INSTITUTE of Museum and Library SERVICES

Talking Points: Museums, Libraries, and Makerspaces

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By the Numbers

- STEM workers in all demographic groups, including those who are foreign-born, **earn more than non-STEM workers.**
- Women hold **only 25% of STEM jobs.**
- For 65% of scientists with advanced degrees, their interest in science **started before middle school.**

MAKESHOP at the Children's Museum of Pittsburgh.

What Are Makerspaces?

Makerspaces are part of a growing movement of hands-on, mentor-led learning environments to make and remake the physical and digital worlds. They foster experimentation, invention, creation, and exploration through design thinking and project-based learning. The movement aligns with President Obama's Educate to Innovate initiative and his call to "think about new and creative ways to engage young people in science and engineering [and]...encourage young people to create and build and invent—to be makers of things, not just consumers of things." (Obama, 2009)

Museums and Libraries as Makerspaces

Museums and libraries are leaders in participatory learning. They are leveraging their resources, collections, and public trust to strengthen community-based learning, particularly for critical thinking, problem solving, collaboration, and engagement in STEM. Makerspaces enable visitors to pursue their own interests in building things and to collaborate and share with one another. Private funders, including the Cognizant, MacArthur, Mozilla, Pearson, and J.D. Bechtel, Jr. foundations, have supported museum and library-based maker programs.

Makerspace Support

IMLS investment in making includes support for a variety of learning spaces in libraries and museums that promote STEM, creative, and 21st century learning for people of all ages. Five IMLS-MacArthur Learning Labs grants have supported makerspaces.

In addition, IMLS funds work to advance best practices for makerspaces and maker programming nationwide:

- In 2012, IMLS awarded a National Leadership Grant of $444,296 to the **Children's Museum of Pittsburgh** for a research study of family learning in museum-based makerspaces. In partnership with the New York Hall of Science, the museums are working with academic researchers to design tools and principles of practice that support productive patterns of family participation and their associated learning outcomes in these spaces.
- In 2014, IMLS announced an effort with the **Children's Museum of Pittsburgh** and its university, museum, and library partners on a national program to build a field-wide understanding of making in museums and libraries. With $425,192 in IMLS support, the museum will develop a framework and suite of resources including hands-on professional development experiences and a community of practice. The project's website and online publication will share the framework, makerspace studies, research and evaluation reports, as well as resources for field-wide replication.

Examples of IMLS-Funded Maker Projects

The New York Hall of Science received grants in 2011 and 2012 for a makers project and for planning a learning lab within its Cognizant Maker Space. The Queens Makes program, developed in partnership with the Queens Museum of Art, fostered invention, experimental problem solving, design, and building for young tinkerers and their families. It included ongoing weekend programming targeting local Latino, Asian, and Caribbean communities and encouraging them to engage with the museum as a place to showcase their talents and passions. The learning lab grant enabled the museum to prototype a youth-centered, community-engaged Digital Making program, where middle and high school youth could investigate and communicate STEM topics through digital media including sound, video, and games.

With IMLS Grants to States funding, the **Idaho Commission for Libraries** established the Make It at the Library project. The project supports the implementation of makerspaces in eleven public libraries across the state and is in its second year. The focus is on delivering creative, STEAM-based learning opportunities for tweens and teens to help prepare them for the future. The project includes hands-on training on tools and technology, leveraging partnerships, and evaluating outcomes. The results include formal and stealth programming incorporating engineering, robotics, 3D printing, and other STEAM topics to draw community members into these innovative programs and spaces.

With a 2013 IMLS grant the **Center for Science & Industry (COSI),** in partnership with the Columbus Idea Foundry and the Columbus Museum of Art, will increase staffing to focus on maker program development. The three partners will collaboratively develop and implement "maker" educational programs at STEM (Science, Technology, Engineering, and Math) high schools and within their own organizations that focus on 21st century and innovation skill building. The partners will develop programs that embody the maker values of collaboration, risk-taking, creativity, and personalized learning.

With a 2013 National Leadership Grant of $246,545, the **Westport Library** and its partners will introduce a new model of makerspace in libraries and a way to systematically integrate the culture of interactive "making" into the library profession. There will be self-directed, hands-on maker experiences; maker workshops; tinkercamps for teens; and monthly makers-in-residence workshops focused on topics such as building all sky cameras, Arduino quilt creations, and creating musical instruments with Makey Makeys and Scratch. The library will also create Interactive Innovation Stations to introduce people to the concepts and techniques of design-thinking.

The **Oregon Museum of Science and Industry** received a 2012 Learning Labs grant of $100,000 to help plan its Tech Lab/makerspace, which provides visitors the chance to explore new and emerging technologies, as well as existing and established technology. Ranging from 3D printers to typewriters and iPads to telegraph machines, the tools presented provide entry points to creative problem solving. Staff members arrange three to five facilitated and self-directed activities and design challenges daily. Through resolving these design challenges, visitors highlight specific scientific principles, use the design process, and create results that can be tested. For example, this winter visitors challenged themselves to fold paper airplanes to then fly them through a series of "holes" requiring adjustment to compensate for height, distance, and accuracy.

With $249,999 funding from IMLS, **Chicago Public Library** and in partnership with the Museum of Science and Industry, designed and launched a public digital design and fabrication lab at the Library's central location. The Chicago Public Library has introduced thousands of adults and teens to "making" and the technologies enabling new forms of manufacturing, art and design in the Maker Lab, which has become a model participatory learning space.

About the Institute of Museum and Library Services

The Institute of Museum and Library Services is the primary source of federal support for the nation's 123,000 libraries and 35,000 museums. Through grant making, policy development, and research, we help communities and individuals thrive through broad public access to knowledge, cultural heritage, and lifelong learning. To learn more about IMLS, please visit www.imls.gov.