NYC FIRST

STEM Center in Washington Heights Case Study

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Siegel Family Endowment

We are a foundation focused on understanding and shaping the impact of technology on society.

Our Focus on Learning

We strive to understand how we can better equip individuals with the knowledge they need to contribute to and engage with a rapidly changing society. Yet, we also recognize that every factor in a learner's education – from broadband access to safe and affordable housing to the development of social-emotional skills – can widen inequality and impact success. Our work supports and shapes programs and solutions that build lifelong learning opportunities and envision an education system that works for everyone, by addressing long standing social and economic inequities.

Schools as Community Infrastructure

For schools to become the most effective and powerful versions of themselves, it's critical to understand their place within and connection to the communities they serve, and how both systems – school and community – must be strengthened in tandem. Using a multidimensional framing for school allows us to consider their infrastructure needs in a holistic way that elevates the school community's strengths and resources, and identifies needs that remain unmet. By conceptualizing and conceiving of schools as bigger than the buildings in which they operate, we have an opportunity to expand what schools can do, and ensure that they are set up to do that critical work.

NYC FIRST

About Grantee

NYC FIRST enables students from diverse communities across New York City to engage with STEM (science, technology, engineering and math), focusing on using robotics education in rigorous, meaningful and joyful ways, setting students on rewarding pathways academically and professionally. NYC FIRST offers mentor-based robotics leagues, neighborhood-based STEM Centers, credit-based courses for public high school students, professional learning opportunities for teachers, and other opportunities offered in partnership with diverse and far- reaching institutions including the city's public school system, public libraries, institutions of higher learning, corporations, and others. Through these activities, NYC FIRST is preparing the next generation of innovators and leaders while strengthening communities.

KEY TAKEAWAYS

- Investing in a community by providing and centralizing both **high quality STEM-based resources and committed, experienced professionals** – done in a highly cost-effective model – can catalyze significant change, leading to larger scale, highly impactful programs, such as district-wide robotics, serving thousands of teachers and students.

- With efficient resources and thoughtful partnerships, **powerful learning opportunities can exist outside of schools**, covering both formal and informal contexts, seven days a week, morning through evening.

- When developing an education program, **organizers should balance being responsive to the particular needs, values, goals, and interests of the community** they seek to serve, with the experiences and expertise inherent in the organization.

- There are opportunities for learning programs to **align metrics to the larger change that they would like to see in their communities**. This may mean tracking measures of success across long periods of time and in unconventional ways. This work is challenging and requires resources.

Executive Summary

We often imagine that learning takes place in two distinct and disconnected spaces: in school classrooms and in enrichment programs held offsite. Yet, NYC FIRST's STEM Center model blurs these lines. In the New York City neighborhood of Washington Heights, NYC FIRST runs a facility dedicated to STEM learning at the local New York Public Library (NYPL) branch. Though it is not physically housed within a school, the STEM Center partners deeply with the public K-12 school district as well as with the community at large. In very tangible ways, the NYC FIRST STEM Center is bringing school into the community and bringing community into the school.

Washington Heights sits in School District 6, which describes itself as a place "where every child, in every school, is afforded an exemplary 21st-century learning environment through a multidimensional approach that engages families and community." The area in the far north of Manhattan that includes the neighborhood of Washington Heights is known as "Little Dominican Republic," and approximately two-thirds of residents identify as Hispanic. Still, that figure has declined over the past decade, as the neighborhood's white population has increased and gentrification has displaced some lower-income families.

The STEM Center in Washington Heights has a variety of tools, equipment, and materials used for robotics and other STEM activities. The Center offers expert instruction in a range of informal and formal education programs, including workshops for community members, for-credit courses for high school students, professional development opportunities for educators, robotics leagues for students, open drop-in hours, and field trips for local classes. Staff are often from the community, speak Spanish, and work to provide the types of programs and guidance that community members identify as important. They also seek to build partnerships with local public schools, introducing and reinforcing the core values of rigor, meaningfulness, and joy in learning both inside and outside of the classroom.
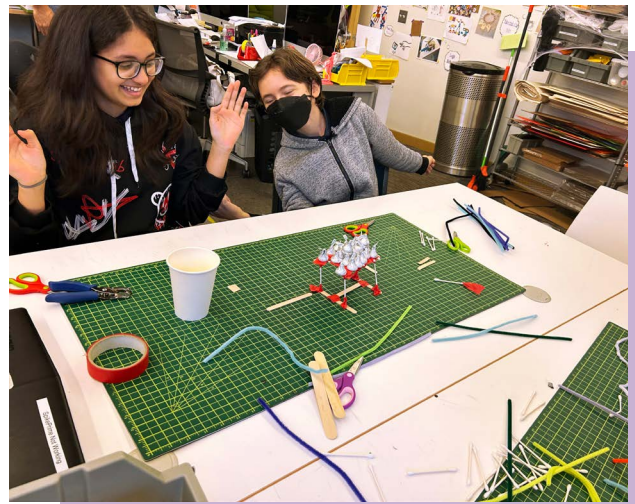
Program

NYC FIRST's STEM Center at the Washington Heights branch of the New York Public Library (NYPL) – one of a network of STEM Centers that NYC FIRST operates – is many things at once. It's a cost-effective way to help teach many students and teachers in many schools in District 6. It's a space for community members to work with 3D printers, laser cutters, and other equipment. It's a field trip destination for public school classes in the neighborhood. It's a classroom where high school students earn credit for immersive engineering learning. It's a meeting space for robotics teams. It's a professional learning space for public school educators who are seeking to build design thinking and rapid prototyping approaches into their curricula.

Weaving these varied activities together is a model for education that rests on an asset-based philosophy of partnership and collaboration that is clearly centered on the learner, not the school building. In what NYC FIRST CEO Michael Zigman describes as a "hub-and-spokes model," its STEM Centers serve many schools from one location, providing expertise, fabrication equipment and computing, and research-backed curricula and programming in STEM and robotics education. At the same time, NYC FIRST connects with Department of Education leaders, educators, students, local residents, and other community stakeholders to devise and offer opportunities that will resonate with the needs and interests of the community.

The result is a programming approach that is both efficient and responsive. Zigman explains, "The equipment is wonderful, but the thing that breathes life into the STEM Centers is the people who work there. The ability to empower our staff, invest in them, and provide them professional learning and growth opportunities is the key to success. They're the ones who are, more than anything, catalyzing the community."

Having the STEM Center in District 6 helped make possible New York City's first district-wide robotics program. The STEM Center serves as the hub of learning for the community and the nerve center for the 40 K-12 schools participating in this program. Teachers come for weekly professional development and the Center hosts field trips for hands-on learning multiple times a week. At the end of the district-wide program, 40 teachers in the program were surveyed, and 100% of them said that their students gained new engineering skills, took ownership of their work, and took an interest in STEM and/or robotics outside of the classroom. NYC FIRST would like this model of success to spread to other school districts around the city.

Core Elements: What Makes the Program Work?

1 Blending Formal and Informal Learning Opportunities

The STEM Center in Washington Heights offers both formal and informal learning opportunities for community members. Formal learning opportunities include for-credit courses for high school students, institutionally recognized professional development workshops for teachers, and teacher-led field trips to the STEM Center. Informal learning opportunities include workshops for residents to experiment with STEM Center equipment, winter holiday activities, and drop-in hours for students to build community (and robots) in a safe space outside of school.

This place-based mix of formal and informal offerings is rare in the education nonprofit world. Zigman says that the approach provides agency and essential opportunities to participants and allows the STEM Center to engage more community stakeholders in deeper ways than would otherwise be possible.

The combination of formal and informal learning programs also has an added benefit: greater efficiency. Zigman says, "We're able to concentrate both human capital and material resources in a non-traditional manner, deploying those resources to serve more learners, more responsively, and more cost-effectively."

2 Emphasizing Diversity—In Programming, Staff, and Community

NYC FIRST staff recognizes that their programs need to be responsive to – and in some cases co-designed with – the community. At the same time, they recognize that a standardized approach to programming provides advantages when it comes to efficiency and quality assurance. Diversity in programming, staff, and community all allow the STEM Center in Washington Heights to balance community responsiveness with standardization.

More than access to equipment, or any individual course or workshop, Zigman says that the STEM Center in Washington Heights is designed to be a space for "fostering community and for bringing people together, having them rub shoulders with each other, having the flow of ideas and opportunities get swirled around together."

Zigman says that that work begins with offering residents multiple and accessible ways to be involved. To that end, the STEM Center focuses on offering both simple and more intensive ways of serving a range of community members, including students, teachers, administrators, families, residents, and others.

The work of deep and impactful community engagement also means staffing the STEM Center with some people who are from the community and can meet residents where they are. For example, in Washington Heights, most STEM Center staff members are conversant in Spanish – the language that many residents are most comfortable speaking.

3 Building Bridges to Schools

At its heart, the STEM Center aims to be a hub of learning and a nerve center for 20,000 students in the public school district serving Washington Heights and surrounding neighborhoods. But realizing this vision for the STEM Center would be possible only if NYC FIRST built bridges between the STEM Center and the larger school district – an institution that serves far more learners than would typically set foot in the public library. As Zigman puts it, the STEM Center provides a "jumping off point for us to reach schools."

NYC FIRST's partnership with New York City's Department of Education takes a variety of forms: professional development workshops for educators, for-credit courses for high school students, curricular materials, and field trips, among them. In Washington Heights, the STEM Center provides the physical space in which many of these activities take place. It also provides the resources that enrich STEM learning for many students in the neighborhood.

Those investments in building bridges between public schools and NYC FIRST are paying off. In the course of fulfilling requirements for NYC FIRST's for-credit course for high schoolers, a team of students from the STEM Center in Washington Heights was in the top 20 in the world for an advanced innovation project that involved a wearable mesh fabric that directed electrical pulses to muscles of wheelchair users.

4 Rethinking Traditional Metrics

When it comes to evaluating the success of educational experiences, NYC FIRST thinks about a range of metrics, as it works toward an objective of launching its students on a trajectory to well-paid jobs that value technical skills, critical thinking and collaboration. These metrics include: increased STEM participation; social and emotional growth; equity, diversity, and success; and scale and immersion.

NYC FIRST examines these areas through surveys of participants, analysis of program statistics, and tracking of participants over time. In all cases, NYC FIRST chooses metrics that correlate with increased quality of life for participants. For example, when it comes to STEM participation, NYC FIRST surveys students about whether they are interested in pursuing and identifying with STEM, majoring in STEM fields in college, and then working in STEM professions, where jobs pay over twice as much as those in non-STEM professions. NYC FIRST students are more likely to be interested in all these areas – a finding that holds regardless of race, gender, income or community type.

Zigman points out that this evaluation work is not always easy. He says, "It requires tremendous resources to do serious evaluations of our work." But he also says that investing in mission-aligned ways of understanding the impact of that work also makes the work much better. "We can't improve if we don't know what's working, for whom, in what ways," he says.

Impact and Next Steps

Impact

NYC FIRST hopes to scale its STEM Center approach but is mindful that the process won't necessarily be linear and must be responsive to local community conditions. The organization is in the process of evaluating partners to house and support additional STEM Centers in other New York City neighborhoods. Host sites might include other library branches, but could also include other institutions such as the NYC DOE, corporations, institutions of higher learning, public housing, and other sites.

In the meantime, NYC FIRST continues to see impact of its programs in numerous ways:

- NYC FIRST's district-wide program in School District 6 has lit a spark in young students, with 100% of teachers surveyed saying that their students gained new engineering skills, took ownership of their work, and took an interest in STEM and/or robotics outside of the classroom.
- There is growing evidence that social-emotional qualities such as self-efficacy and self-management rival academic or technical skills in their ability to predict employment and earnings, increased academic success, decreased risk, and increased thriving. In its core STEM Center courses, 95% of students improved their social-emotional skills, with the biggest gains in self-management, the ability to take positive risks and persist through life's challenges.
- NYC FIRST has seen an impact in the areas of equity and diversity. The majority of students NYC FIRST serves are low-income and students of color, and approximately half of students taking courses in its STEM Centers are young women.

In the past year, two Title 1 schools that NYC FIRST has worked with in its credit-bearing classes at its STEM Centers won the city-wide high school robotics championship, defeating an elite public school in the semi-finals and an elite private school in the finals. And as mentioned earlier, a Title 1 school in the Bronx reached the top 20 in the world in an innovation challenge, citing the support of the STEM Center as critical to its success.

- Regarding scale and immersion, NYC FIRST reaches thousands of students annually, enabled by its STEM Centers. Many students in its credit-bearing classes spend approximately 200 hours each year in these programs.

Next Steps

NYC FIRST is seeking further capacity to staff STEM Centers and to mentor students.

1. Interested New York City residents can look for opportunities to get involved by coaching robotics teams, teaching workshops, working in a STEM Center, or volunteering in other capacities.

2. NYC FIRST welcomes queries from other communities about how to work with schools and neighborhoods to offer rigorous, meaningful, and joyful robotics and STEM education.

3. Reach out to NYC FIRST to learn more about STEM Centers or any of their other projects.

To learn more and contact Siegel Family Endowment, visit www.siegelendowment.org