Makerspaces@your School Library: Consider the Possibilities!

Cynthia R. Houston, Ph.D., MLIS
Western Kentucky University
1905 College Heights Blvd., Bowling Green, KY 42101
United States of America
Cynthia.houston@wku.edu

Abstract

Community centers called "Makerspaces," "Hackerspaces," and "Hubs" are materializing in schools, libraries, and industrial buildings across the globe. Educators believe that the Maker movement has the potential to stimulate interest in learning in the STEAM areas (science, technology, engineering, art, and mathematics) because hands-on inquiry learning is embedded in every Maker activity. School libraries have always been resource centers for student inquiry learning and many school librarians see Makerspaces as a means to attract students and faculty to the school library for instructional collaboration. This paper provides an overview of Makerspaces in school and community settings and offers advice for school librarians interested in becoming involved in the Maker movement.

Keywords: Makerspace, STEM, 21st Century Skills, technology, science

The Maker Movement

As an outgrowth of the 21st Century Skills initiative, a new movement entitled the "Maker Movement," has transformed technology learning from a computer lab into a hands-on, minds-on workshop environment. The activities of "Makers" take place in a community of creative and enterprising individuals, who are developing innovative technology applications using lo-tech and hi-tech tools and ideas. The physical space, tools, and "Maker" activities are housed in libraries, industrial buildings, and community centers, called Makerspaces, Hackerspaces, or Hubs. They reflect the communities they serve, but all share the Maker philosophies of local empowerment, innovation, and collaboration (Anderson, 2013). There are Makerspaces in most every community across the globe, with Makers of every age collaborating on projects as simple as a marshmallow catapult, to 3D printed dollhouse furniture, to prototypes of innovative technology applications.

The Maker movement has been especially attractive to youth who enjoy tinkering and exploring real-world applications of their ideas. For example, last year, four 14 year-old girls from Nigeria collaborated on the development of a urine powered generator as part of a high school science project with the goal of finding alternative solutions to Nigeria's electricity problems (Olofinlua 2013). Their generator, which can create 6 hours of electricity from one liter of urine, was featured at the 2012 Makerfaire Africa event held in Lagos, along with hundreds of other hi and low tech locally produced products ("A urine powered generator" 2012).

As the process of collaboratively designing, developing, and prototyping technology involves every aspect of learning, the Maker movement encourages and supports lifelong learning, along with the application of personal, interpersonal, and cognitive skills, all of which are themes for this conference. As school librarians consider the changing landscape of their spaces due to changes in technology and curriculum they should consider becoming players

in the Maker movement by creating a participatory space for community interaction, lifelong learning, creativity, innovation, and hands-on technology learning.

Many school librarians are intrigued by the idea of integrating a Makerspace into a library facility because it is another way to connect library resources with inquiry learning, which is the fundamental philosophy of 21st century learning. The American Association of School Librarians' *Standards for 21st Century Learners* (2007) emphasizes the importance of developing inquiry skills in a collaborative environment that is rich in information tools and resources. Many educators believe that informal environments like Makerspaces support deeper, more meaningful learning in STEAM (science, technology, engineering, art and mathematics) disciplines because hands-on learning activities make these subjects less abstract and easier to understand (Britton 2012; Gershenfeld 2007).

An example of how a Makespace can be integrated into a school library facility is the "Michigan Makers" afterschool program, based in the East Middle School library. In the 2012-2013 school year this group of students-turned-Makers explored many kinds of desktop manufacturing tools in activities focused on STEAM learning. As part of this program students learned how to use sewing machines to make pillows of different shapes and sizes; how to program Arduino microcontrollers to program patterns for LEDs; and how to build Raspberry Pi computers ("Arduino Workshop One" 2013; "Michigan Makers Blog" 2013).

An example of a Makerspace housed in an international school is the United Nations International School's Makerspace called the "CoLaboratory". As opposed to a traditional computer lab, the CoLaboratory combines hi-tech tools such as computers, microcontrollers, and 3D printers with lo-tech tools such as nuts, bolts, hammers, and screwdrivers. The goal of the CoLaboratory is for students to explore concepts in the STEAM areas through the inquiry method and the design process. According to Zammarano and Jenkins (2013) projects in the CoLaboratory engage the students in STEAM content learning in a different way than traditional classroom activities. When students in the CoLaboratory were asked to design and build a maze using a recycled laptop box and a simple LED circuit, Zammarano and Jenkins observed: "the process of designing, problem solving, painting, questioning, cutting, pasting and presenting their final product makes this project engaging and relevant for the child" (Zammarano & Jenkins, 2013, para. 7).

Making Space for a Makerspace

There are many different levels at which school libraries can be involved in the Maker Movement and support STEAM learning activities. For example, in communities where Makerspaces are vibrant community centers, school libraries can support student's interests by developing a library collection following Makerspace and STEAM themes. Collection building should focus on the nuts and bolts of starting a Makerspace, including guidebooks for projects in the STEAM areas, and any related materials in multiple formats that occupy the 500, 600, 700 sections of the library collection. Support for community Makerspaces can be expanded through regular visits by students and school librarians to local Makerspaces with information related to the library's collection of Maker resources and programming. This type of outreach has the potential to develop a successful partnering of resources, expertise, and facilities. Either hosting or staffing a booth at a Maker Fair, where Makers gather to show off their projects, is also an effective means to support the Maker community and STEAM learning. As part of library advocacy and outreach programs, school librarians can assemble kits and portable programming materials to offer "Pop-up Makerspace" activities in classrooms or other areas of the school. Finally, if your school library has the space and resources to develop a Makerspace, attracting a new population of patrons to use the tools and resources inside the space and participate in programming activities is an easy task. Makerspace programming in school libraries can transform libraries into spaces to "create,

build, construct, do, and express all kinds of both personal and collaborative products" (Loertscher, 2012, p. 45).

Advice for Maker-Librarians

The school library as Makerspace is a new concept in library services and there are some serious issues to consider when wading into these uncharted waters. Primarily, schools should consider the liability involved with housing potentially harmful tools and equipment, the expertise required to maintain equipment and train students in their use, and how to program Makerspace activities so that they effectively introduce STEAM concepts and spark interest in STEAM careers.

With liability on the minds of every public institution, public libraries with established Makerspaces, such as the Westport Public Library in Connecticut or the Allen County Public Library in Indiana have liability waivers and user agreements that can be used as a model for schools and districts to follow. The Michigan Makers club at East Middle School requires a permission slip and parent orientation. These agreements can be found on most websites connected with library Makerspaces. It is good advice to have a waiver and user agreement in place before any Makerspace programming takes place in the school library.

Space and facilities are always a primary consideration for any innovative school programming initiative. School librarian, Leslie Preddy (2013) offers a number of suggestions to consider when planning Makerspaces:

1. Adequate space for autonomous activity, storage, and instruction – Preddy suggests creating a space for students to be autonomously productive and active in a space that can be used for multiple purposes and is easy to clean.
2. Adequate lighting and electrical outlets – Considering that technology will play a key role in most Makerspace activities, Preddy suggests a well-lighted space with room for students to spread out and work on projects, and plenty of electrical outlets be provided for tools and computer technology.
3. Flexible, mobile, convertible furnishings – To create a flexible Makerspace in the library or one that can "pop-up" throughout the school building, Preddy suggests that furniture be as mobile as possible.
4. Self-instruction via library resources, DVDs, pathfinders, etc. – From the beginning, Maker-Librarians should develop the school library collection to support and create interest in Makerspaces. Preddy suggests both physical resources, such as how-to books and DVDs, and virtual resources, such as Pathfinders and websites, be part of the library collection.

When considering the staffing and program development required for the Makerspace, East Middle School Maker-Librarian, Rachel Goldberg emphasizes the importance of enlisting a core of volunteer mentors to assist students with their projects and help them develop their ideas. She suggests tapping resources found in local high schools, universities, and community groups who have an interest in Makerspaces. According to Goldberg, "Partnering with enthusiasts and giving them a space to share their craft with young people is an excellent way to build community relationships and develop lasting partnerships." (2013, par. 4)

Imagine it! Do it!

Makerspaces in school libraries that support 21st century learning strategies and STEAM content have the potential to disseminate interest in science, technology, art, and mathematics to a large number of students, including minorities and youth from low-income families who are under-represented in careers from these subject areas. School libraries have a long tradition of serving the education and information needs of the school

community, and providing free programs and services for all. There are many ways school libraries can support Makerspaces and STEAM learning, from stocking library shelves with books and magazines, school visits to community Makerspaces and Maker Fairs, to housing a full-fledged Makerspace in the building. Given the financial considerations, physical space, and staffing needs associated with leading the way in educational innovation, what is required is for school libraries to imagine the different possibilities for supporting Makerspaces and STEAM-related programming in their own communities. In a recent issue of *Teacher Librarian*, David Loertscher advises school librarians to ride the wave of innovation:

> As teacher librarians we can embrace new and innovative ideas or allow them to grow up around us, excluding us, ignoring us, or we can embrace, join, encourage, and move to the center of both serious academics and the exciting movements in education. It's our time folks (2012, p. 46).

Key Resources for Kickstarting a Makerspace

Makerspaces: A new wave of library services. ALA TechSource Webinairs – A four part series of webinairs on Makerspaces from alapublishing.webex.com

Makerspace.com – Comprehensive resources for developing Makerspaces and Makerspace programming including the free *Makerspace Playbook* ebook guide.

Makerbridge - Comprehensive resource for those involved in community Makerspaces from http://makerbridge.si.umich.edu/

Maker Education Initiative – Educational arm of the Maker Movement with a focus on youth Maker education programs and resources http://makered.org

Preddy L. (2013). *School library makerspaces: Grades 6-12.* Santa Barbara, CA: Linworth. Available in October, this guide provides programming ideas and advice for implementing a Makerspace in a middle or high school library.

References

American Association of School Librarians. (2007). *Standards for 21st century learners.* Chicago, IL: American Library Association, Retrieved from http://www.ala.org/aasl/standards-guidelines/learning-standards

Anderson, C. (2013). *Makers*: *The new industrial revolution.* New York: Crown.

Arduino workshop one. (January 7, 2013). *Michigan Makers Blog*. [Blog] Retrieved from http://michiganmakers.weebly.com/1/post/2013/01/arduino-workshop-one.html

Britton, L. (October 1, 2012). The makings of maker spaces, part 1: Space for creation, not just consumption. *The Digital Shift*. [Blog] Retrieved from http://www.thedigitalshift.com/2012/10/public-services/the-makings-of-maker-spaces-part-1-space-for-creation-not-just-consumption/

Gershenfeld, N. (2007). *Fab: The coming revolution on your desktop--From personal computers to personal fabrication*. New York: Basic Books.

Goldberg, R. (June 7, 2013). Michigan Makers. *Young Adult Library Services*. [Blog] Retrieved from http://www.yalsa.ala.org/yals/michigan-makers-winter-2013/

Loertscher, D. (2012). Maker spaces and the learning commons. *Teacher Librarian 39*(6), 45-46. Retrieved from EBSCO Host databases.

Michigan Makers Blog. (2013). Retrieved from http://michiganmakers.weebly.com/michigan-makers-blog.html.

Olofinlua, T. (February 8, 2013). Teen girls invent urine-powered generator to tackle Nigeria's energy problems. *Global Press Institute.* Retrieved from http://www.globalpressinstitute.org/africa/nigeria/teen-girls-invent-urine-powered-generator-tackle-nigeria's-energy-problems#ixzz2WaAVAFtV

Preddy, L. (2013). Creating school library Makerspace. *School Library Monthly*, 29(5), 41-42.

A urine powered generator. (Nov., 2012). Makerfair Africa 2012, Lagos: In pictures. [Blog] Retrieved from http://makerfaireafrica.com/blog/

Zammarano, F. and Jenkins, J. (2013). United Nations International School MakerSpace aka. CoLaboratory. [Blog] *Makerspace Education Initiative.* Retrieved from http://makered.org/2013/03/united-nations-international-schools-makerspace-aka-colaboratory/

Biographical note

Dr. Cynthia Houston is an Associate Professor in the Library Media Education program at Western Kentucky University. Her research interests include digital resources, the status of school libraries, and international comparative librarianship.