14. Supporting Educator Reflection and Agency Through the Co-Design of Observation Tools and Practices for Informal Learning Environments

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Abstract: Spaces for youth to create what they imagine, such as makerspaces and learning labs, are proliferating in community centers, libraries, schools, and museums. There is still much to learn about how to document what happens in these spaces, especially in ways that can support educators in design and practice. In this paper, we share exploratory design-based research investigating how making and learning practices are identified and interpreted by educators working in library spaces connecting teens to tools, mentorship, and support for creative production. First, we share how researchers and educators co-designed observation tools, building on existing frameworks of learning practices involved in making activities. Second, emergent themes from co-design activities are presented, including the importance of organizational history and shifting perceptions about evaluation and data collection as opportunities for professional learning and advocacy. Finally, implications and future work are discussed.

Introduction

A teen boy leans forward on his chair toward a computer screen, engrossed in frame-by-frame editing of a digital video, painstakingly playing, editing, testing, and re-editing. The boy is deleting frames in which the lead actor freezes and an offscreen teen quickly rushes in to place an object in his hand. In the completed clips, the object magically appears. Two other teen boys sit on either side of the editor looking at their phones. One is an actor in the video. The other has a small speaker playing music in his backpack tucked under the chair. They remain in their positions for more than 30 minutes while the editor does his thing. Other music fills the space from speakers behind the front desk. A group of teens eat snacks and play video games nearby and across the room six teens on couches are having a discussion during a mentor-led science program. This scenario is just a typical afternoon at this YOUmedia location. While mentors constantly navigate from moment to moment, providing help and support as needed, identifying what is happening for whom is often difficult to unpack and certainly difficult to capture and share in a way that is systematic and summative. Additionally, for those new to the space, interpretations of who is learning through making and who is not can be oversimplified. Concerns about providing quality opportunities for youth, about equity of access and goodness of fit, and about understanding learning in ways that are authentic to the environment and its community, are key reasons that research-practice efforts to document learning practices in informal spaces are urgently needed.

In this paper, we share one part of a larger collaborative research-design partnership to develop observation tools documenting youth learning processes through making that are authentic to the learning environment and useful for stakeholders, including youth, educators, and administrators. Overarching questions that guide this work include: (a) How are learning practices in making interpreted by educators? (b) How can observations support professional learning and inform changes in practice and design of spaces and programming? Initial themes emerging from the work are presented and discussed, as are implications for design, practice, and future work.

Understanding Making and Learning in Informal Spaces

Spaces for youth to create what they imagine using analog and networked tools, such as makerspaces and learning labs, are increasingly popping up in community centers, libraries, schools, and museums (Hatch, 2014). There is evidence that skills, dispositions, and experiences of making and creating are increasingly important. Research focused on middle school found that greater involvement in production-oriented experiences was significantly related to important competencies, including more confidence in their own capacity to generate new ideas, stronger self-efficacy with professional tools, a propensity to share technical expertise with a broader network of people, and intent to continue to develop technical expertise in the future (Barron & Martin, 2016; Martin, Barron, Stringer, & Matthews, 2014). Incorporating spaces for making and creative production into libraries is of interest as a way to respond to current thinking about critical literacies and future workforce needs in ways that resonate with libraries (Moorefield-Lang, 2014), and it is suggested that through these spaces patrons have new ways to collaborate, play, solve problems, explore, and produce (Britton, 2012).

Research-practice design partnerships have contributed to operationalizing what learning in making and production spaces looks like in ways that resonate with educators. Bevan, Gutwill, Petrich, and Wilkinson (2015) worked with museum practitioners to catalog video cases of making in the museum and empirically identified dimensions of learning in tinkering. Wardrip and Brahms (2015) similarly worked with teaching artists at another museum space and developed a framework of learning practices of making. These frameworks use a practice-based perspective on learning that asserts an understanding of learning as fundamentally tied to the social and cultural contexts in which it occurs and focuses on the "practices" that define learning communities (J. S. Brown, Collins, & Duguid, 1989), including interactions with others, as well as with tools and materials and practices (Wardrip & Brahms, 2015). These models are helpful in providing a common language to guide discussions about making as a learning process by identifying ways to conceptualize, support, and assess such forms of learning through design. But there remains a need for tools and measures that can illuminate these practices in the learning spaces in ways that can be documented by practitioners.

Documenting and assessing learning in informal and media-rich environments in general is recognized as difficult (Lemke, Lecusay, Cole, & Michalchik, 2015). Much of the existing research in these spaces has focused on the design of the spaces and projects and the experiences of participation (e.g., Blikstein, 2013; Buchholtz, Shively, Peppler, & Wohlwend, 2014; Sheridan et al., 2014) and sought to measure the outcomes of programs and participation as opposed to documenting processes. In addition, methods used in these studies often use rich qualitative data collection such as ethnographies that necessitate a research team (e.g., Buchholtz et al., 2014; Sheridan et al., 2014) or require youth to systematically document their contributions through portfolios and reflections (e.g., Keune & Peppler, 2017). These options are often not feasible for practitioners to use regularly to access data in ways that can summarize patterns and inform practice.

Methods

This paper summarizes part of a larger research-practice initiative exploring how four different informal environments interpret and observe learning that happens in their makerspaces and developing a suite of observation tools to inform research and practice. The initiative is based on previous work that identified seven salient learning practices of making (Brahms & Wardrip, 2014; Wardrip & Brahms, 2015). The work takes a design-based research approach, engaging in iterative development of solutions to practical and complex educational problems in an actual learning environment (A. L. Brown, 1992). Key to this approach is collaborative design work, ensuring that practitioners

have a voice as part of the research team, thus promoting uptake and use of emergent designs and knowledge and ideas (Datnow, Hubbard, & Mehan, 1998; Gravemeijer & van Eerde, 2009).

Context and Participants

This paper centers on one of the four partner locations, a YOUmedia library space in Chicago, Illinois. YOUmedia 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 (Barron, Gomez, Pinkard, & Martin, 2014; Ito et al., 2013). The YOUmedia space shared in this paper is equipped with areas to hang out and play video games as well as areas encouraging creative arts and technology pursuits with materials such as video cameras, drawing tablets, sewing machines, paints, and an in-house recording studio. In the space, teens have access to adult mentors, many of whom have a content-area specialty, who 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.

Two staff from YOUmedia, a frontline branch mentor and the digital media coordinator, and a learning sciences researcher from outside of the library collaborated over the course of a year (the first three authors). Throughout the process, they regularly engaged other YOUmedia staff, including librarians, mentors, and administrators, as well as research and design partners at the other project locations.

Process

Regular time for research-practice discussions. The three-person YOUmedia team met every two weeks in person over one year to identify and negotiate the problems of practice and potential design solutions. Meetings were captured through field notes (18 pages). Once a month the team met virtually with researchers and practitioners from the other co-located project sites to share work and get feedback.

Local context setting and relationship building. To build trust and understanding between the three local research-practice project collaborators and other YOUmedia staff, time was reserved for bidirectional communication and learning. This phase included learning about and sharing the seven learning practices of making (Brahms & Wardrip, 2014; Wardrip & Brahms, 2015) and existing observation tools and learning frameworks used at YOUmedia. Data included field notes (10 pages) and artifacts from four meetings with YOUmedia mentors and administrators throughout the year.

Identifying learning values. To identify and negotiate learning values and how they connected to making and production and to explore practices of observation and assessment at YOUmedia, the research and practice team invited YOUmedia staff to participate in short informal feedback sessions. Seven mentors and three administrators participated in conversations that queried reactions to existing frameworks of learning, their personal and organizational learning goals for youth, and indicators of youth learning and development at YOUmedia. Questions were shared with participants beforehand. Conversation notes were typed into the document by the researcher during or directly after the meetings, and some staff added additional responses in a Google doc (13 pages).

Prototyping, testing, feedback, and revision. Based on information collected, representations of learning goals within the site and digital and analog forms for documenting observations and reflection questions were prototyped and regularly discussed, negotiated, and renegotiated during team meetings and informal check-in reviews with staff. Potential value, usability, and potential-use cases were focal feedback and discussion themes. During the course of the project, three distinct documents were developed: rationale for valued learning practices at YOUmedia, guide for observations, and a tool to document observations. Each had multiple rounds of prototyping and revision. All versions

were archived as data (15 documents). Notes and other data were regularly synthesized and translated into shareable Google slide decks that served as editable anchors for discussion and negotiation. This collaborative analysis served as the basis of identifying emergent themes.

Findings

1. How Were Learning Practices of Making Interpreted by Educators?

Attention to language was important and mentors translated practices. Mentors valued existing frameworks of learning and making and recognized many of the practices as important within the YOUmedia space, but they frequently translated the practices into their own institutional language. They made sense of the seven learning practices of making defined by Wardrip and Brahms (2015) by grouping and ordering them, often linking them to fundamental frameworks of YOUmedia, including HOMAGO (hanging out, messing around, geeking out; Ito et al., 2010) and connected learning (Ito et al., 2013). For instance, the practice of *tinkering* was considered valuable and was identified as one of the ways youth "mess around" in YOUmedia, as per the HOMAGO language. Other practices were modified to better represent the practices in their space, as when one mentor commented,

> Like for *hack and repurpose* there is the more familiar practice of breaking apart a computer and putting it back together. But then also cutting apart beats. Hacking and repurposing different segments of a song to create something new. (May 2019)

In addition to the language used to identify and define practices, other word choices related to the development of an observation tool emerged as culturally problematic. These included *evidence* and *evaluation*, which had negative connotations for youth and mentors in the library space and in the community. One asked, "How can we establish a tool where the observation/evidence are not assumptions made by other people?" (May 2019)

Opportunities for connections and relationships through making were of interest. The organizational history of YOUmedia heavily influenced the interpretations of the learning practices of making (Wardrip & Brahms, 2015), and YOUmedia staff recognized a critical absence of two constructs: (a) relationships, including communication, sharing, collaboration, and bidirectional teaching and learning with peers and mentors, and (b) 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. Recent studies in connected learning environments have identified a variety of ways mentors (Barron et al., 2014) and peers (Maul et al., 2017) can support an interest-related creative pursuit, such as encouragement, teaching, motivating sustained engagement in a pursuit, and making friends. Mentors saw connections to these other practices within the existing frameworks (for example, one mentor noted, "Within *sharing resources* there is a collaboration piece") but wanted more explicit attention.

> I enjoy when I can see a teen is comfortable yet respectful when experimenting and using the tools available on their own. Especially when they shift their approach to incorporate more tools and resources both in and outside of the space. (May 2019)

> [This framework needs to include] critique and criticism and reflection about work and the world in general. To situate [teens] and their work in it. (May 2019)

Learning practices were interpreted holistically. Initial project observation tools represented one learning practice. YOUmedia mentors determined that single-practice observations would not capture the nature of their programming, which acknowledges that youth engage in multiple learning dimensions at once, including social and creative learning pursuits. To observe authentically in the space, mentors advocated for a tool that holistically documented indicators but assigned them to areas of overarching importance. As such, four primary learning values were identified, collapsing and organizing important practices. For instance, agreement in the YOUmedia context that the practices of "*inquire* and *seek resources* are pretty similar; they are both really getting at the idea of having curiosity and figuring out what you are doing" was mediated by folding them into a larger dimension of "messing around." Under this theme, observers could document what they saw related to common indicators of engagement, such as asking questions (inquiring) or checking out tools (seeking resources) at YOUmedia. Similarly, staff stressed the importance of a simple observation tool that allowed for flexibility to document the space in different ways (e.g., both a formal program in action and open-ended time during which teens are in a certain production area) and for different units of time (reflecting that mentor time for observation was limited and that trajectories of learning in the space were often and necessarily a "slow and nonlinear process" as teens made decisions about what to do and how to do it). Reflection questions included in the observation tool were appreciated but only if they were "to the point" and "not redundant."

Implications for design. The observation tool was expanded to support a holistic view of YOUmedia learning practices and at the same time simplified to encourage observer participation and ease of observation practice. Details of observation were pushed to the second page and the primary space for documenting what was noticed was foregrounded, including open-ended entry within primary quadrants using YOUmedia practitioner language (messing around, geeking out, building community, and making connections) with subindicators available for identification but not requiring itemized response (Figure 1). Open-ended questions for reflection and to spark discussion for learning and decision making were added on the second page. The adapted observation tool was designed to observe multiple contexts—a program, activity in a particular space, or the design of the environment. In this way, the observation focused not on making claims about a particular youth but rather on the interactions (or potential for interaction) between youth and mentors and space. A user observation guide was also created that framed observation as a way to *document* learning and *support* learning in practice as opposed to *collecting evidence* for *evaluation*. The guide includes a crosswalk document identifying commonalities between YOUmedia learning goals and the multiple frameworks the project and practitioners referenced, and descriptions of indicators of learning from the language of mentors and administrators.

Figure 1. Three major design phases of the observation tool, (c) being the most recent iteration.

2. How Can Observations Support Professional Learning and Inform Changes in Practice and Design of Spaces and Programming?

Informal evaluation and assessment is happening but is difficult to share. Before the development of the observation tool, staff had ways of determining challenges and successes and making adjustments in the moment and from program cycle to program cycle, but this was happening at an individual level or small-group level, rather than at a programmatic or organizational level. There was not a formalized practice nor were there systematic ways to share decision making and observations with others, and this was especially concerning when thinking about how existing knowledge was being shared with newer mentors. Through conversations with staff, it was clear that traditional evaluation of learning, such as pre-postsurveys, was not of interest, but ways to document what they cared about in ways that could be shared with others (within and outside of the organization) was. They were especially interested in how to document practices that were difficult to capture through traditional write-ups or attendance numbers. One example was asynchronous collaborative work, such as a model train landscape built by multiple teens often working at different times over months. Others include showing how going deeper with a smaller number of youth is critical for youth learning and development and how youth *hanging out* in the YOUmedia space achieves goals that might be overlooked or less obvious than other practices. Multiple staff noted that stakeholders and outside audiences are often "too judgmental about one [type of activity] being better than the other" (July 2018). One mentor reflected how staff saw things differently:

> Each of these practices lives on a continuum of value that is fairly evenly spread. It is important to value *Inquiry* similarly to *Fluency*. (May 2018)

Mapping observation onto existing practices of evaluation and professional development suggested potential shifts in practice to support staff. Observation and evaluation were initially interpreted by many staff as problematic and not necessarily helpful in supporting their practice:

> Evaluations are a necessary evil. I hate them. As a staff member, I want to spend all my time with students. The thing that is most rewarding is actually doing the work. I will do this because it takes this to keep the funding going and we want to make sure we are doing as well as we can. I don't resist it. (April 2018)

> We have done reflective practices that has not been tied back into our other work. Not necessarily transparency around it. So, there are feelings that nothing will come of it. (July 2018)

More systematic observations using shared tools was identified by mentors as a way to illuminate reasons and decision making, including advocating for changes in programming and planning for thematic reflection discussions during staff meetings. Also, using one tool for observation and program planning was of interest to support joint understanding of YOUmedia goals and to ensure that the data being collected and the reflection questions being asked are of interest to educators for use in practice as opposed to collecting information for other people.

Implications for practice. Specific opportunities to use the observation tool to convey information and as an anchor to guide discussion were identified. *Mentor program planning*: Quarterly meetings to support mentors in planning for the next program cycle are using the observation tool to guide goals and activities (Figure 2), using shared language and emphasizing depth and breadth of learning practice. *New hire mentor shadowing*: YOUmedia mentors shadow at other branches as part of the onboarding process and the observation tool is being experimented with as a way to focus what new hires observe within YOUmedia core learning values and key indicators. *Summative data review*: Qualitative summaries and photographs of spaces and activities were of interest for both documentation of practice and guiding staff conversations. Based on the preference for digital data collection, an online version was developed, allowing open-ended documentation and reflection along major themes and questions and summative analysis. As we return to the opening scenario, the observation tool allows documentation of the ways in which the two youth hanging out around the video editor are engaged in the creation process through relationships, supporting and sustaining his focused video production work (Figure 2). Using qualitative counts of observations documented can reveal the proportion of observations in each primary learning values quadrant (Figure 2), with the option to explore the presence of specific indicators within those broad areas. This articulation of distinct activities can promote conversation, reveal patterns of coverage, and suggest potential areas for more support and/or offerings.
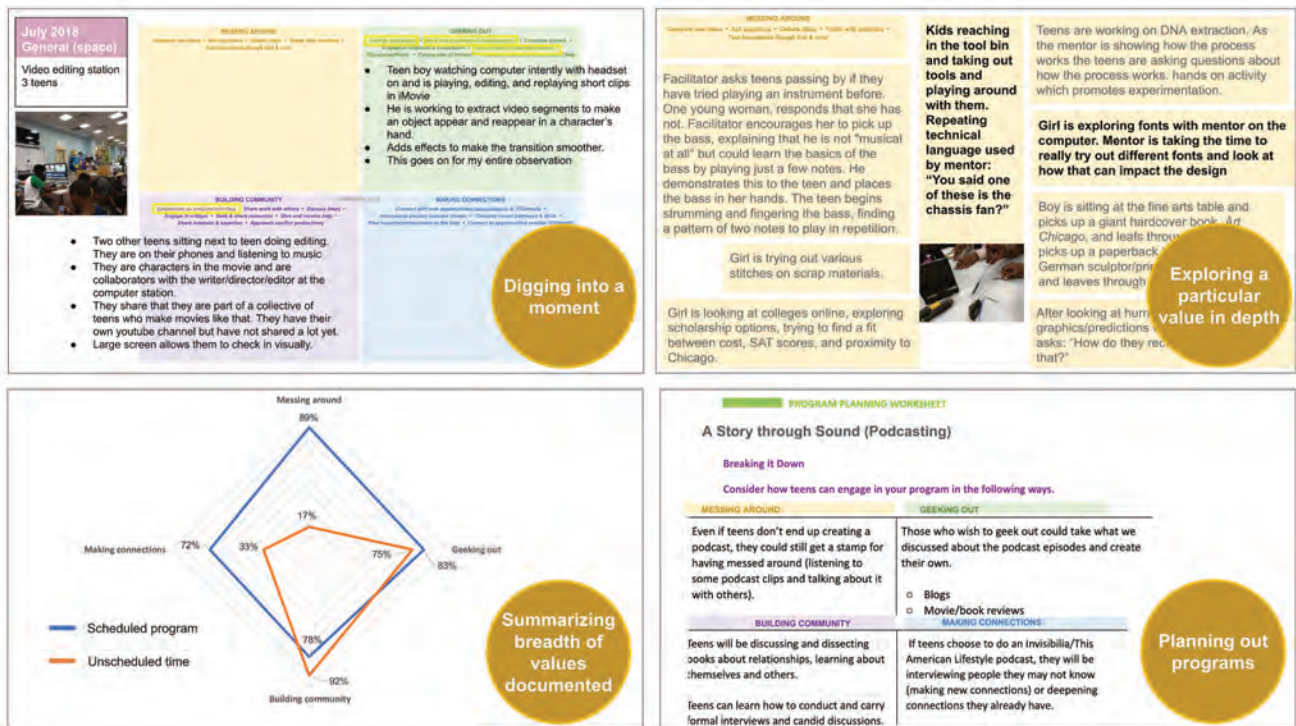
Figure 2. Examples of observation tool data visualizations (single observation and across multiple observations) and planning documents.

Discussion

Our thematic findings stress the importance of organizational history and support, both in the interpretations of learning practices in making that emphasized core YOUmedia learning frameworks of connected learning and HOMAGO (Ito et al., 2010), and in the necessity of changes in day-to-day practice that would allow observation to thrive. They also suggest that co-design and use of observation tools and practices have the potential to shift educator perceptions of observation as top-down evaluation to observation as professional learning and in support of practitioner-led advocacy for what they care about, including a broader view of making and learning. Promising uses of observation tools are to share common language, goals, and facilitation strategies across a distributed system and to celebrate work and ideas in ways that can inform practice. Recent work has provided empirical evidence that the shared process of the adaptation of materials for use in learning environments through collaborative design offers ample opportunities for professional development and educator agency for educational change (Voogt et al., 2015). This work has implications for both design and practice in that it provides an example of a flexible observation tool for informal teen making and production spaces that values the ideas of connected learning, including thematic insights about design and practice directly from practitioners, but perhaps more important, it suggests multiple benefits related to the process of co-designing an observation tool.

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