



# Open Portfolios

MAKER EDUCATION INITIATIVE

## Survey of Makerspaces, Part I

Kylie Pepler, Adam Maltese, & Anna Keune, Indiana University  
Stephanie Chang & Lisa Regalla, Maker Education Initiative

## The Maker Ed Open Portfolio Project

### Survey of Makerspaces, Part I

Kylie Peppler, Adam Maltese, & Anna Keune, Indiana University  
Stephanie Chang & Lisa Regalla, Maker Education Initiative

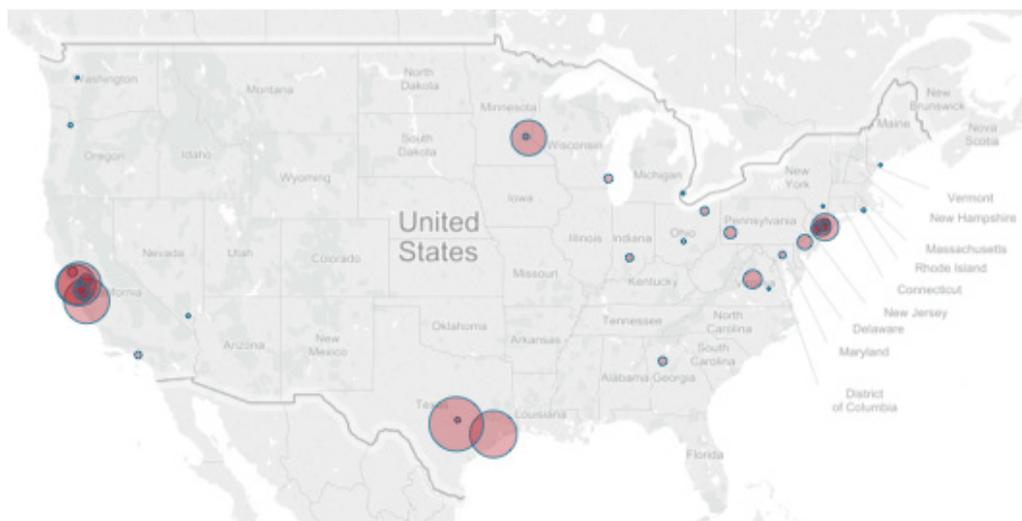
#### SURVEYING MAKERSPACES

While makerspaces are beginning to pop up all over the globe, we currently know little about them and how they view themselves as educational spaces. Consequently, as part of the Open Portfolio Project, we reached out to an array of makerspaces, including hackerspaces, school-based makerspaces, and other community-based organizations with maker programming, to learn more about where they're situated, who they serve, and the kinds of activities in which their members regularly engage. In addition, we sought to better understand how they connect to the current policy landscape (particularly the alignment with science, technology, engineering, and mathematics [STEM] fields). This brief summarizes the responses to several sections of a broader survey (see Appendix B for a full copy of the survey) that was sent out to Maker Education Initiative field sites and allied institutions, and is Part I of a three-part brief series summarizing the survey's results.

#### WHO ARE THE RESPONDENTS?

A total of 51 youth-oriented makerspaces from across the United States responded to our survey, in addition to one site from Korea. The makerspaces reported serving a median of 450 visitors annually, with a wide range from 50 to 850,000 annual participants. The participating makerspaces reported that they involve a total of approximately 1.8 million annual visitors in their makerspace programming—a testimony to the growing popularity of the Maker Movement here in the United States. See Figure 1 below for a visual map of the locations of the makerspaces participating in the survey and their relative sizes. See also Appendix C for a full listing of each of the field sites, locations, numbers served, brief descriptions, and demographics<sup>1</sup>.

The responding makerspaces identified as being located in one or more physical spaces, including 39% in schools (of which 2% of respondents were homeschools,



**FIGURE 1:** Map of survey responses depicting the location and the relative size of the makerspaces in terms of the estimated daily number of participants/visitors to the site.

<sup>1</sup> The 10 field sites in Appendix A represent a selection of makerspaces from this longer list that participated in our site observations.

6% charter schools, 16% independent schools, and 16% public schools), 26% in afterschool programs, 28% in community-based organizations, and the remaining 22% were found in a range of other settings, including low-profit, limited liability (L3C) business, international schools, science museums, libraries, city institutions (i.e., local government institutions), and other types of non-profit institutions. Of these, 77% responded that they were non-profit organizations, and an additional 6% of sites responded that they were situated in for-profit institutions.

The majority of respondents have provided maker programming for two years or less, with 16% in existence less than 1 year, 41% in existence for 1–2 years, 18% in existence for 3–5 years, and 26% in existence for more than 5 years. This bimodal distribution reflects the relative newness of many makerspaces nationally as well as a group of maker-type organizations that have been in existence for some time but are well aligned with the larger goals and ethos of the Maker Movement.

#### A “MAKERSPACE” BY MANY NAMES

In this report, we call all 51 sites by a general name: “makerspace.” However, we note that the sites refer to themselves by a variety of names and descriptive titles of services. In fact only around half the sites consider themselves to truly be a “makerspace” (53% of sites) with sites commonly calling themselves by one or more other terms, including commonly a “drop-in space” (23.5% of sites), at teen/youth center (24% of sites), an innovation lab (22% of sites), a design lab (14% of sites), hackerspace (10% of sites), FabLab (8% of sites), idea lab (8% of sites), science lab (6% of sites), as well as a host of other titles including the following terms used by three or less of survey respondents:

Active-Play	Hands-on Learning Space	place for collaboration and creation
After School Program	Idea Lab	Production Studio
Art Center	Informal Learning Environment	robotics learning lab
Arts Camp	Lab	Sandbox,
Audio Studio	Learning Lab	School
Children’s Creativity Museum	Make space	Science Lab
Club Home	Maker Art	Studio
Community Space	Maker lab	Tech Center
Creativity Lab	Makery	Teen Media Lab
Design-Based	Media Lab	Teen Tech Studio
DJ Studio	museum	Tinkering space
Gallery Space	Museum as Play	Workshop

This diversity in naming is reflective of the larger Maker Movement. Making encompasses a wide variety of categories, activities, and learning approaches, which are seen in the many different naming conventions that tend to be embraced in today’s landscape. This wide range of names also highlights some of the unique foci of each space or program. However, this does raise challenges for visitors, policymakers, and researchers seeking to easily identify a relevant population of sites with programming. For our purposes, we asked sites that self-identified as makerspaces to respond to our survey.

#### WHOM DO MAKERSPACES SERVE?

Across all makerspaces surveyed, 42% of program participants were White, 20% were Black/African-American, 18% were Hispanic/Latino(a), 14% were Asian, 0.3% were Native American, and 5% did not fall in the given categories. While these represent the mean across all makerspaces responding, the sites vary widely in the populations they serve (see Table 1). This also demon-

TABLE 1: Race and Ethnicity Across All 51 Makerspaces

	ASIAN	BLACK/AFRICAN AMERICAN	HISPANIC/LATINO	AMERICAN INDIAN & ALASKA NATIVE	WHITE	OTHER
MEAN ACROSS ALL MAKERSPACES	14%	20%	18%	0.3%	42%	5%
MEDIAN ACROSS ALL MAKERSPACES	7%	10%	10%	0%	44%	0%
STANDARD DEVIATION	19%	21%	24%	0.9%	30%	16%
MIN. ACROSS ALL MAKERSPACES	0%	0%	0%	0%	0%	0%
MAX. ACROSS ALL MAKERSPACES	94%	95%	88%	5%	98%	100%
POPULATION BY HISPANIC/LATINO ORIGIN AND BY RACE FOR THE US IN 2010	4.8%	12.6%	16.3%	0.9%	63.7%	9.3%

strates greater diversity than the current US population based on findings from the US Census data in 2010. Additionally, the sites surveyed reported serving individuals with mental/physical disabilities, which was an average of 8.1% of the total populations served, ranging from 0–66% of the population served across sites.

Collectively, this paints a picture that stands in stark contrast to the adult demographics (i.e., predominantly middle age, White males) attending Maker Faires or subscribing to Make: Magazine (Make Media, 2012, 2013a/b) that has been subject to a great deal of recent scrutiny (Buechley, 2013). We believe that the prior statistics are representative of the current demographics found in STEM fields, which have had a hard time attracting women and people of color into these fields (Intel, 2014). However, this new generation of makers looks to be more diverse and holds a great deal of transformative potential as we think about supporting these young makers across their lifespan.

### WHAT TOOLS AND MATERIALS ARE MAKER SITES USING?

Over half of the makerspaces (51%) reported laptops and computers as core tools for making, and 25% also mentioned tablets, which hints at a large proportion of making including digital processes or products. On these tools, 22% of the sites run multimedia software, including Adobe Creative Suite, Garageband, and ProTools, 14% coding tools including Scratch and [Code.org](http://Code.org), and 12% 3D modeling software such as Tinkercad, Maya, and 3D Tin.

Nearly 40% of the makerspaces mentioned 3D printers as frequently used tools, 26% reported using laser cutters, and 8% mentioned vinyl cutters. Every day crafting tools and supplies, including cardboard and paper, scissors and other cutting tools, tape and glue, as well as popsicle sticks and googly eyes among others, were reported by 39% of the sites.

To document and record making activities, 22% reported using cameras, including video, DSLR, HD, point and shoot cameras, and camcorders. Of these, 4% reported using smartphone cameras to record making activities.

These findings and a range of other tools and materials are summarized in Table 2.

**TABLE 2: Most Commonly Reported Tools and Materials Across Sites**

TOOLS, EQUIPMENT, AND MATERIALS	PERCENTAGE OF SITES
Laptops and computers	51%
3D printers	40%
Every day crafting materials	39%
Laser cutters	26%
Tablets	25%
Multimedia software	22%
Soldering irons	22%
Photo and video cameras	22%
Hot glue guns	20%
Saws / wood and wood scraps	20%
Circuitry tool kits	18%
Coding tools	14%
Drills	14%
MakeyMakey kits	12%
General hand tools	12%
3D modeling software	12%
Robotics kits	10%
Sewing machines / sewing materials	10%
Metal working tools and materials	8%
Vinyl cutters	8%
Smartphone/iPod Touch	4%

### MAKERSPACE PROGRAMMING

Among after-school or out-of-school programming (18% of sites), youth used these tools and materials to work on projects for an average of 1–2 hours per week, every day of the week or during weekends. Another 18% of other sites reported a variety of camp programs, including 6–8 week-long summer camps, school-break day programs, and one-week day camps, all that offer a diverse range of project involvement opportunities as well as access to a mix of tools, use instruction, directed challenges, and open-ended projects. 10% integrated maker clubs (related to robotics and design) into their flagship offering and 8% others reported interactive exhibits (gallery spaces, activity tables, self-guided activities, etc.).

Presentation of work created by the youth at the sites was an important aspect of core maker programming. 16% reported opportunities to present work to the public on-site, through interactive family nights, exhibiting youth work at the site, organizing school-wide year-end festivals, or public workshops several times during the

year. 12% reported private exhibitions of youth work, such as portfolio defenses and presentations open only to a specific audience. Off-site public presentation of work (defenses) was reported by 5.9% of the responding sites. These types of sharing events included Maker Faires, Mini Maker Faires, and other local fairs and events.

Professional development opportunities, where educators shared program development insights and practiced skills with educators from other schools, were reported by 16% of sites. 8% reported facilitating outreach programs and workshops in neighborhoods, libraries, and other community facilities. Other programs (12%) included offering internship programs, such as residency and volunteer opportunities at the site and small apprenticeship programs in coordination with other local organizations.

## CONCLUSIONS

Our Open Portfolio Project site survey helped to frame our continued research and strongly informed the site visits and findings that arose from the greater field. As making is adopted as a theme, emphasis, or focus for youth educational programming at a variety of settings, it remains important to recognize and pay attention to what the field is doing, what audiences are served, and what gaps still remain. As seen through the many different materials being used and the diversity of race and ethnic backgrounds of youth at these makerspaces, both the breadth and the current inclusivity of making forms a

firm foundation for future policy and educational efforts seeking to deepen learning in these spaces over time.

## ACKNOWLEDGEMENTS

*The work of Maker Ed's Open Portfolio Project is made possible by generous support from the Gordon and Betty Moore Foundation. We warmly thank the members of the National Working Group who continuously provided constructive comments and valuable insights to our work.*

## REFERENCES

- Buechley, L. (2013, October). *Thinking about making*. Key-note speech presented at FabLearn Conference, Stanford University.
- Intel Corporation (2014). *MakeHers: Engaging Girls and Women in Technology through Making, Creating, and Inventing*. Retrieved from <http://www.intel.com/content/www/us/en/technology-in-education/making-her-future-report.html>
- Make Media (2012). *Maker Faire Bay Area Attendee Study*. Online. Available at: <http://cdn.makezine.com/make/sales/makerfairebayareasurvey092012.pdf>
- Make Media (2013a). *Maker Faire Bay Area Attendee Study*. Online. Available at: <http://cdn.makezine.com/make/sales/MFBA%0202013%020Survey%020.pdf>
- Make Media (2013b). *World Maker Faire NY Attendee Study*. Online. Available at: [http://makermedia.files.wordpress.com/2014/03/mfny13\\_survey\\_final.pdf](http://makermedia.files.wordpress.com/2014/03/mfny13_survey_final.pdf)