

Individualized, Equity-Focused Evaluation of Public Library Makerspaces

PROJECT JUSTIFICATION

Overview. The University of Illinois Chicago in partnership with Blue Island Public Library, Chicago Public Library, Denver Public Library, East Baton Rouge Parish Library, Eaton Public Library, and the Public Library Association proposes a National Leadership Grants for Libraries Program (NLG) Planning Grant to support the development of an individualized, equity-focused evaluation framework for adult-serving public library makerspaces: Maker Benefit, Experience, and Equity (MBEE). This \$149,979 exploratory research project will lay the foundation for building public libraries' capacity to evaluate their adult-serving makerspaces by addressing four inter-related performance measures: 1) outcomes of makerspace participation; 2) relevance of those outcomes to individual participants (i.e., makers' perceived benefits of participation); 3) makerspace access (i.e., participation by and barriers to participation for different populations); and 4) makers' experience of the makerspace climate. The MBEE framework will guide libraries in applying an equity lens to each performance measure to assess equity of makerspace access, experiences, and outcomes.

The proposed two-year project (8/1/2023-7/31/2025) will address a guiding principle for library programming outlined in an IMLS-funded report: "Programming is effective to the degree it serves the authentic needs and interests of its target participants" ([Barchas-Lichtenstein, et al., 2019](#), p. 8). MBEE will provide a framework for libraries to assess the extent to which makerspaces support adult makers in meeting their individual goals, rather than basing evaluation solely on library goals. In addition, the project will address an IMLS-supported competencies framework that highlights the need for libraries to employ equity-oriented evaluation frameworks when assessing programming ([Norland & Barchas-Lichtenstein, 2021](#)), enabling libraries to identify, examine, and address structures and practices that can perpetuate marginalization and exclusion ([American Library Association, 2017](#)). The Public Library Association will lead dissemination activities for the project to ensure results are shared with public libraries of all sizes and in all community contexts. Libraries can apply project results to conduct multi-faceted makerspace evaluations and use their findings to better address community needs and foster greater equity in makerspace services and participation.

Research Questions. This planning grant will support exploratory research in six public library makerspaces to address the following research questions:

- 1) What are the desired benefits and outcomes of adults' makerspace participation from the perspective of makers and makerspace staff?
- 2) What factors facilitate access and engagement for adults in public library makerspaces? What factors serve as barriers to access and engagement?
- 3) Which demographic variables are necessary to understand the specific adult populations that are and are not engaged in a particular makerspace?
- 4) What aspects of makerspace environments and interactions contribute to an inclusive climate and foster a sense of belonging among adults? What aspects detract from an inclusive climate and sense of belonging?
- 5) What additional factors should be considered when assessing equity of makerspace services and participation for adults?

NLG Goals and Objectives. This research project will advance NLG Goal 1—which aims to build the workforce and institutional capacity necessary to serve the information and education needs of the public—and focus on NLG Objective 1.1, which calls for the development of replicable tools that support informal science, technology, engineering, and mathematics (STEM) learning and other types of participatory learning in libraries. Specifically, this proposed planning grant will lay the groundwork for building libraries' institutional capacity to meet the needs of the public by conducting rigorous evaluation of STEM- and arts-related makerspaces for adults and then applying the results to enhance opportunities for these types of participatory learning.

Project Type. NLG planning grants are intended to support exploratory activities, such as pilot studies and proofs of concept, that have the potential to lead to future implementation ([IMLS, 2022](#)). In this proposed planning grant, we will conduct exploratory research in six adult-serving makerspaces in public libraries in three different regions of the country. Our aims are to 1) develop the MBEE evaluation framework; 2) build a network of libraries engaged in developing and field testing MBEE; 3) identify variables and desired outcomes to address in future evaluation instruments; 4) test and refine the data collection methods and procedures we will use to develop those instruments; and 5) surface unanticipated themes and issues that may need to be addressed in the MBEE framework and

instruments going forward. Results will be disseminated to public libraries of all sizes and in all types of communities through a project website, findings brief, free webinar, conference sessions, and open-access journal article. Public libraries will be able to apply the MBEE framework to conduct multi-faceted makerspace evaluations and use the findings to better address community needs and foster greater equity in makerspace services and participation. We also plan to draw on our findings and lessons learned to apply for a full-scale NLG Applied Research Project grant to develop and validate evaluation instruments for public library use.

Current Need, Connection with Current Scholarship and Practice. The MBEE project intentionally responds to two intertwined areas of focus within public libraries: 1) Public Library Makerspaces, and 2) Evaluating Makerspaces.

Public Library Makerspaces. Public libraries across the country are increasingly investing in makerspaces and making programming to support inquiry-based learning and to foster innovation, creativity, and collaboration, with some libraries framing makerspaces as a core library service (e.g., [Halverson, Lakind, & Willett, 2017](#)). Makerspaces for adults have emerged as key library resources that provide robust environments, programs, and services to support three interrelated types of activities (e.g., [Hicks & Long, 2020](#)). First, these spaces foster lifelong learning focused on foundational, transferable skills and knowledge including technical skills required to operate makerspace hardware and software; skills, knowledge, and dispositions related to the design process and design thinking; and 21st century skills such as critical thinking and creative problem solving. Second, makerspaces support entrepreneurship and socioeconomic advancement by providing resources, support, and inspiration for adults to design and create products to sell and to produce packaging and marketing collateral. Third, the spaces support recreation and wellbeing by providing opportunities for adults to develop and pursue hobbies, cultivate and express creativity, relax and have fun, and discover and enhance their unique talents and passions. While the larger maker movement has frequently been a white, male, middle- or upper middle-class pursuit ([Calabrese Barton & Tan, 2015](#)), public libraries have focused on extending opportunities and creating inclusive makerspaces that foster a sense of belonging for a broad range of community members ([Lakind, Willet, & Halverson, 2019](#)). This reflects libraries' long-standing commitments to advancing equity, diversity, and inclusion (EDI) ([American Library Association, 2017](#)) and serving as community anchors for groups that have been socially marginalized or excluded ([Horrigan, 2015](#)).

Evaluating Makerspaces. While public libraries have invested in makerspaces, they are increasingly seeking to assess both the impact and value of library programs and services to support accountability to funders and inform continuous improvement of library offerings. Currently, most of the available evaluation resources are designed to assess learning outcomes associated with makerspaces. For example, IMLS-funded projects are currently developing a set of [makerspace assessments](#) and a digital toolkit for [observational assessment data](#), both with a focus on assessing making-related learning outcomes. This work is critical to understanding makerspace impact, yet evaluating a makerspace requires more than assessing learning outcomes. For example, consistent with libraries' commitments to EDI ([American Library Association, 2017](#)), makerspaces aim to foster an inclusive climate, identify and address potential disparities in outcomes or experiences, and eliminate barriers to access and meaningful participation ([Chang et al., 2019](#)). Without careful attention to EDI, makerspaces can fall short of their potential to foster innovation, creativity, collaboration, and STEM-based learning for all segments of communities ([Koh, Abbas, & Willett, 2018](#); [Lakind et al., 2019](#); [Martin, 2015](#)). Therefore, libraries need to evaluate makerspace access and makers' experience of the makerspace climate and examine disparities in access, experiences, and outcomes as part of their evaluation activities.

Further, research has highlighted the heterogeneity of public library makers and corresponding variability in makers' activities and goals. As [Cun and colleagues \(2019\)](#) observed: "Anyone could be making anything for any amount of time in a library makerspace" (p. 40). As a result, participation in a public library makerspace can lead to a wide range of outcomes—and those can include and extend beyond learning-related outcomes. In our prior research, we found that failing to adequately address this variability during an evaluation could result in an underestimate of makerspace benefits for two reasons ([Teasdale, 2020](#)). First, evaluation in libraries often focuses on examining a set of desired outcomes that are encapsulated in library-specified goals. However, given the heterogeneity of makers and their aims, it is unlikely that library goals can fully capture the varied, individualized nature of makerspace participation. As a result, library-specified desired outcomes may not reflect the range of makers' purposes and the benefits they seek. Thus, an evaluation focused exclusively on library goals may miss key outcomes that makers value and achieve. Instead, libraries need evaluation strategies that address both library-specified and participant-defined desired outcomes.

Second, applying desired outcomes uniformly can result in a mismatch with some participants. For example, a library might specify a goal for its makerspace of supporting entrepreneurship. In an evaluation of that makerspace,

some makers may report that their participation did not help them start or advance a business. To accurately interpret these data, the library would need to distinguish between makers whose purposes and desired benefits were and were not related to entrepreneurship. Otherwise, the library could misinterpret the findings as a lack of success, when the findings may actually represent a lack of relevance of the desired outcome for some or all of the makers. Rather than applying desired outcomes uniformly, therefore, libraries need individualized evaluation strategies that can capture variation in makers' purposes and the benefits they seek and achieve.

Addressing Current Needs. This project will address the needs described above by developing the MBEE evaluation framework, building a network of libraries engaged in developing and field testing MBEE, and laying the groundwork to create and validate MBEE evaluation instruments for library use. The proposed MBEE framework will address the breadth and variation in outcomes adult makers prioritize and seek—including desired outcomes not reflected in library goals—as well as characteristics related to makerspace access and climate. Thus, MBEE aims to focus on four inter-related performance measures—outcomes, relevance, access, and experience—as well as equity of makerspace access, experiences, and outcomes. Our research will identify the variables and indicators needed to capture relevant maker demographics, potential barriers to access, self-reported outcomes of participation, makers' perception of the relevance of those outcomes, and makers' experience of makerspace climate.

The benefits of participation will be represented through a Maker-Benefit Index that will reflect the outcomes that are most important to each maker and the extent to which those specific outcomes are realized. This measurement approach will be adapted from patient-centered healthcare, a field recognized as a leader in positioning individual's specific needs and desires as the driving force in quality measurement ([NEJM, 2017](#)). A patient-benefit index is used to identify patients' priorities, capture variation in priorities, and evaluate health care from patients' perspectives ([Augustin et. al., 2008](#)). Similarly, a Maker-Benefit Index can enable libraries to individualize outcome data to capture and understand variation in the outcomes that makers prioritize and achieve ([Teasdale, 2022](#)).

Target Group and Ultimate Beneficiaries. The target groups for this planning grant will be the adult makers and makerspace staff and leaders who will participate in the research at six makerspaces. Across these locations, the planning grant will engage approximately 54 adult makers and 24 makerspace staff and leaders and build a network among the six participating libraries. Results will be disseminated to public libraries of all sizes and in all types of communities, as described below. As a result, the ultimate beneficiaries will be adult makers and makerspace staff and leaders affiliated with the public libraries that learn about the MBEE framework through these dissemination activities and apply it to evaluate their makerspaces. These individuals will benefit when the findings are used to improve their libraries' adult-serving makerspaces to better address community needs and foster greater equity in makerspace services and participation.

Research Sites. The research will be conducted at six adult-serving makerspaces operated by six different public libraries. Selection of libraries has been guided by three aims: 1) ensuring robustness of the research, 2) maximizing national impact, and 3) advancing the project diversity plan (described below). Libraries are located in states in three distinct regions of the U.S.: Colorado (West), Illinois (Midwest), and Louisiana (South). Across these regions, we will include large, urban libraries (which serve the majority of the U.S. population) and small and rural libraries (which reflect the majority of libraries in the U.S.) to capture a range of maker experiences and contexts and to maximize applicability to all types of public libraries.

Research Sites		
State	Large Library	Small and/or Rural Library
Colorado	Denver Public Library (DPL)	Eaton Public Library (EPL)
Illinois	Chicago Public Library (CPL)	Blue Island Public Library (BIPL)
Louisiana	East Baton Rouge Parish Library (EBRPL)	To be determined after funding is awarded (TBD)

Within each state, we have selected a large library to anchor the project (CPL, DPL, EBRPL). These are libraries with multiple, well-established makerspaces that have been active in providing services throughout the pandemic. The level of makerspace activity and staffing will ensure that we are able to recruit research participants and gather data for the project, even if unexpected disruptions arise. In keeping with the equity focus of the project, we have selected anchor libraries that serve diverse populations in terms of racial and ethnic identity and socioeconomic status and have demonstrated commitments to advancing equity in public library makerspaces. In addition, we have selected libraries

that are leaders within their regions and nationally, as evidenced through their involvement with professional organizations and projects that address making in public libraries. This will help us build a network of libraries engaged in developing and field testing MBEE and support broad dissemination.

Similar criteria have guided selection of small and/or rural libraries as research sites (BIPL, EPL, TBD). As with the larger libraries, we have recruited libraries with well-established makerspaces that are leaders within their regions and nationally and provide responsive services to the diverse communities they serve. This will ensure the robustness of the research, advance the project's equity focus, help build a network of MBEE libraries, and support broad dissemination. We have designed our strategy for selecting small and/or rural libraries to align with libraries' varying staffing levels and planning timelines, as well as each state's unique context. This includes the complexities of libraries partnering on equity-focused projects at a time when libraries nationwide are facing increased challenges to materials and programs that address race, gender, and sexuality. For Colorado and Illinois, small and/or rural libraries have been included as partners in this proposal (BIPL, EPL). For Louisiana, we will select a small and/or rural library after funding is awarded (see below for details).

Colorado. Research at **Denver Public Library** (DPL) will take place at the idealLAB at the Rodolfo "Corky" Gonzales Library, which opened in October 2018. This 960 square-foot space is in a highly visible location adjacent to the library entrance and circulation desk. Based on community input, the Gonzales makerspace places a heavy emphasis on textile tools, including sewing machines (consumer and industrial), quilting machines, sergers, a coverstitch machine, a digital embroidery machine, a sublimation printer, a heat press, weaving looms, and materials and tools for knitting, crochet, and felting. This is in addition to hand tools, a 3D printer, computers with the Adobe Creative Suite, a Cricut cutting machine, jewelry making tools and supplies, art and craft supplies, and open work surfaces. The makerspace is open 22.5 hours per week for self-directed making and offers programming at least once a month. DPL serves a population of approximately 711,000 ([U.S. Census, 2021](#)). In the primary neighborhoods served by the Gonzales Library, 45% of the population identifies as White, 39% Hispanic/Latinx, and 18% Black/African American ([U.S. Census, 2021](#)). Twenty-four percent of individuals are living below the poverty line ([U.S. Census, 2021](#)).

Research at **Eaton Public Library** (EPL) will be conducted in its state-of-the-art makerspace, which opened in January 2022. The library's goal for the space is to encourage imagination, creation, and creativity as well as supporting life skills and learning. The makerspace includes a 3D printer, a laser cutter, a Cricut cutting machine, a sewing machine, two button presses, computers with the Adobe Creative Suite, and a photo scanner. The makerspace is open during all library hours (56 hours per week) for self-directed making and also offers weekly classes. The space is supervised by the library's technology services coordinator. EPL serves a population of approximately 10,000 people in the high plains of Colorado ([U.S. Census, 2021](#)). Ninety-one percent of the population identifies as White, and 25% identify as Hispanic/Latinx ([U.S. Census, 2021](#)). Four percent of individuals are living below the poverty line ([U.S. Census, 2021](#)).

Illinois. Research at **Chicago Public Library** (CPL) will take place in the Harold Washington Library Center, CPL's flagship location in downtown Chicago. The 625 square-foot Maker Lab opened in 2013 in a renovated display room on the third floor of the 10-floor building. Maker Lab provides two laser cutters, four 3D printers, two electronic cutters, four sewing machines, an embroidery machine, a CNC desktop mill, two irons, 40 laptops with open-source software, and a projection screen. Maker Lab is staffed by two full-time employees, open 16 hours per week for self-directed making, and offers two to three programs per week. CPL serves a population of approximately 2,697,000 ([U.S. Census, 2021](#)). The Harold Washington Library Center serves library users from nearby high-rise apartments and offices, students and staff affiliated with downtown colleges and universities, and tourists. In the downtown area, 63% of residents identify as White, 15% Black/African American, 15% Asian/Asian American, and 8% Hispanic/Latinx ([U.S. Census, 2021](#)). Approximately nine percent of households fall below the poverty line ([U.S. Census, 2021](#)).

The **Blue Island Public Library** (BIPL) makerspace spans two creative spaces. The 4000 square-foot "high tech" space opened in 2006 and offers two 3D printers, a laser cutter/engraver, computers with Adobe Creative Suite, and a sound booth and recording studio. The "low tech" space was housed in a converted storage room from 2015 until it moved to a newly constructed 1200 square-foot space in 2022. This space offers hand tools (manual and power), sewing machines, arts and craft supplies, a Silhouette cutting machine, and a computer with Silhouette Studio software. Together, the spaces host open making nine hours per week and weekly programming. The spaces are staffed by a team of full-time and part-time staff as part of their larger portfolio of duties. BIPL serves a population of approximately 22,000 ([U.S. Census, 2021](#)) in the southern section of the greater Chicago metropolitan area. Forty-six percent of the population identifies as Hispanic/Latinx, 32% Black/African American, 21% White, and 5% two or more races ([U.S. Census, 2021](#)). Eighteen percent of individuals are living below the poverty line ([U.S. Census, 2021](#)).

Louisiana. Research at **East Baton Rouge Parish Library** (EBRPL) will take place at the River Center Branch Library, located in the heart of downtown Baton Rouge. This library building opened in 2020, with the makerspace on the third floor of the four-story library. The makerspace offers two 3D printers, a laser cutter, a CNC machine, two sewing machines, a Cricut, a heat press, and 10 soldering irons. Adjacent to the makerspace is an audio and video control room and a sound-proofed recording studio. The space is staffed by a library technician who reports to a full-time librarian who organizes most of the programming. Technicians from the reference and teen departments also provide assistance in the space. EBRPL serves a population of 440,000 ([U.S. Census, 2021](#)). In the census tracts served by the River City Branch Library, 64% of residents identify as Black/African American, 28% White, 4% Hispanic/Latinx, and 2% Asian/Asian American ([U.S. Census, 2021](#)). Thirty-five percent of individuals are living below the poverty line ([U.S. Census, 2021](#)).

The sixth research site will be selected after funding is awarded (**TBD**). Consistent with the selection criteria described above, we will select a small and/or rural library in Louisiana with a well-established makerspace that is a leader within their region and provides responsive services to the diverse communities it serves. The process for identifying and selecting this library is described below (see Project Workplan, Activity 1: Planning).

Dissemination Partner. The **Public Library Association** (PLA) will serve as our dissemination partner for this planning grant. PLA is the largest association supporting the needs of public library professionals. Founded in 1944, PLA serves nearly 10,000 members in public libraries large and small in communities across the United States and Canada. PLA offers professional development and networking, transformative public library initiatives, a biennial conference, and a robust track of sessions within the annual conference presented by its parent organization, the American Library Association (ALA). As part of this work, PLA guides public libraries in using data to better understand and demonstrate their impact through several interrelated initiatives including [Project Outcome](#), [Benchmark](#), and [Impact Survey](#). PLA also provides national leadership in [advancing EDI](#) in public librarianship by convening meaningful conversations and facilitating continuing education for member library staff. For this planning grant, PLA will leverage its webinar series ([PLA Online Learning](#)), member e-newsletter, and social media presence to disseminate the MBEE framework and lessons learned to public libraries of all sizes and in varying community contexts, and expand the network of libraries engaged in field testing MBEE going forward.

Relationship with IMLS Funded Projects. MBEE will complement IMLS investments to develop capacity and resources for makerspace evaluation, while uniquely addressing the heterogeneous, individualized nature of public library makerspace participation ([Cun et al., 2019](#); [Teasdale, 2020](#)) and responding to the need for equity-focused evaluation frameworks ([Norland & Barchas-Lichtenstein, 2021](#)). To date, IMLS has invested in the set of [makerspace assessments](#) and digital toolkit for [observational assessment data](#) noted above; a framework for examining [community-level impact](#) that is also currently in development; a national forum on [makerspace research and assessment](#); training for library staff in [research methods](#) and [evaluation](#); a library makerspace [collective](#); and research to improve access for [makers with disabilities](#) and [blind and visually impaired teens](#).

Given the complexity and variability of library makerspaces, a suite of complementary resources and strategies is required to equip libraries to conduct rigorous, comprehensive makerspace evaluation. This is similar to efforts in the field of informal science education such as [EvalFest](#) and [PEAR](#) that provide a set varied data collection approaches and resources and, in the museum sector, the IMLS-funded [COVES](#) evaluation project. MBEE will fill a gap in the current suite of IMLS-supported makerspace resources by equipping public libraries to implement an individualized, equity-focused approach to makerspace evaluation.

To support integration across IMLS-funded projects, we will disseminate a findings brief that reports the results of this planning grant to the leaders of the initiatives listed above. In addition, our project website and dissemination webinar will highlight the ways that libraries can use MBEE in combination with the aforementioned makerspace frameworks and resources. For example, our dissemination might highlight how a library could use an IMLS-supported observational assessment tool to evaluate library-specified learning outcomes and also use the MBEE framework to gauge the relevance of those outcomes to makers' goals and priorities. As another example, MBEE findings might reveal shortcomings related to makerspace climate or access in a particular library. Our dissemination would highlight how the library could draw on IMLS-supported research and makerspace networks to identify and implement appropriate modifications to its makerspace offerings or environment to provide more robust, responsive, and equitable making experiences.

PROJECT WORK PLAN

The project work plan has been designed to address the research questions listed above. The UIC Institutional Review Board will oversee all research procedures to ensure compliance with ethical and data security guidelines.

Theoretical Framework and Design. This research will be guided by Activity Theory ([Greeno & Engeström, 2014](#)), a theoretical framework that has informed prior studies of public library makerspaces ([Einarsson, 2021](#); [Einarsson & Hertzum, 2020](#); [Teasdale, 2020](#); [Teasdale, 2021](#)). Activity Theory supports examination of complex activities and learning environments and provides a sociocultural perspective that aligns with equity-oriented approaches to making ([Calabrese Barton & Tan, 2018](#); [Vossoughi, Hooper, & Escudé, 2016](#)). We will employ a qualitatively driven mixed methods research design to allow us to capture a holistic portrait of each makerspace ([Greene, 2007](#); [Hall & Ryan, 2011](#)). The emphasis on qualitative methods within our mixed methods design is well-suited to exploratory research and surfacing and understanding participants' perspectives, priorities, and experiences ([Creswell & Poth, 2018](#); [Maxwell, 2012](#)).

Data Collection Methods. For each library, we will gather survey data and conduct structured observations to capture the following makerspace characteristics: 1) hours, location, and setting; 2) equipment, software, and programming; 3) number and characteristics of makers; 4) amount and type of making activities; 5) interactions among makers and staff; and 6) makerspace rules and guidelines. Survey data will be gathered using the Qualtrics online survey platform. These data will be supplemented by in-person observations to expand and deepen understanding of each makerspace ([Patton, 2015](#)).

Next, we will conduct focus groups with adult makers and makerspace staff at each library. We have elected to use focus groups because they enable researchers to understand how a group of individuals sees, understands, and values a particular program or service ([Krueger & Casey, 2015](#)). Further, unlike individual interviews, focus groups foster discussion and allow participants to compare and contrast their experiences and expand upon others' ideas and perspectives. Given that focus groups are composed of individuals who share a relevant characteristic or experience, we will conduct one focus group with makerspace staff and leaders and one to two focus groups with adult makers in each of the six research sites, totaling 15 focus groups. Each focus group will last approximately 90 minutes and be structured to include a mix of discussion questions and reflective activities such as card sorts and photo elicitation activities. Given the level of resources available for the current project, all focus groups will be conducted in English. We plan to expand our scope to include multilingual data collection in subsequent phases of the research, as additional resources are secured.

Focus group sampling will be purposive, centering on individuals with the knowledge and experience necessary to help us answer our research questions ([Patton, 2015](#)). For the staff focus groups, we will recruit makerspace staff and leaders because they have knowledge about the benefits and outcomes associated with participation in the focal makerspace, factors that can facilitate or inhibit access and engagement, demographic variables necessary to understand which specific populations are and are not engaged in the makerspace, and aspects of makerspace environments and interactions that can contribute to or detract from a welcoming and inclusive climate. Makerspace staff and leaders also have knowledge about additional factors that should be considered when assessing equity of makerspace services and participation. We will recruit participants by sending an email message to all individuals who staff and supervise the focal makerspace. We expect each staff focus group to include three to five individuals. In total, the six staff focus groups will engage approximately 24 individuals.

For the maker focus groups, we will recruit individuals who are at least 18 years of age and have worked on at least one large project or two small projects in the focal makerspace in the previous year. We will share flyers and emails with makerspace users and post recruitment messages on social media, directing makers to the project website for additional information. Those interested in participating will complete a screening survey on the project website. Focus group participants will be selected to reflect the demographic composition of the community served and the variety of activities the makerspace supports. Maker focus groups will include five to seven individuals, and each participant will receive a \$50 gift card in acknowledgement of their time and expertise. In total, the nine maker focus groups will engage approximately 54 individuals.

We will use semi-structured focus group protocols to direct the conversations. Development of the protocols will be informed Activity Theory, the research cited above, literature on climate and access in informal and formal learning contexts, and input from the project team and advisors. The protocols will focus on: 1) desired and actual outcomes of makerspace participation; 2) aspects of the environment and interactions that contribute to or detract from an inclusive climate and sense of belonging; 3) potential barriers to participation; 4) demographic variables

necessary to understand which populations are and are not engaged in a particular makerspace; and 5) additional factors that should be considered when assessing equity of makerspace services and participation.

All focus groups will be audio recorded with participant consent and transcribed to facilitate analysis. We will also capture digital images of card sorts, photos, and other materials used in reflective activities.

Data Analysis Methods. Survey and observation data will be synthesized to develop a descriptive portrait of each makerspace and identify commonalities and differences across the six sites. We will conduct thematic analysis ([Braun & Clarke, 2006](#)) on the focus group transcripts and images to surface, identify, and analyze patterns and themes within and across the data, using qualitative data coding and data displays ([Miles, Huberman, & Saldaña, 2019](#)). We will develop a coding scheme informed by Activity Theory ([Greeno & Engeström, 2014](#)) and the literature cited above. The resulting codes will be used to label segments of text that address desired and actual outcomes of makerspace participation, makerspace climate, barriers to access, and populations that are or are not engaged in a particular makerspace. We will supplement this coding process with open, inductive coding to capture additional factors that are important for understanding equity and to capture novel, unexpected, or contradictory patterns in the data. We will then sort, collate, and present the coded segments using data display matrixes to identify, test, and explore emergent themes. Findings will be reviewed and refined by the full project team and advisors. Results will be organized to address three purposes: 1) finalizing the MBEE framework; 2) identifying variables and desired outcomes to address in future evaluation instruments; and 3) surfacing unanticipated themes and issues that may need to be addressed in the MBEE framework and instruments going forward. Throughout the process, we will also capture lessons learned about the data collection methods and procedures to inform future phases of research.

Project Team. MBEE will be led by **Dr. Rebecca Teasdale**, Assistant Professor of Educational Psychology at UIC. She will serve as the Principal Investigator (PI) and supervise all research and dissemination activities. Teasdale is an evaluation methodologist who specializes in evaluation of programs and services in public libraries and other informal learning contexts. Her previous research has focused on methods for evaluating public library makerspaces (e.g., [Teasdale, 2020](#); [Teasdale, 2021](#)). Prior to joining UIC, Teasdale worked as a public librarian and library administrator for more than 15 years. The PI will hire a UIC doctoral- or masters-level Graduate **Research Assistant** to support the research activities. The Research Assistant will have training in social science research methods, including study design, instrument development, data collection, and analysis.

Library team members will include **Amber Greene** (Library Director, EPL), **Ashley Kazzyaka** (ideaLab Program Administrator, DPL), **Sasha Neri**, (Information Center Manager, CPL), **Micah Rademacher** (Head of Adult and Technical Services, BIPL), and **Adam St. Pierre** (STEM Librarian, EBRPL). The library team members are regional and national leaders in library makerspace design and implementation, oversee makerspaces in the participating libraries, and bring more than 70 years of combined library experience. Each library team member will coordinate data collection at their respective library, review and provide feedback on study methods and preliminary findings, and participate in dissemination activities. Dissemination to public libraries will be led by **Katina Jones** (Evaluation and Assessment Program Manager, PLA). Jones will coordinate a dissemination webinar through PLA Online Learning and publicize the webinar and project findings through PLA's e-newsletter and social media channels (see below). Jones is a national leader in evaluation of public library programs and services.

Project Advisors. The project will be supported by four advisors, who will provide feedback on the data collection instruments, sampling strategies, data analysis, findings, and dissemination products and strategies. Advisors will also provide feedback about project effectiveness and quality (see Performance Measurement Plan section below and attached plan for details). Rather than gathering advisors for formal meetings, the PI will connect with advisors individually or in small groups based on the expertise that is required as the research unfolds. The project advisors have been selected for their complementary areas of expertise: **Dr. Cecilia Garibay** (President, Garibay Group) is a national leader in equity-focused research and evaluation in the informal learning field and has led multiple IMLS-funded projects for museums, including EDI-related [capacity building](#), [landscape study](#), and [resource development](#) projects. **Kieran Hixon** (Rural & Small Library Consultant, Colorado State Library) is an expert in small and rural library services and former president of the Association for Rural & Small Libraries. **Dr. Linda Hofschire** (Principal, LJH Consulting) is an expert in public library evaluation and capacity building and has directed several IMLS-funded projects that provide [research methods training](#) for library staff. **Dr. Kyungwon Koh** (Associate Professor, School of Information Science, University of Illinois Urbana-Champaign) is a nationally recognized makerspace researcher and has directed several IMLS-funded research projects focusing on makerspaces, learning, and community, including a project [measuring the impact and value](#) of public library makerspaces.

Activities, Tasks, and Timeline. The project will be organized to accomplish three major activities.

Activity 1: Planning. The project team will focus on project planning from August 2023 through March 2024. To begin, the PI will recruit, hire, and train the project Research Assistant. The PI and Research Assistant will then finalize the research plan and draft the data collection instruments, incorporating review and input from the full project team and the project advisors. The final plan and protocols will be submitted for approval by the UIC Institutional Review Board. The PI and Research Assistant will also develop the project website. Next, the PI and Research Assistant work with team member St Pierre (STEM Librarian, EBRPL) and advisor Hixon (former President, Association for Rural & Small Libraries) to recruit and select a small and/or rural library in Louisiana to participate as a research site. St Pierre and Hixon will share information with their networks of Louisiana libraries and through the State Library of Louisiana email list and social media channel, directing interested libraries to the project website for additional information. The PI will meet with all interested libraries via Zoom to gather information about their makerspace, community context, and capacity to host research activities. The project team will then select a library that 1) has a well-established makerspace with the capacity to recruit research participants and gather data for the project, 2) provides responsive services to the diverse communities the library serves, and 3) is a leader within their region and/or nationally, as evidenced through involvement with professional organizations and projects that address making in public libraries. Finally, the PI and Research Assistant will work with the teams from all six libraries to schedule and plan the in-person observations and focus groups at each research site.

Activity 2: Data Collection and Analysis. Data collection will begin in February 2024. The PI and Research Assistant will distribute the survey to each of the six research sites. Focus group recruitment will take place in March and April 2024, with observations and focus groups conducted April-June 2024. This timeline has been designed to avoid inclement winter weather in Colorado and Illinois and Mardi Gras festivities in Louisiana, as both could negatively impact focus group participation. Library team members will lead recruitment of participants for the focus groups at their respective research sites, using email, flyers, and the project website to share information with prospective participants. The PI and Research Assistant will conduct the observations and focus groups at each makerspace with logistical support from library staff. The RA will capture observation data, audio-record each focus group, and capture digital images needed for analysis. Audio recordings will be professionally transcribed in June 2024. The PI and Research Assistant will then analyze the resulting data July-October 2024. Toward the end of the analysis period (September-October 2024), the PI and Research Assistant will identify findings, finalize the MBEE framework, and identify implications and next steps for future research, with input from the full project team and advisors.

Activity 3. Dissemination. Dissemination activities will begin in November 2024 and include five strands. 1) The PI and Research Assistant will prepare a findings brief and post it to the project website. 2) The PI and Research Assistant will work with Jones (Evaluation and Assessment Program Manager, PLA) to plan and implement the dissemination webinar through PLA Online Learning. The live webinar will be free of charge for participants and archived for free streaming on demand. In February 2025, the PI will share the findings brief and information about the webinar with leaders of the IMLS projects described above, as well as leaders of other initiatives focused on public library makerspaces (e.g., [MakerEd](#), [Play Make Learn Conference](#)). Jones will publicize the webinar and findings brief through the PLA e-newsletter and social media channels. The webinar will be conducted in March 2025, archived on the PLA website, and linked from the project website.

3) The project team will submit proposals to present a conference session as part of the PLA strand of the [ALA annual conference](#) and a session at [NOMCON](#) (the National of Makers Conference). If accepted, we anticipate presenting the session(s) in June 2025. 4) The PI and Research Assistant will prepare an article for submission to a peer-reviewed library and information science journal (e.g., [Library and Information Science Research](#), [Information and Learning Sciences](#), [The Library Quarterly](#)) to share project results. We will draft the manuscript in February-May 2025 and submit in June 2025. To support broad dissemination, the article will be published as “gold” open access ([Association for Library Collections and Technical Services, 2014](#)), which will make the article freely available to all evaluators, researchers, and public libraries. Information about the conference session and article will be posted to the MBEE website and shared with leaders of the IMLS-funded projects and related initiatives outlined above.

5) The PI and Research Assistant will identify findings that are specific to the six research sites for this project. We will prepare summary reports of library-specific findings and implications in September and October 2024. The full project team will use this information to plan professional development activities for staff in the participating libraries. We anticipate professional development will be delivered in February and April 2025, depending on trainer availability.

Compensation for Research Sites. Each makerspace will receive compensation for the time and expertise library staff will invest in the project (\$2000 per library). In lieu of direct financial support for staff salaries, the libraries have requested compensation in the form of makerspace supplies and materials that will directly benefit makerspace participants. Each makerspace will identify the supplies and materials that are most relevant for the community it serves (see Budget Justification for examples). UIC will purchase those items and provide them to each participating makerspace. In addition, the libraries have requested compensation in the form of professional development for makerspace staff and leaders to support them in taking action based on library-specific research findings (see Budget Justification for additional details and examples).

Performance Measurement Plan. We will track and assess our progress in several ways throughout the life of the project (see Performance Measurement Plan for additional details). Twice per year, we will examine effectiveness and efficiency. To assess effectiveness, the PI will compare the actual results of the project against our intended results and make adjustments to ensure the project is on track to achieve the intended results. The PI will also gather feedback from the project advisors about the effectiveness of project activities. To examine efficiency, the PI will assess the alignment between our actual expenditures and the proposed budget and make adjustments to ensure the project is using resources as intended. We will examine project quality in three ways. At the beginning of the project, the UIC Institutional Review Board will assess all research procedures to ensure compliance with ethical and data security guidelines. Twice per year, the project team will identify the extent to which project activities are meeting the expectations of the library partners and identify ways to maximize project quality, and the PI will gather feedback from the project advisors about the quality of project activities. Finally, the PI will examine timeliness each quarter by assessing the alignment between our actual activity completion dates and the proposed Schedule of Completion and making adjustments to ensure the project is on track to be completed within the proposed timeframe.

DIVERSITY PLAN

This proposed planning grant has been designed to advance EDI practices in public libraries in four ways. 1) The project will address the need for libraries to employ equity-oriented evaluation frameworks when assessing programming. We will develop the MBEE framework to help libraries apply an equity lens to four inter-related performance measures—outcomes, relevance, access, and experience—to assess equity of makerspace access, experiences, and outcomes. The research will also identify additional factors that should be considered when assessing equity of makerspace services and participation for adults.

2) We have designed the research activities to address diversity and inclusion. We have selected research sites that serve diverse populations in different regions of the country and within distinct community contexts. We have chosen focus groups as our method of data collection with adult makers to deepen our understanding of their perspectives and values so we can incorporate those into our ongoing work. We will select participants for maker focus groups to reflect the demographic composition of the populations served and the variety of activities each makerspace supports. We will compensate each maker who participates in a focus group with a \$50 gift card in recognition of their time and expertise. These gift cards are essential to ensure we can recruit a diverse sample. Gift cards are also a critical strategy for fostering equity, because makerspace staff and leaders who participate in focus groups will be compensated for their participation as part of their work duties. Without the gift cards, makers would be expected to participate without compensation, producing inequity between participating makers and staff.

3) We have assembled a group of project advisors who will aid us in addressing EDI in each phase of the research project. Garibay is an expert in advancing EDI in informal learning contexts and a leader in culturally responsive and contextually relevant approaches to research and evaluation. Hixon brings expertise in ensuring equitable engagement of small and rural libraries within the public library field. Koh specializes in equitable engagement in library making and makerspaces, including both individual- and community-level engagement. Hofschire is an expert in building the capacity of library staff to evaluate library programs and services with attention to diversity and inclusion as related to evaluation questions, processes, findings, and implications. Together, the project advisors will bring diversity of thought and perspectives to their role in guiding the project team.

4) Our dissemination strategy will make project findings available and accessible to libraries of all sizes and in all types of communities so they can apply the MBEE framework in their makerspaces. We will publish a findings brief on the project website, host a free webinar through the PLA Online Learning, submit a PLA session proposal for the ALA Annual conference, submit a NOMCOM session proposal, and publish an open access peer-reviewed journal article.

PROJECT RESULTS

This proposed planning grant will yield five categories of results: 1) a finalized MBEE evaluation framework, 2) a network of public libraries engaged in developing and field testing MBEE, 3) variables and desired outcomes to address in future evaluation instruments, 4) data collection methods and procedures we will use to develop those instruments, and 5) unanticipated themes and issues to address in the MBEE framework and instruments going forward. The publicly available project website will serve as the repository and point of access for all MBEE products and activities. We also plan to draw on our results to inform an application for a full-scale NLG Applied Research Project grant to create and validate evaluation instruments for public library use.

Finalized MBEE Framework. This project will help to refine the MBEE framework in three ways. First, the exploratory research will deepen understanding of the four performance measures that constitute the proposed MBEE framework. Findings will also yield greater insight about how libraries can apply an equity lens to each performance measure to assess equity of makerspace access, experiences, and outcomes. The project team and advisors will identify implications for refining the MBEE framework and then disseminate the finalized framework to public library practitioners, researchers, and leaders of the other IMLS-funded projects (as described above) for their use.

Network of MBEE Libraries. The proposed research will bring together six public libraries in three states to develop and finalize the MBEE framework. In doing so, this planning project will build a network of libraries engaged in field testing MBEE. During dissemination, we will connect with additional public libraries that can be involved in future phases of the research. This will enable us to capture a broad range of maker experiences and contexts and maximize applicability to all types of public libraries. Further, the network will provide support for libraries in using the MBEE framework. For example, the six libraries participating in this planning grant will receive shared professional development sessions to support them in taking action based on library-specific findings from the research.

Variables and Desired Outcomes. In addition to finalizing the MBEE framework, the proposed research will identify key variables and desired outcomes that will need to be addressed in MBEE evaluation instruments developed in the future. These might include variables to capture relevant maker demographics, potential barriers to access, self-reported outcomes of participation, makers' perception of the relevance of those outcomes, and makers' experience of makerspace climate. We will draw on these results to inform next steps for this research, which we anticipate will lead to an application for a full-scale NLG Applied Research Project grant to create and validate evaluation instruments for public library use.

Data Collection Methods. Through this planning grant, we will develop and test data collection protocols and procedures for gathering information from adult-serving public library makerspace participants and staff. As we gather and analyze the data, we will capture lessons learned to shape future phases of the project. These insights will inform subsequent research to develop MBEE data collection instruments for public library use and shed light on the types of training materials and guidelines libraries will need to effectively use those instruments.

Unanticipated Themes and Issues. NLG planning grants are intended to support exploratory activities, such as the research outlined in this proposal. Therefore, this project has been designed to surface unanticipated themes and issues that may need to be addressed in the proposed MBEE framework, including additional factors that need to be considered when assessing equity of makerspace services and participation for adults. Thus, a key result of the proposed research will be identification of those themes and factors that will need to be considered and addressed in order to help libraries conduct rigorous evaluation of STEM- and arts-related makerspaces for adults and then apply the results to enhance opportunities for these types of participatory learning. These themes and issues will be incorporated into our plans for further research.

Taken together, these five categories of results will lay the foundation for building participating libraries' capacity to evaluate their adult-serving makerspaces by addressing four inter-related performance measures—outcomes, relevance, access, and experience—and applying an equity lens to each measure. In doing so, MBEE will help libraries better address community needs and interests and foster greater equity in makerspace services and participation.

Year 2												
Activities and Tasks	Month											
	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025	Jul 2025
Activity 2: Data collection and analysis (cont'd)												
Analyze data	■	■	■									
Identify findings and finalize framework		■	■									
Identify implications and next steps for future research		■	■									
Activity 3: Dissemination												
Findings brief												
Prepare findings brief				■	■							
Post to project website						■						
Share with IMLS-funded makerspace projects							■					
Publicize via Public Library Association communication channels							■					
Webinar												
Plan and schedule webinar			■	■								
Develop content					■	■						
Publicize webinar and manage registration							■	■				
Deliver webinar								■				
Conference session												
Submit proposal for Public Library Association session at American Library Association Annual conference	■											
Submit proposal for NOMCON: National of Makers Conference			■									
Present conference session(s)											■	
Peer-reviewed article												
Draft manuscript							■	■	■	■		
Submit manuscript to peer-reviewed journal (i.e., Library and Information Science Research, Information and Learning Sciences, The Library Quarterly)											■	
Participating libraries												
Prepare summary reports of library-specific findings		■	■									
Plan and schedule professional development sessions				■	■							
Deliver professional development sessions							■		■			

Individualized, Equity-Focused Evaluation of Public Library Makerspaces

Digital Products Plan

This project will produce a project website, evaluation framework, findings brief, webinar, and peer-reviewed journal article.

The **project website** will be freely available using a standard web browser and without charge. The website will be maintained for a period of 3 years after the conclusion of the project and will include links to each of the products outlined below.

The **evaluation framework** will be posted and freely available on the project website for a period of 3 years after the conclusion of the project. The public will be able to access, read, and download the framework using a standard web browser and without charge. The project team will not copyright the evaluation framework.

The **findings brief** will be posted and freely available on the project website for a period of 3 years after the conclusion of the project. The public will be able to access, read, and download the brief using a standard web browser and without charge. The project team will not copyright the findings brief.

The **webinar** will be hosted by the Public Library Association (PLA) as part of its [PLA Online Learning](#) webinar series. The live webinar will be free of charge for participants and accessible using a standard web browser. The webinar will be recorded and archived by PLA. The recording will be available on the PLA Online Learning website for free streaming on demand for a period of 3 years. We will provide a link to the archived webinar on the project website for a period of 3 years after the conclusion of the project. The project team will not copyright the webinar.

The **journal article** will be submitted to a peer-reviewed library and information science journal such as [Library and Information Science Research](#), [Information and Learning Sciences](#), or [The Library Quarterly](#). The article will be published as “gold” open access, which means the authors will retain the copyright and the article will be freely available immediately after publication. We will post a link to the journal article on the project website for a period of 3 years after the conclusion of the project.

Individualized, Equity-Focused Evaluation of Public Library Makerspaces

Organizational Profile

The **University of Illinois Chicago** (UIC) is an urban, land-grant Carnegie Research 1 University and the second campus established under the University of Illinois system. As the city's largest university and only public Research 1 institution, UIC advances scholarship through research, teaching and service in partnership with the Chicago community. The following UIC [Mission Statement](#) was affirmed by the UIC Board of Trustees on 1/19/2017:

UIC provides the broadest access to the highest levels of intellectual excellence. UIC's mission is (a) To create knowledge that transforms our views of the world and, through sharing and application, transforms the world; (b) To provide a wide range of students with the educational opportunity only a leading research university can offer; (c) To address the challenges and opportunities facing not only Chicago but all Great Cities of the 21st century, as expressed by our Great Cities Commitment; (d) To foster scholarship and practices that reflect and respond to the increasing diversity of the U.S. in a rapidly globalizing world; and (e) To train professionals in a wide range of public service disciplines, serving Illinois as the principal educator of health science professionals and as a major healthcare provider to underserved communities.

UIC was formed in 1982, when the University of Illinois at Chicago Circle and University of Illinois at the Medical Center campuses consolidated to form a comprehensive university campus with six health science colleges and an academic medical center. UIC is now comprised of 16 academic colleges with over 3,100 faculty and 11,000 full-time employees who serve more than 34,000 undergraduate, graduate, and professional students. The university is one of the nation's most diverse public research universities, welcoming students, staff, and faculty from a variety of racial, ethnic, and class backgrounds, gender identities, sexual orientations, and abilities to cultivate a diverse learning community. UIC is a federally designated Minority-Serving Institution, Hispanic-Serving Institution, and Asian American and Native American Pacific Islander-Serving Institution. Among UIC students, 36% identify as Hispanic/Latinx, 23% White, 21% Asian/Asian American, and 7% Black/African American ([UIC, 2023](#)). One in three students speak a language other than English at home, with more than 60 languages spoken ([UIC, 2023](#)).

This project will be conducted within the **College of Education**. The College of Education currently enrolls more than 1,200 students: 43% identify as Hispanic/Latinx, 28% White, 15% Black/African American, and 8% Asian/Asian American ([UIC College of Education, 2022](#)). The College of Education has a long history of conducting equity-focused research projects in partnership with community-serving organizations. As a result, several service units within the College of Education are well-positioned to support this project, including 1) Measurement, Evaluations Statistics and Assessment faculty, who provide methodological expertise in quantitative, qualitative, and mixed methods research and evaluation; 2) Educational Technology Lab, which provides technology support and resources including responsive helpdesk support, access to software for data collection and analysis, and equipment for faculty and staff to utilize such as laptop computers and video cameras; and 3) Office for Research, which facilitates proposal development, promotes interdisciplinary projects, and works with campus-wide initiatives related to faculty research. The office provides pre-award and post-award support for sponsored research, develops and monitors implementation of research policies in the College of Education, and serves as the College of Education liaison with the UIC Vice Chancellor for Research.

Support will also be provided by the **UIC Library**, which is the largest public academic research library in Chicago. The library contributes to teaching, research, outreach, and clinical service by acquiring, organizing, and archiving information. It also provides expert staff, access to information sources in all formats, and instructs users on how to retrieve and use information. UIC Library extends information services regionally, national, and internationally through a variety of cooperative and reciprocal programs. UIC Library faculty maintain active research agendas, further equipping them to support this project. This includes a recent IMLS National Leadership Grant [award](#) to support development and testing of assessment tools for measuring library impact on student academic success.