FOSTER THE FLOW:

How Libraries Can Manage the Knowledge Movement Through Maker Spaces

Erin Stoner

Abstract

This work will explore how libraries can properly manage new user needs with constantly emerging technology, new communities of makers craving hands on learning, and even yet to be seen methods for knowledge flow. Creating spaces for this type of exploration and making has become a necessary part of communities across the Unites States. Here, there are three first hand looks at how they manage spaces in different types of suburbs of Chicago. Along with some thorough research, these types of spaces or services are emerging in most libraries in some way, whether it is a Photoshop demo at the Hinsdale Public Library or a full-on teen space with permanent gaming stations, as in Studio 270 at the Gail Borden Public Library. The research draws upon decisions which went into these spaces before they were created, and how they are managing different maker spaces from Aurora to Hinsdale to Elgin and many others. There will be discussion of multiple space options and how to properly assess user needs throughout specific communities and exceed the needs which are assessed. Sometimes the user doesn't know what they need to assist their creations until they see it. As the famous quote regarding the initial phases of automobile innovation by Henry Ford goes, "If I had asked people what they wanted, they would have said faster horses." Maker spaces in libraries need to offer more than users could imagine, or otherwise access, innovating community knowledge sharing and fostering new skills and ideas. The true beauty of the movement is the sharing aspect. Members of the maker community are all on the same team, continually building a world consisting of their own invention and interests, with shared knowledge at the heart of the movement.

Telling the Right Story

Libraries must be able to tell their communities story effectively, or in the very least, assist in the story making process for users. "In effect, community storytelling, properly framed and interpreted, was an undiscovered intelligence tool," (Howley). This is one way for the library to understand its users, to listen to the stories already being told by community members. "Community stories about the library experience revealed themselves as the ideal media to promote libraries, their values, and their contributions to the community's common good," (Howley). Library managers had to think about their staff and information differently. They needed to value shared knowledge found social media streams such as Instagram and Pinterest. "The key leap of the imagination here isn't so much fretting about how creative librarians are but rather the belief that the rudiments of service journalism and social media strategy are teachable," (Howley). The other thing that is key, make sure what you are sharing and adding to this world is relevant to your users. "Offer someone a media experience that's beautiful but irrelevant, and you'll lose him or her in seconds," (Howley).

Another example of this is the Westport Public Library who's Director, Maxine Bleiweis, says in *The Makings of Maker* "We want the library to be a space where you can invent. You can learn at every stage of your life," (Britton). Britton explains, "typically, the spaces will:

- Foster play and exploration
- Facilitate informal learning opportunities
- Nurture peer-to-peer training
- Work with community members as true partners, not as users or patrons
- Develop a culture of creating as opposed to consuming," (Britton).

The main idea is that people learn more easily when it is among peers and it is fun, not forced. How to do you manage a space like this? How to you tell this story before someone walks in the door? "When someone is engaged in a playful space, that person will learn more easily. Creating playful information-based spaces allows the learner to explore and engage with content on the learner's terms instead of on the instructor's terms," (Britton). A great example of this type of programming is through the Detroit Public Library, where "this past summer, the library ran weekly Maker Day camps that included Arduino robotics, a bike tech camp, and a clothing design and sewing camp," (Britton). These were commonly mentioned interests of the teens of the area, so by listening to the local story, they joined in the "conversation," so to speak, sharing relevant knowledge back to these interested patrons and then they could share with each other too. The library should be a shell, and a versatile one at that. The librarian should be ready to go with the flow as STEM program is occurring, "Bleiweis says the library is there to provide the framework, not to be in charge. She says there is a shift from a librarian being the person who had all the answers to the person who has questions and the ability to find the answers," (Britton).

Starting a Space

One of the most important aspects libraries should prepare for is the variety of needs their users will present. The space should be modular to some degree, allowing stations which can be changed to suit the project of the moment. It should be able to hold many users' interests, the most popular route to suit many users are computer workstations with powerful software differing from the regular public

internet stations. Libraries may want to offer some engineering options, including electronic parts or soldering irons. The community may need a space and equipment for sewing or knitting projects such as different sewing machine options and knitting or crochet needles. These needs may change daily or depending on what time of day it is. The space should be able to adapt as necessary.

Bohyun Kim breaks down a price point for libraries who are curious what it might take to get started in her article *Building Blocks of an Innovation Space* in the Library Journal, "a pre-assembled desktop 3D printer of FDM (fused deposition modeling) – type costs from $1,000 - $2,500, and the price of a desktop 3D scanner can range from $370 to $2,800," (Kim). She goes on to explain, "You will need a budget of approximately $1,300 to get started [with an inexpensive 3D printing setup] … It is important to think ahead about which staff, department, or team in your library will take responsibility for it," (Kim). The staff training is a serious investment, but should be seen as just that. "You will need sufficient resources for the staff to learn new skills. Be sure to set aside enough time for staff training and encourage staff members to play with the equipment and work on test projects collaboratively," (Kim). This will encourage patrons to collaborate with staff and each other as well.

Bohyun Kim details how to keep up with the financial requirements of having a Maker space, "equipment will need to be refreshed after a certain period since technology changes quickly. Consumables such as filament will also need to be purchased on a regular basis," (Kim). In other words, the space will need to be more than a single grant application. There will need to be a financial plan in place, of how to continue to create revenue for the space to run. The space might charge

a materials fee. If so, how you are collecting the money? If it is popular enough, it may be necessary to charge a materials fee. She brings up a very important other idea of understanding your new "work flow." She says, "envision how the service will be rendered, from the first step to the end product. How will the user find out about the Maker space? How will s/he interact with the staff to initiate the request?" (Kim). She suggests having a planning committee or team in place to run through all possible scenarios until you are sure you have all bases covered.

Other things to consider are what is popular in other spaces. In "Making it Happen," Dixon describes some of the most popular Maker programs by age group, "the most popular adult programs are predominantly, though not completely, low-tech: crafts (30%), cooking (28%), 3-D printing (27%)." She goes on to describe the most popular teen maker programs "are cooking (27%), coding (26%), 3-D printing (22%), and crafts (20%)." The most popular kid programs of this type are, "are LEGO/building kits (35%), crafts (29%), robotics (19%), and cooking (10%)" (Dixon). She also details the differences in popularity and there have been some things that have jumped. "In the last three years, the programs showing the most dramatic jump in popularity are coding / programming (from 36% to 65%), painting / drawing (43% to 69%), 3-D printing (23% to 45%), robotics (32% to 53%), and building kits (71% to 87%)," (Dixon).

Communities might go to great lengths to find out what Makers want in the space, like with the April 2017 focus group study conducted at University of Virginia Library to assess Maker space plans. Melinda Baumann found, "participants prioritized the need to make the space accessible to people with disabilities," over the need to discuss any specific equipment requests, the focus group was overly

concerned it could be utilized by all. She notes surprise in results of users saying too much tech equipment, and not enough hands on supplies could turn certain people away. Saying, "designers should avoid targeting all services at users with lots of technological expertise (because 'high tech is a turn-off' to some students and makes them 'feel intimidated')," (Baumann). She also noted that, "some participants also identified a need for 'simple' materials such as markers, paper, and scissors that are 'more reputable than high-tech' and will ensure that the space is not too tech heavy," (Baumann). The best takeaways from the recent focus group are the ideas they expressed including, "offering workshops and short courses, displaying finished projects, and hosting non-Maker events in the space," (Baumann). Having a cross pollination among departments and interests will bring in new users and new knowledge. The focus group definitely agreed the library was the right spot, "they express that the library is uniquely positioned to function as that neutral, welcoming space," (Baumann).

An interesting project to get patrons started with electronics and engineering might be with paper circuits. For instance, when you combine LED lights, alligator clips, power sources such as batteries, and nice origami paper as described in *The Big Book of Maker Space Projects*. Authors Colleen and Aaron Graves say it's a great introduction to electricity and to "help your makers learn about the circuits that power our world with … fun paper circuitry projects," (Graves and Graves). They show you how to create an adorable paper creature with LED light up eyes. Then go on to show you how to integrate more intricate LED strips into a picture book with popup and light up parts. Begin with the construction and a book binding seminar, then add an additional STEM session after with the light up eyes and then

you will please everyone, the tech crazed and those who are all about getting their hands dirty crafting. These different types of Makers can assist each other, making it more fun and more interactive.

Start Small with Beginners in Hinsdale

There are several ways libraries can incorporate spaces like this into their services even if they don't have a ton of space or staff to handle a full-on maker space. One example is the Hinsdale Public Library where technology is at the forefront for all ages. The main attraction is the Digital Media Lab, or the "DML" as the locals call it. In this private nook, you have a 27" iMac, a video to DVD conversion station, a "keyboard, microphone, Wacom tablet, photography studio equipment and more," ("Devices - Hinsdale Public Library"). In the main space, they host eight public Windows computers with Microsoft Office Suite, and 2 15" MacBook computers. Guest passes are liberally allowed to all patrons, card or no card. You can also "check out" MacBook or Windows laptops for use in their 6 study rooms, need be. As far as training resources often offered by Hinsdale they are among libraries offering resources, "from online learning systems like Lynda.com to regular computer classes for all skill levels, many public libraries are already invested in community workforce development and stand ready to help with internal efforts," (Brown). They are offering a variety of beginner tech programs from Photoshop to WordPress for beginners.

In their Youth Services department, they host a Silhouette Cameo vinyl cutter and a 3D printer, the Maker Bot Replicator 2, available to all staff. They have tween programming and introduced the community to programs like Tinkercad, and

showed students an introduction to the world of CAD. You can handle equipment such as the 3D printer or vinyl cutter in one of two ways. As with the Hinsdale Public Library, the "equipment will be accessible only to staff, who will take requests for 3D printing or 3D scanning from users and deliver the results," (Kim). While it currently isn't an advertised service on their website, Ridgeway Burns, Youth & Young Adult Services Manager, told me during an exclusive interview, "we will often print objects for regulars. If a kid pulls me over to show me his design, I'll tell him we will try to print it for him." He says he tries not to make any promises, while regular copiers and printers can be problematic, 3D printers tend to be especially finicky, and patrons, especially the young ones, often don't understand how the behind the scenes troubleshooting really works. Ridgeway also gave the insight that while there are free program options such as Sketchup, these programs are extremely time consuming even with access to great tutorials on Lynda.com. The program can scare away users who didn't intend to spend great amounts of time learning software before creating. These users might be better off beginning with Thingiverse or Tinkercad, which are much more beginner friendly.

Though, it can be surprising, as Michelle Cooper, director of the White Oak Middle School Maker Space says when asked how she sustains her Maker Space, "Students are pretty savvy inventors. The key is to continually challenge the students. To inspire innovation, I held a Great Maker Challenge. Students met during the month of April to create chain reaction machines," (Zuger). When Cooper was asked how to make it work without "blowing the bank," she responded, "Grants are a wonderful option to help implement maker spaces. Donors Choose has been a superb resource to help me fund our maker space," (Zuger). She also

says to "keep reports, take lots of photos to share, invite the community to a maker showcase, and create a blog so that the school and greater community feel part of the experience and see the value in supporting it, financially and through offering their time and other resources," (Zuger). It is essential that maker spaces in libraries especially follow this advice. These are not necessarily a given to board or trustee members, and maker spaces want to be able to prove worth whenever asked. Proving community engagement should do the trick.

Music is key at Gail Borden's Studio 270

Studio 270, originally launched beginning of 2011, is primarily a space for high schoolers. The space is also home to the library's Digital Media Lab (DML), a high tech, professional level music and video studio. The spaces are managed very differently, but both offer teens resources they otherwise would not have. The space is currently managed by Billie Moffett, Director of Studio 270, who began at Gail Borden 15 years ago as a Reference Librarian. Adults can book the DML in hour increments. Billie told me, "it is booked a week and a half in advance, and we only allow up to two weeks in advance, otherwise it would be booked solid too far out," (Moffett). She says they have done no special marketing and the space is full whenever it is open, which is when high schoolers are out of school.

There is a wonderful crafting station she has made from an old quilting table full of supplies for students and two gaming stations along the back wall of the room. Some of the other interesting features in main teen space are dry erase paint on the wall featuring upcoming programs and fun ideas, an eight-person study room, a table with chess board, Twister and other board games, three Mac Minis

loaded with media editing software, Silhouette Cameo, button makers, a keyboard on the cheaper side for general play and learning, ten laptops and five iPads to check out in the room, and the ever popular foosball table. She allows students to display their art work around the space with corkboards/pins or tape as they please. She feels that with this type of freedom, it balances the other policies which may be holding back the young artists.

Moffett says it gets fairly noisy, which is part of the fun but also part of the challenge, as they are allowed to be louder and eat in this space, something that is otherwise not allowed in other spaces of the library. Moffett says she has a no tolerance policy for inappropriate language which can be a major issue she has to deal with in the space. She will ask the person to stop if the use profane language, if they continue, they will be asked to leave, and if that doesn't happen, then security is promptly called. Managing a space full of high school students can be challenging. How do you allow them to communicate as peers, while keeping it decent? She also reports incidents with equipment being stolen. The space has strict borrowing policies in place for patrons using the space and borrowing equipment. Although she admits the one for students technically can't be binding, as they are minors, it has all their information on it and does make them, and their guardian associated with their library card, accountable to a certain extent. This has helped keep the Studio's equipment safely available for the teens who deserve it.

She is not a one-woman crew, she is accompanied by two full time associates and four part-time aides to assist in the space. Collaboration in the Elgin community and abroad has happened naturally through their intricately planned and implemented Digital Media Lab, or as Moffett referred to it, the "mini recording

studio." She says often users will share on Sound Cloud to hear each others' work, talk about their projects to others, and get the word out. The DML at Studio 270 always has a staff member hanging out when patrons are in it, which is all the time. Patrons book the DML for voice recording or mixing for vocal tracks in hip-hop or rap music –sometimes making an accompanying video, orchestra tryouts, podcasts, or school projects. They found one of their staff members while he was working on his own music at Gail Borden, approached him, told him to apply for the associate position, and now they have Andre. While it is a common strategy to use the staff's interest to fuel projects and programming in maker spaces, Gail Borden went one step further and brought in the talent based on user needs. "More than ever before, today's libraries are identifying the unique goals, hopes, needs, and aspirations of the communities they serve and aligning themselves with them," (Brown).

Aurora Santori Branch Makerspace, Too Much?

The Richard and Gina Santori Public Library of Aurora, along with all their Makerspace, opened in June 2015. The manager of digital services, Himanshu Trivedi, says the Digital audio / visual studio they have is still "in progress," but the space boosts keyboards, digital drums, green screen, extensive lighting options, a variety of mics and cameras available to use. Also, on the second floor of the Santori Public Library, is a large lab of 27" iMacs to hold courses right next to the other huge selection of public internet and work stations. There are also eight adult study rooms, two with smart TVs, as well as two teen rooms, and a large teen programming or study area. Downstairs, as you walk in, the Makerspace is available to all users, no card needed, no signed agreement.

The space thus far has been about 80% new users 20% regular or repeat users. To not scare anyone away, they try to stick to intro classes, which help introduce people to these processes. The Makers just pay a replacement material fee when using the equipment. Aurora is the second to largest city in the state of Illinois. As found in "Making it Happen," there is a higher probability a larger library will run Maker programs, "77% of libraries serving 25,000 provide some type of Maker program, versus 96% of libraries serving 100,000 to 499,000," (Dixon).

They have a ton of very specialty machines including a Form 2, 3D liquid Resin Printer by FormLabs, three PLA 3D printers, and an Epilog Mini laser cutter. The most popular equipment along with the 3D printers, is their oversized plotter printer, vinyl cutter, and possibly the laminator. Another very interesting tool they are offering is the Sprout dual touch station, which allows the student to interact with 2D models in a 3D way. With a tool like this, the student can learn piano, "dissect" the parts of a human heart, or even learn to fold origami. The user can interact with the information in a unique hands-on way.

Something to consider, when choosing equipment for a maker space, who will be interacting and who will be staffing the space? Trivedi warns if your IT staff are all windows guys, be hesitant to fill the makerspace with only Macs. They won't be able to troubleshoot problems as easily and "working Windows computers are better than broken Macs," (Trivedi).

They do a lot of outreach to local book stores (Barnes and Noble) or schools or other branches with the equipment, especially to do 3D printer demonstrations. They have even had the girl scout troops come in or team up with different

departments, have a children's program in the Makerspace. They probably have some type of outreach activity associated with the space twice a month.

They don't find a lot of need for written policies in the space as the patron doesn't interact with any of the difficult, dangerous, or expensive equipment. They can leave a file for the staff to process. The only rule I found was technically Makers should be 13 and older, but it's a loose. Kim discusses maker space policies, "It should specify who is allowed to use the Maker space and explain the process. It should also prepare the staff for contingencies during the Maker space operation." She continues, "As long as some tools is the Maker space can be harmful, you will need to cover some basic safety issues and indicate that in the policy," (Kim).

They gathered customer feedback about equipment to acquire before hand through a variety of community canvasing and surveys. It was as much about the technology and equipment as the user experience, which is "the sum total of all the experiences a patron has with the library, such as the quality of the furniture, the apps on the iPad in the makerspace, or the usability of the databases – hinges on one factor: relevancy," (Howley). But, it can be a bit like the famous Henry Ford quote, when you ask what people want most, they want a faster horse, because they don't realize the existence of anything greater. Library maker space creators are running into similar problems. Everyone wanted a 3D printer, and it has been very fun and popular for the community. However, in Aurora, the idea of the laser cutter was very popular too, but it's an $18,000 investment. Not to mention, the $4,000 stand and ventilation system. It hasn't been the most popular, so sometimes the process outweighs the initial popularity. He explains 3D printing is a "balancing act, you might say something like 'We'll get you started,' show them

some resources, but some users expect you to make it for them. These processes are a lot of time behind the computer first, making the piece, then you set go. Not the other way around," (Trivedi).

Depending on who you've got on staff will dictate the types of expertise you have available. It's important to realize once the space is built, it has to be staffed at all times, realize "as a library, you need to be ready to take it on, and people will be very frustrated if you can't keep it open when wall says its open," (Trivedi). These are the only things which could hold back a space like the Santori Library, because "a lack of funding, supplies, and staff capacity are the biggest factors that hold libraries back from trying new Maker programs," (Dixon).

He says it's important, however, to instruct patrons "we are not a Kinkos, and we don't want it to seem that way," (Trivedi). Programs which have worked at other facilities have been "taught by a local expert paid through grant funding. Although it is valuable for a library to have community members volunteer their time and expertise, it is questionable whether programs based solely on volunteers will be suitable," (Britton). Therefore, a lot of libraries depend on their staff for the direction of the programming.

Begin a Making Movement

One approach to creating a maker space is the "Slow Build," as John J. Burke describes in his book *Makerspaces: a Practical Guide for Librarians*, "jump into the creation of a makerspace, but do not add everything right away. There is no set of required services, technologies, or operations that you must have to get started… Add something either in response to the wishes expressed by your library users to

spark creativity and get people thinking – then you can build from there." He also details that you can do the opposite and start big if your budget allows, purchasing machinery that can accommodate many types of making. One option that could be good to get some ideas is to visit many neighboring maker spaces already in operation. Ask them what is popular and what they might do differently. To evaluate what is being used in maker spaces, a survey about activities in libraries involving making asked respondents what was getting used the most. Results showed, "the most common responses were 3D printers (18 responses and 32 percent of respondents), video production and editing (9 responses, 16 percent), and sewing or sewing machines (4 responses, 7 percent)," (Burke). It is also key to "keep in mind that the makerspace is not a "one and done" sort of enterprise. You will start off trying to interest people in the types of making that both you and they thought would be great to learn. Some will pan out, and others may fall by the wayside after a time," (Burke).

Emily Thompson, Learning Technologies Librarian at the State University of New York at Oswego, NY explains her advice to future maker spaces, "have someone on staff who likes to take stuff apart. Machines require maintenance, and someone has to be willing to deal with it. Repairs to the 3D printer and other items can be quick but require a lack of fear to open devices up," (Burke).

There is a tendency to ignore handmade crafts, but He argues there is value in offering simpler options. "Combining the ease of entry, the draw toward community, and the satisfaction of completing something with hands and hand tools makes these tasks fit into the makerspace ethic," (Burke). Spaces should also

consider recycling stuff as an important aspect. "A popular approach to arts and crafts in a makerspace is upcycling, or reusing discarded items," (Burke).

Bohyun Kim explains "the importance of a clear goal for your own library's Maker space cannot be overstressed in its planning and implementation state," (Kim). She gives some suggestions of ways to get to know your community, "gather information about your potential community of Maker space users, and prepare as much as possible. Visit local Maker spaces, identify and talk to Makers in your community, and learn from their experiences," (Kim). Do your research. Don't purchase unnecessary expensive equipment without having the proper staff to back it up for the community.

When Michelle Cooper was asked what she thinks is coming next, she definitely still feels the topics will be student driven. "Gamification will continue to rise as students can code their own games, create apps, 3D prototypes, and social programs, as well as explore virtual gaming worlds such as Minecraft and the new Swift Playground from Apple," (Zuger). Cooper also is on board that the Maker movement is here to stay saying, "maker spaces will become a seamless part of our culture, a necessary and expected part of education, public libraries, and institutions of higher learning," (Zuger).

As STEAM and Makers become more symbiotic, and more makers join the movement, libraries especially need to incorporate these ideas into their mission, goals, and services. Often, users will want to know what is coming up next. Westport Public Library who's Director, Maxine Bleiweis, often surprises when she admits "in true Maker fashion, the library doesn't know where it's going next with its Maker space. They are allowing the space to evolve naturally. When people ask

what she is going to do next, her response is, 'What do you think we should do next?' Then the library works with the community to make it happen," (Britton). This is clutch, go with the Maker, follow the movement, be the shell for their creation.

Bibliography:

Baumann, Melinda. "Focus group insights." *Library Journal*, 1 Oct. 2017, p. 20. *Student Resources in Context*, Accessed 6 Nov. 2017.

Britton, Lauren. "Making space for creation, not just consumption: libraries around the United States offer tools for patrons to learn by doing." *Library Journal*, 1 Oct. 2012, p. 20+. *Student Resources in Context*, Accessed 6 Nov. 2017.

Brown, Susan. "Public Libraries as Partners." *Library Advocate*, Nov. 2016, p. 22.

Burke, John. *Makerspaces*. Lanham: Rowman & Littlefield, 2014. Print.

Burns, Ridgeway. Hinsdale's Maker Spaces. 2017. in person.

"Devices - Hinsdale Public Library." *Hinsdale Public Library*. N.p., 2017. Web.

Dixon, Jennifer A. "Making it happen: LJ surveys public libraries to benchmark how Maker initiatives are taking hold across the field." *Library Journal*, 1 June 2017, p. 42+. *Student Resources in Context*, Accessed 6 Nov. 2017.

Graves, Colleen, and Aaron Graves. *The Big Book Of Makerspace Projects: Inspiring Makers To Experiment, Create, And Learn*. New York: McGraw Hill Education, 2017. Print.

Howley, Brendan. "Culture change in data-driven storytelling." *Information Today*, Sept. 2016, p. 13+. *Student Resources in Context*, Accessed 6 Nov. 2017.

Kim, Bohyun. "Building blocks of an innovation space." *Library Journal*, 15 Feb. 2016, p. 42+. *Student Resources in Context*, Accessed 6 Nov. 2017.

Moffett, Billie. About Gail Borden's Studio 270. 2017. in person.

Trivedi, Himanshu. Santori Library Branch Brings Resource Abundance to Aurora. 2017. in person.

Zuger, Sascha. "The making of a maker space." *Technology & Learning*, Oct. 2016, p. 33. *Student Resources in Context*, Accessed 6 Nov. 2017.