

Change in the Making: Makerspaces and the Ever-Changing Landscape of Libraries

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Abstract

Makerspaces and accompanying technologies are exciting new services being offered in libraries. However, these come with their own challenges and successes. Training for maker learning locations continues to be difficult to obtain. In-service librarians rely on peers in the field and online resources for their training. Most pre-service librarians are graduating each semester not knowing the skills needed to maintain and serve in makerspaces. As library services continue to change what skill sets are needed to sustain the ever-changing library environment? In this study, 12 interviews were conducted one-on-one with librarians possessing makerspace facilities in their library settings. The interviews were used to gain feedback regarding the makerspace locations in each library. Interviews were digitally audio-taped and transcribed. Results were organized into thematic codes using NVivo 10 qualitative data analysis software. Some emergent themes include librarian and patron training, makerspace implementation, staffing models, and overall reactions.

Keywords: librarians, library services, library training, makerspaces, pre-service librarians, schools of library and information science

Making is an activity that encourages students and patrons to use the library in a new way: to create, use, and share (Canino-Fluit, 2014). When makerspaces are incorporated into libraries, patrons are offered new opportunities to collaborate, learn through play, problem solve, build, investigate, and produce (Britton, 2012). No two makerspaces are the same, some have a focus on crafting, painting, and more artistic endeavors; while others have an emphasis on technology with 3d printers, laser cutters, music studios, and computer programming. Some maker learning locations are a mix of the arts and technology. Makerspaces are exciting new services being offered in libraries at the school, public, and academic level. They create an engaging atmosphere for learning and experimentation but they do come with their own challenges and successes.

In her book *Tomorrow is Now* Eleanor Roosevelt (1963) stated the following:

It is not too much to say that our whole attitude toward education must be changed. The training of the past – too long inadequate even for the purposes of the past – will not serve in preparing the youngsters of today to meet new conditions; above all, conditions which

none of us can clearly foresee. It is one thing to provide a simple skill that can be applied to a given situation. It is quite another thing – and a new, a revolutionary thing – to prepare young people to meet an unknown world, to solve unforeseeable problems, and to adapt their skills, their intelligence, and their knowledge to new situations that are developing with lightning speed. (pp. 66-67)

These words were written over 50 years ago and they hold true today. Librarians are continuously asked to look to the newest technologies and be knowledgeable in the latest trends. They are the technology leaders of their schools, communities, and universities. As Roosevelt speaks on preparing young people to meet an unknown world; what happens when the world is unknown to the librarians, the teachers, and the trainers as well? How are in-service librarians and educators keeping up with emerging technologies and learning spaces? Are pre-service librarians graduating with the knowledge and skills to serve in libraries with makerspaces, 3d printing, and other technologies that will be developed in the future? There is a fearlessness required in working in these spaces, being vulnerable to failure, offering new classes, accepting aid and training from peers and volunteers, building new connections, and working with new tools and technologies. It might seem a little scary but in reality it is very exciting.

Literature Review

Research on makerspaces in libraries to date is limited, but growing. The topic of makerspaces is more commonly discussed in popular writing venues like magazines, trade publication, and blogs. Research on training, professional development, and coursework in makerspaces is scarcer. Maker learning spaces are still new locations and services to the field of librarianship. This newness makes finding training opportunities problematic, project ideas difficult to locate, and peers with makerspaces hard to pinpoint. Fortunately, each year more librarians make the decision to include makerspaces, but the amount of libraries in the United States, and particularly worldwide, with maker learning locations is still modest.

Through surveys and telephone interviews Small (2014) investigated the information needs of young innovators. The students in this study had taken part in a state-wide invention convention. Small found that students who participated in activities involving innovation

were inquisitive, imaginative, and motivated. They wanted to solve real problems that could help people. Innovation in libraries encourages using critical and inquiry based thinking. Makerspaces, hackerspaces, fab, and idea labs in libraries can aid in stimulating student curiosity. Having trained librarians aiding in this student growth is well worth the integration of an innovation space.

Mathews (2012) recommended that librarians face the future boldly and fearlessly. Library spaces and jobs are shifting. The traditional library spaces our patrons, as well as we, are familiar with are being altered. Librarians will not always work in what is considered the conventional physical library. There is a need for librarians who think outside the box, who think and express ideas differently. By thinking like a startup, librarians are thinking of their users. This idea, of course, is not new to the principles of librarianship. Making patron driven decisions, gearing library spaces and services to the client is part of basic training and education. Similar to Murray (2014) while the library spaces and roles may change foundational training will keep librarians in the field grounded.

Murray (2014) in her article *Applying Traditional Librarianship to New Roles for Special Librarians* discussed the changing roles of librarians. While core values may not have changed, roles, jobs, and expectations have. In this piece Murray looked at the various duties librarians in special libraries are called upon to perform, for instance, digitization, archiving, and knowledge management. She reminded the reader that traditional roles of librarianship can be the foundation to build new skills upon. As new roles arise, as new skills and duties are achieved, look toward the future but remain grounded in the core skills learned in schools of library science. The education currently offered in schools of librarianship will serve new librarians well.

The implementation of makerspaces in libraries takes planning and training. These are not library services that come standard and rarely do librarians enter with full knowledge or background in making, hacking, inventing, crafting, or 3d printing. It is noticeable, from interviewing librarians in the field, that training, a professional learning network, and online resources are vital when it comes to incorporating makerspaces and the technologies that are commonly housed within such spaces. Being willing to be an innovator, problem solver, and collaborator is necessary for a librarian to find success employing a makerspace in his or her library.

Methodology

For this study an individual one-on-one interview approach was used to move toward a thematic analysis of how makerspaces were integrated in library settings. Twelve librarians were interviewed for this study. Four were in k-12 school library settings, four in public library settings, and four in academic or university library settings. Eleven of the libraries were in the United States and one was in Canada.

Sample

Purposeful sampling was used in this study. Only librarians with makerspace learning centers in their libraries were asked to participate. A search was conducted of libraries with makerspaces in the US and Canada. Once those were located, an email invitation was sent to each librarian contact for the makerspace location. Twelve librarians were willing to take part in the interview process. Saturation of themes was well reached among the 12 participants.

Data Collection

One researcher conducted the one-on-one interviews. Participants signed consent forms, which included permission to share the library and librarians' names in the study. There are still so few libraries with makerspaces, keeping them anonymous would have been difficult. The consent forms also included permission to share findings in presentations and publications. Interviews lasted between 30-60 minutes. The interviews were digitally audio-taped (with participant's consent) and then transcribed. All of the interviews took place via Skype or Google Hangout.

Interview Questions

Very few demographic questions were asked. The focus of the interview was on the makerspace, implementation, decisions, successes, challenges, training, projects, and outcomes. Participants were asked some of the following questions:

1. How long have you had a Maker Space Learning area?
2. Do you provide or does the library/school provide training or classes for the 3D printers for users? If so what type (ex. Face to face, online, tutorials, etc)
3. Do you offer classes and workshops in your Maker Space? Can you provide some titles and examples?
4. What training was provided to you or to your staff before working with 3D printers and Makerspaces?

5. Why did you decide take the step to implement this technology and space?
6. What has been the overall reaction to the 3D printers? Reaction to Maker Space?
7. What have been some of your favorite projects, productions, or creations to date?
8. Can you provide any stories or narratives of success?
9. What have been the challenges of implementing 3D printers and the Maker Space into your library/school?

Follow up questions were asked as needed during the interview process or in emails after the interview. Some question topics included funding, ideas for makerspace user agreements, and upcoming projects.

Data Analysis

Data was analyzed using Nvivo 10 qualitative data analysis software. Participant's interviews were imported into the software and common themes were explored throughout the 12 interviews. Some common themes included patron and librarian training, decisions for implementation, successes, challenges, projects, and funding.

Results

Interview respondents were librarians with makerspace location in their libraries. Four librarians were in K-12 or school libraries, four were in public libraries, and four were employed in higher education or academic libraries. The age of each makerspace varied. At the time when the interviews took place one librarian had implemented her maker learning space the previous month, while a participating academic librarian had formed the makerspace or 3d printing lab ten years back. Each librarian's experience varied when it came to the realization of makerspaces.

Decision to Implement

Why have a makerspace? While they bring together innovators, thinkers, and creators, these spaces also require room, planning, resources, staff, and finances (Range and Schmidt, 2014). Every librarian in this study had a reason for including these learning spaces in their library services. Ida Mae Craddock discussed how libraries are in a state of fight or flight:

Libraries are, in general, in a fight for their lives where it's change or die. If nobody comes to your library then no one is going to fund you. You know we have to see return on investment and if we can

say that easily we have 20,000 (student) walk-ins over the course of an academic year in a thousand person high school then investing in our library is then wise because your dollars directly impact the education of 20,000. If you can say well I've really done a great job doing research with these 500 kids the return on investment is not there and while traditional libraries have an incredible value, they have serious value that is not how information is stored anymore. So it's a question of does information go to your library to die or does it go there to take on new life?

Staffing Models

Staffing in libraries is a challenge at best. How does a librarian staff a library and a makerspace? In general participating librarians in this study were very creative with their staffing. Being "by yourself" is very common with a makerspace in a library whether it is at a school, public library, or university. Typically there is one person aiding patrons in the space. Mark Anderson at The Chicago Public Library takes care of staffing by reaching out to other branches in the system:

So everything we do we have to use existing staff and then move them from somewhere else. So our staffing model has been people come one or two days a week. So that's been kind of hard because they are at their home locations and then when they're here they're on duty the whole time...Originally we were open from 10-8 but that required two staffs, like a 9-5 staff and a 1-9 staff and that was really, really hard to manage so we scaled it back to just 1-8 and that's one staff. But that also gives us time in the morning if someone is here to go in the lab and maybe work on some of the machines, test out things, without the public around. So that was one of the things learned or I've learned is that people need off desk time, off lab time to work on designing new classes or working on contacting people about partnerships or other things like that.

Librarian Training

Where do librarians learn all of the skills that it takes to run a makerspace? What happens if a librarian doesn't know how to fix a 3d printer? Where do they turn if they know nothing about laser cutting, knitting, making purses from books, or building worlds in

virtual realities? Every librarian who started a makerspace asked themselves these questions, then found resources, peers, and online aid to get them started with their maker learning locations. Having an adventurous spirit can also help. Michael Holt describes his early training with 3d printers at Valdosta University:

The training was entirely provided by the School of Hard Knocks. Trial and error, of course we would go online and look at documentation and what other people had used, that kind of stuff but I am entirely self-taught on these printers. I may have called Makerbot support a time or two but that's about as deep as we've gotten into it. There are not really a lot of peers around. I'm sort of by myself down here and I had a couple of good student workers, an applied math major and an art major who worked in the library. I was able to use them as they were really, really passionate about it and they would stay up there after they got out of classes until two or three am in the morning just working on the 3D printer, figuring it out and they would report back to me, that's where I've gotten most of my knowledge from. Other is just tinkering on my own, watching YouTube Videos, and the sort.

Librarians listed peers in the field, YouTube and other online resources, student assistants, friends, parent and community volunteers, as well as general exploration and tinkering as their methods of training. Makerspace training is evolving slowly. Libraries in the public and academic sectors across the United States are offering makerfares, and 3d printing camps for young people but adult training is still lacking. Independent or not for profit makerspaces, useful locations for adult training and online options especially in 3d printing, are emerging.

Patron Training

Patrons coming to makerspaces rarely know what they are doing either. Younger patrons are much more likely to step in to experiment, play, break, and build. They possess that fearlessness that makerspaces encourage. The librarians interviewed offered a myriad of training opportunities and workshops to their students and patrons, commonly with the help of staff, student assistants, and volunteers. Most offered their training in a face-to-face environment, but some offered online tutorials and webinars as well. Eric Maslowski with The University of

Michigan, where they have had 3d printing for over ten years, described their training in the following manner:

For the cube printers, which really require the users to really understand how the printers work because they're going to be using them themselves, there are a lot of tutorials that we've created online that kind of walks the users through the various principals that they need to know to operate them successfully. The higher end machines we only have tutorials for that, we have a couple of videos that kind of give people a sense of what the process is and this printing would be primarily because these larger machines are more of a service in terms of people submit their model, we check in, we give them recommendations, make sure its printing properly, and then we print it, and they get their product. It's a little more of a turnkey service in that respect. We do other workshops and we also participate in classes quite frequently.

The 3d printer is commonly a technology in need of workshops or training. It is not brand new to libraries but many patrons have never seen or worked with one. As new technologies emerge new workshops and training sessions will develop as well. Steve Teeri with the Detroit Public Library Teen Hype Center, a teen's only maker learning location, shared the Hype's menu of workshops and training sessions:

We do bike tech which is bike repair workshop and we partnered with a local community focused bike shop to do that so we have a bike mechanic who comes in two hours a week...We've also done some motion controlled video games using the Microsoft Kinect Motion Controller and MIT's Scratch software on iMac computers. I should mention that our instructor for that is actually a former HYPE Teen ... and is now at the local university, Wayne State University, finishing his computer science degree this semester. So it's sort of a way that we were able to bring him back and show our teens if you work hard you can do something like this... We do some soldering and an intro to soldering and then build it up to where they are making robots with Arduino and Parallax Robot kits. We do sewing and wearables, so we have a few sewing machines and the teens learn how to lay down designs and then sew clothes together... We also have

silk screen equipment, we've done silk screen t-shirts and silk screening onto clothing and poster making and we do traditional crafting like knitting and cross stitch and paper craft. The idea being we try and hit a range of things if any one subject doesn't connect with one of the teens hopefully there's one or two others that will.

Discussion

The participants in this study shared many interesting perspectives on the topic of makerspaces and libraries. Each librarian's makerspace had its own story, a beginning: how each makerspace was integrated into overall library services, a middle: where librarians figured how to make the makerspace effective for their patrons as well as for themselves, and an end: where the maker learning space was implemented, used, evaluated, and growing. Every librarian offered his or her own set of training opportunities and workshops, they each had their favorite projects and outcomes, each found funding from different and various sources and in the end they had successful, growing makerspaces to offer their library clients.

Training is still an area of concern but practicing librarians are finding ways to gain the knowledge they need to manage their makerspaces. Pre-service librarians are in an excellent position to use university resources, find 3d printers, experiment with as many new technologies as possible, as well as be bold and request classes, short courses, summer sessions, and seminars focused on maker experiences. Further research is needed in each area discussed in this research study. Training, classes, workshops, and development for both the librarian and patron would be excellent explorations where little exists. Long term studies looking at the overall effects of makerspaces in libraries is certainly desirable as well. Studies in every type of library focusing solely in the academic, public, and school sectors would be incredibly useful to this field of research. At this time, with so little empirical research in the field, adding to the body of research is needed and necessary.

Conclusion

I started with Eleanor Roosevelt (1963) and I will close with a quote from *Tomorrow is Now*. I feel it is fitting:

Undoubtedly, one of the most vital elements in preparing the young

to meet and cope with questions that cannot now be foreseen is this: unless people are willing to face the unfamiliar they cannot be creative in any sense, for creativity always means the doing of the unfamiliar, the breaking of new ground. It is from this creative element, which we should be stimulating now, that all the new ideas of the future will come. (p. 67)

The core training of librarianship has served us well. Upon that foundation we can build the new tools we will need in the new and emerging roles we as librarians will face in the coming years. Library services are changing and librarians are ready. We can look toward the future, break new ground, see the unfamiliar, and forge ahead excited by what it brings.

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