool to support girls and youth of color to pursue studies and careers in STEM.

Notably, the case studies reveal the difference between STEM program elements that must be *customized* for communities and those that should be *standardized*. In other words, there are some elements of programming that are essential to every family engagement effort, such as dedicated and consistent outreach to families. However, what that outreach looks like will depend on a variety of factors, including the communities and organizations involved, the language and age of participants, and the objectives of the program.

Techbridge Girls

Since its founding in 2000, Techbridge Girls has prioritized family engagement through a variety of program elements as a way to support girls’ interest in STEM. Among their family engagement efforts are family

events for girls to showcase their projects to their families, as well as ongoing outreach to families through newsletters, emails, text messages, and handouts. Additionally, they have piloted ongoing communication with families via a commercially available mobile education app.

Techbridge Girls also develops unique resources, such as [STEM Family Guides](#), to provide families with ideas for projects to do at home and with research on how parents can support their children's



Photo Credit: SYFC

engagement. This guide was first developed for families in the San Francisco Bay Area and has since been adapted and translated into multiple languages for families nationwide. Techbridge Girls regularly asks parents for feedback on their programming, through surveys, focus groups and targeted interviews.

More recently, Techbridge Girls deepened its family engagement programming through a partnership with the [Somali Youth and Family Club](#) (SYFC). SYFC is a community-based organization based in Greater Seattle that serves East African refugee and immigrant families.

Callista Chen, Pacific Northwest Executive Director of Techbridge Girls, spearheaded this unique family engagement effort through the acquisition of a Race to the Top grant. According to Chen, her organization knew that there was a large and growing Somali immigrant population that they wanted to reach in the Greater Seattle area. Chen also knew that developing Techbridge Girls' capacity to engage this community through culturally responsive family

engagement required working with a deeply connected partner organization. Simultaneously, SYFC was looking for an experienced partner to help provide high-quality STEM programming to build their own capacity to support families academically.

Mutually Beneficial Relationship Building

Early Steps to Win-Win Programming. Chen knew she wanted to better serve Somali girls but had no one on staff with experience in this community. So Chen actively sought out community contacts. Her first attempt was at a middle school open house where Techbridge Girls was recruiting girls for its afterschool programming. Despite trying to talk with several East African families, she was not able to meaningfully engage with them. Recognizing the limits of her own knowledge, Chen suspected that their reluctance to talk with her might be due to both language and cultural barriers. Chen was careful not to assume that the families were disinterested or that they weren't doing STEM in their own homes. Rather, Chen felt strongly that Techbridge Girls needed to take a more culturally responsive approach to recruiting.

Reaching out to her network, numerous people referred Chen to [Hamdi Abdulle](#), the Executive Director of the SYFC. Abdulle grew up in and previously taught science in Somalia. With a bachelor's degree in Teaching from Lafole College of Education in Mogadishu, Somalia, as well as a Bachelor's of Science from George Mason University in Virginia, Abdulle has deep credibility in both the local Somali and wider Seattle region.

Prior to beginning work together, Chen and Abdulle met and brainstormed how they could collaborate. They considered several options, including recruiting more girls to come to Techbridge Girls programming and having Techbridge Girls provide professional development training to SYFC staff, as Techbridge Girls has done for other organizations such as Y-USA and Girl Scouts of the USA. Abdulle shared her desire to increase high-quality afterschool programming at an apartment complex for recently immigrated Somalis. She also wanted to foster family support of students' academic goals through new programming that would fit into and strengthen an existing set of workshops for families at the SYFC offices.

According to Chen, these early steps in building a mutually beneficial relationship were a key element of their success.

“To build a relationship with an organization, it just takes time.... You have to test out the waters. You have to work together. You have to see if it works. You have to adjust. And a relationship takes time to build, especially to build a program that crosses organizational cultures - like a national nonprofit and small, local community based organization- and also the deep cultural issues between Western and non-Western organizations. There are many different expectations and the way that things are traditionally done have to be merged and worked through.”

Techbridge Girls recognized that although they were experts in STEM for girls, they knew very little about Somali culture. Similarly, Abdulle knew that SYFC parents wanted to better understand the technology that everyone is talking about and that they wanted their kids to be in on technology-related skills and opportunities. Self-reflection by leaders in both organizations was important in building a partnership that addresses mutual needs and strengths.

Over time and through numerous in-person conversations, the two organizations built a shared vision and goals for a partnership to serve Somali parents, including those who had recently immigrated. In the next section, we describe how Techbridge Girls and SYFC collaborated to create culturally responsive workshops.

Culturally Responsive Design Process

Recruiting. Workshops were offered to anyone who lived at the Pine Ridge Apartment Complex in SeaTac, Washington, and who benefitted from the services of the SYFC. The primary attendees were a group of 10-20 Somali women who mostly knew each other and whose kids are friends. This peer-to-peer social connection among parents, with encouragement from SYFC leaders, was an important mechanism for recruitment.

Content and Delivery. The pilot year of the family engagement collaboration involved a series of seven workshops for the Somali parents. Techbridge Girls and SFYC staff collaborated to identify topics that were most relevant to families and brainstormed how to make each workshop culturally responsive to the



Photo Credit: SYFC

Somali immigrant community. Tania Tauer, who has a Ph.D. in Chemical Engineering and leads Techbridge Girls' design and delivery of professional development trainings with external partners, drafted the workshop content. Tauer then shared it with Chen, Abdulle and a SFYC program coordinator for their input.

The workshop series started with a basic introduction to STEM, focusing particularly on engineering and technology. Participants learned about the rapidly growing number of STEM jobs in the Greater Seattle region and discussed the need for increased diversity in these STEM fields. Finally, participants learned concrete strategies to support their children during STEM activities and discussed how to encourage their children through various pathways to careers in the engineering and technology sectors. Throughout the workshops, participants took part in experiential, hands-on activities, similar to what Somali girls would do in Techbridge Girls programs. They also talked about research on growth mindset, grit, and the engineering design process.

Whenever possible, Techbridge Girls and SFYC tried to connect information and activities to the participants' lived experiences. For instance, some of the women, when they lived in Somali, were nomadic, and they built and rebuilt their family dwellings. When they learned the terminology and concepts around the engineering design process, they said, "We understand. We were like engineers there, we were building and designing things. That's not so different than what you're trying to teach us." This connection validated the "funds of knowledge" that the families possess,⁹ supported the mothers to develop a positive STEM identity and improved their confidence in being a STEM advocate for their girls' futures. This example of analogous STEM literacy also provided a learning moment for Techbridge Girls staff about the culture of this newly immigrated group of Somali women.

Program Implementation. Making this connection between technological concepts in the US and the lives of the women in Somalia was accomplished through two design elements: the iterative development of each workshop around the learning needs of the community and the live, simultaneous translation of each workshop by Abdulle.

Because the women served by SFYC are mostly pre-literate or illiterate, Techbridge Girls created presentations and handouts full of graphics, icons, and photos and only a few words. Techbridge Girls staff

paused in the middle of sessions for the Muslim call to prayer. The workshops for parents took place at the apartment complex where the women lived and included free child care. By making presentations accessible, and by holding the workshops in a convenient location with childcare, Techbridge Girls recognized and addressed significant barriers to participation. Techbridge Girls also acknowledged and responded in a culturally appropriate way by validating the importance of prayer for these women.

The simultaneous translation was particularly useful because Abdulle would not only translate Tauer's discussion directly from English to Somali, but also translate the content to be culturally-meaningful for participants. For example, while introducing a package engineering design challenge, Abdulle reminded the women of when they used to carry eggs in Somalia. She connected how they would creatively protect the eggs by surrounding them with sand to how engineers in the US have to design packaging to protect fragile products like electronics. This helped the women connect the activity to their own lives, and also fostered their development of a positive STEM identity.

Lessons Learned

In reflecting on the pilot year of the partnership with SFYC, Chen noted several lessons learned that are helping improve Techbridge Girls' own practices and hold promise to advance the field.



Photo Credit: SYFC

New family engagement projects will do best with grants that are both flexible and generous - not only in terms of money, but also with time and outcomes. According to Chen, a key to the successful design and implementation of their content and processes was a very generous and flexible grant that allowed them to pilot and refine. She noted, "If funders or organizations on the ground want a quick win doing culturally responsive family engagement, they are going to be disappointed." Programs need to modify existing content or to create new materials. Collaborators who work in connection with an academic calendar will need a full academic year to pilot and test, and then a second year to refine based on data.

Truly successful partnerships are relationship-driven, and these relationships also take considerable time to develop. This is particularly true when working across very different cultures, such as a national nonprofit like Techbridge Girls and a local community-based organization like SFYC, or across Western and non-Western cultures. It takes time for partners to understand culture, to self-reflect, and to develop strategies and techniques to be culturally responsive.

Have a mindset for continuous feedback that supports iterating and refining.

There was a continuous process of self-reflection and feedback both during and after the workshop sessions, with Techbridge Girls and SYFC checking in with each other and the parents on what to include in each session and how to make content more useful.

For the pilot, Techbridge Girls utilized a very experienced educator, Tania Tauer, who was both a highly-skilled facilitator and who knew the material well. Despite her unfamiliarity with the Somali language and culture, Tauer's strengths as an educator gave her the latitude to offer in-session flexibility. Tauer also used post-workshop feedback to adjust for the next time.

Foundations can support best practices for culturally responsive program design by requiring or encouraging self-reflection, ideation, collaborative design, and piloting. When Techbridge Girls and SYFC launched the project, they didn't know exactly what the program would look like or what the outcomes would be. However, they were confident in promising their funder two outcomes: (1) that each organization would build its capacity to serve recently immigrated Somali parents better going forward and (2) that they would iterate and revise program content and delivery, based on continuous feedback from parents about what was interesting and helpful, and what was not.

Code Next



Code Next tech lab in Oakland, CA. Photo Credit: Google

The second program showcased in this case study, Google's Code Next, represents a notable initiative for corporate social responsibility. Google's research on the state of **computer science in K-12 education** found that approximately half of all Black and Latinx students lack access to computer science in school. Code Next is designed to help address this digital divide.

To achieve this, Code Next implements programming with three culturally responsive and family-focused components: intentional design, contextualized outreach, and monthly workshops. Google believes that in order to see a big shift in the tech space and

participation from Black and Latinx technologists, they have to make long-term investments that both **leverage and support social capital in communities**. April Alvarez, who is Google's Code Next Program Manager explains:

"At **Code Next**, our mission is to build social capital in Black and Latino communities through innovative tech learning experiences. When we talk about social capital, we're talking about the network, and the people, the organizations that students can tap into and access resources for student support. So when we

were designing the program, we knew we had to design and make sure that we built up resources for parents.”

Each program component is informed by a combination of research, the program managers’ experience, and the input and expertise of the families in the communities they are serving. Through this approach, culturally responsive family engagement is a fully integrated element of Code Next’s strategy. Here are some of their best practices that can be adopted by out-of-school-time STEM and computer science-focused organizations, even with a limited budget.

Intentional Design

Research-based Design. Code Next took the approach of adopting best practices in computer science education that had been developed elsewhere and then customizing these research-based programs for local communities. Code Next partnered with MIT to use its [Family Creative Learning](#) workshop, which introduces parents to computer science through making in inclusive, culturally-relevant learning environments.

Family Creative Learning is currently hosted by Ricarose Roque, an assistant professor in the Department of Information Science at the University of Colorado, Boulder, who collaboratively designs workshops with educators and coordinators in schools and community groups like Boys and Girls Clubs. Organizations and educators can access a free [Facilitator’s Guide](#) to Family Creative Learning, which includes a framework for implementing family workshops, along with photos and strategies that show how workshops were implemented in multiple sites near MIT.

Experience-based Design. Alvarez also asked for input from multiple sources, with a focus on fostering diversity and inclusion. One of the first places she turned to was the existing Computer Science Education community. According to Alvarez,

“We had a listening tour with folks who have been in CS education for a long time and we asked them about what it would take to be successful. If they could design a program, what might it look like? And one of the things we got was high touch. The other piece that we got was involving the family.”

They then made sure to incorporate those elements into their new program. Moreover, before coming to Google, April Alvarez provided counseling to parents about financial aid and college. She and everyone on her team have a background in education. Alvarez and her team also come from the communities they serve, so it’s easier for them to broker relationships and for families to relate to them.



Photo Credit: Family Creative Learning

Community-based Design. Listening to families about what works for them and barriers that they face is a core element of effective and culturally responsive family engagement. Code Next offered families opportunities to provide input into the design of the program, as well as opportunities to give feedback on pilot implementations. Code Next utilized multiple ways to listen to families, including through anonymous surveys, informal but intentional conversations between staff and families, and focus groups with external evaluators.

Contextualized Outreach

While it was piloting its program, Code Next staff asked families about their digital access and the best methods of communicating with them. By soliciting input from families, they learned that *there is no one best way to communicate* with the different communities they serve. The program therefore customizes outreach. Here is what Code Next learned about this process.

Pay attention to timing. Just like organizations need to be strategic with timing of their social media posts, they also need to think about the best time to send information to families. Whether receiving new information or reminders, families and students benefit from programs sending updates multiple times, several days in advance of events, over different days and different times. Ask families when they are most likely to read what you send.

Vary the forms of outreach. Code Next utilizes up to four different forms of communication to stay in touch with families: apps, texts, email, and old-fashioned paper. They also use different forms for different communities. *By asking parents about their preferred form of communication*, Code Next learned that Oakland parents prefer text and that New York parents prefer email.

Commercially available apps serve as a central repository of information, as a form of communication through push notifications, and as a way for families to connect with each other. There are a wide variety of apps available, the best of which are [certified as compliant with state and federal student data privacy laws](#).

Code Next also sends home paper copies of information; this format intentionally duplicates text, email and app messaging, helping to ensure that it reaches parents at least once.

Translate as necessary. In Oakland, the need for written and spoken Spanish translation is essential. Code Next has translation volunteers at all of their in-person events and they translate anything that's printed that's going home to parents.

Listening to families about what works for them and barriers that they face is a core element of effective and culturally responsive family engagement.



Monthly, Community-Based Workshops

Code Next provides monthly computer science workshops for parents that are experiential, community-building, and resource focused.

Experiential and Social. “All of the fun and engaging ways we introduce students to computer science, we also do that with parents,” says Alvarez. “We give parents a hands-on experience through [Scratch](#) and [Makey Makey](#) projects and making their own videos.” Parents also reported enjoying a workshop run by Google volunteers on the Google suite of products, where there was one Google volunteer for every parent.

When designing hands-on activities for parents, Code Next makes a concerted effort to be attuned to the prior experience and background knowledge of parents with computer science. They try not to make assumptions about parent experience, so that parents are neither overwhelmed with new information nor underestimated. This is important because [Google’s research with Gallup](#) shows considerable variation across parents’ knowledge about what activities make up computer science, as well as parent perceptions of the value of a career in computer science. Black parents, for instance, were considerably less likely than Latinx and White parents to know that coding and programming are activities in computer science. Latinx parents were less likely than Black and White parents to believe that most people who work in computer science have good paying jobs.



Parent of an Oakland student at one of Code Next’s monthly workshops shares his creation with the community
Photo Credit: Google

The monthly meetings aren’t all about learning computer programming; they are also about building community. Code Next implements its learning events as social events, with built-in time for parents to meet each other and have informal conversation over meals. This approach to creating safe and welcoming spaces for families, where their voices and relationships are valued, is meant to help families build community networks.¹⁰ This helps families to be resources for each other as their children pursue STEM

education and career opportunities. It also helps local communities build a sense of belonging within the broader STEM community.

Resource Focused. Code Next helps parents connect the dots between out-of-school and in-school computer science activities with long-term career opportunities. Monthly meetings often include discussion about STEM pathways generally as well as a focus on computer science pathways. They do this through panels of Google employees or other guest speakers, providing role models who are representative of the Black and Latinx communities they are serving. Another introduction to the STEM pathways focuses on high school course planning and talking about admissions requirement to state university systems, with highly specific information about the STEM required courses that high school students need to think about ahead of time.

Lessons Learned

Code Next frequently solicits input and feedback from the communities they serve. Interestingly, Alvarez has found that getting families to provide constructive feedback is one of the hardest challenges of implementing the program. Most of the feedback that they receive from families was positive and encouraging. Ironically, Code Next's financial resources and corporate status via Google likely present a bit of a challenge to get critical feedback from participants.



The program providers know from experience that there can be a variety of barriers that prevent families from giving constructive feedback. Although they were not certain of the cause, staff perceived that the power dynamic between the organization and participants who received free programming could inhibit critical feedback. In an effort to address this, Alvarez and her staff made a point to gather feedback multiple times, in various formats, including in person and anonymous surveys.

Whether a program originates in the corporate or social sector, adequate funding is a necessary but insufficient investment solution to solve for equity and inclusion barriers in STEM. Code Next--which was founded and funded within Google's division for Diversity, Integrity and Governance-- illustrates that the culturally responsive mindset of a program's staff is equally important to its success as its financial resources.

Next Steps

Culturally responsive family engagement is a key lever for improving access and equity in STEM because it has a catalytic effect on core programming activities. As a strategy for improving program impact, family engagement provides a strong return on investment. Practitioners can use the guideposts in this case study to inform design, evaluation and revision of program processes and activities. STEM funders, especially those with a focus on girls and youth of color, can be more effective with all their programs by asking: “What are you doing for family engagement?” And “What culturally responsive processes have you put in place?”

Together, the following action items for culturally-responsive family engagement in STEM can be a great place to start this conversation:

- Engage in self-reflection, check on assumptions, and acknowledge the limits of our knowledge about the communities we serve.
- Design with the expectation of extended timeframe and flexible funding, which are critical to build meaningful relationships across cultures with community brokers and communities.
- Develop continuous input feedback loops that support program design and refinement.
- Contextualize and customize programming, but don’t reinvent the wheel; where strong, research-based curriculum exists, start with that and customize.
- Hire staff and build mutually-beneficial partnerships with credible liaisons from the community that the organization is trying to serve.

Organizations that work with these guidelines in mind recognize that family engagement is not an optional “nice to have.” Rather, family engagement is a strategic imperative that improves access to and efficacy of grant-making and programming.

Additional Resources

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We would like to thank April Alvarez, Callista Chen, Hamdi Abdulle and Tania Tauer for sharing their experience and expertise with us. For their thoughtful and helpful comments on earlier drafts, we also extend our thanks to Jameela Jafri at Project Exploration; Frieda McAlear at Kapor Center for Social Impact/Level Playing Field; Jean Ryoo at the University of California, Los Angeles; and Cary Sneider at Portland State University.

We welcome your feedback on this case study. Send us your comments and questions to info@stemnext.org.

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7. The authors of this case study include Techbridge Girls Founder and former CEO, Linda Kekelis, and former Techbridge Research & Evaluation Manager Kara Sammet. Both authors led family engagement projects while at Techbridge Girls, but were not affiliated with the organization when the programming that is highlighted in this case study took place. Kara Sammet is also a contractor for Google's K-12/Pre-University Education Outreach department, but is unaffiliated with Google's Code Next.
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