

Making Connections: Exploring Culturally Embedded Making Practices and Perceptions (Work in Progress)

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Since 2006, the exponential growth of the Maker Movement has catalyzed the development of tools, spaces, programs, and events that allow people to engage in activities and processes that have clear links to STEM learning^{1,2}, and in particular, engineering skills, knowledge, and ways of thinking³. Informal learning environments, such as museums, science centers, and libraries, have increasingly embraced these practices⁴, setting up Maker spaces, advancing Making activities, and sharing practices across institutions, through informal conversations and meetings and also through workshops and sessions at national conferences⁵.

While Maker activities and events have been shown to be quite successful at attracting traditional informal STEM learning audiences – commonly white, male, and middle/upper-middle class - to an expansive range of design-based activities, emerging leaders in the Maker Movement have identified a need to better engage a broader range of participants, including people of color^{6,7,8}. As can be the case with other informal STEM learning experiences⁹, members of communities of color may not identify with – or even be aware of – the Maker Movement and the Maker Community as it currently exists.

This lack of awareness and connection to the Maker Community by members of traditionally underrepresented audiences may become a growing challenge for the STEM community, particularly because Making is being championed by educational leaders across the country – as well as the White House and President Obama himself – as a catalyst for developing interest and understanding in STEM. Indeed, if Making is to be acknowledged as a prominent pathway to science and engineering careers, then it is increasingly problematic for it to be yet another context in which the persistent underrepresentation of women and people of color tends to be reified – despite, of course, the fact that *all* communities and cultures have been engaged in design and generative practices throughout history and circumstance.

In seeking to contribute to the knowledge base about how to better engage underrepresented groups – and in particular, people of color – in Making, the Making Connections project has three goals: 1) to better understand the perceptions people of color may hold about Making; 2) to better understand the culturally-embedded making practices that people of color may engage in, and 3) to leverage the themes identified in parts 1 and 2 to develop a range of museum-based Making activities that may be more inclusive of, and engaging for, members of underrepresented communities. In this paper, we focus on the first two goals of the project, and present preliminary findings from our exploratory data.

Theoretical Framework

Without doubt, the ubiquity of creation and innovation across cultures positions Making as an activity with nearly boundless potential to connect people from all communities to STEM concepts and practices. However, just like any community – and in particular, *communities of practice*,¹⁰ where members participate in joint enterprises and have a shared repertoire of skills, knowledge, and values – the Maker community is continuously defined and redefined by its members. Today's Makers often have ties to other communities of practice, such as the

“hacker” community, the DIY community, the crafting community, the progressive education community, the constructivist education community, the *constructionist* education community, the informal learning community, and the STEM education community, to name but a few. Perhaps not surprisingly given the wide range of interests and pursuits that come together under the Making umbrella, definitions of Making, the Maker Community, and the Maker Movement have been in flux ever since the first Maker Faire in 2006.

It is likely that some of the hesitation to define and delineate “what counts” as Making comes from a deeply embedded spirit of inclusion and sharing commonly found within the Maker ethos¹¹. Once definitions are articulated, boundaries tend to be drawn, which then might lead to ideas, practices, and artifacts being considered “within” or “outside” the realm of Making. However, whether it happens formally or informally, intentionally or organically, vibrant communities of practice eventually create commonly accepted norms, understandings, and values.

Recently, researchers and practitioners who have been writing about the Maker Movement have advanced more specific definitions of Making, such as:

- “build[ing] or adapt[ing] objects by hand, for the simple pleasure of figuring out how things work”¹²; or
- “a class of activities focused on designing, building, modifying and/or repurposing material objects, for playful or useful ends, oriented toward making a ‘product’ of some sort that can be used, interacted with, or demonstrated”¹³; or
- “creative production in art, science and engineering where people of all ages blend digital and physical technologies to explore ideas, learn technical skills, and create new products”¹⁴.

These broad definitions, and many others found in the Maker literature, seek to balance the need for identifying boundaries around a particular community of practice with the strong desire to be inclusive of all types and forms of Making. However, articulating these ideas in scholarly journal articles and books does not necessarily mean that members of the Maker community a) know about these definitions, b) buy into these definitions, or b) enact them in daily practice. In other words, although these definitions are rhetorically inclusive, they may not accurately represent the types of activities that the emergent Maker community of practice considers “legitimate” – and therefore authentically representative – of Making.

Arguably, one – although admittedly imperfect – window into the daily practices and legitimized activities of the Maker community is MAKE Magazine, which has a paid circulation of 125,000 and is also available online through makezine.com. Launched in 2005 by Dale Dougherty and O’Reilly Media, this flagship publication has fueled the explosive growth of the Maker Movement across the world. MAKE Magazine has a wide and growing readership, (and its synergistic relationships with Maker Faire and the Makershed.com supply website, which comprise the other areas of the Maker Media Company formed in 2013) have created a powerful engine and infrastructure for the Maker Movement, and in so doing, have helped advance perceptions of what counts as Making activity, as well as the accepted identity of the Maker.

In 2013, as part of her closing keynote to the FabLearn conference in 2013, Leah Buechley presented an analysis of 36 Make Magazine covers, which spanned its first nine years of publication. The five most prevalent themes she found featured on the MAKE magazine covers included: electronics (53%), vehicles (31%), robots (22%), rockets (8%), and music (5%). In addition, across those covers, there have been 40 people pictured; 85% of those people have been men and boys, 15% have been women, and there have been no people of color.

Certainly, the analysis of MAKE Magazine covers may seem like a somewhat superficial understanding of what Making is and how the Maker community defines itself. However, considering the central roles that the Magazine, the Maker Faires, and the Makershed play in the Maker Movement¹⁵, it is difficult to imagine that these elements do not also contribute to the “big-D Discourse” of Making. Gee¹⁶ defines “big-D Discourses” as a particular “way of being in the world” that belongs to a specific community – it consists of not only the language of a particular community, but also the “ways of acting, interacting, feeling, believe, valuing, and using various sorts of objects, symbols, tools and technologies – to recognize yourself and others as meaning and meaningful in certain ways.” Thus, in her analysis of the images on the covers of MAKE Magazine, Buechley provides us with an initial glimpse into the “big-d Discourse” of Making by exploring what, and who, is highlighted and celebrated over the first nine years of issues: predominantly white men and boys engaging in projects involving electronics, vehicles, and robots.

How, then, do we as an engineering education community begin to return to a broader definition of Making? One that is not necessarily as codified by MAKE Magazine, but one that is more aligned with the creative and generative processes found within and across *all* cultures¹⁷? In the first stage of the Making Connections project, we begin to address one aspect of this challenge by seeking to better understand how people underrepresented groups perceive and define “making”, and how these perceptions may align, or not, with how MAKE Magazine defines “Making”. Therefore, the research questions guiding this early inquiry are:

- 1) How do people of color describe and identify making practices and products?
- 2) How similar or different might these descriptions be from what is commonly being defined as Making (particularly within MAKE Magazine)?

Methods

The Making Connections project is a research and development project being conducted by a large Midwestern science center. In order to address the research questions listed above, we began by identifying a set of community partners who acted as “cultural navigators” for our institution. Almost all of the community partners had already collaborated with the Museum on prior project and had some familiarity with the work and mission of the institution. The partners extended invitations to members of their communities to participate in various ways on the Making Connections project.

In the first phase of the project, each community partner co-led a “Listening Session” with a member of the Museum’s community engagement team. These Listening Sessions were

essentially focus groups where members of communities of color gathered to provide insight and feedback on a range of questions, including questions focused on their perceptions of, and experiences with, making. Across the project, there were seven Listening Sessions conducted, with a total of 67 participants primarily self-identifying as African-American, Latino, American Indian, and/or Hmong. In addition, community partners (n=10) were interviewed multiple times during the project by members of the research team.

Listening Sessions were documented with ethnographic field notes while interviews were audio recorded then transcribed. All field notes and transcripts were qualitatively coded for emergent themes, as well as for the themes identified by Buechley in her analysis of MAKE Magazine covers. An initial set of findings, focused on a subset of data, are presented below.

Preliminary Findings, Part 1: Artifacts

During the each of the Listening Sessions, participants were asked to respond to the question “What have you made lately?” Across the fieldnotes for the seven Listening Sessions, 97 individual responses were recorded by the note takers. The top four emergent categories found in responses to this question included: Art/Crafts (27%), Cooking/Food Production (27%), Repairs/Renovations (19%), and Activities/Toys for Youth (14%).

In addition to the emergent themes, Buechley’s themes from the MAKE Magazine covers were also explored within the participant responses. Only 3% of responses were associated with electronics, 4% were associated with vehicles, and 3% were associated with music. No responses were associated with robots or rockets. Figure 1 below provides the comparison of theme frequencies across both the Making Connections Listening Sessions and the MAKE Magazine covers.

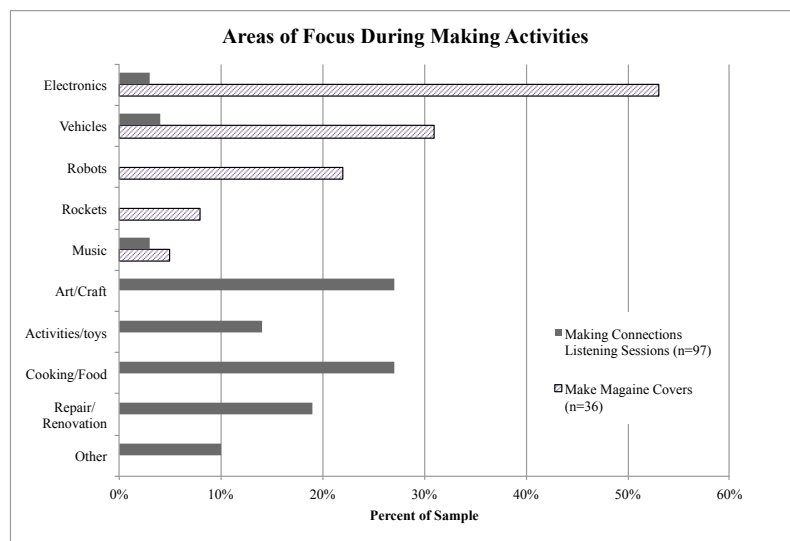


Figure 1. Analysis of Descriptions of Making.

Responses coded as Art/Crafts ranged from expressive paintings and drawings to craft projects that involved traditional techniques such as intricate beading or paper crafting. In addition to

several mentions of cooking as making, participants also described a range of gardening methods (such as using a grow lamps) to produce their own food. Responses associated with repairs and renovations related primarily to cars and houses. Interestingly, several participants also mentioned creating games or activities for kids and youth, in order to engage them in productive play – and at least in one instance, “keep them from getting stuck in front of a screen”.

Preliminary Findings, Part 2: Common Reasons and Practices

In the descriptions that study participants provided us in both the Listening Sessions and Community Partner interviews, we heard them talk about their work in ways that suggest that both scientific and engineering habits of mind, like observing, trying out different plans to determine which is best, weighing different tradeoffs while developing a prototype, all as part of their making processes. These weren't simply mindless activities, or things that people were doing in the same way at all times; they were tinkering, experimenting, and working out the best methods to develop the best products possible given the materials they had on hand.

Discussion: (M)aking vs (m)aking

In this paper, we have argued that while the Making has great potential to provide pathways to science and engineering careers for many audiences, the ways in which the Maker Movement is defined by the Maker Media brand may be excluding the culturally-embedded making practices found in communities of color. Early analysis of focus group and interview data with members of communities of color reflect this lack of alignment between their perceptions of making in their every day lives and what is commonly portrayed as Making within the Maker community.

Using Gee's theory on Discourses, it is possible that the branding of Making by MAKE Magazine results in a limited definition of making focused heavily on electronics and mechanics. We argue that a return to a more inclusive view of making – one characterized by creative, innovative, and generative processes found within all cultures, and values and highlights examples of innovation that include the types of making identified by our study participants – is essential in order to broaden participation in Making activities. In other words, if the Making community of practice is to become more diverse, then a more diverse pool of activities and pursuits must be legitimized by the current leaders and influencers within the Maker community. Future work includes the continued analysis of focus group and interview data, as well as a final round of data collection and analysis with project staff, community partners, and participating families.

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