

Building and Sustaining a Thriving Maker Hub

GUIDANCE FROM PIONEERING PROGRAMS IN PITTSBURGH

“Pittsburgh has built a strong foundation of networked organizations, including school districts, which are committed to innovating learning experiences for the 21st century. Pittsburgh is fertile ground for large-scale investment in maker movement activities because it illustrates that all schools and all students are capable of remaking learning.”

- Remake Learning, Kids + Creativity Network report

VOICES FROM THE FIELD: GROWING A MAKER ECOSYSTEM

A remnant of Pittsburgh’s industrial past is what residents describe as a “proud DIY work ethic.” Indeed, the Maker Movement has developed quickly in this town through a mixture of museums, community-based organizations, makerspaces, and universities. Over the past several years, the city has slowly built one of the most extensive, collaborative, and innovative networks of maker education sites in the country. The city, (and more specifically, the talented staff of these local youth-serving organizations), is now seen a national leader for integrating the tools and technologies of the Maker Movement and the resources of the local community to address youth development. Other cities keen on growing their own range of maker education offerings have much to learn from the strategies that Pittsburgh organizations have used to pursue a broad and ambitious mission, which is roughly to provide all Pittsburgh residents with supported opportunities to play, create, innovate and make using real tools and technologies.

This report shares the perspectives from several organizations that exemplify the collaborative and creative spirit key to the city’s success as a hub. Many of them, it should be noted, have benefited from guidance and support of the Maker Education Initiative (Maker Ed), a national nonprofit committed to creating more opportunities for all young people to develop confidence, creativity, and interest in science, technology, engineering, math, art, and learning as a whole through making. Here we highlight two of their programs, Maker VISTA and Maker Corps, which have been integral in growing organizational capacity at several sites. In addition, we draw from interviews and documentation from other Pittsburgh-based maker education programs to provide additional insight into the strategies that have contributed to Pittsburgh’s success as hub for maker activity.

“It’s a very simple thing, but if you see someone doing something that you can relate to, you can then see yourself doing it, and maybe going beyond that. So, Pittsburgh is emerging and I hope that it’s emerging consciously with its challenges. And I think how to make it a more Maker city is just making ‘making’ more accessible.” – Nina, Assemble

THE MAKER VISTA PROGRAM

The Maker VISTA Project is a federal AmeriCorps VISTA program administered by the Corporation for National and Community Service (CNCS), and is managed by the Maker Education Initiative. It is a national service project and has partners across the U.S. Between November 2013 and February 2015, Maker VISTA members have served organizations in California, Pennsylvania, Maryland, Florida and Texas.

Maker VISTA members provide capacity building services to propagate maker education for youth-serving organizations serving high-poverty communities. The AmeriCorps program currently has six focus areas with specific strategies for lifting individuals and communities out of poverty. The Maker VISTA program focus area is education, specifically maker education, which includes an emphasis on science, technology, engineering, mathematics, art, and learning as a whole. Due to this inclusion, Maker Ed has an additional recognition as a STEM partner with CNCS.

AmeriCorps VISTA is a national service program administered by the Corporation for National and Community Service (CNCS). VISTA stands for Volunteers In Service to America, and allows Americans ages 18 and up to serve in under-resourced and high poverty communities across the United States. The VISTA program began in 1965 as a nationwide initiative to fight poverty and joined the AmeriCorps network of service programs in 1993.

<http://www.nationalservice.gov/programs/ameri-corps/ameri-corps-vista>

Each site hosts one or two Maker VISTA members who serve for one year and build infrastructure, expand partnerships, secure resources, organize maker education training, and/or link communities to the larger Maker Movement. One of the unique parameters of AmeriCorps VISTA is the requirement that all partners such as Maker Ed incorporate capacity building as the intention of every activity. When applied in the context of organizations that provide maker education for youth, the Maker VISTA project has tremendous potential for sustainable impact at a national scale.

Every sub-site has a self-identified capacity building goal. The capacity goal for the Pittsburgh site, Assemble, is Leveraged Resources, which focuses on additional resources or assets garnered through capacity building activities such as funding, volunteers, in-kind support, or partnerships. Each capacity goal is further shaped by performance measures that determine the types of activities to reach the capacity goal.

Overall, Maker VISTA members support the development, implementation, and sustainment of systems, structures, and processes with the intention to achieve lasting positive outcomes for the beneficiary populations.

Pittsburgh Maker VISTA site: Assemble

Mission Statement: Assemble is an open physical space in an urban neighborhood in Pittsburgh. We unite artists, technologists, and makers with our neighbors of all demographics. Assemble provides a platform for experiential learning, opening creative processes, and building confidence through making.

"I feel like [maker education] is just like activating people to find their own agency."

- Nina, Assemble

Located in the Garfield neighborhood, Assemble is a small storefront space on the main street that doubles as an art gallery and activity space for maker education programs. Some programs are drop-in, such as “Assemble Afternoons” or “Saturday Crafternoons” and others are repeat classes organized around skill development. They also do outreach programs at local schools. Founded in 2011 by Nina Barbuto, Assemble is run by a Board of Directors, three program managers and a group of volunteers and interns. During the summer of 2014 two Maker Corps Members also helped develop and deliver summer camp programs.

Nina saw the opportunity to have VISTA members as a way to build capacity for the organization, establish more efficient organizational systems, and continue to build relationships with other organizations and the community. Two VISTA members began their service in July 2014 and are currently the only two full-time volunteers at Assemble. Kate Bell, a former lawyer with a personal interest in making from the Burning Man community, is the Outreach and Volunteer Specialist. Sienna Cittando, a librarian interested in teen services, is the Development and Database Specialist. Both Kate and Sienna bring professional experience that has enabled them to transition into their new roles and also bring new perspectives to the organization.

In the first six months of their service, they have made significant progress on the organizational goals outlined in their VISTA Assignment Descriptions (VAD). Specifically, Kate and Sienna have been instrumental to the:

- Submission of seven grant applications
- Development of a database system for tracking donors, volunteers, participants, other organizations and a general mailing list
- Approval of Assemble as a Pittsburgh Public School Afterschool Provider serving up to 1000 students
- Development of press releases, a content plan for the website, and local advertising for Assemble’s programs

Nina’s vision for the future of Assemble includes hiring full-time permanent staff to lessen the administrative load on their volunteer board, being open longer hours during the day, deepening relationships with participants and their families by offering more programming directly to parents, and attracting more attention from local media outlets. She also would like to pursue ways to keep programming as low-cost and accessible as possible while also increasing financial stability for the organization. All of the on-site programs at Assemble allow participants to pay what they are able, which means that the programs are not sustainably funded. Some programs are funded by grants or individual donors, but it is still a challenge to balance a model that prioritizes affordability with high-quality experiences.

THE MAKER CORPS PROGRAM

Maker Ed’s Maker Corps program is designed to increase the capacity of youth-serving organizations eager to engage youth and families in making. Each Maker Corps cadre is a new workforce that is constantly learning, working collaboratively, and infusing new energy into established organizations. Maker Ed partners with select youth-serving organizations each year to train and place Maker Corps Members at each site that are committed to developing and delivering maker programs to youth and families throughout the summer.

Maker Corps program goals:

- Build confidence, creativity, and career readiness of Maker Corps Members.
- Diversify and expand the network of makers, mentors, and community leaders.
- Expand the capacity of youth-serving organizations to engage youth and families in making.

Maker Corps Members (MCMs) are passionate makers or aspiring makers who serve as peer mentors and bring their own enthusiasm and knowledge to each Host Site. The majority are college students, young professionals, or teachers seeking to learn and expand their experiences.

Maker Corps Host Sites are U.S. organizations including science centers,

children's museums, schools, libraries, makerspaces, and other youth-serving agencies able to provide safe, creative environments with the personal and social support necessary for each child to have a rich making experience. Host Sites provide day-to-day supervision over at least two MCMs employed at their site during the summer.

Pittsburgh Maker Corps Sites: Assemble, Millvale Community Library, MAKESHOP at the Children's Museum of Pittsburgh

During the summer of 2014, three organizations in Pittsburgh participated in the Maker Corps program: Assemble, the Millvale Community Library, and the MAKESHOP at the Children's Museum of Pittsburgh. Across the board, both Host Site supervisors and MCMs described the experience as a positive one, particularly because of the relationships the organizations and the MCMs made with their local community.

- *"As a public library in a community with many children who would not otherwise be given the opportunity to engage in Maker activities, we strive to provide equitable access to educational opportunities for our children and the robust Making experiences provided throughout the summer were a perfect fit with this goal."* – Host Site Supervisor, Millvale
- *"Because of Maker Corps we were able to offer more and a wider variety of programs this summer, which benefited a wide range of people in our community. They brought enthusiasm, ideas, abilities and extra hands and minds to much that we did."* - Host Site Supervisor, MAKESHOP
- *"[Something I achieved that was important to me was] [I] taught kids about soldering, illusions, and perception. [We] worked in a group to finish a large task showing the kids that every small simple part works together to make something complex."* – MCM, Assemble

These three organizations, just a few of the dozens of maker education programs in the Pittsburgh area, also reflect the diversity of programs in the city. Some are affiliated with large organizations (MAKESHOP), others are stand-alone community-based organizations (Assemble), and still others serve multiple functions for the community (Millvale Community Library). All are utilizing the guidance of the Maker Movement to design exciting and relevant programming for their audiences.

These sites also noted that Maker Corps helped them build both long- and short-term organizational capacity. In the short-term, MCMs developed and delivered programming during the busy summer months that allowed the sites to serve larger audiences. Longer-term, these organizations noted that

the programs or activities developed by MCMs and the new perspectives and ideas they shared greatly aided them in thinking about future programming.

During the summer, both the Host Site supervisors and the Maker Corps Members in Pittsburgh collaborated through occasional in-person meet-ups and communication via an online community. These connections were an extension of the existing network in Pittsburgh, but were also guided by the added structure of participating in the same national program. The maker programming at Millvale Community Library was initially provided by the Mobile MAKESHOP, an initiative of the Children’s Museum of Pittsburgh. Brian Wolovich, the president of the library, found the support from the other organizations tremendously helpful as he started to develop new programming, due largely to the spirit of the community: “It’s a tight network, here. We support each other and we try to... understand that will strengthen all of our work. Our work depends on our cooperation—as opposed to some sense of competition or isolationism.” Not only did he connect to other Host Site leaders, they set up gatherings for their MCMs as a way to further their understanding of what a “maker” can be, in different contexts. He said, “each of our sites is so different and they could really learn to see, ‘how does this play out in various spaces?’ and we thought it would benefit our individual space as well for them to be able to come back.”

ADDITIONAL PROGRAMS IN PITTSBURGH

Pittsburgh: The city, its people and the Maker Movement

To give deeper context for the Pittsburgh maker community, we spoke with the program managers of additional organizations: The Maker’s Place, the MAKESHOP at the Children’s Museum of Pittsburgh and the Labs @ Carnegie Public Libraries. We asked them to talk about how the design of their programs meet the needs of their audience and what organizational capacity challenges they faced. We also asked them to reflect on the state of the Pittsburgh maker community and what’s needed for it to grow. (See page 11 for a chart of organizations and programs)

The Pittsburgh Maker Community

Programs in Pittsburgh have been developed to meet the needs of their community residents. This means that maker education programs are diverse – not a replication of one program in multiple spaces. For example, the Maker’s Place has four programs for different audiences and is the only organization in Pittsburgh to offer a program that includes an entrepreneurship focus. The Carnegie Public Library oversees 19 sites across the city but modifies its programs to the interest and needs of the local community. Because of this, there are two challenges. First is to let people know about the differences between programs across the city. Second, programs would like to share effective

Additional Resources:

The Grable Foundation

<http://grable.org/areas-of-focus/#out-of-school-time>

Remake Learning

<http://remakelearning.org/network>

PGH: City of Learning

<http://pghcityoflearning.org>

Create Festival (organized by the Pittsburgh Technology Council)

<http://www.pghtech.org/1420.aspx>

HIVE Pittsburgh

<http://hivepgh.sproutfund.org>

practices – both programmatic and administrative – with one another to establish some common standards for best practices.

Defining Essential Elements for Successful Maker Education Programs

While programs differ in their offerings, there seems to be an emerging consensus around key elements that support effective and productive maker education experiences. A current Institute of Museum and Library Services (IMLS)-funded project led by the Children’s Museum of Pittsburgh has begun to document and define these elements based on interviews and observations with over 30 museum and library-based maker programs. Their framework, currently named, “Purpose, People, Pieces and Parts” speak to these core elements¹:

- Facilitation and/or mentorship by a caring and knowledgeable adult
- The use of tools and materials conducive to creativity and exploration
- A well-defined purpose of the program

As Lisa Brahm, the Director of Learning and Research at the Children’s Museum of Pittsburgh put it, “We know that people are the most important part [of maker education].” But finding appropriate staff for these programs has been a challenge at many sites. At the MAKESHOP, finding staff that have a mix of knowledge in pedagogy and technology has not been challenging, but finding candidates that reflect the populations of their local community has been. This may be due to their national reputation as a leader in the field, which has led to applicants interested in participating in the Maker Movement and are early in their careers. At the Maker’s Place, finding candidates with a mix of pedagogy and technology expertise has been more difficult – and difficult to retain those employees because of the salaries they can offer.

At the Labs @ CPL, a core team of three mentors run maker programming across the 19 branches, but the hope is to offer professional development for all staff at each branch to get them familiar with maker education. However there is some resistance and hesitation on the part of non-maker staff to learn new technologies and to see themselves as educators. At all three sites a major focus for program managers has been to develop professional development trainings for staff and find funding to pay for staff trainings. The differences of attracting and retaining staff at these three organizations may reflect the cultures of these types of organizations more than anything else. While all three (museums, community-based organizations and libraries) are not-for-profit institutions, perceptions about the type of work, the pay, and the opportunities for growth may be barriers for some prospective applicants.

The Maker’s Place and Assemble hope to have more physical space than they currently have to provide additional materials and be open longer hours. These drop-in spaces are often seen as an ideal setting to encourage the interest-driven nature of maker programs. But they can be challenging to maintain and staff. The Labs @ CPL has seen interest from both youth and adults and hope to offer more for a wider variety of ages. But it is financially challenging to acquire and maintain materials and technology in makerspaces. Initial investments in materials are often covered by grants, but the cost of maintaining them and training staff on how to use them are ongoing costs. As Pittsburgh pursues the vision of more makerspaces in more neighborhoods open for more hours, the costs of paying for talented staff and adequate materials is challenging to achieve yet key to sustainable programming.

¹ See these resources for more information on this project: <http://blog.ims.gov/?p=5566> and <http://www.makingandlearning.org/>

ELEMENTS FOR A SUCCESSFUL MAKER HUB

Pittsburgh is already a leader in the field of maker education, but it is not a city without challenges for making change. Below we offer additional context into how organizations have navigated and met challenges both within their own organizations and the city itself.

Infrastructure to Support Local Collaborations

In Pittsburgh, the community is supportive and well-connected primarily through personal connections and grassroots efforts. However, some organizations we spoke to called for a better infrastructure to support local collaborations to share information such as ways to outreach to new audiences, manage materials, or provide ongoing professional development for staff. Because there are so many programs across the city and each has its own focus and resources, it would be helpful to have ways to communicate what participants can do at each place, such as a directory of programs. Across the sites interviewed, there was passion for helping interested youth grow and even give back to their community or “home site” after gaining new skills or experiences elsewhere.

“It is notable that Pittsburgh as a region, not merely one organization, has led and will continue to lead this work collectively.”

- Remake Learning, Kids + Creativity Network report

Both Maker VISTA and Maker Corps programs benefit from a national network of other maker education programs that communicate online. Sites share knowledge, strategies, and resources through monthly Google+ check-ins and communities. Maker Ed would like to see this develop into a self-sustaining intentional learning community for future sites and serve as a model for the maker community at-large.

Consistent Language and Communication Messages

Another thread heard across sites was a need for consistent language to describe and define the experiences that maker education programs offer and the skills that participants can gain. This applies to communicating between programs, to participants, and to other stakeholders, such as parents or educators. For example, Nina and VISTA members at Assemble said they would like to offer parent education programs and find other effective ways to communicate about what their child does at Assemble.

For both MCMs and VISTAs, a key activity to develop this language is to be a maker themselves and to listen to what’s important to their participants as they work with them. The VISTA members spoke about how much it helped them to have their own experiences with making during their training, to observe programming at their site and to speak with educators to truly understand the experience that participants will have. This has helped them better communicate in outreach efforts and in grant writing.

As a result of participating in the Maker Corps program, many MCMs reported that they developed their identity as a maker and felt comfortable to lead maker programs in the future. Responses from an end-of-service survey strongly indicated that many MCMs intend to continue their role as a leader of making activities and the movement in general, across the spectrum of formal and informal learning environments. Opportunities to be a maker or observe maker education programs helps individuals develop as advocates for maker education as they learn what is important to them and their audience.

Reliable Evaluation Tools for Documenting Impact

Developing evaluation tools is something that all sites would like to improve on. At the Maker's Place, the staff is working to develop tools to evaluate the ways in which youth have developed and gained new skills through the program but have not found an adequate tool to document this learning. Some sites, such as the Labs @ CPL, are looking at digital badges as an avenue to pursue, both to document learning but also for introducing kids to new areas they may not know about. However, this is still a fledgling area of development as different sites articulate what learning outcomes look like for their particular program.

In grant writing and for monitoring their own achievements, it can be a challenge for VISTA members to know what evidence will be appropriate to measure the impact of their efforts. For some, it may be a matter of better understanding program evaluation or logic models, but it speaks to a larger issue of having few reliable tools to measure the impact of maker education experiences. Efforts to develop such tools are underway through partnerships between program sites and research organizations, some of which are based in Pittsburgh².

Deciphering the funding landscape

Funding for maker education programs has grown in recent years but is still a relatively new idea for some funding agencies. Knowing what the funder is looking for – what they've funded in the past, what sort of impact they want to see – is important in writing a successful proposal.

Some of the key areas that maker programs cite as hard to fund is paying staff wages that will attract high-quality applicants, funding staff time to attend professional development, and providing ongoing funding for maintaining equipment. Several of the organizations we spoke with noted that sharing stories from their participants about what they have gained through the program or experience has been helpful to demonstrate to funders the complexity of program elements that are essential to support effective programming.

For example, the Remake Learning Network supports over 200 Pittsburgh-based organizations that have come together to explore the ways in which Maker, STEAM and digital learning initiatives can inspire learning. They have also funded professional development workshops for formal and informal educators in the city. Mozilla supports Maker Parties, and the Institute of Museum and Library Services have granted research and development grants.

Connecting qualified volunteers and staff with the needs of the organization

As mentioned above, it is challenging to find staff that can meet the needs of the organization – whether that be experience with making, mentorship, or identifying with the local community. Because each organization has slightly different needs and challenges, the process of identifying what gaps exist in the capacity of current staff or volunteers and exploring ways to provide professional development to help current staff grow certain skills are positive ways to begin to address these issues.

The VISTA members at each site have relevant experience that they apply to their tasks for their service that allows them to work independently under the supervision of a staff member. Each VISTA Assignment Description is collaboratively crafted between Maker Ed and the sub-sites along with a joint interview process to increase selection of high-quality VISTA members and aid in volunteer

² For examples, see: <http://www.activationlab.org/research/> and <http://www.moore.org/grants/list/GBMF3508?cat=cc3efd60-a10f-68a5-8452-ff00002785c8>

retention. This was true also of Maker Corps Host Sites; supervisors in both programs cited working closely with Maker Ed staff to craft position descriptions, advertise for the positions and review candidates as a major asset to this process. Another key factor as mentioned above is creating a well-defined purpose for any particular program. Organizations that take the time to clearly define their audience and purpose can then be one step closer to effectively matching those goals with appropriate staff and volunteers.

Understanding barriers to access and community needs

Every city has its own challenges with regards to access to and availability of needed resources. In Pittsburgh, one of the most often-cited barriers is the lack of public transportation between neighborhoods, which has led to a city in which residents tend to stay in their own neighborhoods and don't seek out resources beyond those borders. For the organizations we spoke with, this has meant that while they focus on their local community, it is often frustrating to not attract more people who might enjoy their programming from across the city. For example, Assemble has established an afterschool program but have found it difficult for kids to travel from school and then home in the evening hours.

Organizations also need to find ways to understand their audience – both existing and potential. For some, this has meant relying on the knowledge of educators who provide direct service to participants or establishing advisory or governing boards that include members of community groups. Other good sources of information have been reports on the state of the city's neediest residents, speaking with other friends or connections who serve communities in poverty, and spending time in the communities themselves in their free time.

But a greater goal beyond understanding their audience lies in trust-building with local communities. Several organizations mentioned this as a crucial guiding principle for the work they do. In fact, some organizations, such as Assemble and the Millvale Community Library, are led by people who live in the surrounding neighborhood, demonstrating their investment in the community. For other organizations, collaborating with partners that already have the trust of the community has been.

CONCLUSION

There is great promise in maker education to improve peoples' lives by providing experiences that can lead to developing self-efficacy, creativity, self-awareness as well as technical skills that could be applied in the workforce. The efforts of Maker VISTA members lay a strong, sustainable foundation for organizations to provide relevant programming to their communities and document its impact. The work of Maker VISTA members is to sustainably impact organizational infrastructure to create the conditions that empower youth to learn, and reinforce the opportunity to achieve. The leadership at all of the organizations profiled here understand that their vision to fruition will take time and persistence, but so is the nature of developing the skills of becoming a confident and creative maker.

The two Maker Ed programs that Pittsburgh organizations have participated in, Maker Corps and Maker VISTA, provide the ever-important element of human capacity to help achieve an organization's goals. These programs seem to be especially effective supports because of the additional training, guidance and access to resources they receive from Maker Ed. The infusion of these programs into the existing maker ecosystem in Pittsburgh seem to be an important ingredient to help leverage the potential impact of maker education city-wide. Other cities interested in developing

a supportive network of maker education programs and organizations should consider where strengths and weaknesses lie within the elements listed above.

“Because we talk about empowerment for everybody and building confidence through making is our big main point, and I feel that it's not like a side effect of poverty but a part of getting stuck in the loop is just feeling like you can't do it and you can only do what you see and that's your world but there's so many things beyond that. ... I think it's more about just giving people agency here and also access to these democratic making tools and technology ... But... we are, again, the platform to help that happen.” – Nina, Assemble

Site:	The Maker's Place	MAKESHOP at the Children's Museum of Pittsburgh	The Labs @ Carnegie Public Libraries	Millvale Community Library	Assemble
Organization and Program Description:	The Maker's Place is an ESTEAM focused out-of-school time program. The program provides hands-on product based learning, mentors and cutting-edge technology to encourage middle and high school aged youth to explore, collaborate, innovate and make. We teach teens to make and create products to sell or create businesses.	MAKESHOP® is a space for children and families to make, play and design using “real stuff”— the same materials, tools, and processes used by professional artists, builders, programmers, and creators of all kinds. It is also a place where physical materials and digital media resources intersect; where visitors are encouraged to be curious, creative, experimental and innovative.	The Labs is Carnegie Library of Pittsburgh's teen-only creative technology program. Currently located in three CLP locations, The Labs provides teenagers with access to equipment, software, and trained artist mentors in an innovative learning environment with the focus on creativity and creation. The Labs invites teens of all skill levels to take part on a walk-in basis.	More than a Library -- an agent for positive change. To support our mission of being a force for good in our community, we offer a wide variety of programming for all ages and interests, including activities like homework help, gaming clubs, and GED classes. All of our activities are designed to enrich the lives of our patrons through education, art, community, and sustainability.	Assemble connects artists, technologists, and makers with curious adults and kids of all ages through interactive gallery shows, community talk backs, learning parties, and workshops focused on teaching STEAM principles (science, technology, engineering, art, and math). We host these activities at our space in Garfield's Penn Avenue arts district and at events throughout Pittsburgh.
Setting:	Out of School time program	Children's Museum	Network of local libraries	Small community library	Community space for arts+technology
Audience type:	Youth in grades 6-12	All ages, generally families with children under the age of 8	Youth in grades 6-12	All ages	Youth grades 6-12
Website:	http://themakersplace.org	https://pittsburghkids.org/exhibits/makeshop	http://www.carnegielibrary.org/teens/events/programs/thelabs	http://www.millvalelibrary.org	http://assemblepgh.org