An Ethnography of Maker and Hacker Spaces Achieving Diverse Participation

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MAKER: An Ethnography of Maker and Hacker Spaces Achieving Diverse Participation

Some have hailed the emergence of maker spaces as an opportunity to broaden participation of underrepresented groups in science, technology, engineering, and math (STEM) education, engaging participants in open, creative, and supportive spaces for learning and applying practical STEM knowledge. Others have questioned the potential of these spaces, as many maker and hacker spaces seem to be enacting certain norms that are more conducive to participation of white, male, middle-class, able-bodied hobbyists. Nonetheless, there are spaces noted for participation of homeless makers, women, people of color, and people with different kinds of abilities. This project considers how diverse maker spaces are conceived, constructed and operated to actively involve groups traditionally underrepresented in STEM, and collectively identify practices that can inform the design and operation of campus and community maker or hacker spaces that presently struggle to achieve diversity.

The research employs ethnographic methods and Critical Discourse Analysis (CDA) to characterize spaces in terms of their physical and linguistic artifacts. Here we report results from preliminary research examining online and published artifacts from our cohort of diverse maker spaces in preparation for direct observations beginning in summer 2017.

Research questions explored through this first phase of the project include: (1) What practices and artifacts do participants in diverse maker and hacker spaces employ to establish and maintain environments that are diverse and inclusive? (2) What does the discourse in diverse maker and hacker spaces reveal about how meaning and value are co-constructed around identity, creativity, and the culture of production / the production of culture in engineering? (3) What best practices emerge from diverse maker and hacker spaces, and how can these translate to design or transformation of existing maker spaces on campuses and in communities?

Partner Maker and Hacker Spaces
To date we have conducted a preliminary content analysis of websites of six diverse maker spaces (and one campus space for all first year students on our campus), and engaged two of our partners in preliminary conversations.

- **Liberating Ourselves Locally** (Oakland, CA) https://oaklandmakerspace.wordpress.com "Founded and led by people of color...works for a future where members of our community can be involved in all aspects of creating things that sustain us, such as food, clothing, energy, technology, shelter, and art. We are a local movement whose primary purpose is to serve our communities: people of color, immigrants, poor folks, trans folks, queers, women, youth."
- **Community Science Workshops** (Central Valley, Bay Area, and Central Coastal California) http://www.cswnetwork.org/ Multiple CSW sites "provide opportunities for youth to tinker, make, and explore their world through science in under-served communities across California."
- **MergeSort** (New York, NY) http://www.meetup.com/mergesort/ "New York City's first feminist hackerspace... where women and non-binary people can make things, learn, and work on projects

without fear or intimidation."

- **Paradox Sports** (Ouray, CO) http://paradoxsports.org/ "Creat[es] physical adaptive sport communities built to inspire" and got its start working with "U.S. military veterans on a series of backpacking, mountaineering, river rafting, and rock climbing trips specifically designed to empower injured veterans as they reintegrate back into civilian life."
- **Floyd Center for the Arts** (Floyd, VA) http://jacksonvillecenter.org/ connects making, technology and artisan entrepreneurship in rural Appalachia. In 2003 it opened Virginia's first Cultural Business Incubator and the state's first Residential Crafts School in 2005. "It continues to be widely known for its collaborative approach to creating win/win situations, its inclusiveness, its energy, its support for the creation of quality art and artisan businesses, and its influence on the economies of the region."
- **Hacksburg** (Blacksburg, VA) http://hacksburg.org/ is an inclusive hackerspace outfitted with traditional making tools such as 3-D printers, Arduino and Adafruit, wood and metal shops, as well as traditionally feminine equipment such as sewing machines. They host everything from high altitude ballooning activities to workshops on alternative sexualities, drawing membership from the local Blacksburg community that includes Virginia Tech and residents from surrounding communities in rural Southwest Virginia.

Preliminary Results: Diversity Practices

We present results describing the diversity practices identified so far in our preliminary analyses. Some diversity practices represent common themes across several or even all spaces, while other practices cater to particular populations present in a single organization.

Socio-economic Inclusivity: Maker spaces adopt varying approaches to affordability including sliding scales for membership, shared memberships, and free events. At one site, for example, up to six individuals can share a single $40/month membership where they coordinate access among members of the group. Many sites have regular open meetings which are free to all. Others offer opportunities for scholarships or work studies (usually in the form of teaching) to offset the cost of membership dues and/or class tuition. One space hosts juried exhibits that are typically regional and have low entry fees or are free, which provides a platform for makers to promote and sell their works to the community. Additionally, some maker spaces intentionally situate themselves at sites that are accessible to members by public transportation.

In an Appalachian maker space that describes itself as a "center for rural creativity," attention was paid to include two cultural groups characterized locally as "been here's" (third generation or more in the area) and "come here's" (more recent arrivals). While the two groups don't map neatly into distinct socio-economic categories, the organization is careful to ensure that the rise of the arts in this small rural community does not create a gentrified feel, nor a feeling of exclusivity for those new to, or outside of, a close-knit group of residents. Similarly, at a maker space in a college town that utilizes space near to campus because it is affordable, there is a sensitivity to include individuals affiliated and not affiliated with the university, making activities accessible regardless of affiliation or education. The presence of several campus maker spaces allows the community maker space to differentiate itself in part because of its mixing across town-gown identities and inclusion of small town and rural participants from the region.

Diversity of Ideas: The sense that the members make the space what it is, give it its character, and grow the organization was a key element in several spaces. These maker spaces recruit members with the promise that the space can be used for any project that they want to work on. Organizations described growing and changing based on the arrival of an individual with particular interests in, for example, cosplay ("costume play"--dressing and role-playing as a fictional character), or playing Blues music. These interests, in turn, often draw others to the organization. It is not unusual for individuals to hold multiple, disparate interests that can be explored in the same maker space.

Gender Identity Diversity: Maker spaces described gender diversity in different ways. One organization was founded by a woman after attending AdaCamp, an unconference sponsored by the Ada Initiative with the express purpose of encouraging women's participation in open technology spaces. Another organization was founded by tech industry workers who sought to change the ways in which their employers addressed the gender demographics of their customer base, specifically to expand the categories beyond the gender binary. By collectivizing the creative response and coding work, they felt they could be better change agents at their respective companies and offer a well developed technology solution to further the cause. Yet another organization ensured that traditionally feminine making activities were included from the beginning, such as quilting or sewing. Some sites recognize the needs of non-binary and trans people by specifying on event invitations whether the location has single-stall, gender-neutral restrooms. Additionally, many sites feature people of many genders in the images and videos they post online.

Racial and Ethnic Diversity: Several spaces described welcoming diverse racial and ethnic communities in their midst by either building the space with such diversity at its founding, or by deliberately engaging cultural diversity from the beginning. In one case, school outreach with a STEAM emphasis engaged local Hispanic families and hired bilingual staff members to work with members who spoke English as a second language. In another case, by providing a venue for African American musicians to play, the site drew performances from Gospel to Blues.

Diversity of Ability: Maker spaces advertised their willingness to work with members to make their site accessible to people with disabilities. Several spaces have interior space that is designed for maneuverability around furniture. In fact, one site closed down temporarily with the express purpose of renovating their space to be fully accessible to wheelchair users. This site also uses fragrance-free cleaners and offers to run a HEPA filter prior to an event if an attendee with allergies gives them advance notice. Multiple sites select and advertise that their locations have accessible restrooms and/or elevators. Another maker space, which explicitly serves individuals with disabilities, reframes the conversation about ability; they ask members not what they lost due to injury, but instead what they can do. They work with each person on an individual basis, accounting for the person's needs and teaching them how to climb, with the idea that each member can become a comfortable, self-sufficient climber.

Diversity of Sexual Orientation: At least two sites in our study are known to have been founded by LGBTQ+ people, both with the idea of creating space for queer, trans and non-binary makers. The spaces are promoted as inclusive and welcoming of LGBTQ+ diversity.

Veteran Status: One maker space was co-founded by an injured veteran and now serves many military members (veterans and active-duty). Promotional media online highlights the involvement of veterans in their organization's regular events and also showcases an annual veteran-focused program.

Harassment Statements:
In the interest of protecting members' safety and wellbeing, several sites have formal statements regarding the prohibition of harassment. One maker space detailed behaviors and activities that would constitute harassment in their Bylaws and Community Agreement documents. Another site was a part of collective of maker spaces, in which other member-organizations maintained a "Ban List," a list that cataloged photos, names and alleged offenses (e.g. theft, violence) of individuals who were no longer welcome in the maker spaces.

Conclusion: Looking Ahead
Findings presented here are preliminary and reflect work from only the first few months of the project. As the project continues, additional data collection and analysis will enable us to expand these findings through additional content analysis of websites and on-site visits to include participant observation and interviewing. An unconference to be held in Chicago will facilitate collaboration of Maker partners in further identifying and sharing diversity practices.

Researchers and members of diverse maker and hacker spaces will use the findings from this project to co-construct strategies for (1) stimulating innovative design thinking in experiential curricula; (2) embedding inclusive practices that increase retention and broaden participation in STEM; (3) empowering citizen engineers through local and national networks of makers, students, and faculty; and (4) enabling new STEM and design pedagogies in progressive undergraduate learning environments that will enrich the U.S. innovation ecosystem.