



## **Future of Library and Museum Services Supporting Teen Learning:**

### **Perceptions of Professionals in Learning Labs and Makerspaces**

June Abbas, PhD, School of Library and Information Studies, University of Oklahoma

Kyungwon Koh, PhD, School of Library and Information Studies, University of Oklahoma

#### **Abstract**

Learning Labs and Makerspaces provide informal learning spaces in which teens can create, invent, socialize, and work with mentors and peers. These innovative learning spaces facilitate teens' authentic and social learning experiences, promoting their twenty-first-century skills and multiple literacies. Little research has focused on the challenges, achievements, or goals of professionals in these spaces. This study addresses this gap by studying the experiences and perceptions of learning space professionals. The research question is: What are the challenges, achievements, and goals perceived by professionals of learning spaces in libraries and museums? We discovered the following challenges: having enough personnel, obtaining necessary funding, changing the perceptions of library and teen learning, being able to develop a vision, and providing consistent access to the space. Achievements included: increased teen engagement, staff developing necessary skills, and changing the perception of what a learning space can provide. Goals emphasized the desire to sustain and expand learning space programming, as well as other professional goals. Evaluation approaches included mainly outcome measures, though some output measures continue to be used. Lastly, implications for practice and LIS education are discussed.

#### **Introduction**

As the Young Adult Library Services Association (YALSA) points out, "Teens are not simply older children."<sup>i</sup> Teens have unique developmental characteristics and information needs, as they are undergoing significant changes physically, cognitively, and socially.<sup>ii</sup> Different development theories<sup>iii</sup> suggest key developmental tasks for young adults, including the Five I's—identity, intellect, intimacy, integrity, and independence.<sup>iv</sup> Young adults also have a range of information needs, such as information relating to peer, family, and other relationships; popular culture;

emotional needs; physical health and safety; emerging sexuality; consumer needs; academics; leisure activities and interests; careers; and college.<sup>v</sup>

Libraries play a significant role in supporting these unique and holistic needs of young people. They provide resources and services to engage, serve, and empower young adults, who are defined as people ranging from twelve to eighteen years of age. Nowadays young adults comprise a significant portion of library users. The 2012 U.S. Public Library Survey reports that young adult programming made up 8.9% of all programs offered in public libraries. There were 358,342 programs for young adults across the nation and 5.7 million attendees at programs for young adults.<sup>vi</sup>

Contemporary young adult library services encounter innovative changes in step with current social and economic factors impacting teens. The increasingly diverse demographics of teens, their use of technology, and multiple literacies required to be successful in this global world call for a paradigm shift for libraries and teen services. The YALSA's national forum report, *The Future of Library Services for and with Teens: A Call to Action*, addresses an urgent need of "widely different types of services, access, collections, space, and staff than ever before."<sup>vii</sup> Moving from a traditional concept of information gatekeepers, young adult librarians are called upon to play an active role in promoting young people's twenty-first-century skills, improving their performance and participation in STEM (science, technology, engineering, and mathematics),<sup>viii</sup> and helping students meet national standards such as the AASL Standards for the 21st-Century Learner,<sup>ix</sup> Common Core,<sup>x</sup> and the Next Generation Science Standards.<sup>xi</sup>

Central to this paradigm shift is viewing the library as a community learning hub. This transformation is not confined to teen services but applies to all library communities. The Institute of Museum and Library Services' (IMLS) *Creating a Nation of Learners: Strategic Plan 2012–2016* suggests its vision for libraries as "essential and trusted components of the nation's learning ecosystem providing opportunities for lifelong, 'life-wide' learning."<sup>xii</sup> Placing the learner at the center, the goal is to provide engaging experiences in libraries that prepare people to be full participants in their local communities and our global society.

In response to the changing information landscape as well as national and global demands, transformative library places for teens, called Learning Labs or Makerspaces, have been developed over the past few years. These are informal learning spaces where young people explore both traditional and digital media, interact with mentors and peers, and engage in expressive and creative projects. Learning Labs are guided by research-based frameworks called HOMAGO and Connected Learning. HOMAGO refers to "Hanging Out, Messing Around, and Geeking Out," which describes different levels of youth engagement in digital media.<sup>xiii</sup> Connected Learning is a learning approach in which "a young person is able to build the skills and knowledge to pursue a personal interest or passion in an environment that provides support from friends and caring adults, and is in turn able to link this learning and interest to academic, career success or civic engagement."<sup>xiv</sup> Often created in libraries, museums, and science centers, Learning Labs are characterized by a dedicated physical space where youth and mentors of diverse backgrounds engage in Connected Learning through digital media, creative programming, and partnerships among different youth-serving community organizations.<sup>xv</sup> The oldest Learning Lab in the United States is YOUmedia at the Harold Washington Library in

Chicago, which was launched in 2009.<sup>xvi</sup> Inspired by YOUmedia, IMLS and the MacArthur Foundation supported development of twenty-four Learning Labs for teens in libraries and museums across the country in 2012 and 2013.<sup>xvii</sup> Currently, an increasing number of libraries and museums throughout the United States offer teen learning spaces and programs that reflect Connected Learning principles.

Makerspaces, also referred to as Hackerspaces or Fab Labs, have been growing quickly in the library community to provide places for people to create, invent, learn, and socialize.<sup>xviii</sup> The Maker Education Initiative supports student-centered, project-based learning that stems from the pedagogical tradition of learning by making and through apprenticeship.<sup>xix</sup> The Maker Movement inspired a community of makers who bring the DIY (Do-it-yourself) mind-set to cutting-edge technologies and tools that allow people to turn their ideas into real objects. In Makerspaces, physical objects, DIY, and engineering approaches are pronounced, while Learning Labs were originally designed around the research and frameworks on youth and digital media. Although Learning Labs and Makerspaces come in different shapes and sizes, both types of informal learning spaces facilitate teens' authentic and social learning experiences, promoting their twenty-first-century skills and multiple literacies. Also they offer a range of tools, mentors, and programming opportunities for community teens, who might not otherwise be able to afford these technologies or have access to the mentors' expertise.<sup>xx</sup> While libraries and museums have been earnestly developing these programs, few empirical research studies exist to investigate how effective or successful these services are to the populations they serve. Even less is known about the competencies or skills needed by information professionals who work in these environments, or the challenges, benefits, and goals they encounter while developing these informal learning spaces.

## Research Question

Investigation of Learning Labs and Makerspaces is important in order to understand current changes that young adult library services are facing. These exemplary spaces represent the shifting perception and needs of libraries as learning centers. The YALSA National Research Agenda addresses one of the research priority areas of informal and formal learning environments for young adults.<sup>xxi</sup> There is, however, a lack of research exploring the current state of informal learning spaces for teens in libraries and museums. This research project attempts to address the gap by studying the experiences and perceptions of learning space professionals. The research question that guided the study is as follows: What are the challenges, achievements, and goals perceived by professionals of learning spaces in libraries and museums?

As an increasing number of libraries are currently initiating, continuing, and/or expanding a learning space, it is critical to build upon and learn from experiences of other librarians and museum professionals in this area. Those interested in library/museum learning spaces can learn from challenges that other professionals have encountered so they do not repeat the same mistakes. Identifying what facilitated achievements in different learning spaces helps professionals develop strategies for successful learning spaces and allocation of resources. In addition, learning about goals and visions that learning space professionals set for themselves informs envisioning the future of library spaces and services for teens.

## Literature Review

Because Learning Labs and Makerspaces are currently such hot topics in the library community, the practitioner literature is replete with anecdotal reports on developing these informal learning spaces. Topics include, for example, (1) history and models of Makerspaces and Learning Labs;<sup>xxii</sup> (2) informal reports of how specific libraries or museums developed their Makerspace or Learning Lab;<sup>xxiii</sup> (3) advice, lessons learned, and resources for how to start a Makerspace or Learning Lab;<sup>xxiv</sup> and (4) suggestions for technology use and sample projects.<sup>xxv</sup> See Koh and Abbas for a more comprehensive review of the practitioner literature and major themes therein.<sup>xxvi</sup>

There is little empirical research reported on Learning Labs or Makerspaces. Only a small body of research exists that investigates the state of library learning spaces. For example, the Maker Education Initiative, as part of the Maker Ed Open Portfolio project, conducted a survey of fifty-one Makerspaces to learn about where they are situated, what populations they serve, which activities, key skills, and practices they attempt to cultivate in their spaces, and their documentation and portfolio practices.<sup>xxvii</sup> Burke's study measured the extent to which these innovative learning spaces are being developed in libraries in the United States and seven other countries, or their plans to develop one in the future.<sup>xxviii</sup> The study also investigated issues related to funding, programming, and the top technologies used by library Makerspaces. An important area of research, and one that speaks to the shifting paradigm being experienced by youth services and libraries, is the authors' study to determine the competencies and skills needed by information professionals who work in these informal learning spaces.<sup>xxix</sup> In addition, we elicited the challenges, achievements, benefits, and goals perceived by information professionals who have been instrumental in developing Learning Labs or Makerspaces. In this article we report on the findings related to the challenges, achievements, and goals.

Only one somewhat similar research study was found that is related to the focus of this article, the challenges and achievements encountered, as well as the strategies used by those who have developed these learning spaces. Slatter and Howard interviewed three managers in Learning Labs or Makerspaces in Australia to determine the benefits and issues they encountered in developing their learning spaces. They reported on the benefits of learning spaces in libraries including: (1) increased community engagement, for example, opportunities for community members to engage with new technologies and connect with others over shared interests; (2) partnerships with new entities such as universities, local schools, teachers' associations, and local hackerspaces, or with large corporations or government interests; (3) unfettered access to new technologies (such as 3-D printers) for community members who otherwise would not have access; (4) new learning opportunities for users and staff; and (5) future-proofing the organization, which represents the changing shape of libraries. Each of the above-cited benefits illustrates to the community the importance of the library and how it meets their needs.<sup>xxx</sup>

Other anecdotal accounts reported in practitioner articles noted that additional benefits of library learning spaces are: (1) increasing opportunities for community members to engage with and learn from one another, as facilitated by the library staff;<sup>xxxi</sup> (2) promoting educational benefits through programming that supports the forty developmental assets of teens by providing a space for creative activities;<sup>xxxii</sup> (3) empowering youth through peer-to-peer training opportunities;<sup>xxxiii</sup>

(4) providing intergenerational learning experiences;<sup>xxxiv</sup> (5) initiating a new vision of services and resources for teens; and (6) increasing civic engagement of teens as they tackle problems in their own communities.<sup>xxxv</sup> These learning spaces have served as a catalyst for a robust new vision of collaboration and network development within their community and as a means to form new relationships with teens.<sup>xxxvi</sup>

In terms of challenges or issues encountered as managers developed these learning environments, Slatter and Howard reported three challenges including: (1) budgetary constraints as managers sought funding to purchase the technologies, often relying heavily on partnerships with other organizations; (2) concerns over copyright, liability, ownership, and legal implications, such as who owned the item created in the library, what, if any, copyright restrictions had to be resolved, as well as the general need to understand the legal implications related to products produced in the library; and (3) showing the value and relevance of the learning space and gaining support from the community and staff as the library moved into this new direction of service.<sup>xxxvii</sup>

Other studies agreed with Slatter and Howard's findings but also expanded on the challenges.<sup>xxxviii</sup> For example, developing and providing programming required libraries to expand their definition of literacy to include "transliteracy," or the ability to read, write, and interact across a range of platforms and tools.<sup>xxxix</sup> Still other research reported worries about ceding space and authority to others, such as community mentors, as often these programs rely on mentors or experts from the community.<sup>xl</sup> While these were presented as challenges in the practitioner literature, we also recognize them as promising and innovative changes that might require changing perceptions of library and museum practices and missions, which could be viewed as a challenge *and* an opportunity.

Strategies for addressing these challenges were also reported. For example, Slatter and Howard felt that forging partnerships with outside agencies was vital for connecting with the community and maintaining the viability of the space. They also stressed the importance of making the community aware of the space through advocacy and awareness, and for creating a successful blueprint based on their experiences of developing the learning spaces and then sharing it with others.<sup>xli</sup> Other studies mentioned the importance of having liability and use agreements in place for participants to sign;<sup>xlii</sup> enlisting a core of volunteer mentors;<sup>xliii</sup> involving teens in the design/planning/implementation of the Makerspace;<sup>xliv</sup> and exploring innovative approaches to reimagining space for more effective use.<sup>xlv</sup>

## Methods

### I. Research Design

This article reports the findings from a series of in-depth interviews with professionals in Learning Labs and Makerspaces in either a public library or museum in the United States. This is the first phase of a two-phase research project, comprised of Phase 1: in-depth interviews, and Phase 2: an online survey. The results of the Phase 1 interviews were used to design a questionnaire for an online survey of information professionals who work in these emerging learning environments. This paper reports findings on one aspect from Phase 1, focusing on the

following research question: What are the challenges, achievements, and goals that are perceived by professionals of learning spaces in libraries and museums?

## II. Participant Recruitment

The study used the purposive sampling approach, that is, selecting information-rich participants who can provide an in-depth understanding on the study topic.<sup>xlvi</sup> The researchers reviewed publicly available resources such as the YOUmedia Network, the directory of Makerspaces, and lists of the recipients of the national competitions to design twenty-first-century Learning Labs in museums and libraries by the Institute of Museum and Library Services and John D. and Catherine T. MacArthur Foundation to identify leaders and pioneers in Learning Labs and Makerspaces in the United States. An effort was made to include professionals from libraries (the sample only included public libraries) and museums to include both Learning Labs and Makerspaces. Potential interviewees were invited to participate via e-mail. Nine professionals agreed to participate in an interview session. Each participant received an IRB-approved information sheet, which provided an overview of the study and contact information for the researchers. At the time of the study, all participants lived in the United States and were all English speakers. See tables 1–7 below for participant demographic information.

**Table 1. Organizations**

| <b>Organizations</b> | <b>Number of participants</b> |
|----------------------|-------------------------------|
| Library              | 3                             |
| Museum               | 5                             |
| Science Center       | 1                             |

**Table 2. Types of Learning Space**

| <b>Spaces</b> | <b>Number of participants</b> |
|---------------|-------------------------------|
| Learning Labs | 3                             |
| Makerspaces   | 4                             |
| Both          | 2                             |

**Table 3. Participant Gender**

| <b>Gender</b> | <b>Number of participants</b> |
|---------------|-------------------------------|
| Female        | 5                             |
| Male          | 4                             |

**Table 4. Participant Education**

| <b>Highest Degree</b> | <b>Number of participants</b> |
|-----------------------|-------------------------------|
| Master's              | 8                             |
| PhD                   | 1                             |

**Table 5. Education Disciplines**

| <b>Disciplines</b>              | <b>Number of participants</b> |
|---------------------------------|-------------------------------|
| Library and Information Science | 3                             |
| Museum Science                  | 2                             |

|                      |   |
|----------------------|---|
| Education            | 1 |
| Film and TV          | 1 |
| Museum Science & Art | 1 |
| History              |   |
| Geology              | 1 |

**Table 6. Professional Experience**

| Years of experience | Number of participants |
|---------------------|------------------------|
| 0–5 years           | 3                      |
| 6–10 years          | 2                      |
| 11–15 years         | 1                      |
| 16–20 years         | 2                      |
| More than 20 years  | 1                      |

**Table 7. Experience with Teens**

| Years of experience | Number of participants |
|---------------------|------------------------|
| 0–5 years           | 4                      |
| 6–10 years          | 3                      |
| 11–15 years         | 1                      |
| 16–20 years         | 1                      |

### III. Data Collection

Semi-structured interviews were conducted in summer 2013. Interview questions addressed learning space professionals’ perspectives and experiences, such as challenges, achievements, success criteria, goals, and any other compelling issues in Makerspaces and Learning Labs. See table 8 for sample interview questions. Nine individuals were interviewed using either Skype or Google Hangouts, or by telephone, depending on their preference. The sessions were recorded using software called Audio Hijack Pro. The length of each interview varied between thirty to seventy minutes depending on the degree of detail in each interviewee’s answers. All recordings were then transcribed.

**Table 8. Sample Interview Questions**

| Categories                 | Interview questions   |
|----------------------------|---|
| Challenges                 | <ul style="list-style-type: none"> <li>• What are some of the challenges that you face regularly in your position?</li> <li>• Describe one of the toughest challenges you’ve encountered in your current position. How did you respond? What did you do, and what was the outcome?</li> </ul>   |
| Facilitators               | <ul style="list-style-type: none"> <li>• Describe the outcome or achievement that you are most proud of.</li> <li>• What resources—both in your library/museum and for you specifically—were needed to make it possible?</li> </ul>   |
| Success Criteria/<br>Goals | <ul style="list-style-type: none"> <li>• What criteria are you using to measure success in your job? Is it, for example, based on outcomes, results, or benefits? <ul style="list-style-type: none"> <li>○ How does your manager evaluate your success?</li> <li>○ (Or if the interviewee is a director or manager) How do you</li> </ul> </li> </ul> |

|        |  |
|--------|--|
|        | <p>evaluate your librarians' success in the Learning Lab/Makerspace?</p> <ul style="list-style-type: none"> <li>• Give me an example of an important goal you had to set as part of your role. Was this goal attained? Why or why not?</li> <li>• What are your professional goals for the next year or two? What are you hoping to achieve for your Learning Lab/Makerspace? <ul style="list-style-type: none"> <li>• How do you see your position evolving, both professionally and organizationally?</li> </ul> </li> </ul> |
| Issues | <ul style="list-style-type: none"> <li>• What would you say is the single most important issue that your Learning Lab/Makerspace is facing?</li> </ul>   |

#### IV. Data Analysis

The data included the audio recordings from the interviews and transcripts of the recordings. The transcripts from the interviews were analyzed using the web-based data analysis software Dedoose, using the method of content analysis. The researchers used inductive category development,<sup>xlvii</sup> a specific form of thematic analysis, to analyze the transcripts. Each researcher developed a set of codes to apply to the data set. They then compared the codes and developed a master set of codes. Both researchers then coded all transcripts, refining the coding scheme as necessary, and compared the results. This method provided direction for the analysis, thereby increasing the likely conceptual relevance of the resulting coding scheme to the research question.

### Findings

In this paper we focus on the findings related to the challenges, achievements, and evaluation approaches used by participants to measure success in their programs, as well as the goals they had for the emerging learning spaces and their personal and professional goals. Findings related to the competencies, skills, and their perceptions on the role of higher education in preparing them for working in a Learning Lab or Makerspace were reported in an earlier paper.<sup>xlviii</sup>

#### I. Challenges

The interviewees addressed several challenges they regularly encounter working in a Learning Lab or Makerspace, including issues related to personnel, funding, advocacy, sustainability, visioning, and others.

##### *Personnel*

Interviewees addressed the critical role of mentors in these learning spaces:

[A challenge is] getting connected to people who can act as appropriate mentors for the teens in the space. Because right now what happens is the teens enjoy having the space open, and they come down and grab a snack and hang out and do their Facebook on the computer. But they're not really getting engaged in the programming. And so I think . . . that reflects an absence of mentors with whom they would identify. And so part of our challenge is to find some folks who can serve that role.



Interviewees reported that it is challenging to recruit the right personnel for the learning space, such as finding a staff member who understands and embraces the Maker movement or a mentor who (a) has technical skills, (b) can facilitate learning, and (c) is able to work with teens. An interviewee explained, “It is finding the right person that brings those skills, and it’s also finding a person [whom] the teens [could relate to]—I might find somebody that has those skills, but if the teens don’t recognize them as someone who can speak to them . . . [it would be a problem].”

Another interviewee concurred, saying:

For me the challenge has been to find the balance of professionalism and then what’s called cultural competency. So people who relate to the teens on a level of . . . the teens, in terms of understanding popular cultural references, understanding their experiences, understanding the kinds of media they consume, dependent issues that they deal with or are interested in. Finding people who are like that, but also are able to work in a professionalized environment . . . that’s a hard balance.

Interviewees also discussed staff shortage. Usually only a couple of professionals are dedicated to each learning space. These professionals experience work overload and have to rely heavily on volunteers. The manpower shortage makes it difficult for the professionals to have the time for professional development or reflection. Interviewees indicated that there was a lack of funding for staffing: “Grant funders are reluctant to fund staffing, because they don’t want to be responsible for a position ending if they are looking to fund us for a year or something like that. So the biggest difficulty is advocating for staffing, finding a way to fund staffing I guess in general.” Another interviewee agreed, saying:

People are just shoveling money for buying this stuff. But nobody is shoveling any money or even thinking about money for staff and the people [who] actually facilitate the programs or [who] understand how to facilitate the programs. And that is something I find to be a huge challenge. Where we have the potential to be running programs and really diverse things, but with two people how could you possibly do it? But we don’t have the funding to hire staff. Yet we have a thirty thousand-dollar laser cutter. That, to me, I find to be really imbalanced and a very difficult challenge.

### *Funding*

Securing funding for continuing the learning space and program is an ongoing issue. Several interviewees were concerned about obtaining consistent funding, because many of the learning spaces had been launched with a grant-funded initiative, rather than regular full support. An interviewee said, “It is to convince funders that sustaining this work is useful—you can get people really excited about sponsoring a specific program for underprivileged youth or buying a specific tool, but to keep a Makerspace up and running takes a lot of effort.”

Also, it is particularly challenging to find the funder who understands what the learning space professionals are doing and do not expect them to change their programs to fit the funder’s own perception and mission. Regarding communicating the program outcome with a funder, interviewees stated:

So I guess that would be a specific challenge that is probably the hardest, which is just finding the right funders who understand that what we are doing . . . is progressive. . . . There's a lot of times they would rather have us do things that are a little bit more standard, because it's something they understand better.

I think . . . the programs are grant funded, [and] the people funding the programs seem to me . . . more concerned about quantity than they are quality. They want to make sure that they're funding a program that maximizes the amount of people it serves, as opposed to the actual experience that is presented.

### *Perception of Learning Spaces (Advocacy and Sustainability)*

Interviewees reported that people's understanding and perception about learning spaces are a challenge, because the Connected Learning informal approach to learning is a shift from traditional formal learning approaches. An interviewee explained:

A lot of people don't understand that the philosophical approach that's being used in our program is really how people are learning now. And because of that I think it's challenging to me to raise funds or awareness about what we're doing . . . so, the informal learning, I think, is still something people are trying to get their brains around. To understand that there is rigor in informal learning, too, is something I think that's really challenging.

She suggested that without people's understanding and perception of this as the future of learning and the future of the institution, Learning Labs or Makerspaces would be seen as a fad that may pass, and they, therefore, would not receive stable, ongoing full support as part of the institution.

The professionals think that these learning spaces are becoming (or should be) part of an entire museum or library. But it is not always easy for professionals in learning spaces to make institutional changes beyond individual Learning Labs or Makerspaces when people do not understand the philosophy. According to an interviewee:

Something else we're going to be moving toward is incorporating [the Learning Lab] into the library culture. I think because we were so low on staff and because there was so much turnover from different people leaving [the Learning Lab], it's sort of been seen as a separate thing that just happens in the libraries. So we started like we're working with the Makerspace. We'll be working with our youth services teams moving forward in their meetings and just integrating ourselves into the rest of the library culture. In turn, having the libraries see we are a place that you can refer your teens to and we're part of the library.

### *Visioning and Focus*

Makerspaces and Learning Labs encompass a range of programs, activities, and resources, which can be overwhelming for professionals developing and offering programs. For instance, Maker programs may deal with light circuits, sound circuits, motor and switches, robotics, sensors, rockets, musical instruments, textiles, mechanics, 3-D printing, electricity, paper/cardboard crafts, programming, woodworking, and more. The importance of having a focus was suggested:

It's so broad that it's hard to maintain your focus on what your platform is and what you want to do, but then also accommodate what everybody else wants or hears or thinks about. I guess that would be one of the more difficult [things] . . . like maintaining your vision of what you want to do in your space, because every Makerspace is different and the vision of a Makerspace is developed around the person starting it or the person developing the program. . . . It's really keeping a focus on what you do well and developing programs from there. As your team builds, you'll be able to expand your offerings. But it's really just keeping the focus, I guess, is a long way to say that.

Interviewees concurred about the challenge of envisioning the future of the library and learning space in this changing landscape: "I think the single most [important issue] is to have a vision for the space and create things inside of the space that adhere to that vision. . . . But I think clarity in what you're trying to do and how you go about it, probably to me, is the most important thing." Another interviewee stated:

I would say [a challenge is] responding to the Maker movement as a whole, or I would say that the question that comes up a lot is how are libraries remaining relevant. And for a lot of us, we're looking at ways to offer more educational opportunities, deeper experiences, where people are learning rather than people just coming to the library to get books and learning at home, we're trying to provide learning experiences here. . . . And we're definitely switching from doing less reference, thanks to Google and whatnot, and doing more programming anyway, and our collection development has become centralized, so we're spending less time on the collection and more time on programming.

Establishing a learning space's vision that reflects the community and implementing programs adhering to the vision can be challenging owing to funder's priorities:

I think, I hate to say this, but I think funding is going to take us where we're going. Where the funders are focused on is going to be where our focuses are. We're starting to go into really, the Maker movement, both low tech and high tech, as you know. We're starting some STEM programming, too, which I think everybody's on board with, from the top to the bottom.

Another interviewee further supports visioning as a challenge:

So what I have to be very careful of is people coming at me with a lot of money but asking me to do something very different than what our mission is, as a space. It's called "mission creep," [and] it means that another funder's mission creeps into yours and starts to dictate what your programming does. And so I guess I'm trying to figure out ways that

I don't start to add on or create new programs or change my programming, so that I can continue to keep my staff and my space funded. Because, basically, what we're offering that is unique is often being threatened by not being funded.

### *Access*

User access creates a challenge when the learning space is only offered during a limited amount of hours. An interviewee said, "We're a portable show; we're only there one day a week. And so we're just moving equipment all the time, and so storing and transporting equipment is a challenge." Space is also an issue: "It's not a closed space. And the sound that comes into the space almost renders it unusable . . . in the way of having a discussion during our open hours." Another interviewee indicated that "[the city] has pretty bad public transportation, and especially teenagers are going to feel really isolated in some of these neighborhoods." Still another interviewee agreed, stating:

How do we have access to those teens . . . because we don't have a five-day-a-week or seven-day-a-week drop-in site. We're only one day a week, and already we have teens saying, "If you only did it on Wednesdays then I could come, but Tuesdays I have band," and so the issues of accessibility I think are huge. We have two high schools in town, and right now we're only reaching students from one high school because they're the ones who can walk to the site. The other high school's ten miles away, and they can't get to us because our public transit is so bad. And so I think that is probably one of the biggest issues that we're struggling with at this point. It's great to have four or five kids show up and validate what you're doing and have a good time, but that's not really the number we had envisioned serving. So how do we drive those numbers up and how do we get more kids involved?

Other challenges mentioned include staying ahead of ever-changing technology, safety and liability, and working within the system of a large institution.

## **II. Achievements**

Interviewees reported that the achievements they are most proud of are teens engaging in the program, staff development, and changing the perception in the institution. When asked what resources made these achievements possible, they listed funding, quality staff, community and institutional support, having a network of colleagues, and access to research and publications about experiences developing these learning spaces as important facilitators. The interviewees also appreciated funders who do not micromanage and who trusted and understood what they are doing. They said having a network between Makerspaces/Learning Labs is helpful. Research related to informal learning, such as HOMAGO or Connected Learning, has been a useful resource. An interviewee said having a regular meeting (such as a weekly meeting for reflection and discussion) was important, explaining, "We meet once a week for an hour and a half, and we show examples of what we're doing. . . . [We] try to share ideas [with] each other, reflecting back on what we've tried."

### *Teen Engagement*

Most of all, the interviewees feel a sense of achievement when they see a change in teens, such as a cohort of teens who identify themselves with a learning space; kids who demonstrate what they can do with computers, digital media, and their own creativity; teens coming regularly to the program; and kids who are now contributors to the program. Interviewees said, “[It’s] the fact that teens are feeling much more at home, they feel like this is a place for them.”

I think, you know when I see teens come in and then flash their membership card and walk through the galleries with their friends, I think that’s a sign of success for us, because we just weren’t seeing teens on their own in the galleries. We saw teens through school programs and school tours but nothing outside of that, and I think that’s, you know, developing a major audience for an institution is really important, especially as an educator.

### *Staff Development*

Interviewees are proud of growth in staff. Interviewees who are a manager/director said:

“The team of people that have grown into this. . . . It’s important that the director of the project isn’t the one who holds all the vision and it’s shared”; “compiling a team of mentors who all seem to be on the same page and get along and get the idea of what we’re doing and come up with really cool workshop ideas, and it’s just basically getting it to where it kind of is now running on its own steam.” They are also proud of their own skill development; the skill particularly reported was improvisation skills, “being able to [be] flexible and transform what you thought was going to happen to what is actually happening, and being comfortable with that. Developing that skill, I think, has been one of my greatest achievements and it’s something I know that I didn’t have before.”

### *Changing Perception*

Interviewees said there has been an institutional change: “Hearing other people at the Center [the library/museum] start to talk about the HOMAGO model and start to talk about having teens be creators instead of consumers. It’s like a little virus that I’m spreading by having this project. And it’s definitely changed the way we think about what we might do with teens and that we talk about what we might do with teens.” Another interviewee said the underlying philosophy of learning started to percolate out into the rest of their organization, because she keeps pushing it. An interviewee concurred, “I think more and more now we’ve had people coming to us wanting to do this at other places,” indicating that the learning programs, once perceived as being separate and limited within the learning space, are now spreading to different parts of the library and museum.

## **III. Evaluation Approaches**

### *Outcome Measures*

We asked the interviewees how they evaluate or measure success and achievement in their job or program. Interviewees agree that outcomes with teens who changed throughout the program or became deeply engaged in the learning space meant success/achievement to them. An interviewee explained:

So my success measures are really outcomes with the kids. When I see two girls up on stage in front of a room full of two hundred and fifty people, and they're confident and well-spoken and able to do the program that we've asked them to put together for us, that is success to me. When the shy kid who isn't too good with his peers ends up being the geek who helps everybody else get online, that is success too. So I think a lot of those measures and looking at individual kids and what have they done that has changed them as a person, and what have they done to feel better about themselves, feel better about their ability to accomplish something, I think that is really what I look for as the ultimate measure of success.

Another interviewee provided an example of teens growing with the program, which demonstrates the success of their program: "Our biggest capstone that we have written into most grant opportunities has been creating teen mentors through graduating teens through [the] program and getting them involved as either volunteer mentors within the program or taking what they have learned here and connecting it to some kind of community service project."

Some learning spaces have strategies for measuring outcomes. A museum reported having a dedicated internal evaluation department, in which they conduct video studies and analyze different dimensions of learning. A library said that they had external researchers, but they started to work on their own set of outcomes based on twenty-first-century literacy, such as critical thinking and problem-solving skills.

To demonstrate and evaluate their success, interviewees value stories and anecdotes. "Many times the stories are as powerful as the statistics when we're out talking to our supporters and trying to garner political or monetary support for the Center. So the stories are part of my evaluation as well." Statistics and numbers are part of it, but they don't tell the whole story, and the interviewees attempt to "keep track of . . . meaningful anecdotes of mentor-teen interactions and just sort of seeing what people are getting out of the program. . . . It's a deeper-level thing."

They obtain feedback from teens by asking questions about their experiences. Interviewees said that asking teens a question requires technique and skills and that they have developed strategies for obtaining honest feedback from teens: "I tend to ask them questions about it. . . . It is really challenging, I think, through surveys and interviews to get a wholehearted, real response out of somebody. But if you just let them ramble a bit, you're going to be able to pull a lot of valuable information out of them."

I set up, what I call, the "confessional booth" . . . where they [kids] can go in there; it's totally a private space and they record. And I show them they hit this button to record and this one stops. And I basically prompt them with, "What did you like? What didn't you like? What would you change? What did you do? How did you do it?" and things like that.

Professionals also use observation to find evidence of learning as they run the program:

When I'm working or in one of the programs and there with the kids in the library, I'm always assessing what the situation is. What's the vibe in the room, are kids happy to be there, or are they pulling people in, or are people pulling them out? And I have this sort of constant monitoring thread running in my head that comes from my experiences as a facilitator and my training as a facilitator, to constantly pay attention to what is going on in the room. And so I'm always gathering data from that as well, but it doesn't end up coded on spreadsheets.

### *Output Measures*

Several learning spaces use output measures such as size of audience; however, the interviewees reported challenges in using this measurement:

Because one of the hardest things . . . [is that] museums typically measure success through programs by numbers, how many people show up, but I don't think that's a measure of success, I mean it can be sometimes, but just because fifty people showed up doesn't mean everybody had gained skills or gained knowledge or had a good time even, and so it's usually sort of the basics of getting a little feedback from the participants, but then me having to be really reflective about what were the goals and did I achieve them.

Another interviewee stated:

We haven't come up with an outcome evaluation tool to see if the programming that we've been doing with our digital media lab . . . has been life changing for any of the people who have taken part in it yet, or with the Maker programming either, so that is something we're going to have to look to for the future: . . . how to determine outcomes as much as it might be possible to do so.

## **IV. Goals for the Learning Spaces**

In response to the question "What are you hoping to achieve for your Learning Lab/Makerspace?" most of the interviewees mentioned sustainability and expansion of the space/programs. Interviewees also addressed different personal goals as a learning space professional.

### *Sustainability*

Interviewees discussed the sustainability of their spaces: "I think the goals that are set by the museum are basically to try to continue to run the program, to continue to tie the program into the museum, to continue to find ways connecting the program with the [name of museum] and some of its larger goals. And . . . a lot of it has to do with trying to sustain it"; "[to continue] finding the right way for the program to function week to week"; "[to] keep this space vibrant and alive for people as they come in to experience it for the first time, but to have our repeat

visitors feel that same way”; “[to] continue to fund the project, take some advocacy across the institution and of course [from] the board members.”

### *Scale, Spread, and Expand*

Beyond sustaining the existing space, the interviewees strive to expand the space and programming and disseminate programming to other libraries or museums.

The goals for my programming are to kind of scale and spread what we’ve been doing. So that means that we would like to start to figure out ways to generate income through the curriculum that we’re writing and have it be used by others and . . . disseminated by the [name of museum]. We’d also like to figure out, . . . again, [how to] stabilize funding for the staff and kind of run ourselves as a pan-institutional entity that can . . . work as, not necessarily work as a contractor, but work as advisors for other people developing programs like ours or get ideas from us in terms of what we’ve been doing with the teens.

Another interviewee concurred:

[Our goal is to] offer some programs either as outreach in the community to vulnerable neighborhoods, and/or do some more programming in our branches to involve them a little more particularly in digital making, digital media making, but maybe also do some hands-on workshops as well. So kind [of] expanding out beyond the main library a little more.

To do that, interviewees mentioned they must find funding to hire more staff as well as maintain and expand partnerships. Other specific goals identified included the following: (1) to establish a virtual world and to get teens engaged in it, (2) to create STEAM-based learning, and (3) to provide new workshops. Their goals ultimately aim to “enhance and incorporate the individual learning process as much as possible.”

### *Personal Goals*

When asked about their personal goals related to their job in the learning space for the coming years, interviewees reported a desire to disseminate their experiences working in these learning spaces to a wider audience of their peers by publishing articles and presenting at conferences. They also stressed their need for more professional development related to the content areas presented in their programming, such as coding, using different technologies, and learning hands-on skills like building and using electric circuits. They also reported that they need to learn more managerial skills, including strategic planning.

## **Discussion**

We believe the findings are important in understanding the current state of learning spaces in libraries and museums. The findings have implications for those who are in youth services, including library administrators, librarians, and Library and Information Science (LIS) faculty



and researchers, to overcome challenges and facilitate achievements identified by the learning space professionals.

The findings agree with our assumption about the importance of qualified professionals for the sustainability of learning spaces and programs. Interviewees reported that finding the right personnel for the learning space is one of the biggest challenges because the position requires “the balance of professionalism.” Successful professionals in learning spaces must have the ability to learn and enjoy learning new things, adapt to changing situations, facilitate learning, and have necessary skills in technology, management, program development, and grant writing. They must be able to collaborate with others and have cultural competency to serve diverse populations and relate to teens.<sup>xlix</sup> LIS school faculty, library administrators, researchers, and librarians themselves must make an effort to equip learning spaces with professionals with these qualities.

Library and Information Science (LIS) faculty should review and update their curricula to educate pre-service librarians based on the competencies, skills, challenges, achievements, and goals identified in this study.<sup>1</sup> Most importantly, LIS schools must be a place for students to hone their ability to learn. Students can be introduced to the concept of Personal (or Professional) Learning Networks<sup>li</sup> and start developing or expanding their own learning network. It is critical to teach the theoretical foundations of user needs and behaviors, learning theories, teen developmental characteristics, and cultural competencies—that is, understanding the needs of diverse populations and different learning styles. Students should be taught about evidence-based practice, from identifying community needs, to evaluating a program and assessing teen learning, to applying the assessment results to improve programs. Finally, LIS schools should provide opportunities for students to enhance their technology literacy. Instead of focusing on technical skills, however, it is more useful to promote students’ ability to learn new technologies because technologies continue to change rapidly.

Besides formal education, learning space professionals grow and continuously learn on the job. Professionals obtain the needed competencies and skills through networking (e.g., at conferences and in discussions with professionals from other learning spaces), learning by doing on the job, and self-education (e.g., online training resources, reading articles, and reflection on what they have learned).<sup>lii</sup> Library administrators must support and highly value professional development of their employees. Libraries are a learning community for everyone, including their users and workers. Professionals should be encouraged to participate in conferences, webinars, and meetings to share ideas and practices. They must also be given time to absorb relevant research and theories and to reflect on their own practices.

The interviewees stated that having a network of colleagues working in learning spaces and sharing ideas and experiences greatly facilitated their achievements. Library associations and their divisions—such as YALSA (Young Adult Library Services Association), AASL (American Association of School Librarians), and ALSC (Association for Library Service to Children)—must provide leadership in promoting a network of informal learning space professionals. It is also desirable that libraries and a range of other institutions serving youth create a stronger sense of community and collaboration/networking opportunities. Learning space professionals must be able to identify resources in their community beyond libraries and network with them. For

example, the Da Vinci Science Center in Allentown, Pennsylvania, a Learning Lab, led the creation of the Mentor Allentown Coalition, which leverages existing programs and the local workforce to serve community teens.<sup>liii</sup> Not a single library, school, or museum can provide all the expertise in a range of making and STEM activities. Establishing connections between different learning organizations is essential.

The study found that a key challenge was people’s lack of understanding and perception about informal learning spaces. Many of the challenges that the interviewees experienced seem to originate from the perception that these learning spaces are “special” or “separate” spaces from the rest of the library/museum. This prevents regular and ongoing funding for a learning space and results in limited personnel and access (hour/space). More research on informal learning spaces is beneficial for informing people about the importance of them and helping professionals advocate the need for these learning spaces and this new form of informal learning. It is a clear gap that currently little research has been conducted in and about informal learning spaces. In particular, research on teen learning in library and museum learning spaces is needed to determine the effectiveness of the current approach. An interviewee mentioned that the most common question she receives is whether or not teens are really learning with all the technologies in the learning space. While professionals working in learning spaces have been witnessing positive changes in teens, research findings that show what and how teens learn in learning spaces will contribute to sustainability and expansion of informal learning spaces in libraries and museums.

More evaluation and outcomes-based research is required for professionals to conduct evidence-based practice. Findings of this study illustrated the power of anecdotes and stories. Interviewees explained that they ask teens questions and observe activities for learning assessment. Learning space professionals also document learning activities, programs, and outcomes; related practices are found in the Maker Education Initiative Open Portfolio Project.<sup>liv</sup> Overall, however, findings revealed a need for developing and implementing a systematic way of measuring outcomes with teens.

## **Limitations**

The findings presented in this paper are not generalizable owing to the small number of participants and the nature of qualitative study. These exploratory findings were intended to inform the development of Phase 2: an online survey of professionals in learning spaces across the country.

## **Conclusion**

Learning Labs and Makerspaces are exemplary spaces to demonstrate how young adult librarians strive to remain relevant in this age and to promote teens’ learning. As technologies and situations are rapidly changing in this area, professionals must actively pursue learning and networking opportunities and become lifelong learners. All other stakeholders—including library administrators, Library and Information Science (LIS) faculty and researchers, and organizations related to libraries and informal learning—must support youth service librarians’ ability to facilitate learning in this new era. Perhaps supporting professionals’ continuous learning would

be one of the most effective ways of facilitating teens' learning and promoting libraries as a community learning hub.

## Notes

---

<sup>i</sup> Young Adult Library Services Association (YALSA), "About YALSA," 2015, <http://www.ala.org/yalsa/aboutyalsa> (accessed April 19, 2015).

<sup>ii</sup> Novella Ruffin, *Adolescent Growth and Development*, 2009, [http://www.nvc.vt.edu/mft/mft2\\_files/huebner/Adolescent\\_Growth\\_and\\_Development.pdf](http://www.nvc.vt.edu/mft/mft2_files/huebner/Adolescent_Growth_and_Development.pdf) (accessed September 13, 2015); Search Institute, "40 Developmental Assets for Adolescents," 2015, <http://www.search-institute.org/content/40-developmental-assets-adolescents-ages-12-18> (accessed September 13, 2015).

<sup>iii</sup> Erik Erikson, *Childhood and Society* (New York: Norton, 1950); Lawrence Kohlberg, *The Psychology of Moral Development* (San Francisco: Harper & Row, 1984); Jean Piaget, *The Psychology of the Child* (New York: Basic Books, 1972).

<sup>iv</sup> Debra W. Haffner, *Beyond the Big Talk: A Parent's Guide to Raising Sexually Healthy Teens—from Middle School to High School and Beyond*, rev. ed. (New York: Newmarket Press, 2008).

<sup>v</sup> Denise E. Agosto, "Young Adults' Information Behavior: What We Know So Far and Where We Need to Go from Here," *Journal of Research on Libraries and Young Adults*, 2011, <http://www.yalsa.ala.org/jrlya/2011/11/young-adults%e2%80%99-information-behavior-what-we-know-so-far-and-where-we-need-to-go-from-here/> (accessed September 13, 2015).

<sup>vi</sup> Institute of Museum and Library Services, *Public Libraries in the US: FY 2012 Report*, 2014, [http://www.imls.gov/research/public\\_libraries\\_in\\_the\\_us\\_fy\\_2012\\_report.aspx](http://www.imls.gov/research/public_libraries_in_the_us_fy_2012_report.aspx) (accessed September 13, 2015).

<sup>vii</sup> Linda Braun et al., *The Future of Library Services for and with Teens: A Call to Action* (Chicago: Young Adult Library Services Association, 2014), [http://www.ala.org/yaforum/sites/ala.org/yaforum/files/content/YALSA\\_nationalforum\\_final.pdf](http://www.ala.org/yaforum/sites/ala.org/yaforum/files/content/YALSA_nationalforum_final.pdf) (accessed on September 13, 2015).

<sup>viii</sup> White House, "Educate to Innovate," <http://www.whitehouse.gov/issues/education/k-12/educate-innovate> (accessed April 19, 2015).

<sup>ix</sup> AASL, "AASL Standards for the 21st-Century Learner," 2007, <http://www.ala.org/aasl/guidelinesandstandards/learningstandards/standards> (accessed September 13, 2015).

---

13, 2015); AASL, *Empowering Learners : Guidelines for School Library Programs* (Chicago: American Association of School Librarians, 2009).

<sup>x</sup> David V. Loertscher and Kathryn Roots Lewis, “Implementing the Common Core State Standards: The Role of the School Librarian,” 2013, <http://tinyurl.com/aaslcc> (accessed September 13, 2015).

<sup>xi</sup> AASL, “Correlations between the AASL Standards for the 21st-Century Learner and the Next Generation Science Standards,” 2015, <http://tinyurl.com/aaslngss> (accessed September 13, 2015).

<sup>xii</sup> Institute of Museum and Library Services, *Creating a Nation of Leaders: Strategic Plan 2012–2016*, 2012, [http://www.imls.gov/about/strategic\\_plan.aspx](http://www.imls.gov/about/strategic_plan.aspx) (accessed September 13, 2015).

<sup>xiii</sup> Mizuko Ito et al., *Hanging Out, Messing Around, and Geeking Out* (Cambridge, MA: MIT Press, 2009); Hive Learning Network and the National Museum of Mexican Art, “HOMAGO: A Guidebook,” 2013, [http://dmlcentral.net/wp-content/uploads/files/yolloguidebook\\_r5.pdf](http://dmlcentral.net/wp-content/uploads/files/yolloguidebook_r5.pdf) (accessed August 31, 2015).

<sup>xiv</sup> Digital Media and Learning Research Hub, *Connected Learning: An Agenda for Research and Design*, 2013, <http://dmlhub.net/publications/connected-learning-agenda-research-and-design> (accessed August 31, 2015).

<sup>xv</sup> National Writing Project, *A New Vision for Engaging Teens: YOUmedia Learning Labs Network* (Lulu Publishing Services, 2015).

<sup>xvi</sup> YOUmedia Network, “YOUmedia,” <http://www.youmedia.org/> (accessed August 31, 2015).

<sup>xvii</sup> Association of Science-Technology Centers and Urban Libraries Council, *Learning Labs in Libraries and Museums: Transformative Spaces for Teens* (Washington, DC: Association of Science-Technology Centers, 2014), <http://www.imls.gov/assets/1/AssetManager/LearningLabsReport.pdf> (accessed September 14, 2015).

<sup>xviii</sup> Ellyssa Kroski, “A Librarian’s Guide to Makerspaces: 16 Resources,” *Open Education Database*, 2013, <http://oedb.org/blogs/ilibrarian/2013/a-librarians-guide-to-makerspaces/> (accessed August 19, 2015).

<sup>xix</sup> Maker Media, “Maker Education Initiative,” *Maker Education Initiative*, 2013, <http://www.makered.org/> (accessed September 14, 2015).

---

<sup>xx</sup> Margaret Honey and David Kanter, *Design, Make, Play: Growing the Next Generation of STEM Innovators* (New York: Routledge, 2013).

<sup>xxi</sup> Young Adult Library Services Association (YALSA), “YALSA National Research Agenda,” 2011, <http://www.ala.org/yalsa/guidelines/research/researchagenda> (accessed April 19, 2015).

<sup>xxii</sup> Stephen Abram, “Makerspaces in Libraries, Education, and Beyond,” *Internet@Schools* 20 (March/April 2013): 18–20; Janet Balas, “Do Maker Spaces Add Value to Libraries?” *Computers in Libraries* 32 (November 2012): 33; David Loertscher, Lesley Preddy, and Bill Derry, “Makerspaces in the School Library Learning Commons and the uTEC Maker Model,” *Teacher Librarian* 41 (December 2013): 48–51; Jamie Mayo, “Learning Labs Learning Curve: The Digital Media Lab–Kansas City Project,” *Young Adult Library Services* 11 (Winter 2013): 32–34.

<sup>xxiii</sup> Lauren Britton, “A Fabulous Laboratory: The Makerspace at Fayetteville Free Library,” *Public Libraries* 51 (July/August 2012): 30–33; Karen Jensen, “Tapping into Teens’ Creativity and Turning Libraries into Makerspaces,” *Voya* 36 (August 2013): 25; Carla Haug, “Here’s How We Did It: The Story of the EPL Makerspace,” *Feliciter* 60 (February 2014): 21–23; Jennifer Larson, “A Learning Lab Makes It in Saint Paul,” *Young Adult Library Services* 12 (Winter 2014): 22–24; Mayo, “Learning Labs Learning Curve.”

<sup>xxiv</sup> American Library Association, “Digital Literacy, Libraries, and Public Policy,” Report of the Office for Information Technology Policy’s Digital Literacy Taskforce, 2013, [http://www.districtdispatch.org/wp-content/uploads/2013/01/2012\\_OITP\\_digilitreport\\_1\\_22\\_13.pdf](http://www.districtdispatch.org/wp-content/uploads/2013/01/2012_OITP_digilitreport_1_22_13.pdf) (accessed September 14, 2015); Colleen Graves, “Teen Experts Guide Makerspace Makeover,” *Knowledge Quest* 42 (March/April 2014): 8–13; Cynthia Houston, “Makerspaces@your School Library: Consider the Possibilities!” *Kentucky Libraries* 77, no. 3 (January 2013): 26–28; Jensen, “Tapping into Teens’ Creativity and Turning Libraries into Makerspaces”; Makerspace Team, *Makerspace Playbook School Edition, 2013*, <http://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-Feb-2013.pdf> (accessed September 14, 2015); Nicola McDonald, “Get Making: Incorporating Maker Ideas at Your Library,” *Voya* 36 (August 2013): 30–31; Lesley Preddy, “Creating School Library ‘Makerspace,’” *School Library Monthly* 29 (February 2013): 41–42.

---

<sup>xxv</sup> Makerspace Team, *Makerspace Playbook School Edition, 2013*; K-Fai Steele, ““What We Think Actually Matters?”: Teen Participatory Design and Action Research at the Philadelphia Free Library,” *Young Adult Library Services* 11 (Summer 2013): 12–15.

<sup>xxvi</sup> Kyungwon Koh and June Abbas, “Competencies for Information Professionals in Learning Labs and Makerspaces,” *Journal of Education for Library and Information Science* 56, no. 2 (Spring 2015), <http://dpi-journals.com/index.php/JELIS/issue/view/144> (accessed September 14, 2015).

<sup>xxvii</sup> Kylie A. Pepler et al., “Open Portfolios: Survey of Makerspaces, Part 1,” 2015, [http://makered.org/wp-content/uploads/2015/02/OPP\\_ResearchBrief6\\_SurveyofMakerspacesPart1\\_final.pdf](http://makered.org/wp-content/uploads/2015/02/OPP_ResearchBrief6_SurveyofMakerspacesPart1_final.pdf) (accessed September 16, 2015); Kylie A. Pepler et al., “Open Portfolios: Survey of Makerspaces, Part 2,” 2015, [http://makered.org/wp-content/uploads/2015/02/OPP\\_ResearchBrief7\\_SurveyofMakerspacesPart2\\_final.pdf](http://makered.org/wp-content/uploads/2015/02/OPP_ResearchBrief7_SurveyofMakerspacesPart2_final.pdf) (accessed September 16, 2015); Kylie A. Pepler et al., “Open Portfolios: Survey of Makerspaces, Part 3,” 2015, [http://makered.org/wp-content/uploads/2015/03/OPP\\_ResearchBrief8\\_SurveyofMakerspacesPart3\\_final.pdf](http://makered.org/wp-content/uploads/2015/03/OPP_ResearchBrief8_SurveyofMakerspacesPart3_final.pdf) (accessed September 16, 2015).

<sup>xxviii</sup> Jon Burke, *Makerspaces in Libraries Survey Results 2013*. Retrieved from <http://www.users.miamioh.edu/burkejj/Makerspaces%20in%20Libraries%20Survey%20Results%202013.pdf> (accessed September 16, 2015).

<sup>xxix</sup> Koh and Abbas, “Competencies for Information Professionals in Learning Labs and Makerspaces.”

<sup>xxx</sup> Diane Slatter and Zaana Howard, “A Place to Make, Hack, and Learn: Makerspaces in Australian Public Libraries,” *Australian Library Journal* 62, no. 4 (2013): 272–84.

<sup>xxxi</sup> Britton, “A Fabulous Laboratory,” 32.

<sup>xxxii</sup> Jensen, “Tapping into Teens’ Creativity and Turning Libraries into Makerspaces,” 25.

<sup>xxxiii</sup> Lauren Britton, “The Makings of Maker: Making Space for Creation, Not Just Consumption,” *Library Journal* (October 2012): 20–23.

<sup>xxxiv</sup> Brian Kenney, “Meet Your Makers: The Growing Movement to Transform Libraries from Places of Consumption to Places of Creation,” *Publishers Weekly* (April 2013): 20.

- 
- <sup>xxxv</sup> Association of Science-Technology Centers and Urban Libraries Council, *Learning Labs in Libraries and Museums*, 18.
- <sup>xxxvi</sup> *Ibid.*, 14–15.
- <sup>xxxvii</sup> Slatter and Howard, “A Place to Make, Hack, and Learn.”
- <sup>xxxviii</sup> Britton, “A Fabulous Laboratory”; Betha Gutsche, “Makerspaces in Libraries: Patron’s Delight, Staff’s Dread,” *ALKI* (March 2012): 28–30; Houston, “Makerspaces@your School Library”; Heather Moorefield-Lang, “Making, Libraries, and Literacies,” *Library Media Connection* (January/February 2015): 30–31.
- <sup>xxxix</sup> Britton, “A Fabulous Laboratory,” 33.
- <sup>xl</sup> Kenney, “Meet Your Makers.”
- <sup>xli</sup> Slatter and Howard, “A Place to Make, Hack, and Learn.”
- <sup>xlii</sup> Houston, “Makerspaces@your School Library”; Moorefield-Lang, “Making, Libraries, and Literacies.”
- <sup>xliii</sup> Houston, “Makerspaces@your School Library”; Association of Science-Technology Centers and Urban Libraries Council, *Learning Labs in Libraries and Museums*, 9.
- <sup>xliv</sup> *Ibid.*
- <sup>xlv</sup> Braun et al., *The Future of Library Services for and with Teens*, 12.
- <sup>xlvi</sup> Michael Quinn Patton, *Qualitative Research and Evaluation Methods*, 3rd ed. (Thousand Oaks, CA: Sage Publications, 2002).
- <sup>xlvii</sup> Phillipp Mayring, “Qualitative Content Analysis: Forum,” *Qualitative Social Research* 1 (June 2000), <http://www.qualitative-research.net/index.php/fqs/article/view/1089/2386> (accessed April 18, 2015).
- <sup>xlviii</sup> Koh and Abbas, “Competencies for Information Professionals in Learning Labs and Makerspaces.”
- <sup>xlix</sup> *Ibid.*
- <sup>l</sup> *Ibid.*
- <sup>li</sup> Susan Cordell, Reenay R. H. Rogers, and Lesa Parker, “No More CPR,” *Knowledge Quest* 41 (November 2012): 18–21.
- <sup>lii</sup> Koh and Abbas, “Competencies for Information Professionals in Learning Labs and Makerspaces.”

---

<sup>lii</sup> Association of Science-Technology Centers and Urban Libraries Council, *Learning Labs in Libraries and Museums*.

<sup>liv</sup> Maker Education Initiative, “Open Portfolio Project: Research Briefs,” 2015, <http://makered.org/opp/research-briefs/>.