MAKING AND THE LIBRARY
What is this maker revolution that seems to be sweeping our libraries? Making is a problem-solving-based collaborative activity that involves and potentially engages students and library patrons. Makers are people who create things instead of just using them. They solve problems and address issues to invent or create the item that best suits their needs. Makers are dreamers, problem solvers, hackers, thinkers, builders, and inventors (Canino-Fluit, 2014). The locations in the library now known as makerspaces are areas that encourage play, building, inventing, thinking, group work, and so much more (Britton, 2012). Makerspaces and hackerspaces in libraries show that school library media centers are not just locations to absorb and gain information but also places to create, imagine, and invent.

TECHNOLOGY IN MAKERSPACES
Many types of technology can be used in a makerspace. Arduino (http://arduino.cc/en/Main/Robot), Hummingbird (www.hummingbirdkit.com), and Lego all have robotic building options for students to explore. Old technology that is no longer in use is excellent for students to explore, take apart, and rebuild into something new. Laptops and tablets are great for photo clubs, computer and app design, music recording, and digital storytelling. Laptops, computers, and tablets are typically needed in partnership with 3D printers. 3D printing has become a popular service to offer in makerspaces. It offers users the opportunity to take ideas and make them into reality. This type of printing creates tangible objects from digital data (Kaur, 2012).

There are three main types or categories of 3D printers, but the one most commonly used at this time is a Fused Deposition Modeling printer. Like the Makerbot (www.makerbot.com) or Cube (http://cubify.com/en/Cube), these printers create items from data by piecing together heated plastic layer by layer. Plastic filament feeds through the machine, and when a design has been loaded and chosen for the machine, the filament is heated and used to create the product. While this type of printer is easy to use, challenges still arise in good design. Not every design will become a successful 3D model. Good layout and thoughtful planning is important in successful 3D printing, making this a great technology for any makerspace.

MAKING AND LITERACIES
In librarianship we are familiar with information literacy. As the American Library Association states, information literacy is the ability or set of skills needed from an individual to know when information is needed as well as the aptitude to evaluate, locate, and use the needed information (ALA, 1989). When it comes to makerspaces, as well as the technologies and projects therein, a different type of literacy comes into play: digital literacy. The definition for this type of literacy is where the student or patron has the ability to use different types of technologies to find, assess, make, and communicate information (ALA, 2011). The operative word in this definition for those librarians looking to include makerspaces in their library spaces is making. The staff and faculty in libraries are used to aiding students in finding, retrieving, and absorbing information, but makerspaces and the subsequent technologies move patrons from the receiving of knowledge and information to the making of it. Makerspaces are all about creation, collaboration, problem-solving, thinking, and doing.

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on or at least exhibited in the library for quite some time. Now it has a more specific name. If you’re not sure about a full blown makerspace in your library, start small, which is what many librarians have done. Some start with workshops after school or collaborating on projects with a peer educator. Others go ahead and take the plunge, get a grant, purchase a Makerbot or Cube, and see where things go from there. A few librarians go all in and decide the library needs to change, and while books and e-books will never lose their pride of place, a makerspace would make a great addition and a change of focus is in order. Just like any type of decision for the library, the question comes down to the needs of the students. Is this the right addition for them?

Once the decision has been made on student need, consider the logistics of a makerspace. Common considerations include location, cost, staff, and materials. When working to integrate a makerspace, a dedicated space is usually necessary or at least a location to store crafts and technology carts when items are not in use. Makerspaces do have a cost. Paper and paints, knitting, 3D printers and plastic filament, as well as other technologies all come with a price tag. Many school librarians have pursued grants to get started; others have requested money from parent and community groups. School and county administrations have helped as well in getting maker-areas off the ground. Staffing is always an issue. It doesn't matter whether the library is in a school, college, or public library setting. It takes time and effort to find parent, teachers, community members, and volunteers to help with maker-areas. Some librarians have student assistants to aid with 3D printer training and technology assistance. Everyone can bring in their own area of expertise. User agreements and makerspace policies are also important. Very few examples are available at this time, and many librarians are building user policies based on tablet and other technology-based circulation. When it comes to scheduling the makerspace itself, computer and learning lab scheduling is always a good place to start.

PROJECTS AND IDEAS

Sample of 3D prints from a math unit at Monticello High School (photo courtesy of Ida Mae Craddock)

Makerspaces in school library settings are commonly integrated into the curriculum. How can the maker-area best be used to enhance the learning experience of the students? If studying rocks and minerals, students could make gems or fossils on the 3D printer. For a storytelling unit students can design and create their own characters. This can be done with paint and paper, robotics, or the 3D printer. Math classes can learn about scale and design through multiple types of technology in a makerspace. These are only a few ideas already taking place in libraries in the United States. Makerspaces and the projects within are only limited by imagination. As Ida Mae Craddock from Monticello High School in Charlottesville, Virginia, said when asked about 3D printers and makerspaces, "They can make the theoretical real, and that’s pretty amazing. What can only be imagined is now physical."

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