



## **\*Competencies Needed to Provide Teen Library Services of the Future:**

### **A Survey of Professionals in Learning Labs and Makerspaces**

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## **Abstract**

Libraries are developing transformative teen-centered spaces and services to facilitate informal learning, creation, socialization, and community engagement. For sustained success, it is crucial that qualified professionals staff these learning spaces. This study explored the following research question: What are the competencies required for professionals to provide teens with resources and services in informal learning spaces such as Learning Labs or Makerspaces? Survey results of professionals working in Makerspaces or Learning Labs in libraries in the United States are presented. Findings relate to (1) the participants' job responsibilities and competencies necessary to work in a Makerspace or Learning Lab; (2) their perceptions of the value of their higher-education experiences; and (3) choices of resources for learning competencies. The findings inform professionals working with teens about necessary competencies; provide library directors and managers with a research-based framework on staff recruitment and training; and offer suggestions for curricular updates to library and information science (LIS) educators.

## **Introduction**

Teen services librarians perform a range of tasks, such as collection development, programming, administration, reference, instruction, readers' advisory, outreach, and more. Teen services librarianship in the twenty-first century combines many of the core traditional tasks, but also addresses a shift in contemporary society that reflects increased diversity in teen demographics, teens' pervasive use of technology, and critical skills required for teens to succeed in school and in life. *The Future of Library Services for and with Teens* report by the Young Adult Library Services Association (YALSA) asserts that "libraries must leverage new technologies and become kitchens for 'mixing resources' in order to empower teens to build skills, develop understanding, create and share, and overcome adversity."<sup>1</sup> Over the past few years, an increasing number of libraries have developed transformative teen spaces and services that are

designed to facilitate informal learning, creation, socialization, and community engagement, which embody the image of a kitchen for mixing resources.

These innovative teen spaces are called by different names, such as Learning Labs, Makerspaces, Learning Commons, Hackerspaces, Fab Labs, or Studios. Each space and program might have a different vision and focus based on the needs and resources of the community in which they are embedded. They all, however, share common elements, placing teens at the center of their program. Teens are invited to discover their own passion and interests, facilitated by interactions with supportive mentors and peers, a range of technologies and digital media, and creative hands-on programs.

Learning Labs, dedicated teen spaces in libraries and museums, are grounded in the research-based frameworks called HOMAGO and Connected Learning.<sup>ii</sup> HOMAGO refers to “Hanging Out, Messing Around, and Geeking Out,” the stages of self-directed learning or different levels of youth engagement in digital media. The principles of Connected Learning suggest that young people learn best when they pursue a personal interest or passion, with support from adults and peers, and when they can link their interest to academic or career success or to civic engagement.<sup>iii</sup> Makerspaces offer access to equipment and fabrication technologies, which allow people to not only design their ideas digitally, but to turn those ideas into real objects.<sup>iv</sup> Makerspaces tend to focus on physical objects, DIY (do-it-yourself), invention, and engineering approaches. The Maker program is a type of student-centered, project-based learning that stems from the pedagogical tradition of learning by making and through apprenticeship. Activities vary from skill-building projects to independent long-term projects.

In order for these informal learning spaces to be sustainable and expanded, it is crucial that qualified professionals staff them. Because these are new services and resources, there is a need to understand which competencies—skills, knowledge, abilities, or personal attributes—are necessary for teen services librarians working in these spaces. This paper aims to promote a discussion on how to support librarians so they can obtain and further develop competencies needed to work in emerging informal learning spaces for teens. The presented research seeks to answer the following overarching research question: What are the competencies required for professionals to provide teens with resources and services in informal learning spaces such as Learning Labs or Makerspaces?

The project consisted of two phases: Phase 1: in-depth interviews, and Phase 2: an online survey. This paper reports the results of Phase 2, which was conducted between October 2014 and March 2015, and focuses on findings from individuals working in libraries. The findings provide information for professionals working with teens about what competencies they might want to develop, or improve, in order to provide relevant library services that appeal to today’s youth. Library directors and managers may take away a research-based framework on staff recruitment and training. The study also informs library and information science (LIS) educators on how to update the current youth services curriculum to best prepare future professionals working with teens.

## Literature Review

This section reviews existing literature that addresses personnel in Learning Labs and Makerspaces (roles and staffing), issues about teen services librarianship in the twenty-first century, and existing competencies for librarians.

### Personnel in Learning Labs and Makerspaces

Professionals are integral to Learning Labs and Makerspaces, whether they are called librarians, mentors, guides, volunteers, or staff. Existing literature—mainly reports from professional organizations instead of research-based work—provides useful guidelines regarding the role of mentors as well as staffing in Learning Labs and Makerspaces. Mentors in these informal learning spaces are essentially people who work with youth to facilitate learning and making and who may be experienced in one or more forms of making. They “help teens to identify new interests, encourage them to expand their horizons, and offer them access to expertise and resources.”<sup>v</sup> The Young Makers Program’s *Maker Club Playbook* report explains the role of mentors:

The role of a Young Maker mentor is to help [young Makers] find a *project vision* if they don’t already have one, and then to help them realize that vision. . . . Along the way, we encourage mentors to exploit the *teachable moments* that naturally occur during making to expose the underlying math, science, and engineering principles involved. But they aren’t teachers so much as guides. We also expect mentors to pass on their knowledge of proper *tool usage and safety*. Finally, an important role for mentors is to demonstrate to Young Makers the importance of failure as a mean to success. That is, to expect and embrace failure as a normal part of the making process.<sup>vi</sup>

The *Mentor Handbook* of the Intel Computer Clubhouse Network, which serves as one model for the Makerspace, explains mentors typically serve as a guide, resource, role model, active participant, and catalyst; but mentors should *not* be a know-it-all, dominant authority figure (e.g., schoolteacher, the law, parent), cool peer, therapist/counselor, gift giver, or disciplinarian. The handbook offer strategies and tips for mentors, including the following: be reliable and consistent, make every member feel that they are important, be relaxed and be yourself, be enthusiastic, go with the flow, be approachable, don’t be a director, have fun, and more.<sup>vii</sup>

In a library Makerspace or Learning Lab, mentors are not limited to teen librarians; libraries draw on assets in their communities to recruit mentors. Community members, parents and other family members, and, more importantly, teens themselves support other teens’ making and learning. A successful example includes the Makers-in-Residence programs (also called Artist-in-Residence programs), in which Makerspaces invite community members with different types of expertise—such as artists, engineers, makers, writers, craftspeople, video makers, comedians, musicians, visual artists, and designers—to use their space, facilitate sessions, and interact with other makers. Utilizing the help of available parents and extended family is also beneficial because “not only are most parents and guardians deeply invested in seeing children grow and learn, inviting them to help gives them an opportunity to spend time making as a family, while sharing their own knowledge and skills.”<sup>viii</sup> Last but not least, teens themselves serve as mentors

for other teens; an increasing number of Makerspaces are providing programs to train teens to become mentors for younger children.<sup>ix</sup>

### **Future of Teen Services in Libraries**

In 2013 youth services faculty members from different library and information science (LIS) schools shared their thoughts on the future direction of LIS education for youth services librarianship.<sup>x</sup> They discussed how LIS education needs to adapt to prepare youth librarians to engage with today's teens. Several key issues were addressed, including (1) fostering a user-centered approach instead of a focus on resources; (2) covering a range of resources beyond books and including digital media; (3) addressing diversity and inclusion; (4) being more cross-disciplinary by bringing expertise from other fields; (5) incorporating evidence-based practices and design-based research; and (6) facilitating informal learning.

YALSA's *Future of Library Services for and with Teens* addresses a paradigm shift for libraries and teen services, including the shift as seen through teen use of technology, expanded literacies, Connected Learning, and the social and economic factors impacting teens. In particular, the report explains the paradigm shift in staff. The historical practice was that when libraries have teen services librarians, they are viewed as the only staff who are expected to interact with teens. On the other hand, the envisioned future for teen services includes a hybrid of degreed library professionals, staff, and skilled volunteers "who act as mentors, coaches, and connectors to the information and resources needed by individual teens in the community. Library staff, mentors, and coaches build relationships with teens with the goal of supporting their academic, career, and civic engagement and growth."<sup>xi</sup> The report suggests five fundamental changes/shifts in teen services librarianship, including (1) embracing youth services librarians' role as facilitators rather than experts, (2) refocusing beyond traditional roles and measurements of success, (3) partnering strategically to reach beyond the library's walls, (4) creating a whole-library and whole-school approach to serving teens in physical spaces and online, and (5) supporting library staff in gaining new skills.

### **Current Competencies for Librarians**

The American Library Association (ALA) developed core competences of librarianship in 2009.<sup>xii</sup> The core competences statement defines the knowledge that all persons graduating from ALA-accredited master's programs in library and information studies should know and be able to employ, where appropriate, in the areas of (1) foundations of the profession, (2) information resources, (3) organization of recorded knowledge and information, (4) technological knowledge and skills, (5) reference and user services, (6) research, (7) continuing education and lifelong learning, and (8) administration and management.

There are also competencies statements developed by relevant professional organizations to support specialized learning experiences. Competencies statements that are most relevant to teen services include "YALSA's Competencies for Librarians Serving Youth: Young Adults Deserve the Best"<sup>xiii</sup> and "ALA/AASL [American Association of School Librarians] Standards for Initial Preparation of School Librarians" developed in 2010.<sup>xiv</sup> YALSA's "Competencies for Librarians Serving Youth" defines the knowledge and skills that individuals must demonstrate to provide quality library services for and with teens in the areas of (1) leadership and professionalism, (2) knowledge of the client group, (3) communication, marketing, and outreach, (4) administration,

(5) knowledge of materials, (6) access to information, and (7) services. The ALA/AASL Standards identify five standards for those who develop and manage library and information services in a Pre-K–12 setting, including (1) teaching for learning, (2) literacy and reading, (3) information and knowledge, (4) advocacy and leadership, and (5) program management and administration. In addition, YALSA published “Core Professional Values for the Teen Services Profession,” which defines nine core values for those who work for and with teens through libraries. Not intended to replace the existing competencies, these values are “fundamental underlying principles that guide the decisions, actions, and behaviors of library staff working with and for teens” and provide indicators for practices that resonate with each value. The nine values include (1) accountability, (2) collaboration, (3) compassion, (4) excellence, (5) inclusion, (6) innovation, (7) integrity, (8) professional duty, and (9) social responsibility.<sup>xv</sup>

## **Methods**

### **I. Research Design**

This article reports the findings from Phase 2 of a study to determine the competencies needed by information professionals in Makerspaces or Learning Labs in U.S. libraries and museums. Phase 1 of the study, the analysis of a series of in-depth interviews with professionals in Learning Labs and Makerspaces, was presented in earlier articles.<sup>xvi</sup> This article reports findings from the online survey conducted in Phase 2, focusing on the following research question: What are the competencies required for information professionals to provide resources and services in library and museum learning spaces called Learning Labs or Makerspaces?

### **II. Participant Recruitment**

The study used the purposive sampling approach of selecting information-rich participants who could provide an in-depth understanding on the study topic.<sup>xvii</sup> The inclusion criteria are full-time or part-time professionals working in a physical space of Learning Lab or Makerspace in a library or museum. To participate in the survey, the Learning Lab or Makerspace must provide services or programs for youth under age eighteen. The researchers exempted any library or museum from the sample if they had participated in the Phase 1 interviews.

To develop the sample, the researchers compiled a census of library and museum websites that listed either a Makerspace, Learning Lab, or both. This census was developed by reviewing publicly available resources such as the YOUmedia Network and the directory of Makerspaces. Researchers also reviewed public library and museum websites to determine which mentioned having a Makerspace or Learning Lab. Researchers also sent messages out to listservs and Google Plus Communities for Learning Labs/Makerspaces professionals. An effort was made to include professionals from libraries (the sample included public and school libraries and an “Other” category) and museums, and to include both Learning Labs and Makerspaces.

Potential survey participants were invited via an e-mail to persons identified on the library website as working in the Makerspace or Learning Lab and to appropriate listservs and Google Plus Communities.

A total of 58 professionals from libraries and museums completed the online questionnaire. Forty-four (44) of these participants were from libraries. This paper will report the findings

related to libraries and will not include data from museum participants in the analysis. The opening screen of the questionnaire contained 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 English speakers.

### III. Data Collection

An online survey was conducted using Qualtrix software. The survey was open to participants between October 2014 and March 2015. Survey questions addressed learning space professionals’ perspectives on competencies and skills that they felt were necessary to work in a Learning Lab or Makerspace. The questions also asked participants about their primary job responsibilities and whether or not they felt prepared to perform these. Further, participants were also asked about their educational preparation for working in these emerging learning spaces, and what resources they would use to obtain new competencies and skills required in their current position.

### IV. Data Analysis

The data included the completed surveys from the 44 library participants. However, the completion rate varied between as low as 40 responses to a high of 44 responses for some questions. As a result, the totals in some of the tables will not equal 44 responses. Reports were generated using the Qualtrix report feature and exported into Excel or Word files for further analysis. Due to the small sample size, only descriptive statistics were used to analyze the data.

### V. Demographics of Libraries

Twenty-one states were represented in the sample of participating libraries. Illinois and Colorado included the most participants, with Illinois providing 11% of the sample and Colorado with 9%. See table 1 for a list of all participant states.

**Table 1. States Participating in Survey**

<b>States</b>	<b>Number of participants/per state</b>
IL	5
CO	4
MT, NJ, NY, OK	3
AZ, CA, GA, MA, MO, NV, OH, TN	2
KS, MN, NC, UT, VA, WA, WI	1
Total	44 (in 21 states)

Overwhelmingly, public libraries represented the highest percentage of participating libraries with 82% of the total sample, compared to 11% in school libraries and 7% in “Other.” The “Other” category included three participants from academic libraries. See table 2 for totals for each type of library.

**Table 2. Type of Library**

<b>Organizations</b>	<b>Number of participants</b>
Public Library	36

School Library	5
Other	3
Total	44

The service populations of the libraries also varied. Participants were mostly from service populations of 50,000–99,000 (23%), followed by 250,000–490,000 and 500,000 and higher with equal participants (16%), and with smaller service populations, such as 25,000–49,999, as the third highest representation (11%). See table 3 for participants by service population.

**Table 3. Service Population**

<b>Service population</b>	<b>Number of participants</b>
Less than 1,000	2
1,000–2,499	2
2,500–4,999	1
5,000–9,999	2
10,000–24,999	4
25,000–49,999	5
50,000–99,999	10
100,000–249,999	3
250,000–499,999	7
500,000+	7
Not sure/don't know	1
Total	44

Participants reported having either a Learning Lab (18%) or Makerspace (45%). Eleven percent reported having both of these learning environments, and 25% of participants reported not differentiating between the two types of learning spaces, as shown in table 4.

**Table 4. Types of Learning Space**

<b>Spaces</b>	<b>Number of participants</b>
Learning Labs	8
Makerspaces	20
Both	5
Do Not Differentiate	11
Total	44

In terms of how long each has been offering their Learning Lab or Makerspace programs, 59% reported offering programs between 1 to 3 years, 30% less than one year, and 11% more than 3 years, as reported in table 5.

**Table 5. Years Programs Offered**

<b>Spaces</b>	<b>Number of participants</b>
Less than 1 year	13
1–3 years	26
More than 3 years	5
Total	44

## **VI. Demographics of Participants**

The age, gender, ethnicity, education, professional experience, and experience working with teens were gathered from each survey respondent and are presented in tables 6 through 13. We also asked participants to identify their position in the library. Forty-two percent identified as being librarians, 37% as managers, and 21% as library staff members.

**Table 6. Participant Position**

<b>Position</b>	<b>Number of participants<sup>vi</sup></b>
Manager in library	16
Librarian	18
Library staff	9

<sup>vi</sup>**Note:** Column totals 43 since one participant did not answer this question.

We also asked participants to identify their age, gender, ethnicity, highest degree of education, discipline for their degree, years of professional experience, and experience working with teens.

**Table 7. Participant Age**

<b>Age</b>	<b>Number of participants<sup>vii</sup></b>
25 and under	4
26–34	15
35–44	15
45–54	4
55–64	4
65 and older	1

<sup>vii</sup>**Note:** Column totals 43 since one participant did not answer this question.

The majority of the participants reported being between 26 and 44 years of age (each category at 35%), followed by an equal amount of 25 and under, 45–54 years of age, and 55–64 (each at 9%). Only 2% reported being 65 years or older.

**Table 8. Participant Gender**

<b>Gender</b>	<b>Number of participants*</b>
Female	30
Male	13

**\*Note:** Column totals 43 since one participant did not answer this question.

The majority of the participants (70%) were female, and 30% were males.

**Table 9. Participant Ethnicity**

<b>Ethnicity</b>	<b>Number of participants</b>
White	38
Hispanic or Latino	0
Black or African American	1
Native American or American Indian	0
Asian/Pacific Islander	2
Other	2

As you can see from table 9, the overwhelming majority, or 88% of the participants, reported as being White. Five percent were Asian/Pacific Islander or Other. Only 2% reported as being Black or African American ethnicity. Zero percent were from Hispanic or Latino or Native American/American Indian descent. While it is important to note this disparity in ethnic identification of information professionals who work in Makerspaces or Learning Labs in the study's sample, it is not possible to extend this finding to the entire population of information professionals who work in these emerging learning spaces.

**Table 10. Participant Education**

<b>Highest degree</b>	<b>Number of participants<sup>1</sup></b>
Bachelor's	7
Master's	34
PhD	0
Other	2

<sup>1</sup>**Note:** Column totals 43 since one participant did not answer this question.

The majority of participants (79%) had a master's degree. Only 16% had a bachelor's degree, and 5% reported having some other level of degree such as a high school diploma or associate's degree.

**Table 11. Education Disciplines**

<b>Disciplines</b>	<b>Number of participants<sup>ii</sup></b>
Library and Information Science	28
Education	3
Art/Architecture/History	3
Computer Science	2
English	2
Other	12

<sup>ii</sup>**Note:** Column totals 50 several participants provided more than one answer to this question.

The disciplines for the degrees also varied. The majority of the participants (63%) reported having an MLIS or information science degree, followed by education or a BA in art and architecture or history. Only two participants reported having a degree in computer science, and few reported more creative degrees like graphic design, theater, or digital communication. The “Other” category, each with one response, included chemistry, classics, anthropology, graphic design, communication, journalism, political science, history, philosophy, theater, and digital communication. Some participants held dual masters degrees and still others reported both their undergraduate and graduate degrees in the response.

**Table 12. Professional Experience**

<b>Years of experience</b>	<b>Number of participants<sup>iii</sup></b>
Less than a year	7
1–3 years	7
4–9 years	18
10–20 years	10
More than 20 years	1

<sup>iii</sup>**Note:** Column totals 43 since one participant did not answer this question.

Participants’ years of professional practice varied from 42% having 4–9 years in practice, followed by those with 10–20 years at 23%, and less than 1 year to 1–3 years at equal numbers (16%). Only 2% of the sample had more than 20 years of experience.

**Table 13. Experience with Teens**

<b>Years of experience</b>	<b>Number of participants<sup>iv</sup></b>
Less than 1 year	7
1–3 years	15
4–9 years	12
10–20 years	6
More than 20 years	1

<sup>iv</sup>**Note:** Column totals 41 since three participants did not answer this question.

Participants’ experience with teens also varied, with the highest percentage of participants having 1–3 years of experience working with teens, followed by 4–9 years.

## **Findings**

This study generated findings related to the participants’ job responsibilities and competencies that they reported as being necessary to work in a Makerspace or Learning Lab, including snapshots of competencies as viewed by each participant group (managers, librarians, and library staff). Also included are their perceptions of the value of their higher-education experience and how each of these factors prepared them to work in a Learning Lab or Makerspace. Choices of resources for learning competencies they may not already possess are also reported.

### **Job Responsibilities of Participants**

Participants were asked to list the top three job responsibilities of their current position. The top five job responsibilities reported by all participants included (1) management, (2)

teaching/programming, (3) user services, (4) advocacy and partnerships, and (5) collection development. Management included responsibilities related to management of a department or of the Learning Lab or Makerspace; maintaining the physical building; supervising staff, interns, or volunteers and programs; serving as liaison to IT vendors; and purchasing and budgeting. Teaching/programming responses included developing, planning, and delivering programs and teaching specific classes on technologies for making such as 3D printers and multimedia. User services responsibilities included customer service and reference desk duty, helping teens with equipment in the Learning Lab or Makerspace, and troubleshooting technologies. Advocacy and partnerships responses related to advocating for the Learning Lab or Makerspace, establishing partnerships with community organizations, and outreach to the community through marketing of the learning space. Finally, collection development included selecting and purchasing materials and technology for the Learning Lab or Makerspace.

**Table 14. Top Five Primary Job Responsibilities**

<b>Job Responsibility</b>
1. Management
2. Teaching/programming
3. User services
4. Advocacy and partnerships
5. Collection development

## Competencies

As noted above, the objective of the study was to determine which competencies information professionals who work in Learning Labs or Makerspaces perceive as the most important to their success. The study adopted McNeil and Giesecke’s definition of competencies, which are defined as “the skills, technical knowledge, and personal attributes that contribute to an individual’s success in a particular position.”<sup>xviii</sup> The findings present first the top competencies as reported by *all* categories of participants, including managers, librarians, and staff, in table 15, and then as reported by each individual category of participant, in tables 16–18.

The top ten competencies reported by all groups of participants, in order of frequency, are (1) technology, (2a) teaching/programming, (2b) learning, (3) community advocacy and partnerships, (4) flexibility/adaptability, (5) understanding diverse users, (6) management, (7) communication skills, (8) curiosity, (9) creativity, (10a) patience, and (10b) subject content knowledge and skills. Duplicated ranks (a & b) indicate that these competencies had the same number of responses in the data. The competencies that are not self-explanatory are explained further in the following section. Curiosity, creativity, and patience are competencies that are self-explanatory, and the survey data provided no further accounts about the items.

### *Technology*

The top competency reported by all groups of participants was related to technology—that is, possessing the ability to work with technology, having an interest in or comfort with technology, and being able to teach and learn technology. Also noted were having a basic knowledge of

technology in general and some basic technology skills such as coding, video/audio/photo editing, using touch screens and both computer platforms (PC and Mac), and some facility with graphic design. One participant said, “The person must be willing to learn and [be] flexible. . . . They do not need to come with technology skills.”

### *Teaching/Programming*

The second highest reported competency was teaching/programming. This competency includes the ability to design instructional programs and sessions and to facilitate informal learning. Also important is the ability to involve others in the learning process, to guide projects without doing them for the teens, to provide open-ended programming, to facilitate hands-on learning, and to teach necessary technology.

### *Learning*

Another second highest competency is related to the individual information professional’s willingness or ability to learn. Information professionals should possess a willingness, desire, and enthusiasm for learning. They should be self-directed, lifelong learners who know how to learn. They should also possess the ability to learn technology and to follow instructions/directions.

### *Community Advocacy and Partnerships*

An information professional’s ability to serve as an advocate for the learning space and to network and build relationships with community partners or mentors was the third most frequently reported competency. Possessing the ability to develop relationships with community partners and to market the learning space through public outreach activities are important. Grant writing as a means to sustain the learning space was also noted. One participant said that an information professional needed the “ability to work with the community since a successful makerspace is very community-oriented.”

### *Flexibility/Adaptability*

Being flexible and able to adapt to the changing situations and environments often experienced in a Makerspace or Learning Lab was reported as the fourth highest competency that professionals thought was important to work in these emerging learning spaces. Due to the ever-changing learning opportunities provided by a wide range of mentors, a professional has to be open to change and be flexible and adaptable in their approaches to working with teens.

### *Understanding Diverse Users*

Skills and knowledge of the user-centered approach was reported as the fifth most important competency. Possessing an understanding or awareness of the needs of their patrons or target audience (teens), as well as experience working with the public were all mentioned. One participant noted the importance of traditional library skills, such as “reference interaction skills [or] the ability to figure out what the patron *really* needs” as an essential component of this competency. The ability to work with diverse user groups, such as cultural competencies, emerged as an essential component of this competency because professionals in these learning

spaces serve people with diverse backgrounds (e.g., different socioeconomic status, ethnicity, age, learning styles, and technology abilities).

*Management*

Professionals in Makerspaces and Learning Labs manage the spaces and the people who work with the teens, including the librarians, staff, mentors, volunteers, and anyone who provides programming. They also manage the selection and purchase of technology for the space, budgeting, and writing grants to sustain the Makerspace or Learning Lab. These different aspects of management were the sixth most frequently mentioned competency.

*Communication Skills*

The seventh most frequently reported competency was communication skills. Effective communication with a range of different people such as mentors, community members, potential partners, parents, IT staff, and the teens themselves is an essential competency in a Makerspace or Learning Lab. Professionals need to be proficient in multiple forms of communication, from giving presentations, using social media to advocate for the learning space, or to serve as liaison to various stakeholders and partners.

*Subject Content Knowledge/Skills*

Possessing specialized subject knowledge and skills benefit professionals working in these learning environments. Having subject knowledge of art, science, or computer science, or familiarity with the Maker concept and philosophy were listed as the tenth most important subject content areas that professionals should possess. See table 15 for top competencies reported by all categories.

**Table 15. Top Competencies Reported by All Categories<sup>v</sup>**

Competency
1. Technology
2a. Teaching/programming
2b. Learning
3. Community advocacy and partnerships
4. Flexibility/adaptability
5. Understanding diverse users
6. Management
7. Communication skills
8. Curiosity
9. Creativity
10a. Patience
10b. Subject content knowledge/skills

<sup>v</sup>Numbers duplicated on table 15 indicate that these competencies received the same number of responses.

*Snapshots of Competencies Reported by Participant Groups*

To further understand the competencies that participants thought were necessary to succeed, the researchers separated the analysis by different participant groups: managers, librarians, and staff. The findings from each group are explained below.

The competencies listed by managers mostly match those reported by all categories of participants, except for order of ranking. For example, learning, which was ranked as third for managers, ranked as second for all participants. Community advocacy and partnerships were ranked as second for managers and third for all participants. Another exception is that management skills, ranked as fifth for managers, was ranked as sixth by all participants.

**Table 16. Top Competencies Reported by Managers**

<b>Competency</b>
1a. Technology
1b. Teaching/programming
2. Community advocacy and partnerships
3. Learning
4. Flexibility/adaptability
5. Management skills

There are some definite differences between the librarians' perceptions of most important competencies and those of all participant groups. For example, understanding diverse users and communication skills were ranked higher by this group than flexibility/adaptability or community advocacy. Technology skills and knowledge about appropriate technologies to use are key to this group. Teaching and being able to facilitate programs and informal learning experiences are also very important. Communication skills and understanding diverse users, including the ability to work with young adults from diverse backgrounds, were ranked third by librarians. Flexibility/adaptability was seen as more important by librarians than other competencies such as community advocacy and partnerships.

**Table 17. Top Competencies Reported by Librarians**

<b>Competency</b>
1. Technology
2a. Teaching/programming
2b. Learning
3a. Understanding diverse users
3b. Communication skills
4. Flexibility/adaptability
5. Community advocacy and partnerships

When the top competencies reported by staff of Makerspaces and Learning Labs are reviewed, quite a different picture emerges. Technology and learning remained the top two competencies, as in all participant groups. Dominant staff responses focused on possessing specific technology

skills and a willingness to learn new technologies. However, one difference seen is that curiosity and communication skills (both ranked as third, along with community advocacy and partnerships, in this participant group) are considered very important to staff. Teaching was ranked fourth by library staff, but it was ranked as the second most important competency by all participants. Creativity, ranked as fifth for staff, was ranked lower, eighth for all participants.

**Table 18. Top Competences Reported by Staff**

<b>Competency</b>
1. Technology
2. Learning
3a. Curiosity
3b. Communication skills
3c. Community advocacy and partnerships
4. Teaching/programming
5. Creativity

**Competencies That Participants Did Not Possess**

Participants were also asked if they were ever asked to perform a task or to do something for which they did not feel prepared. The majority of participants or 74% (*N* = 31) reported yes to this question. The competencies that participants felt that they did not possess are listed in table 19.

**Table 19. Competency that Participants Did Not Possess**

<b>Competency</b>	<b>Number of Participants</b>	<b>Response</b>
New technologies and Making tools	15	48%
Others	11	35%
Obtaining funding	7	23%
Advocacy	7	23%
Skills to facilitate learning	7	23%
Science content knowledge	6	19%
Knowledge on user behavior and how people learn	6	19%
Management	4	13%

Forty-eight percent of all participants who responded “Yes” that they had been asked to perform a task they did not feel they possessed the knowledge or skills for, reported the use of new technologies and Making tools as the competency they did not possess, followed by the 35% who reported “Others,” which included (1) publicity, developing press releases and marketing using social media; (2) specific programs; (3) tech skills, computer programming, and learning software; (4) instructing others on topics they did not know (e.g., business and coding/programming); and (5) changing technologies and social media. Participants listed these “Other” items if they felt that the competency they were lacking did not fit into one of the predefined categories. Even though some of the entries do appear to overlap with the categories,

we are reporting the “Other” entries as entered by the participants. Competencies related to obtaining funding, advocacy, or facilitating learning all ranked as third (at 23% each) in the competencies that participants felt they did not possess.

### **Educational Preparation for Current Position**

Participants were asked whether they believed their higher education prepared them for working in their current position in either a Learning Lab or Makerspace. An overwhelming 64% of all participants reported that their educational preparation was somewhat relevant, followed by 14% who believed it was not relevant at all, and 12%, who viewed it as relevant. Only 10% reported that it was very relevant to their current position.

**Table 20. Relevance of Educational Preparation for Current Position**

<b>Competency</b>	<b>Number of Participants</b>	<b>Response</b>
Not at all relevant	6	14%
Somewhat relevant	27	64%
Relevant	5	12%
Very Relevant	4	10%

### **Competencies Acquired or Not Acquired from Higher Education**

Further analysis of the data about the relevance of all participants’ educational preparation revealed that the most relevant competencies participants learned through higher education related to their current position. These included the following:

1. Information systems and technology
2. User services
3. Youth development/learning styles
4. Management
5. Problem-solving skills
6. Flexibility/adaptability

Analysis also showed that the most frequently reported competencies participants felt that they did *not* learn from higher education that are relevant to their current position were as follows:

1. New technologies and Making tools
2. Makerspaces
3. Management
4. Teaching and programming
5. Community advocacy and partnerships

### **Resources to Learn New Competencies and Skills**

Participants were also asked to choose all resources they would use to obtain new competencies in order to be successful in their current position. They overwhelmingly reported learning on the

job (90%), followed by learning on their own using online tools or other resources such as Lynda.com (88%), and by networking with other professionals (81%). They also chose grant-sponsored forums and activities (48%), and then formal education (40%) (see table 21).

**Table 21. Resources to Learn New Competencies and Skills**

<b>Resource</b>	<b>Number of Participants</b>	<b>Response</b>
Learn on the job	38	90%
Learn on own using online tools	37	88%
Networking with other professionals	34	81%
Grant-sponsored forums/activities	20	48%
School (formal education)	17	40%
Others	7	17%

Other resources they reported included (1) courses in relevant technology; (2) hiring experts to offer professional development; (3) learning from others through informal meet-ups; (4) employers providing time at work to research/practice skills/software; and (5) webinars.

## **Discussion**

### **Responsibilities and Competencies in Library Informal Learning Spaces**

This study revealed primary job responsibilities that professionals perform in library Makerspaces and Learning Labs as well as competencies they need to serve today's teens successfully in these informal learning spaces. Major job responsibilities include (1) management, (2) teaching and programming, (3) user services, (4) advocacy and partnerships, and (5) collection development. The survey results also suggest that the top needed competencies are skills, knowledge, and personal attitudes in relation to (1) technology, (2a) teaching/programming, (2b) learning, (3) community advocacy and partnerships, (4) flexibility/adaptability, (5) understanding diverse users, (6) management, (7) communication skills, (8) curiosity, (9) creativity, (10a) patience, and (10b) subject content knowledge and skills.

### **Competencies That Professionals Perceive They Are Lacking**

Among the needed competencies, taking a closer look at the competencies that professionals did not possess or did not learn from higher education reveals implications for professional development and pre-service librarian education. The most frequently reported competencies that participants said they did not learn from higher education fall into the areas of (1) contemporary technologies, (2) Makerspaces, (3) management, (4) community advocacy and partnerships, and (5) teaching and programming. These competencies are closely related to the tasks they did not feel prepared to do, such as (1) working with new technologies and Making tools, (2) advocacy, (3) obtaining funding, and (4) facilitating learning.

It is plausible that professionals did not learn or were not equipped with the competencies about new technologies and Making tools (such as 3D printers and laser cutters) or the concept of Makerspace in libraries, because the tools and concept did not exist when many of the participants attended higher education. Programming, advocacy/partnerships, and management are, however, subjects taught in LIS (library and information science) programs. Still,

participants report that they wish they had learned more about these areas. What does this mean? Certainly, along with classroom learning, professionals need practical and real-world experiences to become well versed in these areas. In addition, higher education must strive to teach those topics more relevant to the real world, cultivate students' ability to find connections between theory and practice challenge them to apply principles to real-world issues, and encourage internships and other hands-on experiences.

Certain aspects of management, advocacy, or programming have been changing or are more pronounced in these informal learning environments. For example, the importance of advocacy and partnerships is particularly emphasized in the survey responses; advocacy and partnerships ranked highly in the primary job responsibilities, top needed competencies, and the competencies that they did not possess. In order to maintain and grow these emerging spaces, professionals are called to serve as advocates for the new resources and services they provide and to convince others of the need and impact of the space in order to secure funding. Building partnerships with other agencies and community members has never been more critical as libraries transform into community learning centers. As a participant aptly indicated, a successful Learning Lab or Makerspace is grounded in the community that it serves and focuses on the needs and assets of the community. These learning spaces often invite community artists, makers, scientists, and family members to facilitate various sessions, which makes community involvement a critical element of the spaces. In addition, Connected Learning principles—a framework for designing Learning Labs for teens—suggest that Connected Learning environments are “designed around networks that link together institutions and groups across various sectors [and] learning is most resilient when it is linked and reinforced across settings of home, school, peer culture and community.”<sup>xi</sup> Professionals working in an informal learning space in libraries, as a key player in the Connected Learning ecosystem, are urged to take an active approach to networking and building partnerships to support teens.

Several survey participants reported that they did not feel well prepared to teach and deliver programs in Makerspaces and Learning Labs. The data do not show whether or not individual participants had taken a programming class in their higher education. Even if they had learned about teaching and programming in higher education, participants might not feel that their coursework was relevant to their current practices. In any case, learning—especially informal learning—is an integral part in library Learning Labs and Makerspaces whether teens are just hanging out, socializing, or making something for fun. Facilitating informal learning, such as guiding open-ended sessions and hands-on learning without directing the sessions, is a set of skills articulated in this study. According to the *Youth MakerSpace Playbook*, mentors in these spaces are “a new kind of teacher,” assuming the most powerful role of adults, who encourage, guide, share, but ultimately allow youth to develop processes and come to conclusions on their own accord. These are essential skills that professionals must have in order to invite, inspire, and potentiate young people in different learning/making situations, such as when a youth is frustrated with a particular challenge or having a hard time getting started, or when mentors would like to invite youth to a learning process or when they want to reinforce engagement and persistence.<sup>xx</sup>

### **Competencies Professionals Learned from Higher Education**

On the other hand, a majority of survey participants (86%) reported that higher education was at least somewhat relevant in obtaining the needed competencies. The most frequently reported

competencies participants said they learned from higher education that are relevant to the current position include (1) information systems and technology, (2) user services, (3) youth development and learning styles, (4) management, (5) problem-solving skills, and (6) flexibility/adaptability. It is promising that competencies on information systems/technologies acquired from higher education are applicable to the participants' current job positions, even though technologies are constantly changing and contemporary Making tools did not exist when many of them attended higher education. Findings suggest the importance of cultivating pre-service or current professionals' interests in and comfort with technology and, more importantly, the ability to learn technologies, rather than focusing on teaching specific technology tools during higher education. The user-centered approach taught in LIS programs—such as serving diverse users based on their needs, developmental characteristics, and information behavior and learning styles—turns out to be valuable when professionals work in Makerspaces and Learning Labs.

It is notable that participants developed some of the key dispositions or personal attributes during their higher education, such as adaptability and problem-solving skills. Library learning spaces are and will be constantly changing, including technologies, and professionals are likely to be asked to perform new tasks that they do not feel prepared to do. A few survey participants commented that during their higher education they were consistently encouraged to expect and adapt to changes in technologies, trends, and community needs and expectations. They were taught to be continually learning, to be a self-starter, and to take initiative, which is a valuable asset in working in Makerspaces and Learning Labs.

### **Learning on the Job Continuously**

While there are qualities that higher education can and must promote during a pre-service training period, the survey results indicate that a majority of the professionals continuously acquire competencies on the job. This is inevitable owing to the constantly changing nature of the space and the necessity of hands-on, experiential learning in practice. Professionals acquire needed competencies by learning on their own or through networking with other professionals in Learning Labs and Makerspaces. Existing networks—such as YOUmedia Network Community of Practice ([community.youmedia.org](http://community.youmedia.org)) or Maker Ed's Resource Library ([Makered.org/resources](http://Makered.org/resources))—offer a forum for professionals to share ideas, experiences, resources, tools and materials, projects, and more.

Because professionals continue to grow after they are placed in an informal learning space, it is not surprising that the ability to learn is one of the top needed competencies. Four participants specifically indicated a need of having research skills, which could be part of their learning process, including “finding online and community resources” and “[the] ability to research and determine when to include new technology.” In these learning spaces, inherently, professionals themselves need to be lifelong learners. The participants' job tasks/responsibilities, however, do not display much about learning; there was only one librarian who reported that one of his/her primary responsibilities is doing research. It would be desirable to allow professionals more time, support, and opportunities for learning and research as part of their job.

## **Diversity and Participant Demographics**

One of the key competencies identified in this study is being able to understand diverse users. The communities that the professionals serve are diverse, and they must possess cultural competencies in order to work with teens from different backgrounds. The demographics of the professionals in this study, however, do not reflect the diversity of the communities they serve. The overwhelming majority (88%) of the participants were White, followed by Asian/Pacific Islander or Other (5%). Only 2% reported as being Black or African American ethnicity, and no participant reported as being of Hispanic or Latino or Native American/American Indian descent. Although these figures show a disparity in this study sample, which may not represent the entire population of professionals in Makerspaces and Learning Labs, at least within this study the finding suggests a need of having professionals from diverse backgrounds in library learning spaces.

## **Limitations**

The result is an analysis of forty-four professionals who voluntarily participated in the survey. Findings in this study cannot be generalized, because the sample does not represent the entire Makerspaces or Learning Labs community. In addition, the findings are competencies that the survey participants perceive to be necessary and might not be a comprehensive list of all skills, knowledge, and attributes needed by professionals in Learning Labs and Makerspaces.

## **Conclusion**

This study investigated competencies needed by professionals working with teens in library Makerspaces and Learning Labs. The research results revealed various skills, knowledge, and personal attributes that are needed to provide innovative services and resources in these emerging informal learning spaces. The findings suggest that library professionals must have technology and Making skills, know how to facilitate informal, hands-on learning, and be able to relate to teens from diverse backgrounds. They must be able to understand the needs and characteristics of individuals and to work with the community closely. Professionals also manage the space and a range of resources, as well as supervise staff and volunteers. Personal dispositions—such as flexibility and adaptability, curiosity, patience, creativity, problem-solving skills, and social skills—are also essential to becoming a successful professional in informal learning spaces. Although the study sample focused on professionals in Makerspaces and Learning Labs, all teen services librarians may find the competencies reported in this study relevant to their position because the mission of empowering teens as creative makers and supporting their Connected Learning experiences should not be limited to a certain library space.

## Notes

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- <sup>i</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).
- <sup>ii</sup> *Learning Labs in Libraries and Museums: Transformative Spaces for Teens* (Washington, DC: Association of Science-Technology Centers and Urban Libraries Council, 2014), <http://www.ims.gov/assets/1/AssetManager/LearningLabsReport.pdf>.
- <sup>iii</sup> Mizuko Ito et al., *Connected Learning: An Agenda for Research and Design* (Irvine, CA: Digital Media and Learning Research Hub, 2013), <http://dmlhub.net/publications/connected-learning-agenda-research-and-design>; Kiley Larson et al., “Safe Space and Shared Interest: YOUmedia Chicago as a Laboratory for Connected Learning” (Irvine, CA: Digital Media and Learning Research Hub, 2013), <http://dmlhub.net/publications/safe-space-and-shared-interests-youmedia-chicago-laboratory-connected-learning>.
- <sup>iv</sup> Maker Ed, *Youth MakerSpace Playbook*, 2015, [http://makered.org/wp-content/uploads/2015/10/Youth-Makerspace-Playbook\\_FINAL.pdf](http://makered.org/wp-content/uploads/2015/10/Youth-Makerspace-Playbook_FINAL.pdf).
- <sup>v</sup> *Learning Labs in Libraries and Museums*, 10.
- <sup>vi</sup> Young Makers Program, “Maker Club Playbook,” 2012, <https://docs.google.com/file/d/0B9esWAj9mpBLNmRIMWYxZjUtZjJjMi00NTdhLTmNjUtMmM5ZDk5NTZmMzBh/edit>, 20.
- <sup>vii</sup> The Intel Computer Clubhouse Network, *Computer Clubhouse Mentor Handbook*, n.d., [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjMz56R-IvLAhUHx4MKHYXzDjQQFggdMAA&url=http%3A%2F%2Fwww.evs4u.ro%2Fsoho%2Flibrary%2Fmentor%2FHandbook.pdf%2Fat\\_download%2Ffile&usg=AFQjCNESaV1a8flUA8xeLrt aQ1OWHTx0tw&sig2=KRcWRX30YBVHTpYmefBftQ](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjMz56R-IvLAhUHx4MKHYXzDjQQFggdMAA&url=http%3A%2F%2Fwww.evs4u.ro%2Fsoho%2Flibrary%2Fmentor%2FHandbook.pdf%2Fat_download%2Ffile&usg=AFQjCNESaV1a8flUA8xeLrt aQ1OWHTx0tw&sig2=KRcWRX30YBVHTpYmefBftQ).
- <sup>viii</sup> Maker Ed, *Youth MakerSpace Playbook*, 54.
- <sup>ix</sup> *Ibid.*
- <sup>x</sup> Sandra Hughes-Hassell, “Some Thoughts on the Future Direction of Library and Information Science Education,” *Young Adult Library Services* (Fall 2013): 39–44.

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- <sup>xi</sup> Braun et al., *The Future of Library Services for and with Teens*, 16.
- <sup>xii</sup> American Library Association, “ALA Core Competencies,” 2009, <http://www.ala.org/educationcareers/careers/corecomp/corecompetences>.
- <sup>xiii</sup> YALSA, “YALSA’s Competencies for Librarians Serving Youth: Young Adults Deserve the Best,” 2010, <http://www.ala.org/yalsa/guidelines/yacompetencies2010>.
- <sup>xiv</sup> AASL, “ALA/AASL Standards for Initial Preparation of School Librarians,” 2010, [http://www.ala.org/aasl/files/aasleducation/schoollibrary/2010\\_standards\\_with\\_rubrics\\_and\\_statements\\_1-31-11.pdf](http://www.ala.org/aasl/files/aasleducation/schoollibrary/2010_standards_with_rubrics_and_statements_1-31-11.pdf).
- <sup>xv</sup> YALSA, “Core Professional Values for the Teen Services Profession,” 2015, <http://www.ala.org/yalsa/core-professional-values-teen-services-profession>.
- <sup>xvi</sup> K. Koh and J. Abbas, “Competencies for Information Professionals in Learning Labs and Makerspaces,” *Journal for Education of Library and Information Science* 56, no. 2 (2015): 114–29; J. Abbas and K. Koh, “Future of Library and Museum Services Supporting Teen Learning: Perceptions of Professionals in Learning Labs and Makerspaces,” *Journal of Research on Libraries & Young Adults* 6 (October 2015), <http://www.yalsa.ala.org/jrlya/2015/11/future-of-library-and-museum-services-supporting-teen-learning-perceptions-of-professionals-in-learning-labs-and-makerspaces/>.
- <sup>xvii</sup> Michael Quinn Patton, *Qualitative Research and Evaluation Methods*, 3rd ed. (Thousand Oaks, CA: Sage Publications, 2002).
- <sup>xviii</sup> B. McNeil and J. Giesecke, “Core Competencies for Libraries and Library Staff,” in *Staff Development: A Practical Guide*, ed. E. F. Avery, T. C. Dahlin, and D. A. Carver, (Chicago: American Library Association, 2001), 49–62.
- <sup>xix</sup> Ito et al. *Connected Learning*.
- <sup>xx</sup> Maker Ed, *Youth MakerSpace Playbook*.