

MAKER CORPS



2014 Evaluation Report

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FORWARD

Even before hiring their first Maker Corps Members, Maker Ed contracted with the Evaluation and Research Department of the Science Museum of Minnesota for program evaluation. Maker Ed has displayed a dedication to continuous program improvement from the very beginning, inviting and incorporating feedback from all sources, and building outside evaluation directly into Maker Corps programming.

Our role as external evaluators is to provide Maker Ed and its stakeholders with an outside perspective on two questions. First: How does Maker Corps impact the Maker Corps Members, participating Host Sites, and the audiences they serve? Second: In what ways can the Maker Corps program improve to better serve these participants and their audiences?

In order to answer these questions, we developed an evaluation plan with two primary methods: surveys and case studies. We surveyed all Maker Corps Members and Host Sites at multiple points during their service year. This method allowed us to get a broad look at Maker Ed's impact across the Maker Corps program. We balanced this approach by conducting case studies at three Host Sites, which allowed us to get a deeper, more specific look at Maker Ed's impact at a few different sites.

This report is a summary of the findings from all evaluation efforts during the 2014 Maker Corps program. We focus on describing the program and its impacts through the eyes of its participants.

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INTRODUCTION

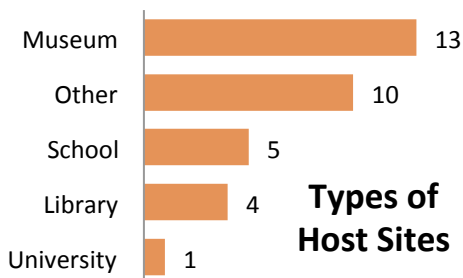
The Maker Education Initiative (Maker Ed) is dedicated to the idea that every child is a maker and deserves opportunities to express their creativity. Its mission: To facilitate and nurture making activities that help young people develop confidence, creativity, and an interest in science, technology, engineering, math, art, and learning as a whole. Maker Ed wants young people to join—and eventually lead—the growing Maker Movement.



Maker Corps was designed to increase the capacity in youth-serving organizations eager to engage youth and families in making. The program was launched in 2012. Each Maker Corps cadre is a new workforce that is constantly learning, working collaboratively, and infusing new energy into established youth-serving organizations. In 2013, its first year, Maker Corps served over 90,000 children and families by placing 108 Maker Corps Members (MCMs) in 34 youth-serving organizations across 19 states. In 2014, 99 MCMs served approximately 53,100 audience members at 34 Host Sites over the course of the summer. Almost all of the difference between the 2013 and 2014 numbers is due to one high traffic organization that did not return in 2014. Ignoring that organization, the numbers for the rest of the Host Sites are very similar. For the remainder of the report we summarize activities only from 2014.

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.

2/3
Of MCMs were students



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.

Maker Ed identifies three goals for the Maker Corps program:

- Build confidence, creativity, and career readiness of 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.

99

MCMs participated
in 2014

The Maker Corps program has concluded its second year. Throughout our evaluation of the program, we found evidence that Host Sites and MCMs are creating and delivering maker programming to a wide variety of audiences while also building internal capacity at their organization. By examining the responses we received from MCMs and their Host Site supervisors, it is clear that each site is building unique programming to best serve their audience. We also hear a desire to more deeply connect and learn from one another. We see a tremendous opportunity for Maker Ed to further document the diversity of Maker Corps programming and enhance the collaborative and educational possibilities of its community.

Diversity, Relevance, and Community

After looking across all the responses, stories, and data, we identified three themes that help tell the story of Maker Corps' impact on its participants and their audiences: diversity, relevance, and community.

In this report we give examples of the great diversity of people, organizations, and programs that Maker Corps attracts, describe evidence of how Maker Corps remains relevant to the goals of this diverse group, and highlight the role of community as a fundamental feature of the Maker Corps program.

DIVERSITY

One of the three primary goals for Maker Corps is to expand and diversify the network of makers, mentors, and community leaders. First, we found that the demographics of the 2014 MCMs closely resembled US Census data (2012) with one large difference. MCMs are much more likely to identify as two or more races (28% of MCMs, 2% of US population). This is impressive given recent criticisms of the diversity of the Maker Movement and a testament to Maker Ed's commitment to this goal.



MAKER CORPS MEMBER DEMOGRAPHICS

	Maker Corps 2014	US Census 2012
White persons only	73%	78%
Black persons only	7%	13%
American Indian & Alaska Native persons only	3%	1%
Asian persons only	6%	5%
Native Hawaiian & Other Pacific Islander persons only	-	0.2%
Persons of Hispanic or Latino Origin, of any race	19%	17%
Two or more races	28%	2%
Female	58%	51%

However, diversity is not just demographics. In order to understand the total diversity of Maker Corps participants, we conducted in-depth case studies of three Host Sites and their MCMs. In order to understand how diverse Host Sites implemented Maker Corps, three case study sites were chosen for their differences. One is a preschool in Florida, the second is a large science museum in Minnesota (the authors' home institution), and the third is a small community library that had just opened in Pennsylvania. In this section of the report, we describe the context of these institutions and what their maker programming is like.

CASE STUDY OVERVIEW

Host Site:	REM Learning Center	Science Museum of Minnesota	Millvale Community Library
Program:	<i>Play Make Share Studio</i>	<i>Activate</i>	<i>The Makeshop</i>
Mission:	To provide quality child care, in a cost effective manner, with knowledgeable and educated teachers in a nurturing, loving, caring and developmentally appropriate environment.	Turn on the science: Inspire learning. Inform policy. Improve lives.	More than a Library -- an agent for positive change.
Setting:	Preschool	Large science museum	Small community library
Location:	Miami, Florida	Saint Paul, Minnesota	Millvale, Pennsylvania
Description:	A makerspace as part of classroom curriculum	Drop-in tabletop activities on Saturday afternoons	Free drop-in activities Tuesday-Friday
Audience type:	Students ages 4-9	All ages	All ages
Audience size:	200 children enrolled in the center annually	655,000 visitors to the museum in 2014	14,200 visitors to the library in 2014
Led by:	Dr. Ryan Moreno, STEM Educator and Dr. Jacqueline Moreno, Administrator/ Developmental Psychologist	Keith Braafladt, Director of Learning Technologies	Brian Wolovich, Library President and elementary school teacher
MCMs:	Barbara and Victoria (current teachers at REM)	Milton and Rachel (college students)	Anna and Nora (recent college graduates)
Website:	www.remlearningcenter.com	www.smm.org	www.millvalelibrary.org

Play Make Share Studio at REM Learning Center

Situated in the shade of palm trees near Miami, FL, the REM Learning Center serves children aged 12 months to nine years. Its maker program lives in a separate classroom space called the *Play Make Share Studio*, which is staffed by Dr. Ryan Moreno, the school's STEM Educator. Prior to working at the school, Dr. Ryan (as he is known by the staff and students) was a mechanical engineer. Ryan's wife, Jacqueline, holds a doctorate in developmental psychology and acts as an administrator, overseeing childhood assessments at REM. Together, Ryan and Jacqueline have designed the *Play Make Share Studio* student experience, carefully considering everything from safety to facilitation strategies, age-appropriate materials to assessment.



“Play Make Share Studio is modeled off of a design studio type of approach. It’s just a flexible space. We were finding that the classroom as it is, it’s more towards either academics or certain areas that are developmentally appropriate. This space was... a little bit more open-ended and allowed for more creative exploration. [Our goal for our students is] being able to adapt quickly to new information, new materials, new tools, and be able to incorporate them into what they feel passionate about.” – Ryan

During the school year, classroom teachers bring their students to the studio twice a week. During the summer, with the dedicated support of their two MCMs (Victoria and Barbara, current teachers who took the summer to focus on the studio), children four and older were able to come three times a week. When students enter the studio, they know to wash their hands, put on safety glasses and meet at the large table in the middle of the classroom to plan what they will make. Dr. Ryan, Victoria, and Barbara help students learn how to safely use tools—from hammers to hot glue to heavy-duty scissors. Although there is sometimes an organized activity, most often children are encouraged to design and make anything they dream up.

Ryan and Jacqueline see the Play Make Share studio as a space for creative exploration. The Maker Corps program allowed them to formally commit to developing what had been an experimental program during the prior school year. By hiring two current teachers as their MCMs, Ryan and Jacqueline were able to achieve two goals at once: they built their organization's capacity by investing in current staff, and they improved their programming via the insights of classroom teachers. During the summer, the team worked together to refine their activities and facilitation techniques, sharing knowledge and experimenting with materials.

Activate at the Science Museum of Minnesota

Long known for its interactive exhibits and extensive educational programming, the Science Museum of Minnesota has also established itself as a place to build and experiment with classic and emerging technology. During their *Activate* Saturday afternoons, a special volunteer cohort facilitates hands-on activities that encourage visitors to play, tinker, make, and engineer. The activities may range from building dinosaur sculptures out of paper and brass hinges to creating a wire-tapping game by making circuits with telephone wire and metal plates. All of the projects are creative design experiences that use inexpensive materials or free computer software. The museum does not have a separate makerspace open to the public, but does offer similar classes, throughout the year in its Learning Technologies Center.



“My goals are to carry on some of the work that I have done for a long time, which is bringing in people to provide them a creative and supportive atmosphere to... do education, and to actually inspire people, and really engage all learners of all kinds in new things. And propagate that kind of thinking.” – Keith

The *Activate* program is the result of many years of experimenting with maker-like programming at the museum, sometimes in partnership with other organizations. Keith Braafladt, who oversees programming out of the Learning Technologies Center, has been with the museum for over 15 years and is focused on making sustainable, capacity-building programming. He settled on a strategy that engages general visitors in short but satisfying making activities and youth who are in a part of a class or camp in longer, more in-depth experiences with using and designing technology.

Through his prior collaborations, Keith connected with many local and national practitioners and established a support network prior to joining Maker Corps. He saw Maker Corps as providing several benefits: It afforded him the chance to hire more staff, thereby advancing program development, and it provided a national platform on which to exchange ideas. He and his team have been active online via Google+ community and their own blog, and consider documenting activities developed by MCMs as an important part of their job. Keith also used established relationships to find his MCMs: He hired a former Education Intern and a member of a Youth Crew from the museum’s Youth Science Center.

The Makeshop at the Millvale Community Library

At the back of the Millvale Community Library is the *Makeshop*: a room overflowing with handmade creations, various tools, circuit boards, and—of course—books. During the summer, when students were out of school and looking for things to do, the *Makeshop* hosted daily maker programming that evolved from programming designed by the MCMs to a few days being devoted to kids' own interests; Tuesdays became *Bike Tuesday* and Fridays was focused on sewing. Millvale is a town of 3,725 residents adjacent to Pittsburgh, and during the summer a core group of about a dozen kids showed up almost daily. Many other community members of all ages came by to check it out, and even people visiting the area. For a library that had only been open for nine months when the summer began, the community response and participation was a strong indicator of the need for its resources.

"I look forward to somebody being able to walk in and check out a DVD, maybe a children's book for their kids, and a circular saw. That to me is success, people utilizing, sharing, connecting through the barter board system, having our lending library established, set up, organized, would certainly be an outcome that I'm looking for." – Brian



Brian Wolovich, the library's President and founder, is a Millvale resident and teacher at a nearby school. Brian was first introduced to Maker Ed through his job as a teacher, at a making and technology conference held at the Pittsburgh Children's Museum. The Maker Corps program seemed like a good fit for the library; it would provide more staff during the busy summer months, continue the maker programming it had previously received from the Children's Museum's *Mobile MAKESHOP*, and hopefully provide momentum for establishing programs like the tool lending library. By being a part of the Maker Corps community, he would stay connected to other organizations in the city that also had maker programming and they and their MCMs could share resources and collaborate locally. The Maker Movement as a whole was attractive to him because it aligned with his philosophy that all people deserve opportunities for empowerment through education.

As we see in these case studies, Maker Ed has succeeded in attracting a diverse and inclusive pool of participants to the Maker Corps program. Even though the Host Sites and MCMs have diverse experience, contexts, and needs, they show similar goals. The Maker Corps program succeeds in identifying and meeting many of these goals. In the next section of this report, we describe how Maker Corps remains relevant to participants with diverse backgrounds.

RELEVANCE

Any program is more effective when it is relevant to the specific goals of its participants. In the case of Maker Corps, participants—both MCMs and Host Sites—used the program to help achieve personal, professional, and organizational goals. Given that Host Sites are diverse in many respects, creating and maintaining relevance is an especially impressive feature of Maker Corps. The program achieves this by providing an easily adoptable structure that is flexible enough to complement an organization’s existing mission.



In this section of the report, we discuss the different types of goals shared by MCMs and Host Sites at the start of their Maker Corps experience, the ways in which they achieved those goals for themselves and their audience, and the impact of the Maker Corps program on their experiences.

Maker Corps Member Goals and Achievements

In order to understand the alignment between MCMs’ reasons for joining Maker Corps and Maker Corps program goals, we asked Maker Ed staff to identify the goals that they thought were the most important for MCMs to achieve by the end of their year. Maker Ed identified 12 goals. At the beginning of their term, we asked MCMs to rate how important the 12 goals were to them. For each, three quarters or more of the MCMs said it was fairly or very important. This finding shows that Maker Ed is successful at attracting and hiring applicants that are a good match for the program.

At the end of their service, over half of the MCMs felt they had achieved 10 out of the 12 goals that Maker Ed identified as important for the program.

Throughout our evaluation, MCMs had opportunities to elaborate on their goals and achievements during the program. We found that their own descriptions of their goals and achievements fell into five broad categories. Three of these categories were personal; two were related to the direct service they would provide to their audiences:

- Developing personally and professionally
- Becoming a better maker
- Connecting and networking in the maker community
- Engaging the audience in making activities
- Helping the audience gain a maker mindset

To explore these themes, we discuss the findings from surveys completed by MCMs and the Host Sites at the beginning and end of their Maker Corps service highlighted by stories from the Case Study sites.

Developing Personally and Professionally



ANNA GRADUATED WITH A DEGREE IN ARCHITECTURE AND HAS WORKED WITH CHILDREN IN A VARIETY OF SETTINGS. BEING A MCM ALLOWED HER TO CHANNEL HER ACADEMIC AND PERSONAL MAKER BACKGROUND INTO THE ROLE OF AN EDUCATOR. BY MID-SUMMER SHE HAD DECIDED THAT SHE WANTED TO GET HER TEACHING LICENSE AND WORK IN A SCHOOL THAT SUPPORTED MAKING ACTIVITIES. BOTH HER FELLOW MCM AND THEIR SUPERVISOR AT MILLVALE COMMUNITY LIBRARY NOTED HOW MUCH SHE HAD TAUGHT THEM ABOUT FACILITATING ACTIVITIES WITH KIDS, ESPECIALLY THROUGH POSING QUESTIONS TO KIDS. “I HAVE THIS RULE THAT I NEVER TELL A CHILD THAT THEY ARE WRONG, I JUST KEEP ON ASKING QUESTIONS UNTIL THEY FIGURE OUT WHAT THEY ARE SAYING IS NOT TRUE OR THAT THEY MAKE THE DISCOVERY THEMSELVES,” SHE EXPLAINED.

Many of the MCMs had personal and professional development goals for their summer. These members were excited about the opportunity to develop skills like public speaking, facilitation, communication, and leadership. Sometimes these skills were related to career or vocational goals, other times they were simply in the interest of being a better and more well-rounded person.

“By the end of the summer I imagine myself as a completely expanded individual. I intend to be smarter, more creative, and to have discovered new fun things that not only I like, but kids [like] as well.”

- MCM, pre-service

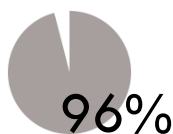
“As a future teacher, I am extremely excited to show students how to take charge of their education...I hope I can bring what I’ve learned into the classroom to show students how making applies to the language arts.”

- MCM, post-service

“[Our Maker Corps Members] were extremely competent and successfully ran three sessions of Maker Camp with little help needed from other staff...They worked hard to learn new skills and teach each other, and other staff, new skills.”

- Host Site, post-service

Where Maker Ed staff had hoped that MCMs would increase their leadership skills during their service, almost all of the MCMs reported that they completely or mostly achieved this goal. During the exit survey, MCMs listed other important achievements during their service. MCMs reported achieving a range of life skills such as, “I learned how to get comfortable outside of my comfort zone.” Many MCMs talked about how they developed as an educator, either formal or informal.



MCMs who increased their leadership skills during their service

Becoming a Better Maker



EVEN THOUGH VICTORIA CONSIDERED HERSELF SOMEONE WHO EXPERIMENTS WITH MATERIALS AND MAKES THINGS, JOINING MAKER CORPS EXPANDED HER DEFINITION OF WHAT HER STUDENTS COULD ACCOMPLISH AT REM LEARNING CENTER. AT FIRST SHE THOUGHT THAT "MAKING" SOUNDED SOMETHING LIKE SCIENCE, BUT AS SHE EXPLORED THE POSSIBILITY BOX AND WORKED WITH HER HOST SITE, SHE REFLECTED, "WOW, THIS IS WAY MORE THAN I THOUGHT IT WAS... I EXPERIENCED HOW TO SOLDER. I'M EXCITED THAT I KNOW HOW TO SOLDER NOW. I EXPERIENCED HOW TO DO BETTER PROJECTS, LESS ARTS AND CRAFTS AND INCORPORATING MORE THINGS FOR CHILDREN. NOW I KNOW THAT I CAN GET A TOOTHBRUSH AND EASILY GET THE MOTOR AND USE THE BATTERY TO DO SOMETHING ELSE. IT CAN BE A PROJECT."

Quite often, MCMs wished to focus their personal and professional development on becoming a better maker. This included attempting or perfecting new skills that fall under the umbrella of making. More broadly, many MCMs were keen to develop a maker mindset, fueling their creativity and innovation.

"I hope to [learn] a lot more about different prototyping processes, such as fiber arts and electronics. I want to be a much more proficient maker and be extremely comfortable working with kids and the public."

- MCM, pre-service

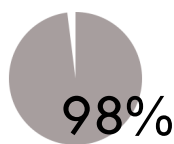
"I learned about myself as a maker: my hesitations, my strengths, and why I doubt myself."

- MCM, post-service

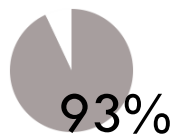
"[Our MCM] worked to learn all she could about 3D printing (which was completely new to her) and became a total whiz at it! As this is the most popular area for youth in our space, she is such an asset now with what she has learned over the summer."

- Host Site, post-service

After their service, many MCMs reported that they would continue to use what they learned in their own development as a maker. Overwhelmingly, the MCMs felt that they learned about the Maker Movement and learned new making skills during their service.



MCMs who learned about the Maker Movement during their service



MCMs who learned new making skills during their service

Connecting and Networking in the Maker Community



THE PITTSBURGH AREA HOSTED THREE MAKER CORPS SITES, AND WHILE THE MCMs GATHERED OCCASIONALLY, ANNA AND NORA FOUND THEIR PARTNERSHIP WITH THE CENTER FOR CONTEMPORARY CRAFT TO BE THE MOST REWARDING. THE CENTER HOSTED TWO WEEK-LONG MINI-APPRENTICESHIPS, ONE IN METALSMITHING AND THE OTHER IN WOODWORKING; ANNA AND NORA BROUGHT A HANDFUL OF MILLVALE KIDS AND WORKED WITH THEM USING MORE ADVANCED TOOLS THAN THEIR OWN MAKESHOP HAD AVAILABLE. BECAUSE THEIR OWN MAKERSPACE WAS LIMITED IN SIZE AND RESOURCES, CONNECTING WITH THE CENTER ALLOWED FOR DEEPER AND MORE CHALLENGING MAKING EXPERIENCES.

MCMs looked forward to the chance to connect with a community of makers during their experience at their Host Sites and Spring Development Camp. For some, they wanted this connection to be a source of ideas, inspiration, or friendship. Others hoped that networking would further their careers.

"I hope by the end of August to have a ton of professional contacts for future opportunities, new friends to make contraptions with, a feeling of community, and a feeling of fulfillment and accomplishment through creating things with other people."

- MCM, pre-service

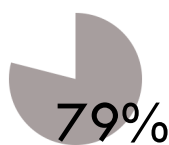
"With the support of a strong community, I learned to embrace my power as a maker and leader in our community."

- MCM, post-service

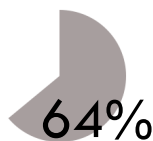
"We brought our Maker Corps Members to the Bay Area Maker Faire in May. That was a great experience for these students – we're figuring out how to make this opportunity available for more of our college students."

- Host Site, post-service

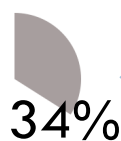
MCMs spend most of their service at their Host Site. Overall, MCMs felt they were better able to connect with their local makers and community than with the national community of MCMs. Increasing the national connections between Maker Corps participants is an opportunity for Maker Ed that we discuss later in this report.



MCMs who made new friends as a part of Maker Corps



MCMs who connected with local makers and other community resources



MCMs who connected with other Maker Corps members nationwide

Engaging the Audience in Making Activities



MILTON ALREADY ENJOYED MAKING AND TINKERING, AND HE HAD A BACKGROUND WORKING WITH VISITORS AT THE SCIENCE MUSEUM OF MINNESOTA. BUT HIS SUMMER AS A MCM PUSHED HIM TO DEVELOP HIS SKILLS AS A FACILITATOR—NOT JUST A MAKER. HE REFLECTED THAT IN THE PAST HE WOULD SIMPLY EXPLAIN HOW TO DO SOMETHING, NOT WHY. “BUT NOW,” HE SAID, “INSTEAD OF JUST TELLING THEM, ‘PUT THIS TOGETHER LIKE THIS,’ I THINK ABOUT TELLING THEM TO PUT IT TOGETHER AND THEN EXPLAINING TO THEM WHAT IT DOES AND WHY IT IS THAT THEY NEED TO PUT IT IN THAT WAY, AND WHY IT WON’T WORK IF YOU PUT IT A DIFFERENT WAY.” HE CREDITED THE DEVELOPMENT CAMP SEMINAR ON FACILITATION, GETTING FEEDBACK ON HIS ACTIVITIES FROM THE GOOGLE+ COMMUNITY, AND THE MODELS OF OTHER ACTIVATE STAFF AT THE MUSEUM AS HELPING HIM TO IMPROVE HIS INTERACTIONS WITH VISITORS.

Many MCMs looked forward to the opportunity to engage the public in making activities, showing particular interest in working with children. For some, the Maker Corps program was their first opportunity to do so, which presented unique challenges. For some, engaging young people through formal and informal education was also a career aspiration.



Every MCM developed making experiences for youth and families and almost every MCM also led making experiences. Responses 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. At the end of their service, many talked about using what they’ve learned in a formal education setting, while others planned to continue working at their current program.

Overall, the MCMs and Host Sites served an impressive number of people. Ninety-nine MCMs served approximately 53,100 audience members at 34 Host Sites over the course of the summer.

"I want to learn how to get younger students interested and engaged with STEAM activities."

- MCM, pre-service

"I feel like I made an impact because most of the children, especially the teens, were quite reluctant [at first] to participate in the maker activities. By the end of the six weeks they were much more interested and engaged."

- MCM, post-service

"Our MCMs were all highly praised by our youth in exit surveys and generally rated as knowledgeable, helpful, and fun! Our MCMs provided such a wonderful experience for our campers, many of them decided to apply for our school year programs."

- Host Site, post-service

Helping the Audience Gain a Maker Mindset



WHEN PRESCHOOL STUDENTS ENTER THE PLAY MAKE SHARE STUDIO AT THE REM LEARNING CENTER, THEY KNOW THEY CAN USE ANY MATERIALS THEY SEE TO MAKE WHATEVER THEY WANT. DR. RYAN AND THE MCMs SOMETIMES ASK THE STUDENTS TO LOOK CLOSELY AT AN OBJECT THAT SOMEONE HAS MADE TO FIGURE OUT HOW IT WORKS OR WILL SIMPLY ASK, "WHAT DO YOU WANT TO MAKE TODAY? WHAT MATERIALS ARE YOU GOING TO USE?" AS THE STUDENTS WORK, THE TEACHERS OFFER ASSISTANCE WITH TOOLS AND PROCESS, ASKING LOTS OF QUESTIONS THAT GET STUDENTS TO ARTICULATE THEIR PLAN. AS BARBARA PUT IT, "I DON'T NECESSARILY LIKE TO DO THINGS FOR THEM; I WANT THEM TO BE ABLE TO KIND OF GET THAT GOOD FEELING ABOUT THEMSELVES THAT THEY WERE ABLE TO ACCOMPLISH IT. SO YOU'RE THERE TO SUPPORT THEM BUT NOT NECESSARILY DO THE TASK."

Similar to their goals for personal development, many MCMs hope to equip and empower young people with the skills and knowledge to explore making. Rather than one specific skill or technology, MCMs were more apt to think about goals for their youth audience in terms of a maker mindset—an ongoing source of creativity and imagination.

In the post-service survey, MCMs described a range of important impacts on their audiences. Through their work, MCMs saw their audience develop life skills such as resilience, confidence, and creativity. Other MCMs described helping their audience develop a new interest or better pursue an existing interest. Many MCMs described just how much fun they saw their audience having during making activities.

"I hope that everyone leaves feeling like they have the ability to explore and create, as well as a few new tricks and places to start from."

- MCM, pre-service

"Due to the MakerCamp program [we offered] I enabled the girls from my underprivileged community to look beyond their horizons and make. Before the program, the girls were really shy, but after they were more confident in their skills."

- MCM, post-service

"Students became more willing to take risks and try new things as the week (and the summer) progressed."

- Host Site, post-service

Some larger Host Sites had high attendance during this time, and smaller sites may have served less people. But most MCMs and Host Sites were very forthcoming with what they saw as Maker Corps' impact on their audience.

Brian from Millvale shared his vision of what a successful Millvale Community Library program would look like:

"For our program and the size of our community, we're not going to say we serve 1,000 kids or whatever larger organizations might have, but, what we hope for is that the depth of the experience can actually change its trajectory of a kid's life and we really hope that that is an outcome. Seeing the way that these kids are engaged and the pride that they're taking in the work that's being developed is really—[it] gives me a lot of hope that we are living out the mission. Seeing that with Anna and Nora and their relationship with the kids was something that really struck me."

Host Site Goals and Achievements

In the first section of this report we used three case study Host Sites to describe the diversity of the organizations that participate in Maker Corps. Even though these sites are very different on the surface, we found that they shared similar broad goals for their Maker Corps programs.

Furthermore, we found that Host Sites shared similar ideas about why Maker Corps was a good fit for their organization. Broadly, Host Sites felt that the larger Maker Movement was important to their organizations for four reasons:

- making is a part of lifelong learning,
- making is a part of creative problem solving,
- making is a part of STEM learning,
- making helps organizations reach new and diverse audiences.

Each in their own way, the three case study sites saw Maker Corps as an effective way to reach a few common goals. With some variation, all wanted to:

- meet a current need for developing and delivering maker programming,
- increase their organization’s capacity for maker programming,
- connect and network with others in the maker community.

Surveys showed that these broad goals were reflected across most Host Sites. In the following pages, we discuss each of the three goals identified above and give examples of how the Host Sites achieved these goals during Maker Corps.

Meeting a Current Need for Developing and Delivering Maker Programming



KEITH AND HIS TEAM HAVE BEEN GROWING AND IMPROVING THEIR PROGRAMMING SINCE ACTIVATE SATURDAYS BEGAN IN JANUARY 2013. IN THE FOLLOWING SUMMER, THEY HOSTED FOUR MCMs, THREE OF WHOM STAYED ON AS PART-TIME STAFF. HAVING THIS CORE OF PEOPLE CONTINUE TO DEVELOP AND ITERATE ACTIVITIES WHILE SUPPORTING ONE ANOTHER HAS BEEN VERY IMPORTANT TO KEITH’S VISION FOR HIS PROGRAM. HE SHARED, “I THINK WHAT WE ARE TAKING TO HEART HERE IS THE IDEA, IS THE MISSION OF MAKER CORPS, WHICH IS TO PRODUCE MORE PEOPLE WITH THOSE STRENGTHS AND SKILLS TO BE ABLE TO GROW THIS KIND OF SENSIBILITY AND APPROACH TO LEARNING AND WE NEED MORE PEOPLE WHO HAVE THE ABILITY TO TEACH OTHERS. WE DON’T NEED MORE PEOPLE WHO ARE MAKERS. WE NEED MORE PEOPLE WHO CAN TEACH THE ART OF MAKING AND HOW TO START THE PROGRAM AND HOW TO SUPPORT THE DIFFERENT TYPES OF PEOPLE THAT WERE COMING IN.” AS PART OF THEIR MAKER CORPS EXPERIENCE, RACHEL AND MILTON HAD DEDICATED TIME TO DEVELOP NEW ACTIVITIES, TEST THEM OUT WITH MUSEUM VISITORS AND GET FEEDBACK FROM OTHER ACTIVATE STAFF. AS KEITH SAID, THEY “HAD A LOT OF ROOM FOR RISK TAKING” BECAUSE OF THE STAFF SUPPORT AND MENTORING AND THE WEEKLY SCHEDULE OF ACTIVATE. HE WAS VERY IMPRESSED WITH THE WORK THAT MILTON AND RACHEL HAD DONE OVER THE SUMMER AND PLANS TO USE SOME OF THEIR ACTIVITIES IN THE FUTURE.

Throughout the evaluation, Host Sites displayed their need and desire to do maker programming. The Maker Corps program provides a way to start programming right away. One of the biggest impacts of the Maker Corps program on Host Sites is the instant capacity they gain from two new staff members who have training in developing and delivering programs. When we asked Host Sites about the ways that MCMs impacted their organization, the two largest categories of responses were about MCMs developing programs and MCMs delivering programs. Host Sites clearly value the help of two extra people to start or continue maker programming at their organization. While not true for all Host Sites, many noted that without the MCMs, these programs would not have been possible.

"[Our make program] was exceptionally well-received and would not have been possible without the extra help of Maker Corps and the thoughtful thinking and hands-on experience they gained throughout the summer."

- Host Site, post-service

"[Our MCMs] were enthusiastic and experienced - they developed and delivered activities that they were passionate about to the enjoyment of our audience."

- Host Site, post-service

"The making experiences we provided ... allowed us to reach new and expanded audiences in meaningful ways. We saw groups and individuals engaging in extended periods of time consistently and returning throughout the summer to try new making activities."

- Host Site, post-service

Overall, Host Sites were very satisfied with their MCMs ability to develop and deliver new types of programs. In addition to talking about the types of new programs and experiences MCMs were able to develop and deliver during the summer, Host Sites also talked about the qualities that MCMs brought to those programs. Some examples: how their MCMs created enjoyment and enthusiasm in their audiences during the programs, how MCMs served as mentors, and how MCMs helped Host Sites reach new audiences through their maker programming.

100%

Host Sites who infused new energy into their summer programming

Increasing Organizational Capacity for Maker Programming



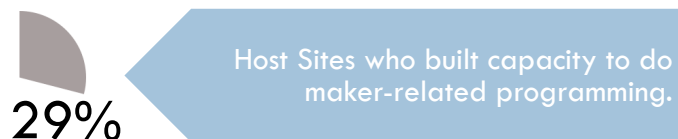
JACQUELINE AND RYAN DECIDED TO HIRE CURRENT CLASSROOM TEACHERS AS THEIR MCMs FOR SEVERAL REASONS, MOSTLY RELATED TO GROWING AND DEFINING THE CONNECTIONS TO CLASSROOM CULTURE. BY HIRING CURRENT STAFF, REM WAS ABLE TO CAPITALIZE ON THE KNOWLEDGE THAT BARBARA AND VICTORIA HAVE ABOUT THEIR STUDENTS, THE CURRICULUM IN THE CLASSROOM AND INSIGHT INTO HOW OTHER TEACHERS MIGHT REACT TO THIS TYPE OF ACTIVITY. THEY ALSO BECAME AMBASSADORS OR MENTORS TO OTHER TEACHERS WHO ARE LESS FAMILIAR WITH THE SPACE. AS THEY HEADED INTO THE 2014-15 SCHOOL YEAR, BARBARA AND VICTORIA HELPED LEAD A PROFESSIONAL DEVELOPMENT SESSION FOR OTHER TEACHERS IN THE TYPE OF ACTIVITY AND LEARNING THAT HAPPENS IN PLAY MAKE SHARE. RYAN AND JACKIE OBSERVED, "THEY WERE ABLE TO SHARE THEIR EXPERTISE AND THEN SOME OF THE THINGS THEY LEARNED WITH THE TEACHERS. THEY ALSO HELPED A LOT IN FACILITATING THE ACTIVITIES THAT THE TEACHERS WERE DOING WHEN IT WAS TIME FOR THEM TO PLAY AROUND AND MAKE WITH THE TOOLS AND THINGS LIKE THAT. ...I THINK THAT MADE THEM FEEL GOOD BECAUSE THEY COULD WALK AROUND WHEN SOME OF THE TEACHERS WERE GETTING FRUSTRATED WITH THE MATERIALS. THEY WERE LIKE, 'HOLD ON THESE IS HOW YOU CAN USE IT.'" THIS YEAR, THE TEAM PLANS TO

INCLUDE CLASSROOM TEACHERS IN THEIR STUDENTS' VISIT TO THE STUDIO AND HELP THEM DEVELOP THE CONFIDENCE IN LETTING GO AND HELPING THEIR STUDENTS BE MAKERS.

In addition to gaining instant capacity, many Host Sites also wanted to develop longer-term organizational capacity for maker programming at their organization. For some Host Sites, the MCMs delivered programs only offered during the summer, but others talked about how MCMs helped build sustainability for the programs of which they were a part. Other Host Sites gave examples about how MCMs brought in new perspectives or changed how the organization thinks about themselves or their programs. Some Host Sites featured the MCMs and their work in professional development opportunities for their staff.



We found some conflicting data in our evaluation in regards to the goal of increased organizational capacity. While we saw many examples of Host Sites describing the organizational capacity they gained during Maker Corps, only 29% said that they “mostly achieved” or “completely achieved” this goal at the end. Most Host Sites (46%) said that they achieved it “a little.” *Organizational Capacity* is a loaded phrase and may be interpreted differently by different types of administrators and “a little” organizational capacity can go a long way. Based on the totality of the evaluation, our opinion is that by participating in Maker Corps, Host Sites are able to move towards building longer-term capacity for maker programming, even if it is in small steps. In contrast, almost every Host Site said that they gained new perspective for future maker-related programming.



2/3

The proportion of Host Sites that are hiring one or more MCMs

One particularly striking way in which Host Sites are creating long-term capacity is the degree to which they are hiring their MCMs. Two thirds of the Host Sites are hiring one or more MCMs from the summer. This amounts to about one third of all MCMs from the 2014 cohort. Many sites not hiring an MCM expressed that they wished they could, but that the MCM could not accept (for example, because they were returning to school for the fall). One Host Site that participated in 2013 and 2014 explained,

“We hired three of four from our last year—and that was mostly because the fourth had school out of town. This year, only one is staying in town. The reason why [we hire them]: they just went through a summer of training, development and creative programming... they are perfect for many roles in our museum!”

"The Maker Corp Members helped us explore how we can incorporate making into all aspects of our education and visitor engagement programming."

- Host Site, post-service

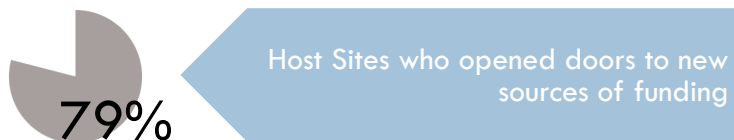
"[Our MCMs] were great! It was awesome to have folks who had the capacity to take on projects that required development (behind the scenes) as well as competent and qualified folks who we could send out to our audience."

- Host Site, post-service

"I think that the programming the MCMs provided not only engaged our visitors but also pushed our organization to be more creative and thoughtful in how we approach making and the ties that can be made to STEM in unique ways."

- Host Site, post-service

Lastly, we know that often the barriers to doing programs at formal and informal learning organizations hinge on securing funds for that program. Because of this, it is very encouraging that most Host Sites (79%) said that they opened doors to new sources of funding by partnering with Maker Ed in the Maker Corps program.



Connecting and Networking in the Maker Community



THE MAKER MOVEMENT IS VERY ACTIVE IN PITTSBURGH; THREE ORGANIZATIONS HOSTED MCMs IN THE SUMMER OF 2014. THE MAKER PROGRAMMING AT MILLVALE COMMUNITY LIBRARY WAS INITIALLY PROVIDED BY THE MOBILE MAKESHOP, AN INITIATIVE OF THE CHILDREN'S MUSEUM OF PITTSBURGH. BRIAN FOUND THE SUPPORT FROM THE OTHER ORGANIZATIONS TREMENDOUSLY HELPFUL AS HE STARTED TO DEVELOP NEW PROGRAMMING, DUE LARGELY TO THE SPIRIT OF THE COMMUNITY: "SO, 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," HE SAID. 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 "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."

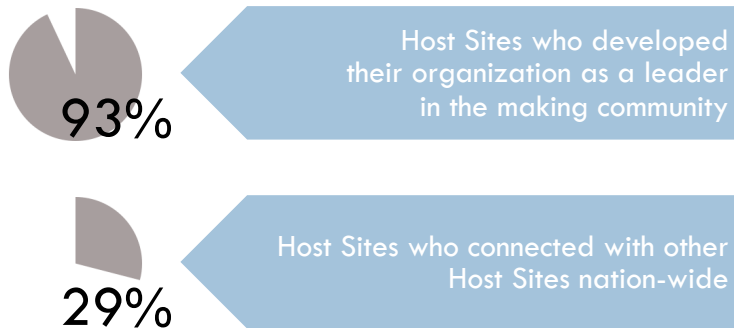
Many Host Sites wanted to join a community of people designing maker programming. Maker Corps has community built into the program; by joining Maker Corps, Host Sites become a mini community hub of at least one administrator and two MCMs. Host Sites also have access to a national community of organizations who are doing the same program.

"The best thing about Maker Corps is the collaborative possibilities. And also this community that individuals who are coming for the first time into it, they have a place ... to be participants in."
- Host Site, post-service

"I felt like a great network was created. I have met new people that I will continue to network with."
- Host Site, post-service

"We tried to set up some partnerships with our other local Host Sites, but it was difficult – once the ball got rolling we all had so many projects that it was hard to keep up with one another."
- Host Site, post-service

While most Host Sites reported benefiting from the community created at their organization through Maker Corps, they had mixed experiences with participating in a national community. Host Sites reported that they developed their organization as a leader in the making community, but relatively few thought that they connected with other Host Sites nationwide. In the next section of this report, we discuss further the role of the Maker Corps community.



Audience Impact

An additional way we examined the theme of relevancy was through the direct feedback from participants or their parents at case study sites. Due to the different ages of participants and the maker programming they attended, we used different data collection strategies for each site.

REM LEARNING CENTER

The teachers at REM definitely felt that their students are learning and enjoying in *Play Make Share*, and parents that we surveyed agreed. Nearly all of the 24 parents that responded to our survey knew about *Play Make Share* and had visited the studio at some point. Even those that were not familiar with the space itself knew of it because their children spoke enthusiastically about the work they did in there.

Parents saw the work done at *Play Make Share* as different than what happens in the classroom or at home because their children get experience with real tools, new technology, make connections to real-world ideas, and have freedom for creative expression. Many mentioned that they viewed this work as related to the essential skills of problem solving and creativity.

"In the space, their projects are more sophisticated, beyond what I thought he was capable of."

"My child never would attempt to make things on her own, but after attending she is very interested in creating new things and devices."

"I feel in Play Make Share the kids aren't told how but are shown how, and [are] given the opportunity to do."

SCIENCE MUSEUM OF MINNESOTA

One Saturday in August we spoke with eight parents during *Activate* as they watched their children make either a balloon rocket or a paper hand with rubber band "veins." Without exception, parents thought their children were engaged and very interested in what they were doing and loved that the activity was hands-on. Several commented on how accessible the activity was for any age (including adults), especially because it didn't require any reading. When asked what their child was doing and learning, many mentioned they were practicing a new skill or getting ideas from other people. One parent captured the spirit of the activities by responding, *"I'm not really sure. There's building and geometry, like that...and air something. And playing. I'm sure that they're learning something but they feel like they're playing. So that's good."*

MILLVALE COMMUNITY LIBRARY

The summer of 2014 was the first summer the library was open, and as word spread about the *Makeshop*, kids, and sometimes their parents, would regularly show up. Over the summer, Nora and Anna reported they had developed close relationships with about a dozen kids as well as familiarity with many more. At the end of the summer, we asked kids to respond to a short online survey about what they liked about visiting the Millvale Community Library. Of the twelve that responded, nine said their favorite thing to do was something maker-related, like sewing, building stuff or doing the activities. Most kids also rated hanging out with Anna, Nora and the other staff as one of the things they like about coming. Most kids came at least once a week. When asked what they learned how to do this summer, all but one kid mentioned either how to use a tool (a soldering iron, sewing machine) or make something ("hook up circuits and stuff", "disassemble a bike").

COMMUNITY

To summarize this report so far, we found that Maker Corps is doing a good job at attracting diverse individuals and institutions and providing training and programming that are relevant to their needs. In this final section, we will highlight the role of community as a fundamental feature of and goal for the program.



Host Sites and MCMs are participating in and defining the national Maker Corps community. By joining Maker Corps, MCMs and Host Sites gain access to the expertise of the national leader in maker education, Maker Ed. Because of the Maker Corps program’s flexibility and the nature of maker programming in general (trying out new things, responding to audience interest, revising and iterating on projects), MCMs and their Host Sites are also building the community and its resources themselves. The idea of community is therefore complex. Maker Ed is connecting organizations and people around common goals and resources. Communities develop at each site as MCMs and Host leaders figure out how to apply the Maker Corps program in their own context.

From the evaluation, we know that joining a community is appealing to many MCMs and Host Site participants. There are two types of communities in action in the Maker Corps program: a *Host Site community*, consisting of at least two MCMs and the Host Site supervisor, and a *national community* comprised of all the MCMs and Host Sites facilitated by Maker Ed.

Host Site Community



BY MID-SUMMER, IT WAS CLEAR FROM VISITING EACH CASE STUDY SITE THAT MCMs AND THEIR HOST SUPERVISORS HAD DEVELOPED EFFECTIVE WAYS OF WORKING AND LEARNING TOGETHER. AT SMM, RACHEL SAID SHE APPRECIATED THE COMMUNITY OF ACTIVATE STAFF AND VOLUNTEERS: “HERE AT THE MUSEUM I FEEL LIKE WE HAVE A REALLY GOOD COMMUNITY. WITHIN OUR LITTLE OFFICE BASICALLY IT’S REALLY CLOSE AND TIGHT-KNIT.” THE FEELING WAS MUTUAL; ALL THE HOST SITE SUPERVISORS SAID THEY LEARNED FROM THEIR MCMs AND THE DIFFERENT PERSPECTIVES AND EXPERTISE THEY BROUGHT.

MCMs and Host Sites are able to reach their goals and provide quality programming, in part because of the supportive community they create. By design, each Host Site hired at least two MCMs for the summer, forming an instant community between those MCMs and their supervisor. Whether delivering programming or designing activities, MCMs always had another person with whom to collaborate.

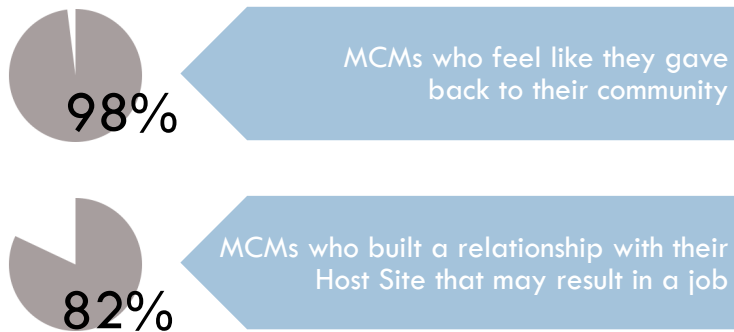
From the case studies and surveys, we learned that supportive communities at the Host Sites rely on a few key ingredients:

- regular and ongoing opportunities for communication,
- openness to learning from the expertise of others,
- clear expectations for programming.

As a result, MCMs felt that they received both direction and the support to experiment, calling upon their own ideas or feedback from their audience.



WHILE THE MCMs AT REM LEARNING CENTER AND SMM WERE ALREADY FAMILIAR WITH THEIR SITE, EITHER AS A CURRENT OR FORMER STAFF MEMBER, FAMILIARITY DID NOT SEEM TO BE A PREREQUISITE FOR SUCCESS. IN FACT, AT MILLVALE, WHERE THE SUMMER OF 2014 WAS THE FIRST TIME THE LIBRARY DESIGNED AND DELIVERED ITS OWN MAKER PROGRAMMING, ANNA AND NORA FOUND IT EASY TO COLLABORATE WITH BRIAN AROUND THIS GOAL. IN FACT, THEY BOTH SAID THEY HAD A TREMENDOUS AMOUNT OF PRIDE AND OWNERSHIP OVER THE PROGRAMMING BECAUSE THEY DEVELOPED IT TOGETHER WITH THE VISITORS TO THE LIBRARY.



Overall, we found that the Maker Corps program achieved the goal of creating a supportive Host Site community. The majority of MCMs said that they built a relationship with their Host Site that may result in a job after Maker Corps was over, and that they felt like they gave back to their community through their Maker Corps service.

National Community



FOR BOTH THE MILLVALE COMMUNITY LIBRARY AND REM LEARNING CENTER, JOINING MAKER CORPS HELPED THEM TO ESTABLISH AND DEVELOP THEIR ORGANIZATION'S COMMITMENT TO MAKER PROGRAMMING. THEY WERE EXCITED TO CONNECT TO OTHERS AROUND THE COUNTRY AND IN THEIR OWN CITIES. BUT BETWEEN THE DEMANDS OF THEIR OWN SITE AND THE CHALLENGE OF FINDING OTHER SITES THEY COULD RELATE TO, IT WAS DIFFICULT TO FORM THOSE COLLABORATIONS. AT BOTH SITES, THEY COORDINATED WITH OTHER LOCAL ORGANIZATIONS TO PARTICIPATE IN MAKER CORPS WITH THE INTENTION OF SHARING THEIR EXPERIENCES, BUT THERE WAS LITTLE COMMUNICATION DURING THE SUMMER.

Many Host Sites and MCMs expressed that they value being connected to a national community but some are not finding the support they need. Managing a vast community of participants with diverse contexts, experiences, needs, and goals would be a challenge for any organization. Through their online Google+ community, scheduled online “Hangouts”, and direct contact with sites, Maker Ed is making promising progress in supporting and creating connections in this community, and many participants report that it was a success for them. Other Maker Corps participants valued the national community aspect of Maker Corps, but found it easier and more rewarding to invest in their own site-based community than to reach out to others.



AT THE CASE STUDY SITES, BOTH MCMs AND HOST SITE LEADERS MENTIONED THAT EFFORTS TO CONNECT TO OTHER MAKER CORPS PROGRAMS (EITHER LOCALLY OR ONLINE) WERE LIMITED AND SOMETIMES UNSATISFYING. MCMs ESPECIALLY FELT THAT IT WAS HARD TO CONNECT WHEN OTHER SITES HAD SUCH DIFFERENT CONTEXTS, SUCH AS THE AGE OF THEIR AUDIENCE, THE FREQUENCY OF PROGRAMMING, OR THE NATURE OF THEIR AVAILABLE RESOURCES.

One major challenge is that various Host Sites are at different points in developing and delivering maker programming, and as a result, they may need different supports. Many Host Sites joined Maker Corps to be a part of this community, to determine how to make it work for their organization and how to best serve their audience. Alternately, some more established Host Sites are tinkering with their programming, not building it from scratch. Maker Ed has tried different methods of connecting Host Sites and MCMs to others who may be helpful in these endeavors, and this work should continue.

Maximizing the benefits of national community is an important priority for the growth and improvement of the Maker Corps program. In our evaluation, while we found that Host Sites are using MCMs to develop and deliver innovative making activities as well as find creative ways to sustain this programming, this knowledge remains mostly on-site. To continue to build this movement and harness the momentum that the Maker Corps program has generated we recommend that with the help of its supporters, Maker Ed find ways to further support the development of a national network of Maker Corps MCMs and Host Sites.

“The thing I wish for Maker Corps is a more robust community of knowledge sharing... You have the framework in place, we just never found the way to leverage it properly!”

- Host Site, post-survey

CONCLUSION

During its second year of programming Maker Ed has implemented a nationwide service program that succeeds in serving its members, its organizations, and their audiences.

MCMs are developing important job skills while learning about making, facilitation, education, and themselves. Host Sites gain instant capacity for developing and delivering highly desirable maker programming in a way that is relevant for their organizations and audiences. Along the way, Host Sites begin to develop long-term capacity to further integrate these programs into their organizations and with their staff. Host Sites and MCMs create meaningful and lasting relationships that often result in jobs for the MCMs. Host Sites and MCMs report that their audiences want the types of programs that are delivered during Maker Corps and they learn from them.

In this report, we have focused on the three aspects of Maker Corps that we feel are most important to their success:

- Diversity
- Relevance
- Community

Maker Ed has built a program that attracts participants who are diverse in many ways. By maximizing the benefits of a national network that is relevant to these diverse participants, Maker Ed has the potential to create an engine of change that can continue to impact MCMs, Host Sites, and their audiences for years to come.

Acknowledgments

We wish to thank all of the MCMs and Host Sites who filled out surveys and participated in case studies; Lisa Regalla, Steve Davee, and Nancy Rink from Maker Ed; and Joe Schantz and Maggie Sandford from the Science Museum of Minnesota. This report would not be possible without their contributions.

