

## Making is for Everyone: Learning within Library Makerspaces for Youth with Disabilities

Aligned with the IMLS National Leadership grant program goal #1, objective 1.3, *Create and/or facilitate opportunities for continuous learning for families, groups, and individuals of diverse cultural and socioeconomic backgrounds and needs including, individuals with disabilities*, researchers from the University of Oklahoma will provide evidence of the current state of programming, design, and accessibility of public library makerspaces' programs for youth with disabilities (targeted age range: 8-24) and suggest principles for inclusive making programs. We will partner with a team of experts in makerspace design, a youth services librarian, a self-advocate with disabilities, a special education specialist, and a parent advocate for youth who have disabilities to conduct a three-year Applied Research project with the goals of determining: 1) the prevalence of makerspaces or maker programming for youth with disabilities in public libraries, 2) the role of parents/caregivers and youth with disabilities in maker programming decisions, 3) the barriers encountered by both libraries developing the programs and those of youth with disabilities who participate, 4) the accessibility of makerspaces or maker programming (both physical and learning-enabled design) for youth with disabilities, and 5) the best practices being applied to ensure accessibility of makerspaces and maker programming for youth with disabilities. We are requesting \$296,685 for this project, which will be conducted from August 1, 2022 to July 31, 2025.

The **research questions** include: 1) To what extent do public library makerspaces provide inclusive, inquiry-based programming for youth with disabilities? 2) How do public library makerspaces incorporate the opinions and participation of parents/caregivers and youth with disabilities into their programming decision? 3) What challenges exist for libraries/librarians developing makerspaces for disabled youth? 4) How accessible are makerspaces to youth with disabilities (both physical and learning-enabled design)? 5) What accessibility and inquiry-based learning best practices are makerspace programs using to engage youth with disabilities? and 6) What principles can guide public library makerspaces to facilitate inclusive maker programming for youth with disabilities?

### PROJECT JUSTIFICATION

Makerspaces are flourishing in public libraries, yet little is known about the inclusive programming being provided to library patrons, especially youth with disabilities. Makerspace programming can address inequities in underserved communities (including youth with disabilities), by providing access to various making technologies, skill acquisition through training, and peer and professional mentoring, each critical to today's youth with disabilities who plan to move into the workforce, but also essential for improving each youth's quality of life.

In 2018/2019, 7.1 million youth with disabilities between the ages of 3-21 were served by the Individuals with Disabilities Education Act (IDEA), which comprises 14% of U.S. public school students ([National Center for Education Statistics, 2020](#)). Approximately 61 million, or nearly 1 in 4 (26%) people in the United States, are affected by a disability ([Centers for Disease Control and Prevention \[CDC\], 2020b](#)). Disability is defined as, "any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions). There are many types of disabilities, such as those that affect a person's: vision, movement, thinking, remembering, learning, communicating, hearing, mental health, and social relationships" ([CDC, 2020a](#), para. 1). Further, according to the World Health Organization, "disability has three dimensions: 1) Impairment in a person's body structure or function, or mental functioning, such as loss of a limb, loss of vision or memory loss; 2) Activity limitation, such as difficulty seeing, hearing, walking, or problem solving; and 3) Participation restrictions in normal daily activities, such as working, engaging in social and recreational activities, and obtaining health care and preventive services" ([CDC, 2020a](#), para. 4).

In 2001, the American Library Association (ALA) approved the Library Services for People with Disabilities Policy, which states in part "Libraries play a catalytic role in the lives of people with disabilities by facilitating their full participation in society. Libraries should use strategies based upon the principles of universal design to ensure that library policy, resources and services meet the needs of all people" ([ALA, 2021](#), para. 3). Additionally, ALA has made equitable access to library services by all individuals a key action area in its updated strategic plan ([ALA, 2015](#)). One way that libraries have met this challenge is by developing programs and services for individuals with disabilities of all ages and abilities. Makerspaces are one prominent example of how libraries can engage with youth with disabilities to meet their educational and social needs because the maker movement aims to engage *all* learners with making activities and access to community resources (Halverson & Sheridan, 2014). Also, maker activities can embrace learners' own identities, prior experiences, and interests for tinkering and inquiry-based learning.

Between 2011-2016, IMLS invested over \$10 million into initiatives and grant projects to enhance libraries' and museums' efforts on learning through making ([IMLS talking points, 2016](#)). IMLS continues to fund grants and programs, even through 2021, to provide makerspace, STEM, and other inquiry-based learning programs within libraries. IMLS has also funded efforts to develop the best practices of universal design and guidance for designing accessible and equitable

makerspaces or inquiry-based programs for youth with [Project Enable](#). Libraries and IMLS recognize that serving youth (and adults) with disabilities is a critical need, *but are these services and programs reaching the intended audience(s) for which they are designed? Is maker programming for youth with disabilities providing inclusive, inquiry-based learning experiences?* While the value and need for equitable programs within public library makerspaces are widely recognized in libraries, only a few studies to date (i.e., Brady et al., 2014) provides research-based guidance for developing and delivering programming for youth with disabilities or learning-enabled designs of such programs within public libraries.

Further, no study or systematic data is available that provides evidence of the prevalence of makerspaces or maker programming in public libraries across the nation, let alone data related to makerspaces with inclusive programming for youth with disabilities. In preparation of this grant, the research team conducted a review of various resources (including public library websites, scholarly and practice-oriented literature, online library association websites, and other resources related to makerspaces and making) combined with emails and phone calls to public libraries that list makerspaces on their websites, to preliminarily determine the prevalence of public library makerspaces with programming for youth with disabilities. While by no means an exhaustive sample, the findings indicate that very few public libraries, approximately 165 in our sample of 3,766 (approximately 40.5% of US public libraries), have makerspaces. Approximately 42 makerspaces of the sample of 165 total public library makerspaces listed or reported inclusive youth programming in their makerspace. We acknowledge that this information may not be publicly available on public library websites or that these programs may not be offered during the pandemic, which would of course affect this sampling and review. However, this limited review of public libraries that house makerspaces or that contain making activities for youth with disabilities demonstrates the critical need for this project. There is no comprehensive source currently that provides systematic data about public library makerspaces, let alone those libraries with makerspaces with programming for youth with disabilities. Goal 1 (Research question 1) will provide such data to librarians and researchers.

Of additional importance to addressing the goals of this project, but more importantly to the community of public libraries and youth services library staff, is the need to uncover the challenges libraries face when designing and providing inclusive programming within makerspaces and in maker programming in general. At least one study (i.e., McGowan et al., 2018) has discussed challenges they encountered while developing their own inclusive makerspace programming, but this area remains relatively unexplored.

Even less is known about how parents and the youth with disabilities contribute to the development of inclusive maker programming. There are a few publications about public library programming for youth with disabilities, and there are those which emphasize the importance of including youth with disabilities in programming decisions (Bushman, 2020; Grassi, 2018; Li & Todd, 2019), but no studies about including youth with disabilities in makerspace and maker programming in public libraries were found. Goals 2 and 3 (Research questions 2 and 3) of this project will provide a deeper understanding of the challenges encountered developing and delivering inclusive maker programming and the contribution that parents and youth with disabilities provide. We have chosen a broad age range of youth (years 8-24) as the target group of youth with disabilities in this study. Youth with disabilities may not function at the same chronological age level as youth without disabilities, or they may have varying levels of abilities. In many states, age 24 is the age in which youth with disabilities “age out” of school, thereby they may potentially rely on libraries more. Also, youth with disabilities may have varying levels of comfort communicating with new individuals in their lives, such as our research team. To develop a representative sample of youth with disabilities, we have chosen this broad age range to ensure that we will be able to capture the voices of youth with disabilities and their experiences using making programming or makerspaces.

Available practice-oriented and research literature provides discussion about how programming should be guided by user-centered and universal design approaches (Anderson, 2021b; Whitver, 2020), and ideas for what to include in design of inclusive makerspaces (Anderson, 2018, 2021; Brady et al., 2014; Dow et al., 2021; Higginbotham & Rouse, 2020). Research about youth with disabilities’ participation in libraries is very limited. Notable examples include IMLS funded Project A+ from which Anderson’s studies (2018, 2021) of autistic youth’s experiences in academic libraries originated and Anderson and Phillips (2021) study with librarians with disabilities; Dow et al. (2021) study demonstrating current reference and instructional services and their challenges and suggestions to include students with intellectual disabilities in academic libraries; Brady et al. (2014) study about implementing an accessible maker program in a public library. Much of what is known of inclusive design best practices and principles comes from outside of public libraries and mostly from the learning sciences and computer science. These researchers have focused on inclusive design studies in nonlibrary makerspaces with programs for youth and adults with disabilities (Bar-El & Worsley, 2021; Bennett & Rosner, 2019; Bennett et al., 2019; Bosse et al., 2018; Bosse & Pelka, 2020; Ellis et al., 2021; Seo, 2019; Seo & Richard, 2018; University of Washington, 2015; Worsley & Bar-El, 2020). These studies provide suggestions for best practices and implementation of inclusive learning design principles but from outside of libraries. One notable exception from library and information science is *Project Enable* explained above. Goals 4 and 5 (Research questions 4-6) of our project will add

to the limited practice and research literature about accessibility of, and best practices for, design in makerspaces for youth with disabilities.

## **PROJECT WORK PLAN**

This three-year research project will be led by Dr. June Abbas (an expert in makerspaces, user-centered design, and digital media advocacy, and a parent of two disabled youth) and Dr. Yong Ju Jung (an expert in informal learning, learning design, educational technology, and makerspaces) in collaboration with a 5-member advisory board who will provide feedback through all phases of the project and assist in the assessment of project activities (for details about team members, see Project Staff and Management section below). In **Year 1**, nationwide survey data and interview data with librarians will be collected and analyzed to explore the current prevalence of programming for youth with disabilities in public library makerspaces; in **Year 2**, the team will visit 7 library makerspaces to deeply examine best practices that provide inclusive programming for youth with disabilities. To further integrate the communities this project is designed to impact, we will invite librarians who develop or work in inclusive making programs and youth with disabilities and their caregivers to participate in interviews, thereby adding their voices to the development of the design principles the team will develop in year 3. We have chosen a broad age range of youth (years 8-24) to ensure that we will be able to capture the voices of youth with disabilities and their experiences using making programming or makerspaces. In **Year 3**, building upon findings from Years 1 & 2, practical design principles will be identified and disseminated to guide public library makerspaces to develop inclusive programming for youth with disabilities.

**Research Questions:** The following research questions will guide the study:

- 1) To what extent do public library makerspaces provide inclusive, inquiry-based programming for youth with disabilities?
- 2) How do public library makerspaces incorporate the opinions and participation of parents/caregivers and youth with disabilities into their programming decision?
- 3) What challenges exist for libraries/librarians developing makerspaces for youth with disabilities?
- 4) How accessible are current makerspaces for youth with disabilities (both physical and learning-enabled design)?
- 5) What accessibility and inquiry-based learning best practices are makerspace programs using to engage youth with disabilities?
- 6) What principles can guide public library makerspaces to facilitate inclusive programming for youth with disabilities?

**Theoretical Framing:** The principles of user-centered design and the embodied learning approach will be the theoretical and conceptual basis in understanding and analyzing accessibility and learning-enabled design of the public library makerspaces. User-centered design emphasizes an iterative design process through identifying users' needs, determining requirements to meet the needs, and prototyping (Schmidt et al., 2020). The procedures and settings of makerspace programming, challenges to the programming, and the experiences of youth with disabilities will be examined from the perspective of user-centered design (i.e., youth-with-disabilities-centered design). Also, the embodied learning approach, which is built upon the theories that cognition and learning are not merely based on brain activities but situated in and shaped through learners' body movements and actions (DeSutter & Stieff, 2017), will be used to develop the conceptual and analytical framework for this project. Given that makerspaces aim at supporting sensory and multi-modal experiences, the embodied learning approach will provide the basis to explore how libraries' inclusive programming (can) support diverse forms of creative learning activities of youth with disabilities.

**Appropriateness of Research Methods:** Survey data are appropriate to collect a large-scale national dataset so that we can determine the prevalence of public library makerspaces across the U.S. The follow-up interviews will complement this nationwide data with concrete examples and voices from several librarians who work for or with inclusive makerspace programming. On-site visits and observations are the most appropriate option for this project so that the team can conduct an authentic and in-depth investigation on both physical (e.g., space, tools) and intangible (e.g., educational programs, activities) settings from the selected library makerspaces. These visits and observations will also include conversations (i.e., interviews) with participants including youth with disabilities and parents/caregivers, through which the team can examine how they perceive the inclusive makerspace programming, what challenges they experience, and what suggestions they can provide.

**Year 1 Project Activities:** The first year will be devoted to assessing the prevalence of public library makerspace programming for youth with disabilities. A national survey will be developed and distributed through ALA, Young Adult Library Services (YALSA), and PLA listservs, state department of libraries youth services representatives, and through other professional social media channels. The national survey will also be emailed directly to public libraries using the

IMLS Library Survey data. Follow-up interviews will be conducted with youth services librarians who direct makerspaces or develop maker programming. ***The survey and interviews will achieve Goals 1-3 and address research questions 1, 2, and 3.***

- 1) The survey, interview protocols, and observation protocol will be developed by the project team after reviewing related literature and consulting with our Advisory Board members. Also, other materials for research, including recruitment emails and consent forms, a protocol and forms to receive informed consent from the librarian and parent participants, and an assent form to receive informed assent from the youth with disabilities will be developed. The informed consent and assent forms will assure protection of participants' privacy. (Aug – Oct 2022)
- 2) Application for Institutional Review Board (IRB) approval will be submitted and processed. (Nov2022 – Jan 2023)
- 3) A project website will be launched to provide updates on our project. (Jan 2023)
- 4) The national survey will be distributed through ALA/YALSA/PLA listservs, state department of libraries youth services representatives, and other professional social media channels, and emailed directly to public libraries in the U.S. The main purpose of the survey is to attain an overview about if and how public libraries nationwide deal with inclusive makerspace programming, rather than understanding user experience. Thus, the survey will target librarians and staff working in or for public library makerspaces. It is difficult to estimate the response rate of the online national survey. According to the IMLS Library Survey data, in 2019 there were 9,057 public libraries in the United States (and Washington, D.C.). An acceptable response rate for an online survey is 15% so it could be estimated that we may receive 1,358 responses, however, as we are only interested in determining which public libraries have makerspaces and programming for youth with disabilities, it is assumed the response rate may be lower. (Feb – Mar 2023)
- 5) The national survey data will be analyzed by the project team, with review and input by the Advisory Board. Survey data will be analyzed through descriptive statistical methods and content analysis. The survey data will also be used to identify 5-10 librarians for the follow-up interviews, from public libraries who report that they provide inclusive makerspace programming for youth with disabilities. (Apr 2023)
- 6) Follow-up interview data will be collected with 5-10 librarians from the U.S. public library makerspaces. This semi-structured interview will take place through video conferences (e.g., Zoom) with each librarian. Each interview will take about 1-hour and will be audio- and video-recorded. Recordings of the interview will be transcribed by a transcription company. We acknowledge that recruiting librarians who can contribute their expertise and time to the project may be challenging if they are unaccustomed to taking part in research projects. To mitigate this, the project Advisory Board includes youth's services library staff who will be instrumental in the development of the project design, the research instruments, and the research activities. (May – Jun 2023)
- 7) Follow-up interview data will be analyzed through qualitative content analysis and thematic analysis (Glesne, 2016; Strauss & Corbin, 2015) to identify common and distinct operating methods and barriers in programming for youth with disabilities, with review and input by the Advisory Board. The interview data will be also utilized to identify a potential pool of exemplary makerspaces for the project team's visits and observations in Year 2. (Jul 2023)
- 8) Conduct performance measures evaluation with Advisory Board (Jul 2023)

#### **Year 1 Project Outcomes**

- 1.1) Database of U.S. public libraries with applicable makerspace programming for youth with disabilities.
- 1.2) Analysis of how public library makerspaces in the U.S. incorporate the opinions and participation of parents/caregivers and youth with disabilities into their programming decisions.
- 1.3) Assessment of challenges to libraries, parents, and youth with disabilities in makerspace programming and participation.
- 1.4) Project website. This website will be regularly updated with any progress of the project.
- 1.5) Performance measures evaluation report.

**Year 2 Project Activities:** The second year will include an in-depth analysis of the accessibility of a select sample of makerspaces that have programs designed for youth with disabilities. The sample will be derived from the survey results and review of IMLS publications on funded makerspace programs and meet the criteria outlined in the Diversity Plan below. The project team will choose 7 public libraries that have makerspaces or maker programming for youth with disabilities (aged 8-24) to visit and observe. The visits will include the observation of the physical space of library makerspaces and their making programs for youth with disabilities as well as conversations (i.e., semi-structured interviews) with participants (parents and youth) and librarians. ***The observations and interviews will achieve Goals 4 and 5 and address research questions 4 and 5.***

- 1) Complete analysis of survey data and identification of exemplary makerspaces. (Aug 2023)
- 2) A sample of 7 makerspaces will be selected from the pool of exemplary makerspaces identified in Year 1. The research team will reach out to the sample makerspaces, ask their permission to conduct the research, and arrange schedules for

visit and observation. We acknowledge that locating libraries with makerspaces with programming for youth with disabilities may prove difficult. Through our preliminary research, we know that there are some libraries with makerspaces that contain appropriate programming. In the event that a large enough sample (7 makerspaces who agree to participate) is not secured, we could expand our sample to libraries without makerspaces but that include maker programming for youth with disabilities. (Sep – Dec 2023)

3) The team will arrange with the libraries to recruit participant parents/caregivers, youth, and librarians and to distribute and receive consent and assent forms from participants to assure their agreements in participation in the research. Consent and assent forms from all participants (librarians, parents/caregivers of youth with disabilities, and youth) will be collected online. We acknowledge that recruiting parents and youth with disabilities for observations and interviews may be challenging. The participants will receive direct benefit by participating in the project, thereby increasing the likelihood of their willingness to participate. (Sep – Dec 2023)

4) PIs and GA will visit each selected makerspace for one-day or two-day observation (depending on distance and librarians' schedules). The visits will include (a) observation of physical space of library makerspaces, (b) observation of their making programs for youth with disabilities, (c) conversations (i.e., semi-structured interviews) with librarians, and (d) semi-structured interviews with participants. We plan to have on-site interviews with 1-2 groups of participants (e.g., pair of parent and youth) right after observing their makerspace program participation. However, we acknowledge that interviews with participants may not be possible for some visits because some youth may not be capable of having conversations with the project team or may not feel comfortable with the situation; in such cases, the team will have longer conversations with librarians. When necessary, we will arrange remote interviews with parents/caregivers and youth using Zoom following the observation. An observation protocol and interview questions developed in Year 1 will be utilized. Fieldnotes, video-records, and photos will be collected from the visits. Interview recordings will be transcribed by a transcription company. After the initial one or two visits, the team will meet with Advisory Board members to share the visit experiences and receive feedback for the following visits. (Oct 2023 – May 2024)

5) Data from the visits will be analyzed by the PIs and GA, with review and input by the Advisory Board. Preliminary analysis will include thematic analysis based on a grounded theory approach (Strauss & Corbin, 2015) to identify certain themes of common and distinct features of accessibility and learning activities at the makerspaces. Using this preliminary analysis to develop a coding scheme, photo and documentation will be analyzed through thematic analysis (Glesne, 2016) and video records will be analyzed through qualitative video-based analysis (Goldman, 2007). Different types of data (i.e., fieldnotes, video records, interview) will be used to triangulate data. The amount of research data the project staff will gather may make data analysis and management quite demanding. The PIs are highly experienced researchers with past successes in large, funded project management and completion. Appropriate plans for data management (version control, file naming, and backups of data) will be in place to address this issue. (See the Digital Products and Data Management Plan documents.) Preliminary and final findings will be reviewed with the Advisory Board during February or March and July meetings. (Nov 2023 – Jul 2024)

6) Conduct performance measures evaluation with Advisory Board (Jul 2024)

### **Year 2 Project Outcomes**

- 2.1) Analysis of common and distinct features of current programs for youth with disabilities at library makerspaces.
- 2.2) Data set of authentic experiences and opinions of youth with disabilities and their parents/caregivers related to the library makerspace programs.
- 2.3) Suggestions of practical and applicable design for inclusive library makerspaces programming for *all* learners including youth with disabilities.
- 2.4) Performance measures evaluation report.

**Year 3 Project Activities:** The final year will include analyzing Year 2 data and design of accessibility best practices. Building upon the findings from Year 1 & 2, practical design principles for public library makerspaces' inclusive programming will be developed and shared with the community. Training modules and webinars will be developed by the project team and delivered through multiple channels, such as YALSA, Niche Academy, and YouTube. Scholarly and practice-oriented publications will also be developed to disseminate the findings and best practices. ***The activities of Year 3 will achieve Goal 5 and address research question 6.***

1) Data analysis of library visits will be completed and discussed with the Advisory Board during the August meeting. (Aug 2024).

2) Design principles for inclusive makerspace and maker programming for youth with disabilities in public libraries will be deduced and developed based on the findings from Years 1 & 2 and suggestions from librarians and participants from Year 2. (Sep – Nov 2024)



- 3) Training modules such as video resources and webinars will be developed. The principles and modules will be reviewed with the Advisory Board, and the Board will help the project team identify resources to better serve needs of the community and youth with disabilities. (Sep – Nov 2024)
- 4) Training modules will be delivered to libraries and potential community partner organizations through webinars, online resources, and in-person sessions at national and state conferences. (Dec 2024 – Apr 2025)
- 5) Outcome-based evaluation (OBE) of the training modules will be conducted to determine if the project outcomes are met. We will ask librarians who attend the webinars to complete a pre- and post-survey before and after each training. (Dec 2024 – Apr 2025)
- 6) The team will share the findings from Years 1 through 3 (a) on our project website and social media channels (e.g., Facebook, Twitter, YALSA), (b) by writing articles for practice-oriented publications and academic journals, and (c) by delivering presentations at regional, state, and national conferences. (May – Jul 2025)
- 7) Conduct performance measures evaluation with Advisory Board (Jul 2025)

**Year 3 Project Outcomes**

- 3.1) Design Principles for Inclusive Makerspace and Maker Programming for Youth with Disabilities in Public Libraries developed by project team
- 3.2) Replicable training modules to train librarians for best accessibility practices for inclusive makerspace programming at public libraries and the design principles.
- 3.3) Delivery of training modules through webinars and presentations through multiple channels, such as YALSA, Niche Academy, and YouTube.
- 3.4) Disseminate findings in at least two practice-oriented publications and two scholarly peer-reviewed publications and conference presentations.
- 3.5) Updates on the project website and social media channels to provide up-to-date information on project activities and to disseminate the findings, publications, presentations, and training modules
- 3.6) Performance measures evaluation report

**Table 1. Project Activities, Products, Contributors, and Completion Dates**

Activity	Product	Who Is Involved	Date Range
<i>Year 1 (for Goals 1, 2, &amp; 3 by addressing Research questions 1, 2, &amp; 3)</i>			
Develop national survey, interview protocols, and observation protocols	Survey instrument, interview and observation protocols	PI and Co-PI; Input from Board	Aug – Oct 2022
Apply for IRB approval	IRB approval	PI and Co-PI	Nov 2022 – Jan 2023
Create the project website	Outcome 1.4	PI and Co-PI, GA	Jan 2023
Collect data (survey and follow-up interview)	Outcome 1.1, 1.2, 1.3	PI and Co-PI, GA, librarian participants	Feb – Jun 2023
Analyze data (survey and follow-up interview)	Outcome 1.1, 1.2, 1.3, 1.4; a pool of potential interviewees	PI and Co-PI; Input from Board	Apr – July 2023
Conduct performance measures evaluation	Performance measures evaluation report	PI and Co-PI, Input from Board	July 2023
<i>Year 2 (for Goals 4 &amp; 5 by addressing Research questions 4 &amp; 5)</i>			
Complete analysis of survey and follow-up interview data	Outcome 1.1, 1.2, 1.3, 1.4; a pool of potential interviewees	PI and Co-PI; Input from Board	Aug 2023
Select a sample of makerspaces, schedule visits, receive consent forms	A selection of exemplary public library makerspaces, schedules for visits, agreements from participants	PI and Co-PI, GA; Input from Board	Sep – Dec 2023
Visit sample makerspaces (data collection)	Data from the visits (fieldnotes, video-records,	PI and Co-PI, GA; Librarian, parents,	Oct 2023 – May 2024

	interview, photos); Outcome 2.2	youth participants; Input from Board	
Analyze data from the visits	Outcome 1.4, 2.1, 2.3	PI and Co-PI, GA; Input from Board	Nov 2023 – Aug 2024
Conduct performance measures evaluation	Performance measures evaluation report	PI and Co-PI, Input from Board	July 2024
<i>Year 3 (for Goal 5 by addressing Research questions 6)</i>			
Complete analysis of visits data	Outcome 1.4, 2.1, 2.3	PI and Co-PI, GA; Input from Board	Aug 2024
Develop design principles and training modules	Outcome 3.1	PI and Co-PI, GA; Input from Board	Sep – Nov 2024
Implement training modules to librarians and community	Outcome 3.2	PI and Co-PI, GA, webinar participants	Dec 2024 – Apr 2025
Conduct outcome-based evaluation	Outcome-based evaluation result	PI and Co-PI, webinar participants; Input from Board	Dec 2024 – Apr 2025
Disseminate findings	Outcome 3.2, 3.3; publication articles and conference presentations	PI and Co-PI	May – July 2025
Conduct performance measures evaluation	Performance measures evaluation report	PI and Co-PI, Input from Board	July 2025

**Meetings Schedule:** During the three years of the project, the research team will meet regularly and as needed. The PIs and GA will meet every other week in person or through conference calls to discuss and check work progress. In addition, PIs will have day-long meetings ten times to 1) develop national survey and protocols for interview and observation (August 2022, November 2022); 2) discuss findings from the survey analysis and identify interviewees for follow-up interviews (April 2023); 3) conduct performance measures evaluation for Year 1 (July 2023); 4) discuss findings from the interviews, select a sample of makerspaces for visits, and update the observation protocols (August 2023); 5) review processes and findings from initial two visits and update plans for the following visits (December 2023); 6) discuss analysis and findings from the visits (June 2024); 7) conduct performance measures evaluation for Year 2 (July 2024); 8) develop design principles and training modules (September 2024, November 2024); 9) conduct evaluations of the project (April 2025); 10) conduct performance measures evaluation for Year 3 (July 2025). Ten of these meetings will include the Advisory Board. The Board will 1) review the survey, interview questions, and observation protocols (October 2022); 2) review the findings from the survey and assist the team in identifying interviewees (April 2023); 3) analyze the project's performance and conduct evaluations for Year 1 (July 2023); 4) review the findings from the interviews and assist the team in selecting a sample of makerspaces for visits (August 2023); 5) review the processes and findings from the initial visits (December 2023); 6) review analysis procedure and findings from the visits (June 2024); 7) analyze the project's performance and conduct evaluations for Year 2 (July 2024); 8) assist in the development of design principles and training modules (November 2024); and 9) evaluate the project's goals and outcomes using the Outcome Based Evaluation developed by the project team, and the new IMLS performance measures (April 2025); 10) analyze the project's performance and conduct evaluations for Year 3 (July 2025); see the Evaluation Plan section for more details.

**COVID-19 Contingency Plan:** While we assume that the pandemic will be over by the time we will start visiting the sample of makerspaces (October 2023-May 2024), we acknowledge that our plan for the visits may be influenced by the pandemic or any situation that causes travel restrictions. If the in-person visits are not possible, we will change the visits to online by (a) asking librarians to make a virtual tour for the observation of physical space of library makerspaces, (b) auditing online makerspace programs, if the library has any, (c) speaking with librarians through conference calls, and (d) arranging conference calls for interviews with parents/caregivers and youth with disabilities. Besides, other data collection methods (i.e., survey, interviews) will be conducted through an online survey tool and conference calls, so we expect minimum influence of COVID-19 on these data sources. Meetings of the research team and with the Advisory Board are already planned to take place through conference calls so will not be affected.

**Project Staff and Management:** The project team includes one library and information science university faculty (Abbas), one learning sciences and technologies university faculty (Jung) and an Advisory Board comprised of one makerspaces research expert (Koh), youth services library staff (Spence), self-advocate and expert in maker education for low vision and blindness (Seo), a member from a parent advocacy group, Parent to Parent USA (Pike), and a special education expert (Gomez).

**June Abbas, Ph.D.,** Professor, School of Library & Information Studies, University of Oklahoma. Principal Investigator and Project Director: Dr. Abbas is a highly experienced researcher whose long research career has focused on children and youth technology use, and the impact of technologies on service provision in public libraries. Dr. Abbas has extensive supervisory and managerial experience and has successfully managed several large research grants. She is also the Interim Director of the University of Oklahoma's College of Arts & Sciences Data Scholarship Program. Dr. Abbas will serve as Project Director and manage the overall project to ensure all goals are met, adherence to the timeline, and completion of all activities. She will also participate in all data gathering and analysis activities, as well as development and delivery of the training modules and webinars.

**Yong Ju, Jung, Ph.D.,** Assistant Professor, School of Library & Information Studies, University of Oklahoma. Co-Principal Investigator: Dr. Jung specializes in researching and designing learning activities and modules for children and youth in various community organizations by utilizing innovative, hands-on technologies and resources. Dr. Jung will be responsible for preparing and conducting data collection and analysis, particularly for on-site visits and observations of learning practices and programming at library makerspaces. She will also lead the analysis and development of the design principles.

**Advisory Board:** A five-member Advisory Board will guide the activities and outcomes of the project by 1) providing input on pertinent questions for surveys, interview and observation protocols, and data analysis; 2) reviewing research findings to provide insight and connection with librarians', parents', and youth's experiences; 3) sharing findings with their libraries and community organizations via social media; and 4) assisting in the development and revision of training modules. Expected total time commitment for the three years is 75 hours (25 hours per year at \$20 per hour honorarium). Each Advisory Board member possesses the necessary expertise to facilitate the development of the project and the fulfillment of its core goals and outcomes. Regular meetings with the Advisory Board members will allow the research team to integrate diverse perspectives from stakeholders and build consensus throughout the project milestones.

**Kyungwon Koh, Ph.D.** (makerspace expert member) is an Associate Professor in the School of Information Science at the University of Illinois at Urbana-Champaign. Her expertise includes the maker movement in libraries and education, learning and community engagement through libraries, and youth information behavior and literacies. **Rebecca Spence** (youth services library staff member) is an Adult and Teen Information Services Librarian at the Norman Public Library Central of the Pioneer Library System. She has managed the programming and collections for young adults. She is an expert on enhancing youth services and designing leading-edge programs for teenagers, including being a founding co-creator of Oklahoma's first literary convention for teenagers (Oklahoma Teen Book Con). She also created and implemented the first library programs in Oklahoma designed specifically for teenagers with disabilities and their families. **JooYoung Seo, Ph.D.** (self-advocate and maker education expert) is an Assistant Professor in the School of Information Sciences at the University of Illinois at Urbana-Champaign. As a member of blind maker communities (e.g., Blind Arduino; Raspberry VI; Blind Electronics), his work has contributed to inclusive design for people with disabilities, particularly those who are blind and/or visually impaired using multi-modal representation, such as tangible robotics and data sonification. His research focuses on accessible computing, non-visual learning/user experience design in STEM+C contexts, and accessible data visualization methods for blind and low-vision learners. **Heather Pike** (parent advocate) is the Associate Director for the Oklahoma Family Network (OFN), Family to Family Health Information Center and Parent to Parent organization, where she has worked for over 19 years. Her position at OFN allows her to serve others and connect with families and organizations across the state and country. She currently serves on the Interagency Coordinating Council for Sooner Start, Center for Learning and Leadership Family Leadership Council, LEND Family Intern, Hearts for Hearing Board of Directors, Oklahoma Communities of Practice State Team, as well as many other committees and councils. **Alvaro Gomez, Ph.D.** (special education expert) is an instructional coach for Northside Independent School District and a Lecturer of Special Education at the University of Texas at San Antonio (UTSA). He partners with teachers in developing both their pedagogy and technology knowledge within contexts that support students with disabilities. At UTSA, he lectures both pre-service and in-service special education teachers on topics such as introduction to special education, teaching strategies for students with mild/moderate/severe disabilities, and research designs in special education.

**Evaluation Plan:** The IMLS agency-level goal of "Promote Lifelong Learning" (see [IMLS Strategic Plan 2018-2022](#)) is applicable to this project. We have selected two of the four objectives under this goal: 1) Continuous learning for families



and individuals with diverse backgrounds and needs, and 2) Support cross-disciplinary and inquiry-based methods of learning within museums and libraries that reflect measurable changes or outcomes that we intend our project to achieve. To assess the attainment of these objectives, we have developed an outcomes-based evaluation (OBE) plan. OBE is used to measure the benefits to the audience or participants of a project ([IMLS, n.d.](#)). Supportingdoc2 provides an overview of the project's OBE plan. The OBE evaluation will be conducted with webinar participants to determine if we have met the two IMLS objectives detailed above. We will also conduct a yearly evaluation at the end of each project year (August 2023, 2024, and July 2025) with the Advisory Board which will include assessment of the new IMLS performance measures including: 1) Effectiveness: The extent to which activities contribute to achieving the intended results? 2) Efficiency: How well resources (e.g., funds, expertise, time) are used and costs are minimized while generating maximum value for the target group? 3) Quality: How well the activities meet the requirements and expectations of the target group? and 4) Timeliness: The extent to which each task/activity is completed within the proposed timeframe? Adjustments will be made to the project activities as necessary based on the performance measures evaluation and feedback from the Advisory Board. (See the Performance Measure Plan for a complete explanation of this evaluation.)

**Communication and Dissemination Plan:** The project findings will be shared with librarians and other professionals in several ways. 1) The project team will develop presentations at venues such as the Oklahoma Library Association, PLA, and ALA, as well as ALISE. 2) The project team, including the Advisory Board, will develop training modules for youth services and makerspace library staff focused on designing accessible and inclusive makerspace programming for youth with disabilities. 3) Researchers will develop a project website and social media channels (e.g., Twitter, YouTube) to share versions of materials produced by the project team. These will include papers, PowerPoint presentations, tutorials, workshop hand-outs, and additional materials from the grant including a link to the database of libraries developed as part of the survey. 4) The project team will write semi-annual project status reports to be posted to the project website, and issue status updates via Twitter and ALA's YALSA member blog. 5) The researchers will provide semi-annual project status reports to the Board members at the Board meetings. 6) Board members will share project updates through their preferred social media channels. 7) The researchers will also publish at least two academic journal articles and two practitioner-oriented articles based on the project results. 8) There will also be social media campaigns at key points in the project (e.g., when training modules are implemented), focusing on Twitter, the YALSA blog, Niche Academy, and YouTube.

## **DIVERSITY PLAN**

This project will contribute to diversity in various ways. First, this project will be conducted for and with youth with disabilities who have been underrepresented in research about many library makerspaces and maker programming. By incorporating their voices into the project and observing their experiences, this project will be centered on how to address their needs and challenges. Also, this project will be conducted by researchers and advisory board members from varied cultural, ethnic, and professional backgrounds (as demonstrated in the Project Staff and Management section) who each bring needed expertise to the project. By disseminating the outcomes (e.g., database, analysis, design principles, training modules, etc.) that are based on the user-centered design perspectives for more inclusive makerspaces and maker programming in public libraries, this project will contribute to extending public libraries' commitment to diversity, equity, and inclusion practices. Furthermore, when selecting libraries to visit and observe, the following criteria will be used: 1) the presence of a makerspace or maker programming for youth with disabilities, and 2) their geographic and demographic diversity. Every effort will be made to choose libraries that meet the two criteria but that are also located in highly diverse communities in urban, suburban, and rural areas, which include a diverse range of ethnic and racial groups with strong representations of Latino, African American, and low-income populations. The training modules will also be adaptable for use with geographically and demographically diverse populations and contain sections devoted to working with users from underrepresented groups.

## **PROJECT RESULTS**

Project results will provide libraries with data to make strong, youth-with-disabilities-enabled decisions when designing makerspaces and maker programming. Youth with disabilities will benefit from libraries providing youth-with-disabilities-centered maker programming. Youth services staff in libraries (and other informal making environments) will have guidance to develop maker programming for youth with disabilities. The summary of Project Outcomes includes: 1) database of public libraries with makerspaces or making programming for youth with disabilities, 2) analysis of library makerspaces incorporation of parents/caregivers and youth with disabilities into programming decisions, 3) assessment of challenges to libraries and youth with disabilities in makerspace participation, 4) practical and applicable design principles for inclusive library makerspace and maker programming for youth with disabilities, and 5) replicable training modules

for best accessibility practices for inclusive makerspace programming at public libraries which will provide public library makerspace staff with tools to develop inclusive programming. Further, the project outcomes build on prior funded IMLS makerspace projects (e.g. Project Enable, Project A+, and the recently funded planning project by PIs Anderson & Phillips (LG245194-OLS) ensuring that IMLS' investments continue to benefit library staff, public libraries, museums, and other informal makerspaces.

### **National Impact**

This project will make meaningful impacts on different audiences, public libraries, youth with disabilities and their families, and researchers. **For public libraries**, the project results will provide them with systematic data to make strong, youth-with-disabilities-enabled decisions when designing makerspaces and makerspace programming. As noted above, there are few studies focused on public library makerspaces for youth with disabilities. The results from the project will enable youth services staff in makerspaces in libraries (and also in academic libraries, museums and making environments) to design and develop maker programming for youth with disabilities that is grounded in a deeper understanding of the contributions and benefits involving parents/caregivers and youth with disabilities in programming decisions. Especially, our project results will provide libraries and youth services staff with training about how to implement best practices when developing maker programming and designing makerspaces. Literature about providing inclusive programming emphasizes the necessity for more training for library staff. Often library staff feel unprepared or uncomfortable when working with youth with disabilities (Grassi, 2018; McDonald et al., 2015; Small & Stewart, 2013). The webinars and training modules will provide libraries and youth services staff with needed training. Project modules will be easily adaptable by any library wishing to develop either maker programming or a makerspace with adaptations for youth (or adults) with disabilities.

Furthermore, the results will include the Design Principles for Inclusive Makerspace and Maker Programming for Youth with Disabilities in Public Libraries that provide practical guidelines and suggestions for public libraries to consider when designing and implementing learning-enabled making programs. Design principles are the list of documented characteristics about the processes in the practice of learning design that are based on related theories and empirical investigations (van den Akker, 1999). There have been diverse studies about design principles for makerspace and maker programming (e.g., Kim, Choi, & Jung, 2020) but they have not fully addressed unique needs and situations for youth with disabilities. The design principles developed from this project will benefit public libraries and makerspaces by guiding them to design theoretically and practically well-informed inclusive maker programming and space for youth with disabilities. Libraries and makerspaces adopting the design principles will benefit youth with disabilities in their communities by providing a more meaningful and safe learning space for them. The design principles developed from this project will be available and applicable to any libraries and makerspaces as well as other informal making environments.

**For youth with disabilities and their families**, the project can help public libraries to incorporate their voices into decision-making and support their learning in public libraries. According to youth.gov, “disabilities can be an important part of a young person’s identity and contribute to their life in many ways. These identities shape how young people with disabilities foster their strengths, interests, and diverse perspectives on the world around them” ([youth.gov, n.d., para. 1](#)). To successfully transition to adulthood and possibly into the workforce, youth with disabilities require: 1) opportunities to develop social, civic, and leadership skills; 2) strong connections to caring adults; 3) access to safe places to interact with their peers; and 4) support services to allow them to become independent adults ([National Collaborative on Workforce and Disability, 2016](#)). Makerspaces can provide each of these and more through connected learning experiences, adult and peer mentors, and a safe environment in which youth with disabilities can feel like they belong. Our project results will provide libraries with data to make strong, youth-with-disabilities-enabled decisions when designing makerspaces and makerspace programming, so youth with disabilities will benefit from libraries providing more youth-with-disabilities-centered programming in library makerspaces and/or general maker programming. The results could also empower youth with disabilities and their parents to actively participate in the libraries’ decision-making processes.

**For researchers**, our project can help scholars from different fields, including library and information science, learning sciences, and computer science, by providing a dataset about the prevalence of makerspaces and maker programming for youth with disabilities nationwide. The project materials will be freely available on the project website, thereby sustaining the benefits of the project long beyond the funding period for not only public libraries but also researchers. Further, we have developed an inclusive plan to assure that project findings and materials are accessible to both the practice communities (library, parent advocacy, special education, and universal design) and academic research community. See the Communication and Dissemination Plan above for more details.





## Digital Products Plan

The project team will manage all digital products produced by this grant as outlined below. Here we describe the types of digital products created by the grant activities, how the products will be made openly accessible, the copyright and intellectual property rights of each product, and how the products will be sustained after completion of the grant project.

### 1. Types

#### *1A. Types of digital products produced*

We will create five main types of digital products:

1. Anonymized research data, including survey data as a digital database, de-identified interview data from library staff, parents, and youth with disabilities, fieldnotes, video-records, and photos and training module evaluation questionnaires.
  - A. The national survey will be conducted using Qualtrix software. The data will be exported as CSV files to Excel for data analysis. Qualtrics runs on a secured site hosted by the University of Oklahoma. Evaluation surveys will be distributed in paper form and then transferred to Excel for analysis.
  - B. An online database will be developed and made available on the project website. The database will be created using MySQL and linked to the project website.
  - C. There will be 35-40 total interviews of 45-60 minutes each. Interviews will be digitally audio recorded and then transcribed into text files. The files will be transferred to Dedoose for data analysis.
  - D. There will be 7 sets of field notes from observations at each exemplar library. Notes will be transcribed as Word files and stored in a text file for analysis using Dedoose. Field notes of the observations will be created by the graduate assistant and PI Jung using a password protected laptop.
  - E. There will be 7 sets of video-records from observations at each exemplar library recorded as mp4 files. Each file will be imported into V-Note® for analysis.
  - F. There will be 7 sets of photos from observations at each exemplar library recorded as JPEG files.
  - G. There will be participant consent and assent forms signed by all librarian, parent and youth participant (approximately 35-40 in total). These will be Word files.
  - H. There will be training module evaluation questionnaires, which will be administered in Word to librarians and Advisory Board members. The data will be transferred into a text file for analysis with Dedoose.
2. Project team meeting notes from project conference calls will be created in Word and stored on a shared OneDrive.
3. Project press releases about project activities and achievements. There will be six, semi-annual press releases written in text files and released via Twitter, Facebook, and via ALA's Young Adult Library Services blog, and the PLA blog.
4. Training modules (public education materials that libraries can use for developing makerspaces or making programming for youth with disabilities). The digital training modules (may be either videos, recorded webinars, or PowerPoint and Word files) can be customized by libraries for their use. The modules and training guidelines will be posted to the project website.
5. The project website, including information about the project (goals, progress updates, and public education materials resulting from the research). The project website will be created using WordPress.

#### *1B. Metadata*

A shared Excel spreadsheet will be used to document each project file. A file naming convention will be used for each file generated by the project. The researchers and Graduate Assistant will complete the metadata for each file on the shared Excel spreadsheet. The project will adapt the Dublin Core metadata scheme to document each project file. Additional elements will be added as necessary to describe the multimedia files in more depth. A README file will also be generated by the PI and the graduate assistant to document version control and file contents. The README file will be continually updated throughout the project as new files are created. The metadata generated by this research project is only of use to the PIs and their research assistants and will not be made publicly available.

### 2. Availability:

De-identified research files and the README file will be made openly available through the University of Oklahoma's institutional repository, ShareOK (<https://shareok.org/>). ShareOK assigns a DOI to each dataset and maintains the data files under each project uploaded to its site. The PI will assure that all personally identifying information is removed from the files before uploading the data to ShareOK for storage. ShareOK is discoverable over the Web, so anyone wishing to access the research files will be able to search the project name and gain access.



## The Board of Regents of the University of Oklahoma

The project website and all digital projects available on the site will be maintained by the PI after the project concludes. The project website will also provide a link to the ShareOK site and DOI for the project's research data. All publications will be cited on the project website, and pre-prints of each will be made available on the project website and ShareOK site as permitted by the publisher's copyright agreement. See the Data Management Plan for more details.

### 3. Access:

Ownership will reside with the research team with the provisions required by IMLS. We will assign an Attribution 4.0 International Creative Commons license to enable unrestricted use of the digital products. We will put no restrictions on reuse. The overriding goal of the project is public education. Therefore, we encourage reuse of our digital products. As required by our Institutional Review Board (IRB), we will anonymize the data before releasing it for reuse. We will not include any personally identifying information (personal names, institutional name, geographic locations, etc.) in the products that we create. The products will not create any privacy or cultural sensitivity issues.

We will create four categories of digital content. Each are described below along with access provisions.

*Type 1)* Anonymized research data, including survey data, de-identified interview data from library staff, parents, and youth with disabilities, fieldnotes, and training module evaluation feedback. We will assign an Attribution 4.0 International Creative Commons license to enable unrestricted use of these data for each set of digital content, with the exception of the video-recordings. Due to the content of the recordings, it will be difficult to remove all identifying content. Instead, we will make clips of the videos available only upon request. The clips will remove the participants from the shots and focus on makerspace-related design elements. A listing with short descriptions of each clip will be available on the project website and the clips will be available by request to the PIs via email. De-identified data from the interviews, fieldnotes, and photos will be made available on the University of Oklahoma's institutional repository, ShareOK, with permission from the participants. Permission will be secured on the consent forms signed by all participants. If participants do not want their photos shared, their photos will not be publicly available on ShareOK.

*Type 2)* Online database of public library makerspaces (gathered through survey in Year 1). This database will be freely available on the project website. We will assign an Attribution 4.0 International Creative Commons license to enable unrestricted use of the database.

*Type 3)* Digital training modules (may be either videos, recorded webinars, or powerpoint and Word files) that can be customized by libraries for their use. We will assign an Attribution 4.0 International Creative Commons license to enable unrestricted use of the training modules and materials. Each will be available on the project website.

*Type 4)* The project website, including information about the project (goals, progress updates, and public education materials resulting from the research). We will assign an Attribution 4.0 International Creative Commons license to ensure unrestricted use of all project website content.

### 4. Sustainability:

During the project period, the PI and the graduate assistant will be responsible for assuring all data files are secure and backed up weekly. Each set of data will be stored on a password protected University of Oklahoma OneDrive folder and only accessible to the PIs and the graduate assistant. The PI will also assure that Research Data Management (RDM) principles are adhered to throughout the project. Original files will be stored separate from the working files. Only working files will be accessed by the project team. *Copies of all working files* will be backed up weekly on a secured external drive that will be kept in a locked cabinet in her office. We will also develop a project specific metadata scheme adapted from the Dublin Core metadata scheme and a ReadMe file for all digital assets to assure that all files and resulting versions are controlled. Data will be maintained for the specified period by the University of Oklahoma's IRB. The PI, Co-PI Jung, and the project graduate assistant will have permissions for uploading content to the password protected WordPress website. We will coordinate content development via our regular project team meetings.

After the project period, de-identified research files will be made openly available (as explained in the Availability section above) through the University of Oklahoma's institutional repository, ShareOK (<https://shareok.org/>). All research files will be converted to pdf format for repository storage. Meeting notes and other project documents will be kept by the PI on a password protected external drive and will be deleted after the mandated period for storage. The project website and all digital projects available on the site will be maintained by the PI after the project concludes.

## Data Management Plan

Managing data across the research lifecycle is important for project success. This data management plan explains how the data will be managed, shared, preserved, documented, and enable reuse of the data during and after the project.

**Type(s) and estimated amount of data:** We will create five main types of digital products:

1. Anonymized research data, including survey data as a digital database, de-identified interview data from library staff, parents, and youth with disabilities, consent and assent forms, field notes, video-records, photos, and training module evaluation questionnaires. See the Narrative for dates of data collection activities.
  - A. The national survey will be conducted using Qualtrics software. The data will be exported as CSV files to Excel for data analysis. Qualtrics runs on a secured site hosted by the University of Oklahoma. Evaluation surveys will be distributed in paper form and then transferred to Excel for analysis. The survey data will be used to learn more about makerspaces for youth with disabilities in public libraries and to identify exemplar libraries to visit.
  - B. An online database of public libraries that include makerspaces and maker programming for youth with disabilities will be developed and made available on the project website. The database will be created using MySQL and linked to the project website.
  - C. There will be 35-40 total interviews of 45-60 minutes each. Interviews will be digitally audio recorded as mp4 files and then transcribed into text files. The files will be transferred to Dedoose for data analysis. Data will be coded and exported to Excel or Word files for further analysis.
  - D. There will be 7 sets of field notes from observations at each exemplar library. Field notes of the observations will be created by the graduate assistant and Co-PI Jung using a password protected laptop. Notes will be transcribed as Word files and stored in a text file for analysis using Dedoose. Data will be coded in Dedoose and then exported to Word files for further analysis and use.
  - E. There will be 7 sets of video-records from observations at each exemplar library recorded as mp4 files. Each file will be imported into V-Note® for analysis and later exported into Word or Excel files for further analysis and use.
  - F. There will be 7 sets of photos from observations at each exemplar library recorded as JPEG files.
  - G. There will be participant consent and assent forms signed by all librarian, parent, and youth participants (approximately 35-40 in total). These will be Word files.
  - H. There will be training module evaluation questionnaires, which will be administered in Word to librarians and Advisory Board members. The data will be transferred into a text file for analysis with Dedoose.
2. Project team meeting notes from project conference calls will be created in Word files and shared within the team using OneDrive.
3. Project press releases about project activities and achievements. There will be six, semi-annual press releases written in text files and released via Twitter, Facebook, and via ALA's Young Adult Library Services blog, and the PLA blog.
4. Training modules (public education materials that libraries can use for developing makerspaces or maker programming for youth with disabilities). The digital training modules (may be either videos, recorded webinars, or PowerPoint and Word files) can be customized by libraries for their use. The modules and training guidelines will be posted to the project website with an Attribution 4.0 International Creative Commons license to enable unrestricted use of the digital products.
5. The project website, including information about the project (goals, progress updates, and public education materials resulting from the research). The project website will be created using WordPress and will be maintained by the graduate assistant throughout the grant period and by the PI after the grant ends.

**Maintaining confidentiality:** This project will not collect any sensitive information. Permission will be secured on the consent forms signed by all participants. We will make every effort to conceal the identity of participants by not mentioning their names in interviews. Due to the content of the videos, it may be difficult to remove all identifying content. Instead, we will make clips of the videos available only upon request. The clips will remove the participants from the shots and focus on makerspace-related design elements. A listing with short descriptions of each clip will be available on the project website and the clips will be available by request to the PIs via email. We will not associate participant names with files, and each will be assigned a pseudonym prior to interviews. Files will be named with the location of the

library (i.e. CPL), participant designation of P# (parent), L# (librarian), Y# (youth), and date (022123). The resulting file name may be: CPL\_P1\_022123. We will also anonymize all data prior to publishing it in the OU institutional repository to remove any library names, geographic locations, and any other identifying information.

**What technical (hardware and/or software) requirements necessary for using the data:** No specialized software or hardware will be necessary to access or re-use the project data. As outlined above, the data will be captured in file types that can be easily accessed and used by available and open access software (i.e. Excel can be exported to CSV files, Word to rtf files, etc.). Video and audio files will be in mp4 format which is the standard for these types of data.

**Project documentation files:** As outlined above, the project will collect several types of documents generated during the research process (consent or assent forms, code books, analyzed data from coding interviews and video/audio recordings) and additional non-research data, such as team meeting notes, press releases, and training modules and materials and html files for the project website. Metadata will also be assigned to each file type detailed above. Research data that is not shareable includes, consent and assent forms, analyzed data from interviews and recordings. Non-research data that is not shareable includes: meeting notes. Non-shareable documents will be kept on a password protected external drive in the PI's office. All other materials will be shared on either the project website or in the university institutional repository.

During the project, the files and data will be managed by the PIs and the graduate assistant. A shared Excel spreadsheet will be used to document each project file. A file naming convention will be used for each file generated by the project (see above for file naming convention). The PI and graduate assistant will complete the metadata for each file on the shared Excel spreadsheet. The project will adapt the Dublin Core metadata scheme to document each project file. Additional elements will be added as necessary to describe the multimedia files in more depth. A README file will also be generated by the PI and the graduate assistant to document version control and file contents. The README file will be continually updated throughout the project as new files are created. The metadata generated by this research project is only of use to the PIs and their research assistants and will not be made publicly available.

The PI and the graduate assistant will be responsible for assuring all data files are secure and backed up weekly. Each set of data will be stored on a password protected University of Oklahoma OneDrive folder and only accessible to the PIs and the graduate assistant. The PI will also assure that Research Data Management (RDM) principles are adhered to throughout the project. Original files will be stored separate from the working files on an external drive in the PI's office. Only working files will be accessed by the project team. *Copies of all working files* will be backed up weekly on a secured external drive that will be kept in a locked cabinet in the PI's office. Data will be maintained for the specified period by the University of Oklahoma's IRB. The PI, Co-PI Jung, and the graduate assistant will have permissions for uploading content to the password protected WordPress website.

**Plan for managing, disseminating, and preserving data after the completion of the project:** After the project period, de-identified research files will be made openly available through the University of Oklahoma's institutional repository, ShareOK (<https://shareok.org/>). The PI will assure that all personally identifying information is removed from the files before uploading the data to ShareOK for storage. All text-based research files will be converted to pdf format for repository storage. A README file will be developed for the project that lists the project name, dates of collection, types and amount of files, a list of all available files and their formats, the URL of the project website, and an explanation of the file naming convention. Files that are not included in ShareOK will not be included on the README file but a note about their availability and access information will be included. The files and README file will be stored indefinitely in ShareOK. A permanent catalog record and DOI will be assigned to the project folder and will be made openly available through ShareOK. ShareOK is discoverable over the Web, so anyone wishing to access the research files will be able to search the project name and gain access.

Video and audio clips will be stored on the PI's password protected external drive. A listing with short descriptions of each clip will be available on the project website and the clips will be available by request to the PI via email. Meeting notes and other project documents will be kept by the PI on a password protected external drive and will be deleted after the mandated period for storage. The project website and all digital projects available on the site will be maintained by the PI after the project concludes.

The project team will review this Data Management Plan every month during the first six months to assure all team members are following its provisions, and every six months thereafter.

## Organizational Profile

**The University of Oklahoma's Mission:** The mission of the University of Oklahoma is to provide the best possible educational experience for our students through excellence in teaching, research and creative activity, and service to the state and society.

(<http://www.ou.edu/provost/mission>, undated).

**The mission of the University of Oklahoma School of Library and Information Studies (SLIS) is to:**

- educate socially responsible, innovative leaders for the information society
- advance interdisciplinary knowledge and design creative solutions to information problems
- contribute to the public good by engaging diverse communities through teaching, research, and service

(SLIS faculty voted to accept this new [mission statement](#) in August 2018)

The OU SLIS offers a Bachelor of Arts in Information Studies, a Bachelor of Science in Information Science & Technology, an ALA accredited Master of Library and Information Studies\*, a Ph.D. in Information Studies, and graduate certificates in Archival Studies, Data Analytics for Information Professionals, and Digital Humanities. The OU SLIS predominately serves LIS communities in Oklahoma and Arkansas, with around 80% of our MLIS alumni finding employment within Oklahoma. Our alumni hold top leadership positions in the state, heading seven of the eight large library systems in the state, and the directorship of the Oklahoma Department of Libraries. Oklahoma has a large and active state library association, and OU SLIS alumni run active Alumni Association and Beta Phi Mu chapters.

The SLIS was established on the Norman campus in 1929 by Jesse Lee Rader and began offering a Bachelor of Arts in Library Science. Two master's degrees were introduced in 1954 and received ALA accreditation in 1956. The University of Oklahoma continues to offer the only ALA accredited master's degree in Oklahoma. As the only ALA accredited program in the state, SLIS offered distance education to other sites in Oklahoma beginning in the 1960s, and formally established faculty in residence on the OU Tulsa campus in 2001. Currently, SLIS has eight tenured/tenure-track faculty, two of which are located on the Tulsa campus. The 2018/19 student body is 193 master's students, one-quarter of whom are in Tulsa, and 75 bachelor's majors on the Norman campus. The brand-new Ph.D. program was introduced in Fall 2018 and currently has 3 students.

Oklahoma is a predominately rural state with three recognized metropolitan areas: Oklahoma City, Tulsa, and Fort Smith. The U.S. Census Bureau's 2018 population estimate was just under 4 million for the state. Oklahoma is demographically diverse with people of Hispanic or Latino heritage making up 10.6% of the population, American Indians 9.2%, African Americans 7.8%, and non-Hispanic whites 65.7% (<https://www.census.gov/quickfacts/fact/table/ok/PST045218>).

\*The Master of Library and Information Studies program at the University of Oklahoma is accredited by the American Library Association Committee on Accreditation, with the status of Continued accreditation. The next comprehensive review visit is scheduled for Spring 2022.