

## Lessons learned: intentional implementation of second makerspaces

By: Heather Moorefield-Lang

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### **Abstract:**

Purpose – What happens when a librarian outgrows their maker learning location or transfers to a new library? The purpose of this study is to explore the planning process for second and/or new library makerspaces. Is the planning more intentional? Is there more focus on how the makerspace should be put together for the community served? Is the community further involved? This study will explore those questions and more.

Design/methodology/approach – Using content analysis, the perspectives of practicing librarians in the achievement of subsequent makerspaces are examined. Data include librarian interviews, an analysis using NVivo 11 through the lens of design thinking, and a final review using member checking by each research participant.

Findings – Makerspaces continue to grow in popularity in school and public/community libraries. What is unexplored is the moving from a first makerspace to the implementation of a second and/or new maker learning location. More intentional planning is involved. The community served by the library is further engaged in the planning. Study results illustrate the value that community insight and intentional planning play in the design and implementation of makerspaces.

Originality/value – Makerspaces in libraries continue to grow in popularity; in turn, the body of peer-reviewed, scholarly publications also continues to grow. Librarians in the field are beginning to move from their first to second makerspaces. This study investigates those perspectives. Much can be gained from the experiences of those who have implemented their second or third makerspace.

**Keywords:** Public libraries | Qualitative research | Community | Design thinking | Makerspaces | School libraries

### **Article:**

## **Introduction**

Makerspaces, a term used in concurrence with fab labs and hackerspaces, are settings where students and patrons can produce, craft, solve problems, collaborate and develop new skills (Preddy, 2013). They are places, both virtual and physical, where users can learn through experimentation, exploration and play (Fleming, 2015). Makerspaces are areas where users gather, share and discover (Britton, 2012). No two makerspaces are the same. Some have a focus on the arts, crafting and expression, while others feature a more technical concentration with circuits, robotics and three-dimensional (3D) printing.

Maker learning environments offer a wide range of learning opportunities for young people (Peppler, et al., 2015). When they are based in school and community library programs, the opportunities for implementation expand. Librarians have the potential to collaborate with peer educators in their community and instruct students in and out of school, educating the population about how to not only be good consumers but also smart creators (Fleming, 2015).

This study will explore what happens when a librarian outgrows their maker learning location or transfers to a new library will be explored. The planning process for a second or new makerspace will also be investigated. Is the planning intentional? Is there more focus on how the makerspace should be put together for the community served? Is the community further involved? This article was written to study that uncharted territory as well as investigate the lessons practicing librarians have gleaned from first makerspace implementations to subsequent ones.

## **Literature review**

As makerspaces grow in popularity in library settings, researchers seek to understand their initial or original use, implementation, planning process and impact in educational and library settings (Bowler and Champagne, 2016; Moorefield-Lang, 2014; Slatter and Howard, 2013). Makerspaces, hackerspaces and fab labs are an ever-growing area of research. The body of knowledge continues to increase across empirical publishing platforms as well as through popular medium such as magazines, popular library journals, blogs, vlogs, webinars and zines.

The maker culture is seen as one where students and library patrons can explore, create, problem solve, collaborate and investigate. Makerspaces, and the librarians/educators putting them into action, offer a safe space to design, create, fail and try again. Previous studies have focused on the importance of having these spaces in schools and libraries (Halverson and Sheridan, 2014; Sheridan et al., 2014; Willett, 2016). Ratto (2011) studied the concept of critical making. He explored why people make, the thought process behind making and their intention in the making process. Deodato (2014) investigated libraries as a participatory culture, a place where the patron is producer. Libraries are not simply a place to organize information but to create it, an idea cohesive with maker learning locations.

The ways in which these learning spaces are integrated into a library program is important. The emphasis on community involvement is crucial. Full execution includes the collaborative effort of everyone in a library community. While there is an ever-growing body of research on makerspaces and maker learning spaces in library settings, few, if any research studies, delve into the topic of second or subsequent makerspace implementation.

Through the course of this research, intention became a very clear theme throughout the interview process, on the part of the librarians and their students/patrons. There was a focus into

how each part of the library makerspace should come together for each library community. Their intention informed the design of a second maker learning space, along with implemented technologies, hours, activities and more. This was different from first makerspaces. Often librarians were new to the idea of a maker space. There was much experimentation. Many participants in this study started out with trial and error. While researching makerspace strategy and implementation, the method of design thinking commonly emerged in the field of maker learning locations.

## **Design thinking**

Design thinking is a methodology used in studies for creation or idea building. When looking at a problem or a plan where there are unknowns, design thinking can be useful, as it draws in the human element of design. According to Dam and Siang (2018), the five core elements of design thinking are:

- (1) empathize;
- (2) define;
- (3) ideate;
- (4) prototype; and
- (5) test.

To empathize means the designer understands the human or community element that is involved. Define directs the maker or designer to frame the plan or design toward the community they are working for or toward. Ideate is the stage of the process for creating and generating ideas individually or preferably with the community involved. Prototype moves into the stage of testing and experimenting ideas with small groups. Test is the final element, and this includes true investigation of ideas, technology, plans and solutions. While design thinking is listed in a linear fashion, in truth, it is a concurrent process (Institute of Design at Stanford, 2010).

## **Purpose of research**

This study is guided from my practice and position as a researcher investigating the topic of makerspaces in library and educational settings throughout the past five years. Neither all libraries have a maker learning space, nor are all librarians interested in incorporating makerspaces into their library programs. Delving into the narratives of those librarians who have chosen to create these learning locations for their patrons and students is important for the field of library science. Examining the intent, purpose and planning process in the implementation of a library makerspace aids current and future librarians in their own practice.

The purpose of this study is to describe the lessons learned from practicing librarians who have had the opportunity to move from their first makerspace to create or introduce a second. Was the planning more deliberate the second time? Were patrons and the community more involved in the planning process? What were the success and challenges faced? The findings from this study may help librarians who are exploring makerspaces in a library for the first time. In addition, the findings may aid pre-service librarians in understanding the process needed to grow in a library space, whether it be a makerspace or not. The results from this study may also

encourage conversations between librarians regarding making, makerspaces, activities and growth in the field.

### *Research questions*

The following research questions guided this study:

- RQ1. What is the overall process for librarians in implementing a makerspace (fab lab or hackerspace)?
- RQ2. How does that process change from a first maker learning space to a second?
- RQ3. How does intent vary from the implementation of a first makerspace to a second or third one?
- RQ4. Is the community more involved in the execution of a second maker learning area?

### **Methodology**

The purpose of this research study was to identify and explore the planning process and implementation of subsequent maker learning spaces. Content analysis was used to complete this research piece. Conventional content analysis allows the researcher to look at existing theories in the field and instead of using pre-existing categories, delve into the themes emerging from the data (Hsieh, 2005). For this study, some of those themes included community, planning and intention. Content analysis can be used with raw material such as emails, text messages and books. It can also be used, as is the case with this research, with interview transcripts. The researcher has the opportunity to determine the emphasis and where it lies within the data, seeking out emerging themes and trends (Marshall and Rossman, 2006).

To ensure that all research participants were treated in an ethical manner, the study was designed in agreement with guidelines provided by an Institutional Review Board (IRB) for the protection of human subject participants. Because of the very exact nature of this research, confidentiality was not possible. Participants agreed to their names, and their libraries' being used throughout the course of the research. At any time, the participating librarians could withdraw from the interview process with no negative repercussions.

Participants were recruited using a snowball sampling method (Handcock and Gile, 2011). While seeking participants, one interview would lead to the recommendation of speaking with another peer in the field. The focus of this research homed in on librarians, who after implementing one maker location in their library, now had the experience of designing and implementing a second. This made for a very select group of librarians in the field. Six librarians were interviewed for the research piece, four from school libraries and the remaining two from public libraries. Previous research by the author had opened doors to research opportunities exploring first makerspaces, but second makerspace experiences had only started to occur in the past two years (Moorefield-Lang, 2014). This made for important information to explore.

The primary sources for data in this study were the qualitative interviews. The length of an interview session depended on the depth of experience each interviewee brought to the

session. The interview was formal, with unstructured follow-up questions to gain a full narrative from each participant. Each interview was recorded with digital audio recorders, while the researcher took notes throughout.

Questions during the interview process included:

- Q1. Does your maker learning space have a name or title? Is it different from the first maker location?
- Q2. Where is your makerspace located? Is that different from the first location?
- Q3. How long have you had your current makerspace? How long were you in or with the previous space?
- Q4. What was the driving force behind creating a new or second maker location?
- Q5. What was your planning process for the new maker location? How was that different from the first?
- Q6. What is the makerspace used for?
- Q7. What has been the overall reaction to your new makerspace?
- Q8. What have been the challenges of implementing your makerspace?
- Q9. What are some of the successes in implementing your makerspace?
- Q10. What is your vision for your space? Where do you see it five years down the road?
- Q11. What recommendations would you offer to someone moving or growing their maker learning space?

Textual data were analyzed using NVivo 11 qualitative data analysis software. Interviews were imported into the software and common themes explored throughout the six interviews using content analysis. This was followed by a review of the data specifically through the lens of design thinking (Dam and Siang, 2018). Member checking was employed for this research piece. Given the personal nature of narrative analysis having interviewees review their statements for accuracy further solidified this study and their representation within it.

## **Findings**

Six librarians took part in this study, four from school and two from public library settings. Three of the school librarians work in middle schools, which serve students ages 11-14 and one school librarian serves in a high school setting which works with students ages 14-18. Public librarians work with a variety of community members using their libraries. Two public

librarians in this research study are employed in the Richland Library in Columbia, SC. This library has two makerspaces, one for adult patrons and another for youth. There is a limitation to this study because of the small sample size. Few librarians have the experience to fully discuss the implementation of a second makerspace, making their narratives hard to find. The qualitative feedback received during this study will provide a strong foundation for future makerspace research.

Each librarian's experience in creating or designing a second makerspace was informed by different circumstances. The public librarians outgrew their original location because of the success of the original makerspace. Each was allotted a new site, budget, technology and staff. Three of the school librarians moved to new positions; hence, the impetus behind creating a new maker learning space. Laura Fleming, a librarian at New Milford High School, encouraged such a strong maker culture in her school that this led to a full renovation of the library and maker learning area.

Interviewees shared their experiences, processes, challenges, successes and suggestions throughout the course of the research study. Using content analysis, common themes (planning, intention, community, success and challenges) emerged from the final interviews. These insights are further explored in the following section.

### *Planning*

When most librarians decide to integrate a makerspace into their library, there can be a great deal of trial and error. One study participant described it as "Seeing what sticks". Those librarians who were pioneers in library makerspace design were figuratively flying without a net. There were no workshops, videos, classes, university courses or aid to help them get started, as is offered now. They were exploring uncharted territory. Librarians have a wide variety of training throughout their careers. However, few graduate from schools of library and information science with the background or knowledge in designing spaces for making. Libraries are an ever-changing landscape. Schools of library and information science lay the foundation for pre-service librarians to build upon throughout their careers (Moorefield-Lang, 2015). It is incredibly important after graduation for librarians to take advantage of professional development in all areas makerspaces included, which can increase community engagement and librarian comfort levels in makerspace planning (Williams and Folkman, 2017).

When asked to discuss their planning process, each librarian in this study had their own process. Laura Fleming from New Milford High School (ages 14-18) looked to the data provided from her school's community:

So, the planning process is rooted in data collection, data that is unique to your school community, as well as data that is relevant in the outside world, and just this world that we're living in. Collecting that data, analyzing that data, understanding your learners, collecting data from them. Analyzing all of those things, and synthesizing that data into themes for your maker space, to ensure that your maker space is unique and meaningful to your school community.

Ida Mae Craddock moved from a high school setting (ages 14-18) with a maker learning space to a middle school setting (ages 11-14) without one. She knew she would want to engage the

community in the planning process as well as discuss ideas with fellow librarians in surrounding areas:

My planning process was I, upon the knowledge that I would officially be moving to this new library, went immediately to another middle school librarian to talk about bringing the collection up to date, which I know seems odd for a maker librarian, but without materials, it is impossible to do this thing. Secondly, I went ahead and tried for community engagement through donations, I needed a lot of stuff and stuff that did not previously exist in the library, so I needed materials, sewing machines, screw drivers, etc. things that would feed that maker education pedagogy without having to spend the money. Donations and then advice were my two-pronged approach.

These are only a few examples into the planning process of study participants. Every librarian had a plan moving into his or her second makerspace. Because of the learning experiences from their first makerspace completion, this subsequent execution was more specific in planning and purpose toward each librarian's designated community.

### *Intention*

Intention emerged as significant for the librarians in this study as we spoke on moving from first maker location implementation to a second. Librarians now knew what to seek, ask for and plan. The first makerspace was more of an experiment, while the second was a chance to create a space truly suited to the needs of the community. As intent turned into actions, these librarians collaborated with their students, faculty, and patrons to create a space shaped for them (Sheridan et al., 2014). Stacy Brown, a school librarian and the twenty-first century Learning Coordinator at Davis Academy in Atlanta, GA (ages 5-14) shared how her first makerspace experience led to the successful creation of a second:

Our first maker location, I would say was really more of an experiment to create an environment where students could come and explore and think with their hands and design new inventions. We launched Maker Monday in that space, and I started teaching a robotic-focused class in that space. While it was great, there was certainly things that we knew we could improve upon. For example, there was not really a significant amount of power outlets, which is something that we needed, or storage facilities, which was certainly something that we needed, or presentation space [...]. In a way, we were very fortunate because from a financial standpoint, we were able to experiment with this idea of a makerspace without having to invest significant resources, and then a few years later, having all that experience behind us and really have a clear understanding of what that should look like to be most effective.

Every librarian mentioned lessons learned from the creation of their first makerspace and how it aided in the execution of a second. Laura Fleming summarized the participants well by stating:

We (teachers, students, administration, herself) certainly did learn lessons over time. We reflected upon past lessons learned and integrated those into the creation of our new makerspace. So yes, it was the second time around.

## *Community*

The importance of community became apparent through the course of the interview process. Slatter and Howard (2013) recognize the ways that makerspaces and the learning therein can connect with a community in ways that traditional library programming may have failed in the past. Makers are also a community unto themselves and having a maker learning environment in the library offers a space for that population as well (Willett, 2016). Jennifer Tazerouti, a school librarian in South Carolina at Edwin P. Todd School (ages 5-14), stated the following about her maker community:

I believe having a makerspace at our library allows it to be everything that it can be, and it makes existing resources blossom. The makerspace provides fertile soil for so many seeds to grow. Leadership, student-learning communities, purpose, creativity. I wanted all that “juiciness” in my library. I like when the kids come in, in the morning, and I see more of an ownership there when they feel like it is their space they have these choices. They can sit and work on their own projects, on the computer, reading, whatever. What I liked the most were the little communities that started to form that would come in together and make. It was so juicy, I couldn’t not have it.

Collaboration between librarian and community is crucial. The library and librarian ultimately serve the community. They are the ones who will use it. Libraries are no longer a location to absorb information but to create (Deodato, 2014). Library patrons will also be the ones to spread the word, talk about new services and share the programming of a library. When asked about the success of the makerspace at Richland Library, Mary Kate Quillivan and Jordan Morris told me:

Honestly, it’s the community. The community, the people that have found out. You would not know that we are this big. You would not know that this many people work here. You would not know those things at all. It’s truly because of word of mouth.

## *Success*

Participants had personal and professional successes addressed during their interviews. Implementing a maker learning space into a library setting has overwhelmingly positive results. The inclusion of a space where students and patrons can create, collaborate, ideate and prototype is commonly very welcome among a library community. In general, making is core to being human; librarians are simply offering a space for that to happen (Hatch, 2013). Stacy Brown has had complete success in her library makerspace, as is evident from her comments below:

It has been very positive. Nothing but positive, really. People like to say it’s the coolest space in the school because, I would say it’s probably the most different from any other space in the school in that everything is different than what you would traditionally see in our other classrooms.

Librarians find success in their patrons’ accomplishments. Mary Kate Quillivan and Jordan Morris with the Richland Library question whether the right type of statistics are gathered from their library when it comes to makerspaces:



Because of our location and population, there is an interesting mix of people that use our space. We have found the people here are those that can pay to drive downtown to use our resources or those that live downtown. One of those groups is our homeless population. Here, at our library it does not matter who you are. Everyone works together and it has been really nice to see that come through with the products customers are designing and the stories they're sharing. Also, as a librarian too, I used to be such a stats driven person. We can go to our computer and run the report. Now it is making sure, because these stories are so valuable, how do we make sure they get told? How does that stack up to other stats?

The successes of maker learning space implementation are many. These librarians found community driven spaces for creation and collaboration to serve as a boon to their students and patrons.

### *Challenges*

While they are incredibly popular, makerspaces do come with challenges. Kurti, Kurti and Fleming (2014) discussed the fact that getting patrons and students into a makerspace to be challenging initially. A makerspace without makers is just a room with materials and technology. Laura Fleming even stated during our interview:

It's like walking a tightrope without a net. Every single day I get nervous that nobody is going to visit the space, and I make it my mission to do what I have to do to get them drawn into the space without forcing them.

Overall, participating librarians in this study had an abundance of students and patrons using their spaces. Their challenges resided in other areas. Jennifer Tazerouti's challenge was knowing whether students were comfortable in a self-directed learning environment:

The big challenge for me is knowing when a kid comes in, are they okay with the self-directed atmosphere of the makerspace, or do they need guidance? That's the biggest thing I've learned. The whole thing is dealing with that and saying, "Okay, you know it's okay if you have to help Johnny, you have to give him parameters or help him get started, but Susie, you can just let her work. That was a big thing, a struggle for me. I wanted everybody to have open access, very little teacher involvement and more self-directed. Not everybody is ready for that.

Other common challenges among participants were mess/clutter, storage (which did improve in a new space) and inconsistent budgets. Long-term sustainability was a further challenge, which arose among participants particularly when asked about future vision for their maker learning space. Every participant had a vision or plan for their space, but for it to succeed, sustainability of the space, budget, staffing and community needed to be maintained.

### **Discussion**

The findings in this study show that librarians implementing a second maker learning location comes with successes and challenges as with all projects. Having that first makerspace experience allowed for more intention, community engagement and specificity in planning the second makerspace. This discussion will look to the data through the lens of design thinking as well as recommend directions for future research.

### *Empathize*

To empathize means to understand the human element or community involved in the design process (Dam and Siang, 2018). The participants in this interview understood whom their stakeholders were in the community tied to their individual makerspace. For this particular research, the move from a first maker learning space to a second allowed each librarian to truly understand the connection between his or her community and makerspace. They could intentionally, with personal experience, meet their community's needs.

### *Define*

In design thinking, when we define, we frame the plan or design toward the community with which we are working (Dam and Siang, 2018). When Ida Mae Craddock looked at her new middle school in Charlottesville, VA, she knew from her previous experience that a makerspace would enhance this new location:

The driving force for creating the second maker location would be student and teacher need, so the library that I entered was extremely traditional and sparsely used. Increasing the library services was my primary objective, and creating the maker space.

When thinking on design, we must consider our community and then define what is needed, preferably collaborating with the community, as they will be the ones we serve.

### *Ideate*

Ideate is the stage in the process for creating and generating ideas (Dam and Siang, 2018). Patron, faculty and student feedback and integration are vital at this stage. Without their voices, how can we be successful? Librarians in this research study took first makerspace experiences and applied them to their second locations. Laura Fleming discusses the importance of reflection in the process of building new ideas

I think reflection is a critical part in the making process for kids. Having that growth mindset, we talk about that all the time now, in conjunction with maker spaces. But I think it's talked about most often with the students who visit the space. So I think those things, having a growth mindset, and reflection, I think are also important for the educators, or the librarians, or whoever it might be, who are making and creating these makerspaces. Understanding and being willing to reflect on things that have not worked over time. And also, celebrating and growing the things that have worked over time, I think is critical for anybody who is either moving into a new space, or looking to grow their space.

Learning from past success and failures, engaging students, faculty and library patrons into the idea process can lead to success in the planning process for a library.

### *Prototype*

To prototype in the design thinking process means to move into the stage of testing and experimenting ideas with small groups (Dam and Siang, 2018). This step works well with makerspaces where creation, experimenting, failure, risk and collaborations are embraced. While the portions of design thinking are being listed here in a linear format, remember these actions rarely happen sequentially. Often steps in design occur concurrently. When implementing new makerspaces, testing new technologies, activities and formats is essential. Having the community “sandbox” or try out new maker methods is crucial to see what could be successful and embraced by the patrons. This is an excellent step for data collection, toward later decision-making, as well.

### *Test*

The final step in the design thinking process is to test. This includes true testing of ideas, technology, plans and solutions (Dam and Siang, 2018). Laura Fleming sums it up well by stating, “Maker spaces should always be growing and evolving with your students, with your school community, with the wider world that we are living in. They should constantly be evolving”. Whether this is a first makerspace, second or more, a makerspace is never truly complete. A maker learning space is always in beta. Technologies, activities, even the community and librarians will continue to evolve and transform. Libraries and librarians are ever-changing to serve the needs of our communities.

### *Implications for future research*

This research has two major implications for future study in this area. Because of the small sample size for this study, further research of subsequent makerspaces across a wider sample nationally and internationally would support the strength of this current research piece, particularly as makerspaces in library settings continue to grow as a research topic in the field of librarianship. Academic libraries were not included in this piece and librarians in that setting would further augment this research in the future.

The second implication of this research resides in the stories or narratives of the makers themselves. The questions, advice, perspectives and interviews on makerspaces in librarianship predominately are from the view of librarians. Viewpoints from the patrons who make in libraries, in other words the communities, from around the world are needed, and they could fill a current research void in librarianship.

### **Conclusion**

This research piece explored the community engagement, intention, planning, success and challenges involved in creating a second or subsequent makerspace. Librarians in the field shared their experiences in moving from a first makerspaces to a second. There is still much to learn

from makerspaces in library and education settings as well as from the librarians and library workers who implement them. Makerspaces are considered informal learning settings where creative arts, technologies and science can come together for idea exploration, product creation, problem solving and collaboration (Sheridan, et al., 2014). These spaces open the door to opportunities in learning, innovation, creation and investigation. Librarians continue to engage their communities through maker learning spaces. We in the field can learn from our peer's experiences as they share planning and implementation strategies. There is a great deal to learn from our field and from the patrons we serve.

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### **About the author**

Heather Moorefield-Lang is an assistant professor with The Department of Library and Information Studies at The University of North Carolina at Greensboro. Her research is focused on emerging technologies and their use in education and libraries. Her current research focuses on makerspaces and their associated technologies in libraries of all types and levels. Heather Moorefield-Lang can be contacted at: [hmoorefield@gmail.com](mailto:hmoorefield@gmail.com)