Assessment in Hands-On Library Learning Spaces

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Abstract: Hands-on learning experiences, such as making and tinkering, are often viewed as a learner-driven approach that can be integrated into any subject or topic area, inherently interdisciplinary. In recent years, libraries have become prominent places for designing and facilitating hands-on learning experiences. As these experiences and programs increase, there has emerged a need for assessment to communicate impacts to various stakeholders and provide useful information to practitioners to make ongoing improvements. This session brings together researchers and practitioners from four projects that are designing and using assessments within libraries. These projects highlight different tools, practices, purposes and foci for assessment. Through this session, participants will become aware of these projects, engage with the tools themselves and consider the theoretical and practical implications for the different approaches.

Keywords: Informal learning; Assessment, Libraries

Session summary

Hands-on learning experiences, such as making and tinkering, are often viewed as a learner-driven approach that can be integrated into any subject or topic area, inherently interdisciplinary. In recent years, it has become evident that it's valued and implemented in many ways. 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.

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 (Chang, Penney, Wardrip et al, 2019). 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.

Given that libraries and library staff are often already evidence-centered and data-driven, many of the 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 a library, whether during a school period or at a community branch. Individual surveys and circulation numbers only tell a small fraction of the richer story at hand. Additional tools used to capture data 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.

This symposium brings together researchers and practitioners working to integrate assessment into their hands-on learning experiences so that it aligns with the core goals defined by the library and their community

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rather than simply being an afterthought or added burden. This session will be broken up into four specific segments in order to engage in the topic with the audience.

- Overview (5 minutes)
- Short Presentations (25 minutes)
- Project breakouts for participants to test tools (30 minutes)
- Discussant response and whole group questions (10 minutes)

First, we will provide a short overview to the audience to make explicit connections across the projects in the symposium. This overview will be given by the team from Maker Ed, a national organization that advocates for maker-based learning experiences in and out of school. Second, each project will briefly present their work. This will give the audience a sense of the contexts in which the projects are working, the assessment tools and practices they are designing and using, and for what purpose. Third, we will divide the room for breakout activities for each project where audience members can try out project tools and ask questions of project teams. Finally, our discussant will offer a synthesis of both the projects' contributions and challenges as well as making connections with similar work in the field. In addition, questions relevant to the whole group can be fielded at this time as well.

Together, this symposium creates an opportunity to further discussions in the field on three main topics. First, these projects provide specific examples of assessment tools in informal learning environments. Informal education spaces are more and more being asked to collect data to justify their programs and/or make formative improvements to their programs. These provide such examples that were co-designed with educators for informing their practice. Second, these examples of assessments position the values and needs of the practitioners at the center of the assessment design process. This represents an opportunity for researchers and practitioners to develop "local instructional theories" for supporting their learners (Gravemeijer, 2004) and fundamentally emphasizes their values and priorities in the assessment design process (Wardrip, Evancho & McNamara, 2017). Third, these projects aim to further the fields understanding of libraries as learning spaces (e.g. Lee et al, 2017; Lee & Phillips, 2018).

Designing for assessment needs and complexities in a library makerspace

Sam Abramovich and Peter Wardrip

Driven by increasing access to new technologies, Making learning experiences are a natural evolution of what libraries offer their communities. However, in addition to new opportunities for learning, the addition of a Makerspace to a library can also be a challenge for librarians, patrons, and other library stakeholders (e.g., elected officials, library board of directors, local employers) who are invested in the success of their libraries. As anchors for their communities, libraries must have access to data that can lead to improved, equitable learning. Librarians need tools and approaches to document and assess Maker-based learning and other ambitious learning experiences, part of what Koh and Abbas (2015) call facilitating learning. Patrons need formative and summative feedback for the novel but important learning they gain in libraries. Finally, guidance on what to do with data is needed for all, since the data is only valuable if it leads to positive action.

Assessments are a means for generating data that can inform both librarians and library stakeholders of how a library-based Makerspace is contributing to the core mission of the organization (Wardrip, Abramovich, Millerjohn & Smith, 2019). The data generated by Maker-specific assessments, used in conjunction with standard library assessment practices (e.g., patron attendance, material circulation, librarian observations) is especially important as libraries are increasingly asked to provide more justification for their budgets. Assessment data can be used to address critics of Making or libraries, who often ask a variation of the question, "Well, it looks like fun…[pause]…but are they learning?" (Petrich, Wilkinson and Bevan, 2013). Data generated by assessments can explain what is being learned and who is learning, allowing a library to directly justify how a Makerspace serves its patrons and the community at large.

A collaboration between the University at Buffalo and the Buffalo & Erie County Public Library engaged in a design-based research study to identify the challenges and scope of assessment needs for a library-based makerspace. The aim of the study was to create a framework that mapped potential assessment tools, learning objectives, and stakeholder needs so that the multiple dimensions of deploying learning assessments in library-based Makerspaces could be better understood. First attempts in our research study, were met with two critical challenges: there was a very large variance in the prior knowledge and learning objectives of library patrons (i.e., people in the Makerspace), and we could not rely on repeated attendance in the Makerspace which negates any assessment designed for repeated measures (e.g., pre and post tests, surveys to measure changes in attitude).

Taking into account these challenges, and based on a literature review, data collection, and feedback from librarians, we created a matrix that pragmatically represents how assessment can be used in Library-based Makerspaces, given the challenges or lack of structure that formal learning experiences rely on for traditional assessment practices (Cun, Abramovich & Smith, 2019). Our belief is that the matrix can help librarians integrate library makerspaces into the assessment practices they already use for understanding patron needs and expanding services. In addition, we believe that the matrix can also support connections between new research, professional development, and assessment practices (such as those offered by our fellow symposium presenters) so that the larger community of practice for library maker-learning.

Capturing connected learning in libraries: Learning what works through the collaborative design and implementation of assessment and evaluation tools

Sari Widman, Bill Penuel, and Josephina Chang-Order

Through collaborations between library practitioners and researchers, the Capturing Connected Learning in Libraries (CCLL) project has developed assessment and evaluation tools and strategies that enable libraries to better assess learning outcomes and make improvements to their connected learning programs and spaces. CCLL draws on the new framework for designing for connected learning, which has four core principles: Connections Across Settings, Shared Purpose, Shared Practices, and Sponsorship of Youth Interests ("About Connected Learning", 2018). Connected learning emphasizes the interconnected nature of learning across settings, including home, school, and local and online community, with a particular focus on increasing equity and access for underserved youth (Ito et al., 2013). Connected learning also centers learning through doing, and is important to many learning environments that center hands-on making activities, including those in libraries (Ito et al., 2013).

Connected learning can be particularly challenging to assess, because it is a multidimensional construct (Maul et al., 2016) with learning outcomes that stretch across settings. Capturing connected learning in libraries presents its own unique challenges, as libraries have traditionally looked to attendance numbers as its primary measure of success (Hoffman, Subramaniam, Kawas, Scaff, & Davis, 2016). Conducting evaluation in libraries is also challenging because of the drop-in nature of much of the programming, and the many demands on library staff's time.

In this paper, we present case studies that illustrate how CCLL's partnership work with urban and suburban libraries sought to navigate these challenges to create assessment tools that both captured connected learning and were usable and accessible for library staff. We developed these case descriptions, which our partners reviewed and edited, from retrospective accounts of our participatory evaluation projects, primarily to facilitate other libraries' use of assessment tools. These case studies center the assessment and evaluation of both drop-in and more structured programs focused on STEAM learning and making with technology tools.

The research team supported partners in identifying clearly defined outcomes of interest, and engaged library partners in developmental (Patton, 2000) and participatory (Cousins & Whitmore, 1998) approaches to evaluation, over multiple phases of collaborative design and implementation. Some of the outcomes our partners were most interested in included: interest discovery and development; 21st Century skills development, such as collaboration, positive risk taking, and persistence in the face of failure; and what aspects of programs youth found most engaging. Though some partners had evaluation needs related to requirements from stakeholders, such as funders and administrators, they were primarily interested in conducting formative evaluation for program improvement.

Through comparative case analysis we explored what tools and methods proved usable to libraries, and which ones did not. Here, we provide key examples of a successful strategy, and an area that proved challenging.

- **Successful use case, Talkback boards:** Talkback boards, which invite program participants to place sticky dots next to a statement that best represents their experience or respond to open ended prompts, have emerged as a particularly helpful tool for our practitioner collaborators. This tool, a practical measure originally developed by one of our partners, was accessible for library staff who don't have a lot of capacity or time to devote to assessment. Our partners also found them to be more easily embedded in the flow of youth programming, as an alternative to surveys that were unpopular with youth.
- **Challenging use case, data analysis:** One prominent and persistent challenge was planning for and successfully analysing data once it was collected. While assessment tools helped library staff understand how youth felt about and engaged with their programs, conducting in depth analysis to identify patterns over time proved challenging. Library partners found it difficult to sort through and make sense of their data in ways that weren't overly demanding on their time.

Lastly we outline how this work has informed our current partnership strategies, which are focused on supporting collaborative analysis of data and customizing evaluation plans to the goals and capacities of staff.

Documenting learning and engagement at the bubbler

Rebecca Millerjohn, Vishesh Kumar, and Peter Wardrip

The Bubbler program at Madison Public Library was started in 2012, relying on a broad network of artists and teaching artists, as well as interested library staff, to support hands-on art and maker-based programming (Halverson, Lakind & Willett, 2016). The cornerstone of the program is the Bubbler's Artist in Residence program, allowing new perspectives and voices of local artists and makers to be shared with the public through the library's platform. The feedback received from these programs was overwhelmingly positive and supportive from the community, but quite early on, the librarians in practice began to critically ask what kind of learning was occurring for participants in this informal, educational space? And how to continue qualify the success of this program? With the help of partner researchers Rebekah Willett and Erica Halverson, the Bubbler team began to explore how other institutions sought to define learning within their spaces. Finding very little in the library world, they turned to the frameworks of children's museums, science centers, and more formal educational spaces (Willett, 2018).

Taking cues from these frameworks and to address the challenge of identifying evidence of learning in our space, the Bubbler has worked to craft their own values and indicators of success over the last five years (Kumar, Millerjohn & Wardrip, 2019). This has been carried out with a variety of observational tools developed and implemented by youth services "Bubblerarian" Rebecca Millerjohn and teams of Making & Learning interns during summer programming. The creation of a library (and Madison Public Library) centric framework has also been informed and continues to be informed by the Bubbler's ongoing IMLS research into stakeholder values and expectations. This IMLS project in partnership with UW Madison, University at Buffalo and the Buffalo & Erie County Public Library, has broadened the conversation of what is being measured in library makerspace programs from purely facilitators, to other library staff, learners, and parents and their values and intentions for using the space.

In this presentation, we will share the development of these tools over time. Through the design tensions framework (Tatar, 2007), we describe this process in three phases. In particular, the design tensions allow us to highlight both how we iteratively refined an observation tool and protocol to document learning in an analog and then digital format while also noting compromises that needed to be made to take into account the context where learning was taking place, the practice of the educators and how we conceptualized learning (and the extent to which it was visible). Ultimately, our designs include informal learning assessments and reflection tools the team has embedded into a series of activities to better observe the thinking and intentionality of maker, as well as the progression from our post-activity reflection forms to an in the moment digital observational assessment app for formal observations.

To concretize these tensions, we will share specific data from the third phase, which is the piloting of a digital observation app. The first pilot of this app finished its first 6-week observational cycle at the end of November 2019. During this presentation, we will highlight tensions with respect to the protocol, the practice of using the app, the constructs embedded in the app as well as the notion of collecting data within the library. In addition, we will also share how the design of the app (and the subsequent pilot data) has allowed us to learn about the facilitation practices, activity design, and learning outcomes of participants.

Making observations at YOUmedia

Caitlin K. Martin

Evidence of important skills, networks, and dispositions associated with making and creating (e.g. confidence in creativity, self-efficacy with professional tools, ideas for the future (Barron & Martin, 2016) coupled with inequities of access and participation related to girls and youth of color (e.g. Warschauer & Matuchniak, 2010) underscore the critical need for ways to better understand what generative making looks like in different environments and how to authentically document what works (Barton, Tan & Greenberg, 2016). Recent research-practice design partnerships have started this work by operationalizing what learning in making and production spaces looks like in ways that resonate with educators. Wardrip & Brahms (2015) collaborated with teaching artists in museum spaces to develop a framework of learning practices inherent in making. To address the need for assessments, this work was expanded to explore how different informal environments interpret and observe learning that happens in their production-oriented spaces and to develop a suite of observation tools to inform research and practice.

In this presentation, we share a case study of the design of tools and strategies for staff at YOUmedia Chicago to document and assess learning in their programs and spaces. There are YOUmedia locations in 20 public libraries across Chicago. These spaces are designed for teens to spend time, build relationships with peers and adults, and access opportunities to explore and deepen their learning in ways that connect with interests and emphasize creative production (Ito, et al., 2008; Barron, Gomez, Pinkard, & Martin, 2014). The observation tools were co-developed (Gravemeijer & van Eerde, 2009) through rounds of prototyping, testing, and iteration during a two-year partnership at a local level between YOUmedia mentors and administrators and an external researcher, and at a networked level between the local team and three other informal learning maker sites engaged in similar assessment design work. In the words of one YOUmedia staff, the local collaboration asked, "How can we establish a tool where the observation/evidence are not assumptions made by other people?" The presentation will be structured in three parts (1) observation tools and rationale behind the design, (2) organizational practices (and challenges) that emerged to utilize these tools to collect data for use in professional learning and decision-making, (3) visualizations of data collected and design implications (both for tool construction and practice).

Use of the observation tool was of interest to address common problems of practice, including developing shared common language, goals, and facilitation strategies across a distributed system; finding ways to celebrate the work and ideas of new and experienced staff in ways that grow and inform practice; and documenting learning practices that staff care about in a way that conveys the value to external audiences. While implementation of observation practices within the organization is a slow-moving process, the design and ideation collaboration process yielded benefits aligning with recent work showing how adaptation of materials through collaborative design offers opportunities for professional development and educator agency for educational change (Voogt, Laferriere *et al.*, 2015). Additionally, the tool—which focuses on four local learning values of messing around, geeking out, building community, and making connections—was intentionally designed to generate flexible data: Qualitative descriptions from observations (images and text) allow staff to unpack a specific learning moment and to dig into documentation of indicators across observations for one specific learning value. Quantification of high level and sub-thematic indicators for each value reveal counts and proportions of observations in terms of particular values and indicators documented, which can cross referenced with other metrics to do comparisons by location, program type, or content area. Articulation of distinct activities can promote conversation, reveal patterns of coverage, and suggest potential areas for more support and/or offerings.

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