Students Are Makers! Building Information Literacy Skills Through Makerspace Programs

Jane Lofton

A makerspace is not simply a space for constructing things; it encourages students to think, learn something new, be creative in accomplishing tasks, share their accomplishments with others, and grow as they do so.

We all thrive on the experience of making something, whether it be a simple two-minute sketch or a complex, multi-step project requiring hours, days, or even more to design and execute. Makerspaces provide our students with opportunities to be not just consumers, but makers and creators. Fortunately, too, makerspaces have many other benefits, including one of the library's most important responsibilities: building students' information literacy skills.

What, though, exactly is a makerspace? As with most recently-introduced concepts, it may take several different definitions to fully capture it. Here are a few that resonate with me and together provide insight into important aspects of the concept:

Leslie Preddy shares this definition in *School Library Makerspaces: Grades 6-12*: "... a destination of thinking, learning, doing, creating, and producing; where students are makers who think, create, share, and grow" (2013). A makerspace is not simply a space for constructing things; it encourages students to think, learn something new, be creative in accomplishing tasks, share their accomplishments with others, and grow as they do so. With each activity, they can move onto a higher level of thinking, doing, and creating.

Here is a definition from Laura Fleming: "... a place where young people have an opportunity to explore their own interests; learn to use tools and materials, both physical and virtual; and develop creative projects." (2015). This definition highlights the importance of allowing students to create something they care about, not just something required as coursework. A salient feature of the school library program is its support of a student's choice in learning; makerspaces also support that choice. This definition additionally notes that makerspace offerings are not necessarily physical. Virtual making, such as coding and using online software tools, may be part of a maker program, too. Makerspaces can work in the digital world, both in terms of the tools used to make something and through using digital tools to share student work. Indeed, building a culture of making is much more important than a maker destination or space.

Colleen Graves offers an excellent multi-point definition on her blog. Here is her graphic summary (2016):

Clearly, a makerspace is a place of inspiration, shifting the paradigm from student as consumer to student as creator. It also shifts the paradigm of engagement to actual empowerment to accomplish something and make meaning from it.

Finally, Andy Plemmons shared this definition on Twitter:

"A space that isn't focused on stuff but rather the spirit of tinkering, creating, failing forward, and sharing" (2016). Like Preddy, he highlights the importance of sharing, and adds one more key element to the concept: makerspaces encourage students not to just make something straightforward, but to experiment and to see failure as a frequently necessary and inherent part of the process. Plemmons proudly displays a "Fail Box"in his library to remind students that failure is normal. I adopted that idea in my library for our 3D projects, along with a display of successes. Students stopping by the display are often more intrigued by the failures than the successes! What real world problem was ever solved on the first try? Helping students learn to persist in the face of failure is crucial to their ability to succeed in the real world and to solve real-world problems.

From all these definitions, you can see that a makerspace encourages (in unranked order): creativity, student choices, sharing, student voice, persistence, real-world problem solving, exploration, learning-by-doing, digital literacy, and tinkering. And it gets better! While not mentioned in any of the above definitions, makerspace activities also encourage collaboration; it is inevitable that many activities will involve pairs or groups of students working together. Moreover, makerspace activities cross arbitrary subject area boundaries. In my library for example, math, computer science, robotics, and art classes all have participated in surprisingly similar 3D printing projects. Given time, I am confident that English, social studies, science, and engineering classes will get involved as well. They even cross age barriers; it

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is remarkable how activities such as 3D print modelling appeals to students of all ages and even adults. Finally, I already mentioned the connection with information literacy. Here is an infographic illustrating those links:

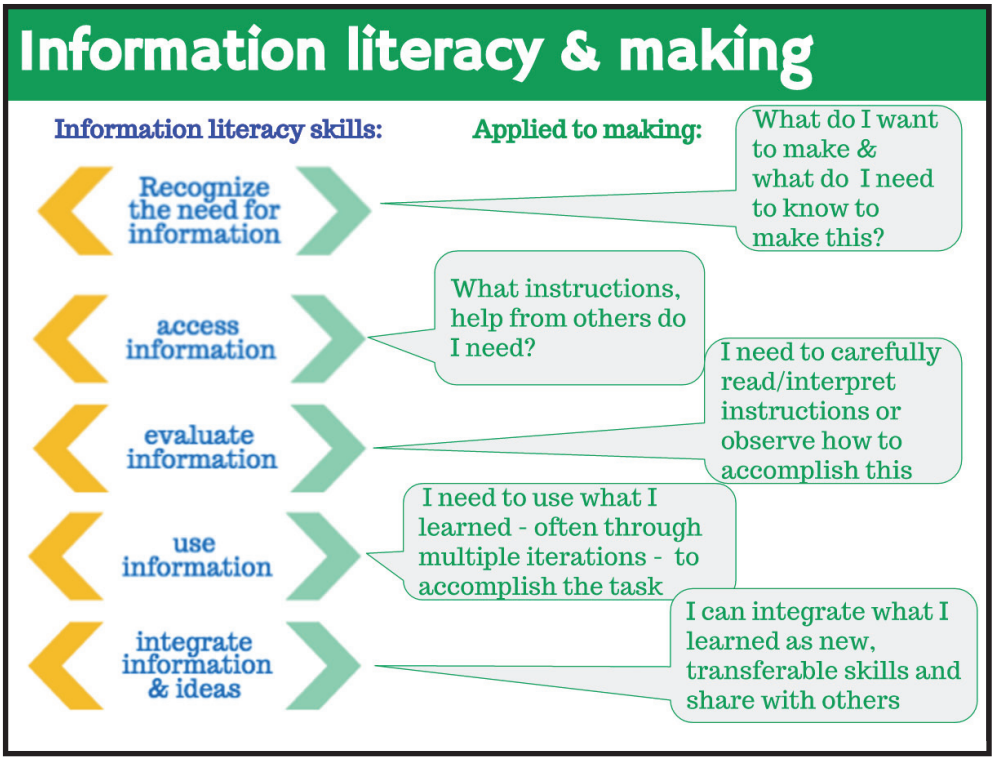

Figure 1: (Lofton, 2016)

At each stage of making activities, students can develop information literacy skills by determining the need for information about their projects, getting the information they need, evaluating the information available, using it to accomplish the task, taking ownership of those skills, and sharing their work with others. Of course, each activity will emphasize different skills, but all will call upon some of the information literacy skills.

With all these benefits, it is no surprise that makerspaces are cropping up everywhere -- in classrooms, newly-designated areas in schools, public libraries, and even shopping centers and the White House lawn.[1] I urge you, though, to advocate for placing your school makerspace in your library. Why? Within the library, the makerspace provides equity of access for *all* students, not just those who are taking a special class or whose teachers have an interest in using them. My library makerspace has been available for class projects, but, equally important, for any students wanting to use it, *both* to complete a class assignment independently *and* to pursue an individual interest not linked to a class. It fits in logically with the goals of the library to help students both discover and pursue their *personal* passions. A makerspace can also serve as a library marketing tool, drawing more students to the library who may not find their way there otherwise. Once there, they will then also find books, research support, technology support, and more. Finally, the teacher librarian who runs the library is the ideal person to oversee and supervise it, since he/she already works across disciplines, is the school information literacy and technology expert, and can tie together student interests and all the subject and curricular areas.

Saying that the makerspace should be in the library does not necessarily, though, mean that it requires a dedicated area. Makerspaces can be as simple as mobile carts with supplies, and can move around the library as needed. They do not even need to start with expensive supplies. Many makerspaces feature primarily salvaged and donated materials, such as cardboard and discarded woodshop tools and craft supplies. There are also numerous grants that could seed the makerspace. Moreover, every makerspace will and *should* be different, meeting the interests and needs of its population. It can emphasize high tech activities, low tech, or anything in between.

[1]For two years now, President Obama has hosted a White House Maker Faire in Washington, D.C. (https://www.whitehouse.gov/nation-of-makers).

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...every makerspace will and *should* be different, meeting the interests and needs of its population.

This diagram shares some of the resources to consider including for makerspace activities. I crowd-sourced this collection with a request on Twitter. Most of the activities do not require a permanent or dedicated space:

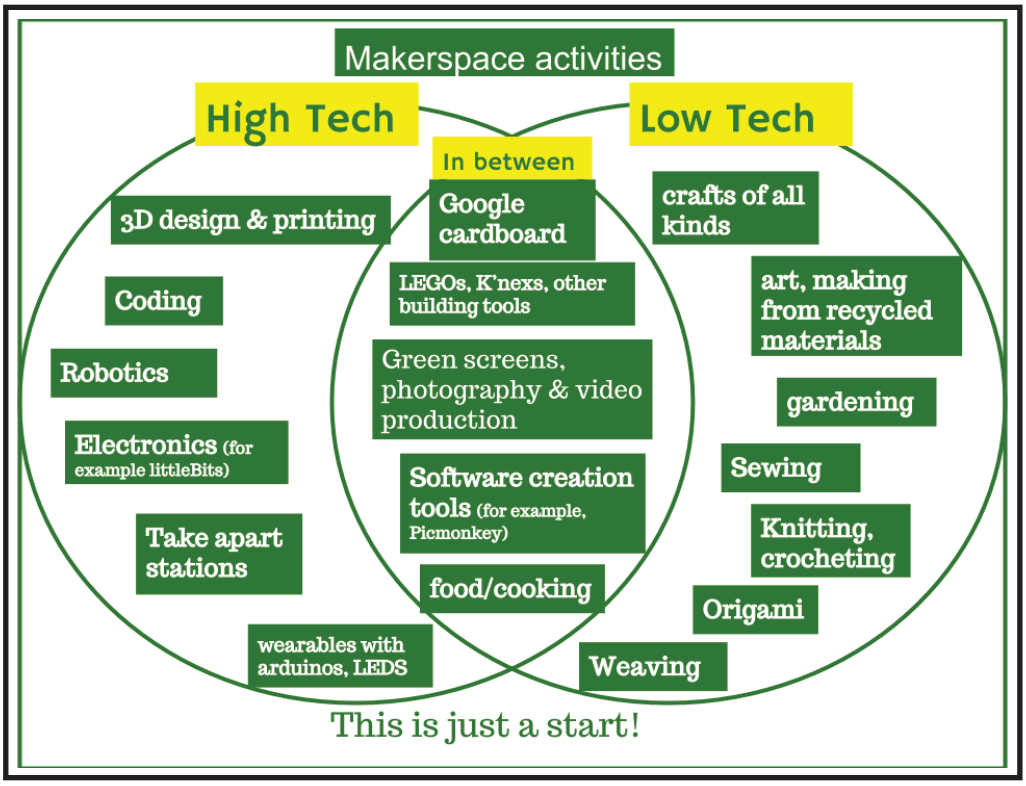

Figure 2: (Lofton, 2016)

A crucial first step in beginning a makerspace is to get your community involved in planning it. That way, it will be sure to meet their interests, and have their buy-in to support it. In my makerspace, I relied on my Geeks Club for direction on where to start. We began with 3D printing at the heart, along with little Bits and a Raspberry Pi, and later branched out into green screen activities, Google cardboard, a BB-8 robot from Sphero, origami, and other simple crafts, all based on student input. Our 3D printers are on mobile carts, and all of our activities move around the library and can be set up easily. To promote what is available, we have hosted several maker fairs and challenge activities.[2] Frequently, promoting the fairs and challenges is what got teachers' attention and requests for class projects using our 3D printers. We also prominently share students' work in library displays and through social media, including Twitter, Instagram, and the library blog. We also seek out coverage in the school newspaper and news broadcasts.

By promoting and supporting student maker activities that encourage them to solve real-world problems while building information literacy skills, we not only help them become college- and career-ready; we may be nurturing the inventor of a game-changing tool to better our world. Let us get started!

[2]For accounts of the maker fair and challenge activities, see the Mira Costa Library Blog, www miracostahighlibrary.edublogs.org or my 19 March 2016 CUE presentation.

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