OPPORTUNITIES AND VIGNETTES FOR LIBRARY MAKERSPACES

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INTRODUCTION

This white paper was informed by the participants of the [National Forum on Research and Assessment in Library Makerspaces](), held at the University of Wisconsin-Madison, on August 6–7, 2019, generously supported by the Institute for Museum and Library Services (IMLS), and co-led by Maker Ed and the University of Wisconsin-Madison. The forum brought together 47 individuals, each of whom are leading efforts in and/or informing maker-centered learning, from various areas of library practice and research, including informal and formal educational institutions adjacent to the field. This white paper is also part of Maker Ed's online Resource Library, in its Research category.

The focus on research and assessment in library makerspaces came about from a collection of needs and problems of practice: 1) for practitioners to better access and incorporate research into their work; 2) for researchers to understand the contextual variables in each environment; and 3) for the maker education field to demonstrate and make visible the value of maker-based library experiences. These needs are supported by a cross-disciplinary commitment to designing for equitable learning environments and the need to demonstrate success on these goals. As a collective of librarians, researchers, advocates, makers, and educators, we seek to understand what practical, ethical, equitable, rigorous, creative, and responsive assessment can look like in library makerspaces.

The discussion-based National Forum had three goals: first, to bring together practitioners and researchers to discuss and share their work with each other; second, to identify and grapple with notable gaps and opportunities that may lead to scaling up library makerspace practices; and third, to deepen the work of documenting and evaluating maker-centered learning.

This report serves as documentation of these conversations, illuminating opportunities and tensions in this field for librarians, educators, researchers, and policy makers. Throughout the paper, we note important "tensions" that surfaced in the field and through forum discussions. We also present the associated "opportunities" and include vignettes of unique libraries and communities. The vignettes show how those opportunities are being manifested and what work is currently taking place. They also reinforce the importance of context—that the culture and values of a community intimately inform the design of any program or activity—and show how equity is being put into action, inclusive of both the successes and challenges of doing so.

As an exploration and analysis of current work, the paper is organized around four main themes. These themes were drawn from the existing literature and field-wide conversations before the forum, and they were refined during the forum:

- **Defining Making and Libraries**: Maker-centered learning is diverse in its implementation, and it's important to collectively understand what form and function it takes in libraries.

- **Shared Considerations**: These considerations consistently arose in forum conversations, and we call them out in the white paper to illustrate the varied approaches that libraries are taking to address these topics. The five considerations are: access and equity, making as a response to community needs, redefining librarianship, supporting lifelong learning capacities, and building community.

- **Demonstrating Value and Making the Case**: Much discussion and work has recently focused on the most effective ways in which we can show and communicate the value of these maker-centered learning experiences to diverse stakeholders. This includes how we might assess the experiences and the implications of doing so, all the while staying true to the values of our institutions and communities.

- **Recommendations for the Future**: These ideas center around furthering partnerships within communities and especially among researchers and practitioners. A common refrain is the need for research to support practice and vice versa.

This document serves as a guide to library professionals, researchers, and maker educators to approach challenges with creative thinking—the very same ethos that we try to nurture in our learners. In turn, these insights will inform new directions for making in libraries and identify areas ripe for future research that will increase the momentum and deepen the impact of maker-centered learning, specifically in library services, and leverage new opportunities for collaboration and work.

DEFINING MAKING AND LIBRARIES

Maker-centered learning is commonly seen as a hands-on, learner-driven approach that can be integrated into any subject or topic area, being inherently interdisciplinary. This type of contextualized learning is important because it can be rooted in tinkering and play, technology-based skill development (Martin, 2015), lifelong learning (Resnick, 2017), and/or career and workforce development (NSF, 2017). Many see making as a pedagogical approach (Clapp, Ross, Ryan, & Tishman, 2016; Peppler, Halverson, & Kafai, 2016) that emphasizes learner agency and promotes both content knowledge and development of dispositions. The learning that occurs within maker programs and spaces is therefore specific to their audiences and communities. And there has been continued conversation and criticism that making—the activities, the facilitation, the cultural roots from which it may derive—must include considerations of equity and inclusion (Vossoughi, Hooper, & Escudé, 2016).

Libraries are unique institutions for making: Baked into the fabric of their existence is a focus on equity and access, a broad definition of literacy (Serafini & Gee, 2017), and a focus on supporting lifelong learning, all in support of their unique communities. There are over 100,000 libraries across the U.S., existing in many forms and serving communities with diverse needs (Rosa, 2019; Lee, 2018). Library staff are data-driven, data-conscious, and data-literate. This inherent diversity of libraries and the communities they serve, their foundational focus on access and equity, and their role in reflecting their community's values, needs, and personalities provide an opportunity to understand how maker-centered learning can be incorporated into many different types of learning environments. Like any educational approach or practice, the design of a learning opportunity or environment must be contextualized to the environment and community that it's a part of (Bruner, 1996).

Maker programs and makerspaces are becoming more and more common in libraries across the country. In a small survey from 2013, 41% of respondents noted that they offered maker activities in their library, while another 36% were planning to do so (Price, 2013). In the 2019 School Technology Survey of U.S. school libraries from the *School Library Journal* (2019), out of 1,008 survey responses, school librarian respondents indicated that they were most interested in integrating maker-related efforts (at 52%), and activities related to coding and making were the most offered tech activities at school libraries. Technology isn't the only driver either; in the same study, school librarians mentioned that low-tech and no-tech activities are just as important in developing 21st century skills. A 2017 report shared that 23% of school-based respondents who self-identify as "maker champions" have a role as a librarian or media specialist, the second highest percentage behind 26% with a "teacher" job title (Weisgrau, Parker, & Romero, 2017).

Though the interest is consistent, what became immediately apparent—both in background research and in the first minutes of conversations at the forum—was that libraries have wildly different interpretations of what making means and what making looks like. Among the many examples are:

- Public libraries using dedicated spaces as a platform to connect community experts to the public.
- Public libraries using art space to inspire children.
- Public library programs supporting young people to create music, games, and movies.

- Academic libraries leading college students through design processes to prototype new products on high-end fabrication equipment.
- School libraries walking students through making activities informed by a carefully designed rubric matched to formal learning standards.
- School libraries hosting community service making.
- School libraries hosting clubs and unstructured making.

Makerspaces and maker programs are being designed and implemented in different types of libraries, each with their own focus and goals. There are K–12 school libraries, academic libraries at post-secondary institutions, public libraries, and public library branches. Each of these libraries have different goals and purposes, leverage different resources (including staff with very different backgrounds), and engage with their community in different ways. For example, the Chicago Public Library's Maker Lab is a collaborative learning environment where Chicagoans come together to share knowledge and resources to design and create items (Chicago Public Library, 2015). Conversely, the Detroit Public Library highlights its library of things (equipment, materials, devices, books, and other resources) in supporting entrepreneurship (Special Collections, 2017).

In public libraries, makerspaces are a part of both youth and adult services, sometimes separated by an entire floor from reference materials and sometimes in the middle of it all. Making may happen in one dedicated space, or as a collection of maker activities spread throughout different areas, or activities may even be transported to places outside of the library walls though use of materials that are on a van or in a plastic crate. Making could look like playwriting, a Lego wall, a drop-in e-textile sewing project, or etching a custom circuit board through a computer-controlled machine.

Library makerspaces are perceived to be spaces that provide materials, equipment, and activities for all levels of ability, yet it's a challenge for libraries to meet this expectation. While library makerspace and maker activities are often open to anyone from entry-level patrons to power users (Willet, 2016), these two populations—and the spectrum of users in between—have very different needs and purposes, inclusive of everything from tinkering to personal projects to skill development for job training. To address the needs of power users, the cost of infrastructure and maintenance, as well as the need for training of library staff, can go up dramatically.

A good example is the comparative cost of using a digital design suite like Adobe on library computers versus encouraging patrons to use a cheaper option like Procreate or even free online design software like Canva. While Adobe is more powerful, licenses come with a significant price tag, and the learning curve for mastery is steep. However, the library providing access to a computer with this software, whether in-house or available on a laptop for checkout, may be the only access a member of the community has to this professional tool. Understanding how to make the choices of what to offer comes down to the library defining and clarifying the goals of their maker-centered programming efforts, aligned with its overall values and the values of its community.

This section has defined the general aspects of makerspaces, libraries, and maker activities and spaces within libraries. We know that simply having a makerspace or collection of maker-centered activities doesn't ensure learners will reap the learning benefits that making affords (Barron & Martin, 2016; Barron, Gomez, Pinkard, & Martin, 2014). Intentional infrastructure, staff capacity, and value-centered practices are key for effectively and sustainably leveraging making in libraries to address the interests and needs of the library community. Additionally, while each making program looks quite different in their approach, there were similar ideas that resonated with all forum participants. We elaborate on these shared considerations in the next section.

SHARED CONSIDERATIONS

Looking beyond what appears to be a bewildering breadth of activities and tools, we noticed a pattern. They are all connected by a set of shared considerations that appear across different library settings:

1. Access and equity
2. Making as a response to community needs
3. Redefining librarianship
4. Supporting lifelong learning capacities
5. Building community

CONSIDERATION #1: ACCESS AND EQUITY

Maker culture has a well-documented problem with equity (e.g. Buechley, 2013; Ryoo & Calabrese Barton, 2018), an issue that many are focused on rectifying (Barton, Tan, & Greenberg, 2016; Fields, Kafai, Nakajima, Good, & Margolis, 2018; Pinkard, Erete, Martin, & McKinney DeRoyston, 2017). According to Drexel University's 2019 study of 30 established K–12 makerspaces across the country (Kim, Edouard, Alderfer, & Smith, 2019), makerspace leaders are disproportionately men, and past speakers have called out the majority of white males featured on the covers of *Make:* magazine (Buechley, 2013). A Maker Promise report from 2018 noted that the majority of its survey respondents and self-identified "Maker Champions" in school contexts are white and female. While this contrasts the generalization of males dominating the maker arena, it's worthwhile to note that "these results are consistent with the current state of racial diversity among educators in the US" ("Fulfilling the Maker Promise: Year Two", 2018), showcasing the fact that education as a field has been notoriously inequitable in its gender and racial representation as well.

Libraries bring an important voice to the conversation about equity in makerspaces and maker-centered learning. Libraries are open to the general public, serving a population that may not feel welcome in a membership-driven makerspace. Libraries have established trust with their communities, allowing library makerspaces to reach all populations, especially those who haven't been seen as the dominant view of the white, male, and STEM-motivated public face of making. Libraries, then, have a unique opportunity to elevate and make present the many cultural practices of making that are often less marketed as such. Long-held forms of creative production such as weaving, quilting, woodworking, automotive detailing, and music creation are inherent to the traditions and practices of many of the communities that libraries serve.

Drawing on existing research on learning and culture (Nasir, Rosebery, Warren, & Lee, 2006), we predict that when libraries align making with the culture of their community by incorporating the needs and interests of their patrons, they are better able to achieve equity. Programs and learning research on makerspaces in museums and out-of-school time programs have explored the ways in which prioritizing a makers' cultural ways of knowing and cultural practices impact participants' engagement and sense of belonging (Searle, Tofel-Grehl, & Breitenstein, 2019; Svarovsky, Bequette & Causey, 2007). Libraries can also take an equity stance by providing levels of services to specific populations rather than providing the same service to everyone. This practice allows libraries to directly address inequities head-on through their practices (Vossoughi, Hooper, & Escudé, 2016)

Providing access to learning is a founding principle of the library and is thus integrated into the making programs at the library. According to Andrew Carnegie, "There is not such a cradle of democracy upon the earth as the Free Public Library, this republic of letters, where neither rank, office, nor wealth receives the slightest consideration." Ensuring that a person's status has no impact on their ability to learn and better themselves is a foundational value among libraries and therefore a foundational value among makerspaces housed in libraries. Access into the library building is generally available to everyone, free of cost, during operating hours, but there may be restrictions on particular spaces or programs offered for specific populations; for example, many libraries provide a restricted teen space available for use only by 13–19-year-olds. Libraries also serve multiple audiences: They provide services for power users—patrons who seek and use the library regularly—while also serving populations that are of specific interest to the library.

WHAT ARE POWER USERS?

Power users are patrons who have ample means and resources to navigate library services ("Power User" 2019; Whitney, 2016). They track library calendars carefully, book a reservation for a program on the first day it opens, and can travel to several different libraries in their area for a variety of library programs. There are lots of reasons to love these patrons. Librarians know their names—definitely their children's names—and have formed trusted relationships with them over years of service. They are also patrons who usually check out a large number of materials and who respond to library surveys. They help make the library a community and readily share what they appreciate about the programming.

TENSION

Who do libraries really serve? Do they, or can they, really serve everyone?

While the library may be open to all, does this mean the focus is on the entire community covered by the library's service area? Youth services librarians often talk about distinctive groups of patrons as they balance their service priorities. On one hand are the power users, active patrons who are engaged and aware of library services and take advantage of all the library offers. In contrast, libraries may also have specifically designed programs to reach populations that don't have access to the library building.

This "tension" of serving everyone is one common throughout all library services—from collection development to read-aloud programs to makerspaces—and has been problematic from the creation of the first public library. The introduction of an equity lens, surfaced repeatedly in conversations at the National Forum, provides a framework to resolve this tension. One such example is in large public library systems where neighborhood branches provide a way to put equity into practice by providing specific resources in response to local needs.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Consider ways to provide levels of services to specific populations rather than providing the same service to everyone.

DENVER PUBLIC LIBRARY | FOCUSED BRANCH EFFORTS

Denver Public Library (DPL), serving the million or so people in the city and county of Denver, Colorado, has 26 branches spread across the city. The neighborhoods in which these branches are located have shared unequally in Denver's economic boom over the last decade. While newly gentrified neighborhoods see new development and high incomes, some neighborhoods, largely composed of long-term residents or new immigrants, have seen wages stagnate, housing costs rise, and opportunities to stay in the city shrink. By consciously placing resources like makerspaces (or technology training, GED programs, or early literacy efforts) in neighborhoods that have been left behind, DPL works toward equitable opportunities for Denver residents. The library is, of course, open to everyone, but by leveraging how embedded local branches are in their neighborhoods, DPL can work to make sure those who need access the most have the opportunity.

HERITAGE HIGH SCHOOL LIBRARY | HIGH-LEVEL OFFERINGS

At Heritage High School (Newport News, VA), students (85% of whom identify as black or African American) have the opportunity to take high-level computer science and engineering courses. Melanie Toran, the school librarian, wanted to ensure that all students have access to these types of experiences and even facilitated maker opportunities specifically for a Special Education class for students with mild intellectual disabilities. Toran facilitates the class in collaboration with a local music mentorship program focusing on music production and sound engineering. Students are supported to use a custom-built music app to develop and code their own digital music tracks. There's an end-of-the year celebration and showcase of their work for other students, teachers, parents, and community members to check out the accomplishments of these students. The celebration is a "Coding Prom," where the students collaboratively create song debuts during the first dance.

TENSION

Libraries, like so many civic institutions, have limited funding and space, requiring them to set strategic priorities that serve specific audiences.

One consistent consideration that came up during the forum was, of course, around funding. With limited funding, a library or a larger library system has to consider equitable distribution of resources and investments into targeted areas of their community. Makerspaces add to the complexity of both funding and services, and that creates challenges for funding programs, equipment, materials, and the staff to activate the programs. Yet, robust maker-based learning experiences don't necessarily require the most expensive equipment and latest technologies.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Consider how budgets and funding influence the ways in which the values of equity and access are put into play in a library space.

Having a library's values and budget plans established first, before seeking additional funding from grants, is key, as it can help determine which grant applications are worth putting considerable time and energy into. It can be tempting to apply for a large grant that "sort of" aligns to an organization but which may limit flexibility and responsiveness to community needs.

Thinking carefully about consumables and fixed costs is also important, especially with regard to makerspaces. Access to certain tools and equipment doesn't mean much without access to materials, and consumable materials require consistent cycles of purchasing. An equity lens demands we lower barriers to both materials and tools, and having a funding model that's flexible can be an opportunity for libraries to build

out their programming options as interest emerges in different activities and at different levels. A common recommendation is for budgets to be spent at dictated milestones, instead of all at once, so that staff can purposefully and patiently observe and examine which tools and materials are most popular with their patrons and/ or depleted most quickly. This cycle also allows for patrons to express interest in tools and materials that staff may have not initially considered.

In makerspaces, money clearly cannot be spent solely on tools and materials either. By now, the field has learned that "build it and they will come" is neither an accurate representation nor an equitable, sensible, or sustainable approach to developing any type of maker program or makerspace. If a library

chooses to spend all of their available funds on high tech equipment without plans for funding staffing, infrastructure, training, or contracting with local experts, they may quickly find themselves with depreciating equipment and limited community engagement. Even leveraging community connections and eager volunteers requires staff time and management.

This section provided both an overview and a glimpse into many important conversations occurring around the topics of access, equity, and equality. Because access and equity are not contained in and of themselves, but rather form the foundation for much of what libraries decide and value, throughout the remainder of this white paper, we share additional ways in which libraries are grappling with these topics.

TENSION
Are libraries neutral?

At both the 2017 and 2018 American Library Association (ALA) Annual Conference, panelists have debated whether libraries and librarians are—or ever have been—neutral (e.g. Carlton, 2018; Sendaula, 2017). At issue is the historical founding of libraries, their status as public institutions, and the responsibility and agency librarians have to acquire and display materials. A driver of these conversations is representation both within librarianship and in books and other media. The discussion also exposes the distinction between equality and equity. While everyone is welcome to libraries, not all patrons feel equally welcomed or well-served.

While there are efforts at many libraries to develop approaches to reduce race-based disparities and advance racial equity throughout their organization (e.g. Sonnie, 2019), making and the "maker movement" bring their own angle to this problem. "Endemic to the development of public libraries is a continual process of justifying their worth to private donors, popular agendas, and trends in government funding" (Lakind, Willett, & Halverson, 2019). In other words, the desire to justify a makerspace in a library may be plagued by mainstream, traditionally white, middle class agendas around entrepreneurial endeavors or high tech innovations, rather than culturally relevant (often low tech) traditions of making. These are the same critiques of the broader maker movement (Vossoughi, Hooper, & Escudé, 2016).

However, there is potential for libraries to redefine the traditional maker movement in a way that does align to their values and goals, especially with a focus on programs that serve specific communities or are led by community members in neighborhoods or branch libraries. Another example is through focusing on outreach of maker programming to target populations.

CONSIDERATION #2:
MAKING AS A RESPONSE TO COMMUNITY NEEDS

Fundamentally, libraries serve the community. Whether attached to a school, a municipality, or special institution, libraries are often the beating heart of their communities. By nature, libraries share and reflect the values and purposes of the communities they serve. Some of the variation in the definition of "making" in libraries can be attributed to the different demands communities place upon their libraries, and those demands and expectations are high. According to a Pew Research Center survey in 2016, "people see libraries as a safe place, a source of educational opportunity and trusted information, as well as a place to ignite creativity in young people" (Horrigan, 2016). The ways those expectations play out will naturally look different from one place to another.

Often the demands of the community align well with library makerspaces and programs, but the unique flavor of alignment changes based on the community's needs and library's goals. For example, workforce development is a common demand from city leadership and neighborhoods. Academic libraries fill this need by meeting requests from potential employers to give students more hands-on time with the design and fabrication process. Public libraries meet this need by helping to train people in new job skills; for example, BLDG 61 at the Boulder Public Library has a program for people experiencing homelessness, training them in woodworking and connecting them to employers.

Public libraries have also begun providing engineering and coding programs (e.g. Braun & Visser, 2017). School libraries have taken the lead in implementing programs like Project Lead the Way, connecting future career readiness with STEM learning. While all of these examples of maker-centered learning revolve around workforce development, they are all unique responses to the needs of their particular community and the goals of their library.

Libraries have long been hubs for those seeking employment. By virtue of being a free public resource, job seekers depend on libraries to do research about careers, gain skills, apply for jobs, and respond to communications. About 90% of libraries offer programs in technology skills, and in many instances, the public library is the sole source of free access. As of 2012, this was true in 62% of communities (Conley 2012).

Libraries provide help and haven, not only for those seeking skills and workforce development, but also for parents seeking educational programs for their children. From story time to weird science to time with therapy dogs, libraries have been serving the needs of their communities for centuries as one of the only public spaces that remains free and accessible to everyone, regardless of ability to pay. As such, the library is a critical foundation to a society that values individual determination and advancement. Additionally, the provision of physical space fills a concrete need in many communities; few people have the workspace or tools in their homes (and some folks don't have housing) to accomodate projects.

TENSION:

When we act responsively to community needs, who in the community is valued? And what sort of power or privilege structure is at play when we consider which individuals are inviting versus being invited?

Libraries must create space for their community to discuss common and differing values and goals when establishing maker programs and makerspaces. Even librarians who are abreast of the latest knowledge and trends in the field, confident in their own knowledge of why it's important to champion learning and making, run the risk of making assumptions about the purpose and goals of a maker-centered program for a new partner or specific population. It's critical to always balance the knowledge and goals of the library with the values of the community.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Question your own assumptions and invite stakeholders into conversations about what is being offered and what they care about, aligning goals and values of core groups.

MADISON PUBLIC LIBRARY | **DEFINING VALUE TOGETHER**

At the Bubbler makerspace, with the help of associate professor Rebekah Willett of the University of Wisconsin-Madison, library staff dove deep into different models of learning frameworks as they sought to define their values and purpose. In establishing their own values, they felt educated and confident in what they'd like to observe and measure: risk taking, initiative, perseverance, opportunities for collaborative learning.

However, in a new Institute of Museum and Library Services (IMLS) project, in partnership with Buffalo & Erie County Public Library, University of Buffalo, and University of Wisconsin-Madison, focusing on assessment in library makerspaces, they focused their research toward their

various stakeholders rather than academic articles. Initial findings showed that joy, fun, and community interactions are cited more regularly as the values of our programs that keep our patrons returning again and again. There almost seems to be an assumption that learning is a given, but what makes it special is the chance for patrons' children to navigate a new space, be with other community members, and have a good time.

MADISON PUBLIC LIBRARY | **STAKEHOLDER GOALS AND VALUES**

In one instance, Youth Services Librarian Rebecca Millerjohn was working with a local after-school center in what is often considered a resource desert area of Madison. The center didn't have any digital tools in

their space; no computer lab or tablets were available. To bridge this perceived gap, Rebecca made the pitch for a series of programs around digital making with the library's iPads. This was flatly turned down. The center director made the case that what her students really needed was hands-on, fine-motor-skill-building activities. She wanted to provide opportunities for her kids to be active and creative with their hands, something she saw as disappearing from her school. Later, her favorite activity cited was a "kindness rocks" project, which invited children to paint joyful messages or pictures on rocks that could be hidden in their neighborhood as tiny acts of kindness. Months later, she still sees the rocks around. Her students are proud of doing this for their community, and the rocks serve as a reminder of that pride and joy.

DENVER PUBLIC LIBRARY | **FABRIC ARTS FOR ALL**

One example of how the Denver Public Library works towards equitable opportunities for Denver residents is through fiber arts. The community at the Rodolfo "Corky" Gonzales Branch is composed of both new immigrants and high-income new residents. Both groups expressed a desire to learn more about fabric arts, resulting in a lab that has monolingual Spanish speakers sewing dresses next to students from an orthodox Jewish school modifying their uniform yarmulkes with zippers and embroidery next to white mothers learning weaving with their families. At the main branch, the needs of people experiencing homelessness are met in part by stocking webbing and other materials for backpack repairs.

HEALING LIBRARY | **SOCIAL EMOTIONAL LEARNING KITS FOR FAMILIES**

The Healing Library was created explicitly in response to community needs, as a way to support families who have experienced trauma. Not a physical library location, the Healing Library works with libraries and communities and develops kits -- everything from picture books with guiding questions, to therapy-based activities with all materials included -- on a variety of topics, like the death of a family pet, dealing with illness, separation and divorce, and more. Families can purchase them directly or borrow them through their local libraries. Through art and play-based making and high-quality engagement with books, the kits help families to develop social emotional learning capacities throughout their healing journey.

These vignettes demonstrate that everyone involved in creating and using the space likely values and prioritizes different goals. Informed library staff can value different things, but their knowledge and goals have to be balanced with those of the community.

CONSIDERATION #3: **REDEFINING LIBRARIANSHIP**

Another common theme at the National Forum was a redefinition of librarianship. The field as a whole has undergone fundamental changes, and making in libraries is a small part, but making and makerspaces could be argued to represent the bleeding edge of this change. The traditional perception of the librarian is that of a gatekeeper, such as the reference librarian taking the public's questions and connecting them to a carefully curated collection of research databases and materials. That perception is slow to change, but the reality is that libraries have taken on the roles of educators, community organizers, connectors, and even social workers in the perpetual quest to respond to identified community needs.

Throughout history, libraries have played a significant role as activists, whether related to freedom of speech or civil rights, and today's changes continue to push the envelope of influence that librarians hold (Jaeger, Bertot, and Subramaniam, 2013). Programs such as the Broadband Technology Opportunity Program have fundamentally remade libraries into locations for access to broadband internet and technology training ("NTIA Releases 3 Case Studies", 2014).

Projects like the Working Together Project in Vancouver have placed libraries squarely in the center of efforts to fight social exclusion ("Community-Led Libraries Toolkit," 2008). A growing number of libraries have full-time social workers in response to the homelessness and opioid epidemics or they've developed programs that explicitly address those issues. Many staff are trained to

administer an EpiPen for a severe allergic reaction and, more recently, a Narcan dose to counteract opioid toxicity. Library staff often support completion of tax forms and immigration paperwork. By responding to community needs, librarians must redefine the roles and responsibilities they play.

TENSION

Who is qualified to facilitate maker programs inside a library? What does qualification constitute?

The particular wrinkle that maker programming has added to this redefinition of the role of librarians is two-fold, changing both the role itself as well as the qualifications necessary for this role. First, adding maker programming tends to reposition library staff as co-learners and facilitators rather than didacts, with a focus on using the community as a knowledge resource. Second, the particular demands of maker programming have resulted in some systems revisiting the qualifications necessary to enter and work in the field.

The unique blend of interpersonal skills, facilitation abilities, and aptitudes for and curiosity about technical skills such as 3D modeling, music production, or weaving is not something currently cultivated in Masters of Library Science programs. And as such, current librarians need more in-depth continuing education opportunities, allowing for not only exposure but also in-depth development of expertise and confidence. A two-hour webinar cannot be sufficient. There has already been a call in the recent decade to not only diversify the individuals who work in library and information sciences (LIS) but also to include clear, intentional training for library professionals or pre-professionals around issues of access, equity, diversity, inclusion, and cultural competence so that library staff can better reflect and serve their communities (Jaeger, Bertot, and Subramaniam, 2013).

The rise of makerspaces in libraries adds to the complexity of responsibilities and professional learning required of library staff. In fact, many library maker-related jobs are dropping the degree requirements entirely in order to attract staff with expertise in their chosen field(s) of making. This highlights another tension in how libraries recognize and hire qualified and knowledgeable staff; often these maker jobs are not offered as full-time positions with the same benefits and status that the librarian-level positions receive (Johnson, 2019).

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY
Leverage the expertise of community members to expand the library's community of practice, wherein the role of the makerspace staff becomes a connector of people and knowledge.

MADISON PUBLIC LIBRARY | LEVERAGING COMMUNITY EXPERTISE

In the second year of the Bubbler at Madison Public Library, staff were approached by a local amatuer cartography club called Map Time Madison. The group, led by two UW graduate students, was looking to expand outside of campus to engage the broader community. The leaders had the expertise, but they needed computers with enough memory to support their free mapping software, as well as space to invite more participants. By providing the platform and the technology, as well as publicity and engagement with interested participants, the librarians did not have to be responsible for the expertise.

As librarians take on new roles as co-learners and facilitators, these refined responsibilities support an assessment mindset of "your success is my success," a relationship-based model of assessment wherein educator and learner are intertwined in success. This shift also fundamentally challenges library workers to move out from behind the reference desk, metaphorically speaking, and learn alongside their communities. Many of the same basic functions of the "classic" librarian are being performed: a reference librarian doesn't *know* the answers for every question that is brought to them, but they know the proper places to look for those answers. The maker librarian/library worker offers the same connection to information and resources but then becomes intimately involved in putting that information into action—the difference between referring someone to a Chilton's manual to fix their car and moving on to the next question, versus referring someone to a YouTube tutorial on soldering and then sitting down to fix their headphones with them.

TENSION

Smaller MLS programs may also struggle to easily incorporate new maker-based curricula into already-packed two-year master's programs, especially when they have limited faculty with varying responsibilities beyond teaching.

Library programs are aware of the changes happening and the changes needed to keep pace with the reality of the profession and practice, but like many programs, changes must be balanced with past and current priorities, as well as staffing and infrastructure.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Update the job requirements or expectations of your library staff positions, opening the opportunities to better reflect the demographics and interests of your community.

DENVER PUBLIC LIBRARY | MLIS & BS OPTIONAL

Denver Public Library has dropped even the bachelor's degree requirement for working in their makerspaces, which has helped build diversity in their staff and given them access to a far wider pool of people who have unique skills and love to teach them.

UNIVERSITY OF NEVADA, RENO | STAFF WORKING ALONGSIDE ONE ANOTHER

No different than public libraries, academic libraries on university campuses find themselves with staff of varied backgrounds and varied degrees. The field generally hesitates to give a title of "librarian" to staff without an MLIS degree, and yet, diversity of skills is critical to the successful operation of a library, especially one with a makerspace. At a library like University of Nevada, Reno's DeLaMare Science & Engineering Library, "technicians" (often classified under "IT" as opposed to "library") work seamlessly alongside librarians, but the team is small and the understanding is shared that each team member brings critical skills. And until graduate library programs are providing the training and skill development that today's librarians need, job titles may be less telling and more limiting.

TENSION
Staff are not and cannot be experts in all things related to making.

In talking to many librarians and practitioners at the forum, another tension that arose is that not many of us even consider ourselves and our colleagues "power users" in all things of making. The question often arose: *Should we be the experts?* In some cases, library makerspaces are welcoming patrons whose interests and expertise vastly outstrip any technical training of library staff. Few librarians can claim to simultaneously be master craftsmen.

However, many public libraries have seen this not as a barrier but as a further opportunity to engage members of the community (Wardrip, Brahms, Carrigan, & Reich, 2017). By positioning the library makerspace as a platform for other artists and makers to share their crafts, a librarian can reposition themselves in a role that they feel more comfortable with—that of connector to community resources, rather than an expert in all things.

By removing the librarian as the chief facilitator, library staff may also find themselves in a better position to observe, document, and evaluate what kind of learning is happening during maker programs. Evaluation of program impacts may be necessary to continue to justify funding maker programming, but it would also allow the librarian to learn what is working in their space and set priorities for what opportunities they want to connect the community to in the future.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY
Tap into and leverage the professional communities of public and school librarians who are incorporating making and learning into their programs. They may serve as perfect models to host Information School students as interns and practicum students.

UW-MADISON INFORMATION SCHOOL | BROADENED APPROACHES

In an effort to address the changing field of librarianship, professors at UW-Madison iSchool have implemented maker and informal learning practices into their broader survey courses. Maker education represents a week of their pedagogical theory and practice class, and recently, their Children's and YA Literature courses have been reframed as "Resources for Children and Youth," to allow for more focus on programming practice. They've also tried to broaden their approach toward teaching assessment in informal spaces.

However, when serving such a wide variety of students seeking to enter school, academic, or public libraries, the best support the iSchool can provide is to connect students—through jobs, internships, practicum placements, or independent studies—to practitioners within those communities who are doing the work on the ground. This, of course, reinforces the need for faculty to know their community and cultivate relationships with practitioners (often alumni).

CONSIDERATION #4:
SUPPORTING LIFELONG LEARNING CAPACITIES

Libraries are institutions that support lifelong learning. Learning happens across the various settings and contexts of daily life over the entire lifespan (Banks, et al., 2007). School-aged children spend less than 19% of their time in formal learning environments like school (LIFE Center, 2005); therefore it's unrealistic to believe formal learning environments (e.g., school, college, or university) are the only places learners gain all the knowledge and skills they need to thrive throughout their lives (London, 2011). Lifelong learning refers to the knowledge and skills learned through living life, from learning how to walk, eat, cook, and do taxes, to specific job skills, as well as pursuits that interest and challenge the learner. This type of learning is based on choice and curiosity, and it fosters creativity, persistence, and an iterative cycle of observing, trying, testing, and finding satisfaction (Banks et al., 2007). The library is the ideal setting to pursue development of lifelong learning skills and dispositions.

Library makerspaces and maker activities support and foster many lifelong learning traits. Forum participants mentioned three specific dispositions (choice, curiosity, and creativity) as relevant and important motivations and outcomes for facilitating maker-based learning experiences. The authors also surfaced joy, personal identity and connections, intergenerational learning, and dispositional mindsets as additional aspects that are nurtured through maker-centered education and are complementary to lifelong learning.

DENVER PUBLIC LIBRARY | EXPERTS EVERYWHERE

The Denver Public Library model is that technical expertise is secondary to learning how to learn. Staff, volunteers, and community educators all model a willingness to experiment, persist through failure, and find resources—in essence, how to learn new things. And in doing so, there doesn't have to be a choice between "librarian as expert" and "community as expert"; all can be dilettante amateurs learning the "soft" skills that will have far more impact than knowing how to 3D-print a Pikachu.

BUFFALO & ERIE COUNTY PUBLIC LIBRARY | HONORING PATRON WORKFLOW

The Launch Pad at the Buffalo & Erie County Public Library is "a comfortable and collaborative space that promotes creativity and innovation." An all-ages makerspace most often frequented by adults, the Launch Pad not only provides access to a range of high tech equipment for audio and video production, 3D printers, and laser cutters, but also to knowledgeable staff who can guide patrons in their use.

As a part of a recent IMLS project, librarian and manager

Jordan Smith asked patrons, "How do you know things are going well?" Smith discovered that his regular patrons truly enjoy having a space to explore their own creative projects and endeavors and being able to tinker indepently with high quality equipment at their own pace. The library's enthusiastic staff has learned to respect that independence and not interrupt the intense engagement and flow experience of their adult learners.

Working one-on-one and listening to patron needs has also helped staff better direct their own learning and development, as well as design responsive classes in

the space based on patron interest. The organic nature of the interactions in the space means that everyone (patrons and facilitators) continues to ask new questions and build knowledge together.

MINNEAPOLIS INSTITUTE OF ART (MIA) | **WIKIPEDIA EDIT-A-THON**

Wikipedia edit-a-thons are intended to create a communal editing experience for new and expert editors in Wikipedia. At MIA, the art research library staff, librarians Janice Lurie and Meg Black, along with the Manager of Lectures and Academic Programs, Susan Jacobsen, welcome participants and equip them with everything they need to get started. MIA's goals for the event are: to enhance Wikipedia articles on underrepresented artists (especially women and artists of color), bring in more women as editors in Wikipedia, provide more visibility for MIA as a resource on underrepresented artists, and also bring more visibility to MIA's research library (both inside and outside the museum) as a resource for knowledge.

To assess the impact of the event, participants respond to a survey about their experience (including questions about their confidence in editing). Librarians Lurie and Black write, "As an institutional library, we want to be information activists, and we want the community to engage in that activism as well." (For more information, see Lurie, Black & Jacobsen, 2017).

INDIAN TRAILS PUBLIC LIBRARY | **THE RE-ENERGIZING RECESS**

Lifelong learning is certainly important to foster with patrons, and library staff have found that it's equally as important for themselves, in order to best develop their own skills and support the interests of their community. The team at Indian Trails Public Library's Launch Pad understands that makerspaces are inherently complex places because there's a constant evolution of knowledge. Skills must develop as quickly as software becomes obsolete, new equipment drops in the market, or new project ideas are dreamed up by patrons.

The critical factor in ensuring that staff can develop in their own ways and share their unique talents with one another is time. With support from the Indian Trail Library trustees and administration, every six months, the Launch Pad closes, and the staff take a full week of "Re-energizing Recess" in order to practice content, teach classes to other library staff, take classes in the community, refill their "creative well," and engage in the continued learning practices that they support with their community members.

FAMILY CREATIVE LEARNING WORKSHOPS | **INTERGENERATIONAL LEARNING**

Public libraries in Boulder and Denver partner with Ricarose Roque, a professor at the University of Colorado Boulder, and her students to run Family Creative Learning Workshops,

an intergenerational maker workshop series. The five-part series is held weekly on evenings or weekends, inviting parents of 5–7-year-olds to come make projects with their kids. The parent-child teams design and invent together, teach and learn from each other, and meet other families in their community. Dinner and transportation vouchers are included, and free childcare is provided for younger/older siblings.

Each workshop has a four-part structure—Eat, Meet, Make, Share—intended to support community building as well as learning and creativity. During Eat, families eat dinner together while engaging in relationship-building activities. During Meet, parents and kids meet in separate groups, which allow them to get to know their peers and ask questions about their experience. During Make, parents and kids engage in design-based, interest-driven projects and activities with a focus on tinkering and storytelling practices that celebrate cultural histories. During Share, parents and kids share their projects, allowing them to practice talking about their projects in their own words, while other families can ask questions and give feedback. The workshops culminate in a community showcase where families share their projects and invite friends and family. Ultimately, the workshops are as much about building relationships as they are about building projects—relationships between kids and parents, between families, and between families and the library staff and resources.

CONSIDERATION #5: **BUILDING COMMUNITY**

During the forum, making in libraries, informed by the values of access and equity laid out in Consideration #1, was frequently described as "building community," or as the variant "community first, tools second." One of the main functions of the space, programming, and/or staff is to build intentional communities of creators, drawing on the knowledge of community members and meeting community needs for a no/low-barrier space to gather and work. In this formulation, library staff acts as facilitators, connectors, and hosts. They bring in experts to share their knowledge, connect people with similar interests in their spaces and programs, use the library as a platform to highlight creative work being done in their community, and make relationship-building a key part of their program's theory and practice.

Libraries continually study and respond to their communities in a variety of ways, including collection building. School libraries often have a library of tools that complement and enhance their makerspaces. For example, Albemarle High School in Charlottesville, Virginia, lends Arduinos and Raspberry Pi microcontrollers to enhance student work in the makerspace. Cake pans and cooking classes often go together in the Rockingham County Public Libraries. Chicago Public Libraries lend hand tools in their bike classes. It has long been established that libraries buy items that will circulate. In the same way we take book suggestions, we also take "thing" suggestions. Creating a library of things and makerspaces that circulate them is a way that libraries respond to their communities' needs.

CHICAGO PUBLIC LIBRARY YOUMEDIA | DEVELOPING A TOOL FOR OBSERVATION

The downtown Chicago YouMedia space is equipped with areas to hang out and play video games, as well as areas encouraging creative arts and technology pursuits with tools such as video cameras, drawing tablets, sewing machines, paints, and an in-house recording studio. Teens have access to adult mentors, many of whom have a content-area specialty, hang out alongside the teens, work on their own projects while being available for questions and support, and design and run weekly programming that changes quarterly.

During a multi-year research-practice initiative to learn about how different environments interpret and observe learning that happens in their makerspaces (building on Brahms & Wardrip, 2014; Wardrip & Brahms, 2015), YouMedia engaged in collaborative work to design an observation tool that captures learning and making in the space. Staff recognized a critical absence of community in a lot of maker frameworks.

They specifically identified a need to include (1) communication, sharing, collaboration, and bidirectional teaching and learning with peers and mentors, and (2) connections to opportunities beyond the immediate learning opportunity observed, including establishing connections to the learning space itself, meeting experts from the field, and being referred to other tools, programs, and support beyond the library space. The observation tool that was developed includes these dimensions staff feel are critical, building relationships through hanging out and messing around that, in turn, builds the trust necessary to encourage young people to try new things and fail at them publicly.

Many library spaces, particularly those created for teens, have been influenced by YouMedia, which places emphasis on supporting teens to create meaningful artifacts with an emphasis on personal relationships and connections. The original design of YouMedia was heavily influenced by research into how youth spend their time (e.g., *Hanging Out, Messing Around, and Geeking Out*, Ito et al., 2010) and how to support youth in creative projects and pursuits that sustain learning (e.g., Barron, Pinkard, Gomez & Martin, 2014). Both research frameworks highlight the necessity of social interactions and building community for participation, making, and learning. Specific design practices that were highlighted include offering youth opportunities to collaborate with peers, ask for and receive support from mentors and other educators, and share expertise and work within and beyond the particular production space.

In this section on Shared Considerations, we presented five considerations for library makerspaces, each with their own tensions and opportunities. We began with an examination of equity and access, highlighting some ways in which libraries can directly address inequities through their practices. The second consideration took a look at how making allows libraries to better respond to community needs. Redefining librarianship was the third consideration, responding to the shifting roles and responsibilities of the library staff as they accommodate making into their practices. The fourth consideration discussed how making naturally supports lifelong learning capacities. Finally, the fifth consideration highlights the fact that libraries don't exist without their communities, and making allows the library to interact with and build their community in new and exciting ways.

As library makerspaces work to grow and evolve practices, we have an opportunity to change the equity conversation in the larger world of makerspaces, maker-centered learning, and makers. We can do this through several methods we've outlined in the preceding section:

- Consider ways to provide levels of services to specific populations rather than providing the same service to everyone.

- Create a variety of practices to engage different parts of the community.

- Consistently evaluate programming structure, asking yourself, "Is it equitable?"

- Consider how budgets and funding influence the ways in which the values of equity and access are put into play in a library space.

- Question your own assumptions about the values and goals of your maker activities.

- Invite stakeholders into conversations about their values, particularly when designing or redesigning services.

- Leverage the expertise in your community by inviting members to facilitate and share their knowledge.

While these statements are easy to say, they aren't as easy to accomplish. Particularly, practitioners and researchers alike have been struggling for quite some time with the question of how to measure and demonstrate the value of maker-centered learning.

DEMONSTRATING VALUE AND MAKING THE CASE

As public institutions, public libraries and school libraries are accountable to their patrons and community members. One way libraries can hold themselves accountable and demonstrate value or make the case for making is through assessment. Assessment, then, is for the benefit of many stakeholders - the program manager, the educator, funders and supporters, patrons and program participants - but ultimately must uphold the mission of the organization. Therefore, as libraries continue to evolve and innovate to better serve their communities, we must learn from new approaches and ask essential questions about the impact of these programs.

Assessment is a challenging but necessary library practice. Creating assessment tools and practices for informal learning spaces is a challenge (Petrich, Wilkinson, & Bevan, 2013). Some issues at play include a lack of training in evaluation of library staff (Filar Williams & Folkman, 2017), the time and resources to collect data, and the diverse needs, interests and skills of patrons (Koh & Abbas, 2015). Despite this, library staff frequently engage in assessment activities, including the collection, analysis, and sharing of data to answer a formative or summative question about what is going on in their space. Sometimes, the questions driving the assessment are top-down, such as when a funder requests evidence of impact or administrators need stories to share with their board. Other times, the purpose of assessment is tied to learning and practice, such as using data to improve programs, advocate for resources or structural changes, or share what is happening in library makerspaces with the patrons who spend time there.

Academic library makerspaces, similar to those in K-12 school libraries, support teachers and students through collaborative course planning, supporting student research, and providing space for experimentation and play with materials. Academic librarians measure the impact of these collaborations in multiple ways, including level of student awareness of the library, usage of its collection, (return) visits to the makerspace, collaboration with professors, and more (Lotts, 207; Welch & Wyatt-Baxter, 2017). A few have participated in research projects to investigate the impact of a library makerspace on student creativity and innovation (Noh, 2017; Bieraugel & Neill, 2017), finding that different space designs impact the type of behavior students exhibited.

It was clear at the forum that there was no "one size fits all" tools or practices for use in library makerspaces, but there was a strong desire to consolidate what the field has learned to date. An important feature of this conversation was around the nature of libraries as *public institutions* and the responsibility to be accessible, welcome and serve all visitors. By the very nature of the public or public school library serving diverse patrons challenges the notion of assessment on a broader scale. Narrowing inquiry questions to manageable scale is important not only for the impact it has on staff, but also on the impact the findings can have on programs or the organization.

ASSESSMENT PRACTICES

The topic of assessment is an ongoing and multi-faceted one, and at the forum, rarely did the question arise of whether or not we should assess. Instead, it was *how?* And *for whom?* And *for what purposes?* Much of the conversation centered on keeping the library's and community's values in mind, as any assessment efforts should reflect the inherent diversity of library services and patrons. It should be noted that this work around assessment is ongoing and doesn't necessarily

represent a comprehensive overview. The topic is a complex one, being discussed at all levels and across institutions of every type.

Given that libraries and library staff are often already evidence-centered and data-driven, many of the forum's questions and field's conversations revolve around how to best capture the varied types of data that pay tribute to the diverse types of engagement occurring at libraries, whether in a school or at a community branch. Individual surveys and circulation numbers only tell a small fraction of the richer story at hand. Additionally, much assessment focuses solely on the individual level, but the ways in which to tell the tales of the collective group could be quite revealing. Integrating assessment into the environment, so that it's not an additional task or an afterthought to an activity, is ideal but is easier said than done.

Other discussions focused on existing tools, defined broadly, that can be leveraged to both capture data and share what actually happens in the space, while taking care to maintain privacy. Tools include everything from detailed research methods to social media platforms to photographs displayed in a space, making visible the learning, work, and identities in a library. These tools must be easily accessible and usable by staff.

Some guiding questions can be utilized to shape any assessment:

ASSESSMENT FOCUS	GUIDING QUESTIONS
Establish the purpose of the assessment	Who should be involved in deciding the assessment purpose?
	For whom is the data being collected?
	What will knowing allow you to do?
Determine approach to assessment	What data will help address the question?
	What data do you already have access to (e.g., photographs, attendance numbers, stories)?
	What more do you need?
	How might you collect that data?
	Who will collect the data?
	When will they collect the data?
	What will you do with that data?
Consider ethics and equity in the process	What role or influence do patrons have in the assessment?
	What role or influence do other stakeholders have in the assessment?
	How, when, and where will the findings be disseminated?
	How will the assessment shape future experiences?
	How does the entire assessment process reflect the guiding principles of the library core values, like community, curiosity, etc.?

TENSION:

How do we evaluate library services that provide deep engagement but reach low numbers of patrons, particularly when traditional methods of success value increasing reach?

When we consider the traditional methods used to evaluate the success of library programs and services, we find a tension in prioritizing whom the library provides services for and how it provides those services. Traditional measures of success are generally tied to physical buildings and use quantitative counts such as program attendance, visitors to the space, and circulation numbers. Under these measures, high quality programs that invite curiosity and critical thinking but bring in relatively small numbers of visitors may be deemed less valuable than a service-level event like a movie screening that draws a large crowd. Frequently, *success* is equated with higher numbers of patrons served.

While higher numbers may mean broader reach, the numbers themselves can be misleading. Because libraries often purposefully don't collect identifying information about patrons in the space, a count of 10 youth over 10 weeks is sometimes reported as 100 patrons served, instead of 10 youth who each participated for 10 hours. Additionally, library staff know having the ability to work in-depth with 10 patrons who return for 10 weeks is often more valuable than short-duration engagement, leading to new relationships, ideas, and opportunities for further learning. However, library staff find it difficult to capture and share that success in ways that their other stakeholders may value or understand.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Advocate for additional capacity, changes in staff roles and staffing structure, and opportunities for professional learning related to assessment in libraries, especially with regard to maker programming.

Multiple stakeholders would benefit from understanding assessment practices in libraries. Research in informal learning has shown that capturing data that is relevant and useful for practitioners is a difficult yet important part of program assessment (Wardrip, Abramovich, Millerjohn & Smith, 2019). Practitioners in the field would greatly benefit from developing or having measures of success aligned with their goals and outcomes. This alignment work encourages administrators and staff to think about practices of assessment as linked to questions of practice as well as formative learning and improvement goals. ALA's Project Outcome has been working on providing an entry-level way for libraries to start measuring outcomes beyond pure attendance or circulation (Project Outcome, 2018). In addition to changing how and what we measure, we also need to advocate for time for staff to engage in training for formative assessment as well as time for data analysis. As we share these aligned assessment practices with library policy-makers, ALA divisions, and funding organizations, they'll be better able to advocate for additional time, resources, and policies around assessment practices for libraries.

TENSION

How do we train practitioners to capture, evaluate, and assess data around their values and goals?

Librarians are trained to collect data for traditional systems of library success, for instance circulation numbers from various collections, program attendance, and reflection of participants. Often, the largest piece of evaluation training happens around building relevant and equitable collections. To build collections in this way requires researching a community and seeing specifically if the library's collection reflects and supports that. Evaluation tools and methods for researching a community include surveys, focus groups, or running data reports but not methods like observations or collecting formative data.

Librarians may also receive training around program design but not necessarily around learning, a topic of high priority for educators. Librarian training around program design covers creating a program or series of programs that support early literacy concepts and practices based on research. Training programs pay little attention to training a librarian in understanding how to measure learning, assess the effectiveness of their programs, or learn reflective practices that would drive improvement. This contrasts with the majority of the librarian practitioners at the National Forum whose goal was looking at the learning and identifying the impact in maker programs. Librarians and library staff in makerspaces need support in assessing their programs and in learning how to effectively partner with outside researchers or evaluators to do this work.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Advocate for graduate library programs to include a more expansive set of curricular and training opportunities, whether related to equity and inclusion or pedagogical approaches to learning and teaching.

TENSION

Library staff providing maker programs may not have training in collecting the unique type of data applicable to making and learning.

As previously discussed, methods of research and data collection traditionally taught in MLS programs may not be as applicable when considering learning in library makerspaces. When establishing metrics for learning, several of the conversations at the forum jumped to consider assessment practices in traditional educational settings, but often with trepidation. While librarians are hesitant to make learning in their spaces "feel like school," that doesn't mean there can't be parallels.

Teachers and traditional educators tend to be better at tracking students' learning over time because it's built in as a part of their practice, and they have the opportunity to see the same students day in and day out. Through cycles of observation and collection of student data, they're encouraged to adjust their instruction as they move students toward curriculum goals. Students are often included in the tracking themselves to better understand the learning goals. For librarians, the foundations of these practices—such as a cycle of observation—might be sound, but what's being tracked, based on the values of the program or the setup of their space, will be very different.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

MLS programs can expand their content offerings through continuing education courses led by local practitioners or alumni who implement making and learning in practice.

UW-MADISON ISCHOOL | CONTINUING EDUCATION STEM WORKSHOPS

In 2017, the University of Wisconsin-Madison iSchool solicited practicing professionals in the community to lead possible courses in STEM learning as continuing education opportunities. Having successfully implemented a coding curriculum into her K–5 library makerspace at Winnequah Elementary School, Library Media Specialist Casey

Ineichen was excited to share her knowledge and earn a little money on the side as an instructor. She ended up teaching her introduction to coding course three times over the next three years, reaching a wide audience of school and public librarians. Taught over four weeks, the course introduced the pedagogy of why coding was beneficial to young learners, highlighted elements of Ineichen's successful coding curriculum, and encouraged participants to tinker with various tools.

As a school librarian with expectations of lesson planning and assessment, she also included research and discussion on how to assess the success of a coding program. She encouraged public librarians to think beyond attendance statistics and consider building in chances for reflection, "exit tickets," or ways to evaluate children's finished products. At the end of the sessions, students submitted the final project of a program plan for their unique spaces and also critiqued (and inevitably borrowed and learned from) each other's plans.

TENSION

The purpose for having a makerspace or maker program within a library differs from one place to the next, and therefore, the definition of success differs as well, dependent on the goals and values of the various stakeholders involved.

The reason for engaging in maker-centered learning or having a makerspace in libraries is linked to the existing organizational values and assumptions. In schools, making is often positioned as a way to support learning in core content areas, for example reading manuals for maker tools to improve reading scores or constructing and testing an inclined plane to support the development of physics knowledge. In public and school libraries, other reasons range from the development of concrete workplace skills such as troubleshooting and computational thinking in order to bolster the community workforce to social-emotional learning and development such as building social networks, increasing creativity and confidence, managing anxiety, and finding joy.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Redefine how we evaluate the success of library programs and services that prioritize quality and depth of service over quantity served.

MADISON PUBLIC LIBRARY | **MAKING JUSTICE**

In 2013, MPL teen librarian Jesse Vieau began doing targeted art- and maker-based workshops at the local juvenile detention center as a part of the Bubbler's Making Justice program (Lakind, 2019). The goal of this program is to provide enrichment opportunities to underserved youth who have otherwise been cut off from nearly all other positive stimulation. Initially, the program targeted digital literacy through video game design and animation. The hope was that participants would form connections to the library that would continue when they were released from the juvenile detention center. This hope didn't materialize as a quantifiable increase in library usage, which could arguably deem the program as a failure. However, story after story from teens leaving the space remember the Bubbler's programs as the single positive experience of their incarceration, in which they felt humanized, valued, and inspired. The focus of Making Justice has shifted to be more about art therapy, mindfulness, and community building. This program is one way the Bubbler provides equitable access to creative programming, yet it's almost impossible to capture the impact of this program through traditional library measures of success.

OPPORTUNITY

Develop tools to assess success and goals in ways that are more equitable for different communities and different learners. Employ diverse definitions of success in library makerspaces.

There is a clear need to assemble tools and assessments that demonstrate alignment for different stakeholder values, along with a similar need to accept that success will look different in different contexts. We need examples of what success

looks like in diverse library makerspaces (e.g., values-based learning goals, Wardrip & Brahms, 2015) and different ways to think about metrics and indicators that reflect those goals. For example, at the forum, practitioners working with making in schools believed they would have more leverage with incorporating making throughout the school if they had tools and assessment methods aligned with standards-based content.

There are similar opportunities to make connections between makerspaces and priority areas for libraries entities, such as the Young Adult Library Services Association (YALSA) National Research Agenda, which identifies equity of access, cultural competencies, workplace readiness, and learning across boundaries in and out of school as areas of interest (YALSA, 2017). In addition to these tools to help define success, there's a

concurrent need for research and practice communities to accept that the measure of success in library makerspaces does and should look different in different contexts, based on the needs and values of different organizations and the communities they serve. Both of these efforts are critical if the design and assessment of makerspaces is committed to achieving equity through diversity (Nasir, Rosebery, Warren & Lee, 2005).

OPPORTUNITY

Rather than looking to traditional educational means of assessment, libraries have the opportunity to be creative and to also learn from other informal institutions who've been viewing learning through more qualitative means.

MADISON PUBLIC LIBRARY | FRAMEWORKS FOR NONTRADITIONAL SPACES

As a part of an IMLS leadership grant, researcher Rebekah Willett at the University of Wisconsin-Madison helped the Bubbler team at Madison Public Library identify several frameworks for learning in nontraditional spaces, including the Exploratorium's Tinkering Studio Learning Dimension Framework and the Children's Museum of Pittsburgh's Principles of Practice. Using these frameworks as a starting point, the Bubbler was able to better identify and track "indicators" of learning in their space. Over the course of three summers of observation in learning and making programs, it became obvious that the fit wasn't perfect, as the Bubbler was neither focused on STEM nor a children's museum. But having the tools as a starting

point has allowed them to identify other values or "dimensions" of learning and repeated, regular indicators of those values. Currently, the Bubbler team is in the process of designing their own tools for observational study specific to the goals of their program.

UNIVERSITY OF NEVADA, RENO | WRANGLERS TRACKING USAGE

The University of Nevada, Reno's (UNR) DeLaMare Science and Engineering Library doesn't currently have any kind of automated system to track users and equipment in their makerspace. Rather, staff "wranglers" play an important role in their internal evaluation and tracking. UNR asks users to return their equipment like they might return books: to put them in the return area. Wranglers then put the tools and

equipment back, every half-hour, allowing them to easily gauge usage and need for maintenance. It's an intriguingly simple concept, and certainly unique, but surprisingly difficult to implement. It also adds a new dimension to helping the library makerspace evaluate what's most popular and in demand.

WASECA PUBLIC LIBRARY | BRANCH FEEDBACK ABOUT CIRCULATING KITS

The Waseca-LeSueur Public Library system is comprised of eight libraries serving rural communities in southern Minnesota. The main branch, Waseca Public Library, received a grant from the American Library Association. With it they developed a set of kits to engage kids in computational thinking and making that were circulated to the branches. To assess how well these boxed

materials supported staff and youth in the remote branches to jump into activities, the library system director developed a paper-based evaluation worksheet that goes out with the kits. Staff at the branches fill out these worksheets after using kit materials and return them along with the kit. The simple one-page evaluation worksheet prompts the staff to document who was there (attendance and gender) as well as stories about what happened and tips from the kids. Through these evaluations, staff are fascinated to find out what kids are creating, what kids are most excited about, or what was planned that didn't go well. The central branch regularly revises the kits and develops additional training materials based on this regular feedback.

SCHOOLS, MAKING, AND ASSESSMENT

In school library makerspaces, making often takes two forms: making pertaining to the content area and truly student-driven, open-ended making. As such, assessment takes varied forms too. Assessment of maker-centered learning in a specific content area is largely driven by traditional state standards, while "open" making provides a multitude of opportunities to learn from and with teachers, students, and community members. The conversations during the forum focused largely on open making and how varying assessments can inform work in school libraries.

TENSION

In schools, there's a tension between making pertaining to content area discipline and making as its own discipline.

Maker-centered learning as part of specific content areas is fairly common, as it relates strongly to the constructivist pedagogy that's well-established in practice (e.g., Tucker-Raymond & Gravel, 2019). However, while making as a pedagogy is strongly embraced, assessment of making is related primarily and often exclusively to the core content and therefore, solely on content knowledge. Learning outcomes are also measured using traditional means, including essays, multiple choice questions, and matching—understandably, as this is how high-stakes state exams are also structured.

Open making in school libraries includes readily available tools and support that are tangential to core content. This type of making in school libraries is less common by nature of it being fairly unstructured in a highly structured school environment. Imagine long periods of uninterrupted free time for students, who have a dedicated space and resources to tinker, build, troubleshoot, and store partially completed projects, some independent and some collaborative.

In addition, soft skills such as persistence, curiosity, research, and cooperation are not measured via multiple choice questions on high-stakes state exams. As those skills become more valuable in workplaces and as policies turn toward workplace readiness in lieu of college admissions, however, unstructured, open making is emerging in school libraries.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Schools have the opportunity to offer opportunities for truly open-ended, student-driven making by creating assessments of their programs that situate soft skills and workplace readiness skills as equally important to content knowledge.

TENSION

School librarians are holding dual, mixed roles, carrying responsibilities that they weren't originally trained for nor have the capacity to handle.

As seen in other fields too, roles tend to shift and change, and makerspaces and technology are driving a number of those changes as well. As reported in a *School Library Journal* article, job titles are evidence of those changes, shifting from "school librarian" to "school library media specialist" to "21st century learning specialist" to "director of information literacy" (Snelling, 2019). Some librarians love the blended responsibilities, while for others, the combination of "certified librarian and instructional technology facilitator" (Snelling, 2019) isn't well-supported or clear.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Built into the roles and responsibilities of teachers and librarians is support for classroom teachers to develop maker activities and projects, showcasing the value of developing soft skills alongside core content knowledge.

BURLEY MIDDLE SCHOOL | HERD OF NERD HELP DESK STUDENTS

Students in the library at Burley Middle School in Albemarle County, Virginia, have an open makerspace that includes a table for take-apart activities. Students are able to come in and, for example, remove parts from a decommissioned laptop, sorting them into appropriate places on a board. This type of open exploration of computer technology relates closely to IT skills, and students fascinated by the take-apart table often become Herd of Nerd help desk students who enroll in a formal program toward receiving A+ repair certification. Assessing the popularity of the table helps the librarian facilitate teamwork, persistence, research, and curiosity as skills for the more formal making environment at the Herd of Nerd help desk.

GLENDALE SCHOOL | ELEMENTARY SCHOOL SELF-PERCEPTIONS

Glendale School's REACH teacher, Sara Milewski, has put considerable effort toward addressing and tracking soft skills in her FAB Lab. Through Google Forms, her 2nd through 5th graders regularly fill out simple but effective surveys, asking about their own perceptions of the 21st century learning skills they're using in the makerspace. The five areas that they address, on a Likert scale and framed as "I" statements, are effort, problem-solving, collaboration, creativity, and Glendale's positive social skills (being safe, responsible, respectful, and kind). All grade levels also fill out exit slips, in their language of instruction, related to the skills they used in REACH. Most importantly, students have an opportunity to look at their own data over time and use it as a basis for reflection and development. They may recognize that they worked hard at collaboration today. This data has begun to feed into considerations for other classroom teachers as well.

COLLECTING AND ANALYZING DATA

Librarians are no strangers to data, however there can be a variety of challenges in the collection and analysis of data. In the forum, the participants noted several facets of the challenge to collecting and analyzing data. For instance, library staff often haven't been prepared to identify relevant learning and engagement data, nor have they been trained on using particular data collection instruments. Also, like practitioners in other settings, being both the facilitator and data-collector can be difficult to manage. And not only are those difficult roles to play at the same time, but also having the time and know-how to appropriately analyze the data is trying. Despite these challenges, data has the potential to play a considerable part in communicating the impacts of maker-based learning experiences and making ongoing improvements to those experiences.

TENSION

How do we respect the privacy of learners and still collect data that allows us to improve our practice?

The very nature of the data collection in libraries can seem at odds with core library values about protecting the privacy of patrons. The ALA website states: "The possibility of surveillance, whether direct or through access to records of speech, research and exploration, undermines a democratic society. In libraries, the right to privacy is the right to open inquiry without having the subject of one's interest examined or scrutinized by others" (ALA, 2017).

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Develop methods for data collection that can serve to answer important questions about practice and impact or help to tell important stories.

We need to develop and share different ways to collect data in libraries that feel authentic in the space and that don't violate the privacy of patrons in library makerspaces. One example is post-program reflections and observations by library staff who work in these spaces and are prompted to share data about how things went and what could be improved, instead of accounts of individual patrons. Another is to have a focal question of interest on a table, where patrons contribute their degree of agreement by dropping a colored marble in a jar—with lighter and darker colors signifying being less or more in agreement.

In this way, too, the results of the data collected is visible to patrons in the space. Openness and transparency about what's being collected and why, as well as outcomes of the results and how action is taken or not, also creates more trust about what data and assessment looks like in the library makerspaces.

UNIVERSITY OF NEVADA, RENO | ANONYMOUS LOW-LEVEL DATA COLLECTION

At the University of Nevada, Reno, all users on campus log in to devices and equipment with their university ID. Despite that, the libraries (unlike other entities on campus) don't collect personal data and are not allowed access to any personal information. Some conversation has surfaced that if libraries can see low-level data (i.e., year of student, discipline or major, etc.), they may be able to better gauge repeat users, heavy users, and early adopters and provide resources and services accordingly. In addition, libraries could begin to make the case that, for instance, students who use the library do better in school, broadly defined.

RESEARCH-PRACTICE PARTNERSHIP DESIGNED TOOLS

Capturing Connected Learning in Libraries

This collaboratively produced series of videos and case studies aims to help libraries to quickly and effectively assess learning outcomes for connected learning programs and spaces. connectedlearning.news/CCLLproject

Making Observations: Evidencing Learning Through Making

Library and museum partners have developed a set of observational tools to measure and improve the practice of maker education in museums and libraries. These tools and approaches guide and support the design of space, activity, and facilitation for learning through making and tinkering. makingobservations.org

Beyond Rubrics: Moving Toward Embedded Assessment

Designed for classroom environments but adaptable to informal spaces as well, the Beyond Rubrics Toolkit has embedded tools to capture evidence of the process of making. This toolkit attempts to capture qualitative and quantitative evidence during the process of making. makered.org/beyondrubrics

TENSION

Each of these different parameters (e.g., maker activity/makerspace, library, drop-in program) has its own set of complexities in regards to assessment (e.g., timescale, informal environment with mixed ages and variety of audiences, etc.).

There are many efforts working toward developing tools for assessment, specifically designed to address the complexities in assessing outcomes of interest to the library maker community. Below we highlight a few of these examples.

TENSION

How do practitioners tell stories with the data that is representative of the work, particularly if they don't have time/training?

This tension rang true in so many conversations at the National Forum. Many wondered, "But how do we have the time?" So many seasoned, respected, and veteran practitioners who have asked the hard questions (e.g., What do we value? What kind or programs should we offer? How do we best engage the community?) have fallen into the trap of not initially carving out the time for evaluation and storytelling into the vision of their programs.

But obviously we must be able to justify what we're doing. The consideration for building in the internal or external capacity to take on the additional responsibilities of running a maker program includes not only program purchasing, design, and facilitation, but also evaluation, storytelling, and stakeholder conversations in equal measure.

TENSION

Practitioners don't have time to collect, sort through, analyze, or make sense of the data.

Library staff are hard pressed to be resource managers, facilitators, program and activity designers, youth workers, evaluators, and researchers all at once. And yet, it's rare to have specialized staff at libraries that can focus on those pieces. Practitioners need, however, to be able to make decisions based on that data to improve their own practice, leveraging this type of formative assessment and reflection cycle to benefit their programs and staff. Regardless of the varied practices of libraries to equitably reach populations, it's important to ensure that librarians are able to actively seek stakeholder feedback in order to inform the services and programs they provide.

APPLICATIONS FOR PROFESSIONAL PRACTICE

OPPORTUNITY

Share the process for embarking on and developing an assessment plan, including how to scope, come up with your primary questions with the community, select the tools to collect data, choose the unit of analysis, share, etc.

SKOKIE PUBLIC LIBRARY | BOOMBOX END-OF-SHIFT REPORT

Skokie Public Library's BOOMbox original survey-based evaluation evolved into richer and more comprehensive end-of-shift reports, filled out by staff at the conclusion of each rotation, giving natural pause to reflect and document. Staff collect information around engagement, including how much time is spent in the space, and record numbers and notes about activities explored and kits or supplies used. They also collect anecdotes about when patrons are supporting each other, trying something new, or generally collaborating. Retention rates are noted by checking whether patrons are first-timers or returning to the space time and time again. The reports include an important mix of both quantitative and qualitative data. In addition, the staff member who closes the space compiles all data into a centralized spreadsheet, where the information is easily accessed all at once. Staff insights and inputs are captured there as well and are equally as important as the standardized data collected.

OPPORTUNITY

Consider small edits that can influence the ways in which information is shared and affect the value drawn from quantitative and qualitative data.

SKOKIE PUBLIC LIBRARY | CHANGING THE REPORT FORMAT

A change in the quarterly report format at Skokie Public Library made a significant difference in how the story of their space and community is told to stakeholders. Previously focused on numbers, it's now organized by their values and priorities, allowing for small stories to emerge, bullet point by bullet point. Those qualitative statements capture more poignant and individualized aspects of the space and cumulatively tell a different and better story about their impact.

Share stories to highlight the values, goals, challenges, and successes of varied library programs

Storytelling needs to be included as part of the expectation of running a maker program; we need to make time and remember to do this. As librarians capture and tell these stories, stakeholders can better understand the value in a maker program. This kind of storytelling is valuable beyond reporting to administration and funders. It's also yet another form of engaging the community and inviting opportunities for connecting over shared values. Learning to look for indicators of learning can be the first step in patrons establishing a maker mindset in themselves or with their kids. The stories you share and tell don't have to be huge longitudinal studies, but rather can simply be a story about one project, one patron, or one workshop. Good stories are more impactful than having all the data and not having the time to analyze and make sense of it all.

MADISON PUBLIC LIBRARY | **IMPACT STORIES**

In the summer of 2018, the Bubbler at Madison Public Library launched their first "Impact Story" in their monthly newsletter to patrons. The goal of the short, two-page story was to share the thought behind and impact of a revamp of the library's summer reading program to culminate in an "earned" maker experience, rather than a small physical prize. The librarian who organized and helped facilitate the series of programs shared anecdotal observations around communal values (i.e., collaboration and multigenerational engagement) as well as photos and quotes from patrons. The response was well received. The marketing department reported the click-through rate for the story was dramatically higher than other newsletter material across departments. The Impact Story format was soon more widely adopted across the library system, and within a year, it has become a foundational part of the Bubbler's practice with continued success. The biggest question the team asked was: Why have we not been doing this in the first five years of the program? The easy answer is time. The librarian who heads up the practice is in a two-year grant-funded project management position where observation and reporting is vital. The bigger conversation being asked by the library now is how to find the allocation to institutionalize the practice.

These examples highlight how making the case for maker-based learning experiences provided in the library are contextual and intimately tied to what the library values for learning and engagement. These examples also take into account the audience being communicated to and the demands of the practitioner collecting the data. Ultimately, small stories over time contribute to a larger body of evidence for what's happening in a library space or program.

RECOMMENDATIONS FOR THE FUTURE

PARTNERSHIPS BETWEEN RESEARCHERS AND PRACTITIONERS

Libraries are sought-after as partners in research. They're abundant and distributed—ALA estimates there are over 100,000 libraries across the country (Rosa, 2019). They're environments for learning, serving local communities without many of the constraints of school classrooms. As public, school, and academic libraries are increasingly associated with making and makerspaces, they've become a hub for researchers.

At the National Forum, librarians and practitioners were supported by a wide field of researchers and evaluators. The vast majority of these researchers and evaluators were university employees, and not one of them was a library staff member. Most libraries hire an external consultant on contract for evaluation efforts. One example of this is YOUmedia at the Chicago Public Library. For the past 10 years, they've contracted with external consultants as they've looked at learning and engagement. Part of their recent collaborative work with an external consultant has been to build capacity within administrative and front-line staff to collect and analyze learning data.

While researchers are eager to partner with libraries as external evaluators, there's an opportunity for a larger library or collaborative library system to consider hiring from within to capitalize on existing institutional knowledge. The bigger opportunity is learning how to support staff to learn evaluation practices through training. Conversations at the convening raised challenges and ideas for new practices, as well as guidelines to support this type of work between libraries and research partners.

OPPORTUNITY
There are many possibilities for mutually beneficial relationships.

Research-practice partnerships can be immensely generative and produce insights and benefits to both researchers and practitioners. These types of collaborations aim to solve problems of practice through rigorous research, with questions and interpretations of data jointly constructed, negotiated, and renegotiated by both parties (Penuel, Allen, Coburn, and Farrell, 2015).

Researchers from multidisciplinary areas, including learning sciences and information and design schools, want to study authentic learning environments. Libraries can be ideal places to both study existing programs and practices, as well as implement interventions. They provide access to real community participants across ages and aren't bound by classroom subject areas, blocks of time, or study. Concurrently, library staff and administrators interested in investigating and reflecting on their own practice and impact often don't have structures in place or available time to do so.

Although there are established best practices for managing research-practice partnerships (e.g., detailed resources from the William T. Grant Foundation at rpp.wtgrantfoundation.org), our convening raised a number of common challenges faced by people engaged in such work, both from research and library practice perspectives.

TENSION
Who defines the terms of partnerships?

Even when a long-term project has a shared question and problem of practice identified at the forefront, the work can be driven by the research partners. Often they're the organization through which grant money is received, and frequently, they've taken the lead on project grant proposals. At the convening, some library staff were grateful to not have to deal organizationally with a financial grant, and they talked about not having time to seek out funding and write proposals, as much as they'd like to. These staff members really appreciated the heavy lift from the research side, who frequently have dedicated grants administration personnel. But the reality of the flow of money often drives the management of the budget, as well as the work and perception of who's driving that work.

Further issues complicate this relationship. Sometimes library administrators agree to participate in research projects and then pass the work on to a library staff member in the field who's then tasked with getting this work done. Other times, staff turnover results in key partners being replaced. If the person actually doing the work doesn't have time or project interest/understanding, then there's an imbalance of expectations.

OPPORTUNITY
Create a guidebook for healthy collaborations.

We need a guidebook on best practices for fruitful, healthy collaborations between artists, makers, library staff, and researchers, as well as between libraries and research institutions. While research papers and websites identifying best practices for research practice partnerships (RPPs) as a model for educational improvement for schools and districts (e.g. Coburn, Penuel, & Geil, 2013; Coburn & Penuel, 2016) are useful, it would be beneficial to establish what works—or at least some models of how things have worked—for partnerships of research and practice with libraries as the site of practice.

What are best practices, including timing and supporting documents, to establish, negotiate, and renegotiate the terms of the partnership? Are there ways to engage both parties in both research and practice? True research-practice partnerships are long-term, often taking years to establish trust and understanding about cycles of work. What happens when projects are more short-term (a year or less)? What's the right role for leadership and implementation at both research and practice institutions and how do we address changes in personnel?

Grant money helps libraries to pay parts of staff salaries, and research partnerships are a great way to do that. Sometimes libraries are looking for just that. Are there best practices or models for managing research-practice partnerships that look different than a purely 50/50 shared endeavor of a classic RPP? Are there some components of work, like feedback loops, that are non-negotiable for a collaboration to truly be healthy?

MAKING OBSERVATIONS RPP | CUSTOMIZED APPROACHES

The Institute of Museum and Library Sciences-funded Making Observations project (2016–2019) was led by researchers at the Children's Museum of Pittsburgh. A goal of the work

was to develop a suite of observation tools for researchers and practitioners looking at learning in makerspaces, building off of the Making + Learning practices framework developed by the project research leads (Wardrip & Brahms, 2015). Three partner locations were recruited to co-design and test tools, including the Chicago Public Library YOUmedia, Montshire Museum of Science (Vermont), and the Science Museum of Minnesota.

For the first few months of the collaboration, all partner locations built tools directly based on the Making + Learning framework, assuming that the work needed to happen within the model established by the research team, who had led the initial grant proposal. At a team meeting, there was an aha moment when partner sites realized they were allowed to truly customize tools for their contexts. The practice partners then spent the next year digging deeply into their own learning values of making and developed tools that fit with their unique practice and staff.

This breadth given to the sites of practice to negotiate the design-work happening at their sites made the work valuable to them in practice and also made the project work live on after the official funding and multi-site collaboration. For the researchers, seeing what actually overlapped in terms of content and practice across locations was invaluable for thinking about how to abstract out generalizable themes and components of making and learning observation practices.

TENSION

Can partnerships truly benefit all parties, especially if researchers and practitioners don't have the same end goals?

There's a fine balance to strike between the goals of researchers and practitioners, and the power dynamics of these relationships can be tricky. On the one hand, researchers might be providing grant money to pay for library staff time or for purchasing supplies; however, library staff are the persisting part of the library and will still be there once the grant ends and the researchers leave. If the goals of both practitioners and researchers cannot align, it's not a partnership but simply a research site.

OPPORTUNITY

Identify new ways to seek out partners and find matches of needs and interests.

In addition to the guidebook for healthy collaborations, outlined above, which should include examples of different ways to think about how RPPs can be beneficial to both parties, the National Forum participants spoke a lot about the need for new ways to do RPP "matchmaking." Matchmaking strategies could allow conversations to happen even before projects are formed or proposals written, facilitating people to connect based on common interests (e.g., research questions that align with problems of practice).

Matchmaking strategies could also make it easy for both researchers and practitioners to be clearer about their needs and to find partners who want to dive in (e.g., a short-term program evaluation needed by a library that matches content related to a graduate student

thesis topic area or a researcher who's looking for a collaborator for an upcoming RFP). Descriptions of what this could look like included virtual design solutions; for example, there could be an online message board or web-based community of practice that utilizes social media tools with tags like #findyourselfaresearcher. Some ideas for in-person opportunities are meetups or mixers at relevant research and practice events (e.g., IMLS, ALA, CLSummit, Maker Ed) and actual brick-and-mortar bulletin boards dedicated to this type of matchmaking.

OPPORTUNITY
Start small, and build something together.

Relationships between researchers and practitioners that ultimately lead to research projects can begin on a more modest scale. Each party can invite the other to come and observe or talk about what interests them. Local meetups or "playdates" for makers and maker educators can serve to foster relationship-building with no project-specific constraints.

SUGGESTED ROUTES FOR RESEARCH AND PRACTICE

Forum participants surfaced many different ideas for moving their own work forward. A few themes emerged and are represented below.

Demonstrate value to stakeholders such as administrators or funders. We all need to continue to work on, explore, and expand the way we demonstrate value, as it seems so many other issues (sustainability, funding, etc.) are tied to our ability to show the positive impact and effects of making and maker-centered learning.

Share research on best practices and evaluation. We've begun working on this effort through convening at the National Form and collecting, consolidating, and curating research reports on the Maker Ed website; however, we hope this is just the beginning. Continue recording, sharing, and curating resources for best practices, frameworks, experiences, connections, and inspiration. Of particular interest are resources on equity in library makerspaces. What activity design, space configurations, promotion and marketing strategies have been successful in welcoming communities of interest into these experiences? As previously noted, we also need to design assessment and feedback tools specifically for these library environments and drop-in programs.

One reason for the need to have a central place to share and curate best practices and research is that not all libraries have time, money, or support to do this work on their own. For example, rural libraries don't have as "loud" a voice as urban libraries and are often overlooked for funding or opportunities based on the numbers or demographics of population served. Additionally, most libraries aren't able to partner with a local researcher. By sharing best practices and tools that are flexible enough to be applied in various contexts, we raise the bar for colleagues who have fewer opportunities to do this work on their own.

CONCLUSION

As libraries continue to work to serve their communities, maker-based learning experiences will continue to be part of those services. Yet, the tensions and opportunities that this white paper has noted suggest that the field has further to go in order to expand this work. Speaking to so many different librarians at the National Forum, the knowledge of our various communities and the dedication to equitable service was a shared passion for our work. Coming from such diverse places, and also appreciating the variance within single communities, it's obvious that there can't be a one-size-fits-all approach to making and learning opportunities.

As libraries seek to find their own fit, they engage in the process of redefining what it means for a library to serve the community. In the professional trajectory of librarians, capacity building will be an ongoing need, whether that's in university-based programs or supporting staff in reflection on their own practices. And training can also help develop assessment and evaluation, such as to support a reflective practice, build partnerships with researchers, and understand the impact of the program.

In the diversity of goals, communities, and capacities for libraries, we can learn from each other and help each library better meet the needs of our patrons. Libraries can play a pivotal role in developing patrons' curiosity, creativity and resilience as they learn across the lifespan.

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APPENDIX A:
FORUM AGENDA WITH OVERVIEW
OF DISCUSSIONS

The National Forum on Research and Assessment in Library Makerspaces was held at the University of Wisconsin-Madison on August 6-7, 2019. The following presents the agenda of the 1.5-day forum, based primarily in discussions among participants. More information is available at makered.org/national-forum-research-and-assessment-in-library-makerspaces/

Chalk Talk: *30-minute discussions related to themes and key questions*

Defining Making in Libraries

1. What values drive our work? What values are similar between library spaces and other makerspaces and what's importantly different?

2. How do our values align with our community (our institution, our larger library community, our local community, etc)?

3. What does making look like in the library (currently and ideally)? ie what counts as making, where does it happen, who is in the space, who is not in the space?

Demonstrating Value

4. Whose values and goals are prioritized when creating and communicating making experiences? (e.g. what counts as learning? for whom? and towards what ends?)

5. What data can we capture that is aligned with our values, showcase the work, and address privacy concerns? What data are current efforts around assessment and evaluation generating?

6. How do we design and communicate about a maker program if stakeholders' (learners, educators, funders) values are different (or in tension)?

Professional Practice

7. What data can we capture that helps us improve and demonstrate value of the making experiences? How might we design activities, space, and/or tools to help capture that data?

8. What practices do we need to develop/employ to reach all learners?

9. How do we support staff in libraries to develop the skills/knowledge to facilitate maker activities ?

Concept Mapping: *Two rotations that elicit connections between themes and ideas*

1. Demonstrating Value

2. Professional Practice

3. Across Demonstrating Value & Professional Practice

Coffee Talk: *Short rounds of conversations focused on participant-led questions from the day before*

Round 1

1. What qualities do you value in collaborators and/or partnerships (especially researcher-practitioner partnerships)?
2. There are large systems at play in our society. How do we respond to these through our work as maker educators/researchers?

Round 2

3. What are good assessment methods (or good data) that empower youth AND/or are not a total downer to an awesome program experience AND/or are not a huge time suck?
4. What excites you or brings you joy about your work as a maker educator/researcher?

Round 3

5. What are good metrics of organizational or community change?
6. How do we talk about and measure community connectedness and/or identity development?

Problems of Practice: *Unconference sessions by affinity groups or topics of interest*

- Racial Equity & Social Justice
- Rural Libraries
- Arts Focused Making
- Analytics // Measurement & Assessment
- Data Privacy
- Sustainability

APPENDIX B:
FORUM PARTICIPANTS

The following individuals participated in the 2019 National Forum on Research and Assessment in Library Makerspaces, supported by IMLS.

Abigail Phillips
University of
Wisconsin-Milwaukee

Alice Anderson
Minnesota Institute of Art

Amy Holcomb
Skokie Library

Bob Russell
National Science Foundation

Caitlin Martin
CKM Consulting

Carlee Latimer
Madison Public Library

David McHugh
Wisconsin Department of Public
Instruction

Desiree Wolcott-Cushman
Multnomah County Library

Erica Compton
Idaho STEM Action Center

Erica Halverson
University of Wisconsin-Madison

Gabrielle Draxler
Janesville Public Library

Gail Zachariah
Keene Public Library

Holly Storck-Post
Madison Public Library

IdaMae Craddock
Burley Middle School

Jennifer Nichols
University of Arizona

Jesse Vieau
Madison Public Library

Josh Weisgrau
Digital Promise

Kathy Ishizuka
School Library Journal

Katie Loughmiller
Milwaukee Public Library

Kristin Fontichiaro
University of Michigan

Kylie Peppler
University of California, Irvine

Lauren Penney
Maker Ed

Lisa Brahms
Children's Museum of Pittsburgh

Lisa Regalla
Bay Area Discovery Museum

Maggie Melo
University of North Carolina at
Chapel Hill

Megan Emery
The Healing Library

Mimi Ito
University of California, Irvine

Mindy Porter
Scott Family Amazeum

Monica Treptow
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Instruction

Nate Stone
Denver Public Library

Nick Wethington
spectrUM Discovery Area

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Shawana Brooks
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MIT Playful Journey Lab

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Boulder Public Library