Framing Makerspace Communities

Short Paper

Parisa Roshan Khanapour
Georgia Institute of Technology
Tech Square Research Building
85 Fifth Street NW
Atlanta, GA 30308
khanipour@gatech.edu

Kayla DesPortes
Georgia Institute of Technology
Tech Square Research Building
85 Fifth Street NW
Atlanta, GA 30308
ksdesportes@gatech.edu

Zane Cochran
Georgia Institute of Technology
Tech Square Research Building
85 Fifth Street NW
Atlanta, GA 30308
zcochran3@gatech.edu

Betsy DiSalvo
Georgia Institute of Technology
Tech Square Research Building
85 Fifth Street NW
Atlanta, GA 30308
bdisalvo@cc.gatech.edu

ABSTRACT

Drawing from over 50 interviews with diverse individuals who identify as makers we explored ways that communities were shaped the physical or online structures they occupy and a shared understanding of behaviors within the community. We identified two key dimensions to maker communities — *fluid* and *structured, and* — *regulated* and *unregulated.* We looked at these dimensions and how they impacted collaboration and learning, and togetherness in various maker communities.[1*]

CCS CONCEPTS

• **Social and professional topics** → **Computing education**; *Informal education; Adult Education*

KEYWORDS

Collaboration, Community, Makerspaces, Learning

ACM Reference format:

Parisa Roshan Khanapour, Kayla DesPortes, Zane Cochran, and Betsy DiSalvo. 2017. Framing Makerspace Communities. In *Proceedings of FabLearn17, October 21-22, 2017.* 8 pages.
https://doi.org/10.1145/3141798.3141814

FabLearn '17, October 21–22, 2017, Stanford, CA, USA

ACM 978-1-4503-6349-5/17/10...$15.00
https://doi.org/10.1145/3141798.3141814

1 INTRODUCTION

Studies of makerspaces have begun to explore *communities of making,* suggesting the nature of communities is relevant in the analysis of making. While the communities identified makerspaces are informally understood, methods of organizing and categorizing these communities has not been defined. To address this, we identified two key dimensions of maker communities: *fluid* and *structured* and *regulated* and *unregulated.* While these dimensions are not exclusive designations, they provide formalized language for diversity of makerspaces and are a step in articulating the breadth of makerspaces.

2 BACKGROUND ON MAKER COMMUNITIES

We focus on three aspects that emerged from our interviews: togetherness, collaboration, and learning.

Togetherness- Much of what motivates creating makerspaces is the allure to facilitate togetherness. A common understanding of togetherness is as a state of being physically or emotionally close to another person or people. However, togetherness has been conceptualized in various ways, using different metrics that spanned location, time, and familiarity. One way that being together is community building in a third space, characterization by Oldenburg, a place outside of work or home where value was placed upon the interaction between those who helped develop social capital [4].

Collaboration- Defining collaboration in maker communities was difficult because they are messy, real-world places that do not have set goals and processes. To scope this for this study, we used a narrow understanding of collaboration in the process of making objects or products. Specifically, in this paper, we identified peer production and remixing as collaboration processes inside maker communities. Remixing is a collaborative practice of taking a previous example and using it as a basis for a new project or program in novel, creative ways [1].

Learning - Another way to conceptualize collaboration within makerspaces was through the construct of communities of practice. This lens explicitly ties the collaborative practices closely to learning. Communities of practice was defined by Eckert as "a collection of people who engaged on an ongoing basis in some common endeavor." The interdisciplinary nature and diversity of knowledge in maker communities made them interesting cases to investigate how members moved from the periphery of a community of practice, to full membership.

3 METHODS

We interviewed 51 individuals who were recruited by: emails, a makerspaces, or referrals. Interviews were done in-person (44), online (3) and by phone (4). Interview questions asked about interviewees' making practices, including online and offline learning experiences and participation in communities. Semi-structured interviews lasted 30 to 60 minutes, were recorded and transcribed. Two researchers started by analyzing half of the interviews, to discuss and refine initial themes in a cyclical process. They used pattern coding to identify emergent themes in the data, describing higher-level patterns that emerged from the interviews. Participants frequented over 20 different physical makerspaces, and many more online community for makers. This broad selection of participants allowed us to gain perspective on the different types of makerspaces.

4 PARADIGM FOR MAKERSPACES

We identified four terms to define makerspace communities. *Fluid* makerspaces are characterized as physical or virtual structures that were in flux, changing at any given time. *Structured* makerspaces are characterized as physical or virtual spaces organized in a systematic way, and maintaining that structure for extended periods of time. *Regulated* makerspaces are characterized as communities that have established rules, both formal and informal, for how people used the space and interacted with each other. *Unregulated* makerspaces are characterized as communities that have few formal regulations for use of tools and space, and a wide range of accepted social interaction**.** Using the data gathered from interviews and observations, we explored the spaces represent *structured* and *regulated; fluid* and *unregulated; structured* and *unregulated;* and *fluid* and *regulated.*

4.1 Structured and Regulated

An example of a *structured* and *regulated* maker community is *TechShop.* [3] where makers engaged in professional-making activities motivated by small businesses. These for-profit spaces required a monthly membership fee, resulting in highly regulated and managed programs. Most makers used the space to create products or prototypes for professional projects. One of the makers in this space described the management as "[doing] a phenomenal job of curating the environment and the culture and keeping it clean literally and figuratively." The space was organized and immaculate, with staff who regulated the space during business hours. There were tables for makers to spread out on while they worked, but policy required them to clear the tables when they were done for the day. The makerspace also contained an extensive set of tools. In order to use most of the tools, *TechShop* required training and/or certification to prove the maker's ability to handle those tools safely.

Togetherness. The majority of participants described a welcoming atmosphere in which they received help on projects in *structured* and *regulated* maker communities. Most of the projects were solo endeavors and it was a common theme for makers to work in the presence of other members of the space, rather than *with* them on a shared project. As Tyler said, "A lot of times you're with other people just for the camaraderie or for the safety aspect of it. But generally speaking, when I'm working, I'm working on my own project, and there might be someone else I know in the room, also working on their own projects, and we might talk to each other while working, and if we have questions, then we take a look." In larger physical makerspaces like TechShop, approaching other members was difficult for many. To address this, many *structured* and *regulated* spaces provided ways for members to find help and projects.

Collaboration. Peer-production was not common in *structured* and *regulated* maker communities. Most of the projects in these communities were produced by an individual and motivated by industry viability. These goals affected collaboration through a greater concern for individuality and authorship compared to recreational or DiY motivated making. As Emma said, "The more people you have working on something, the less and less it gets to be your vision, what you originally wanted it to be." Similarly, remixing did not happen often in offline *structured* and *regulated* makerspaces. The issues of ownership and authorship left makers concerned with appearing to copy others work. Understandably, these tensions were heightened in makerspaces, like *TechShop*, where the space was commercially-driven.

Learning. Often, in a *structured and regulated* makerspace, paid staff provided support to facilitate help-seeking. As Jason said, "Part of our job is helping people when they need it… and even it is something that we personally don't know, we will try our best to connect them with somebody who, whether it's on staff who does know or point them in some direction, whether it's a store or a website or whatever." This staff-led learning and facilitation of peer-to-peer learning was a hallmark of *structured* and *regulated* maker communities that members talked about in positive terms.

4.2 Fluid and Unregulated

An example *fluid* and *unregulated* maker community, All Hands Active (AHA), was started by makers who were passionate about providing a public space that empowered local makers and the public to access resources and tools for their projects. This non-profit community makerspace staffed by volunteers held weekly 'build nights' that are free and open to the public. For full access to the space and tools, a tiered monthly membership could be

purchased with a lower cost for students who were known as "starving hackers." AHA promised a space where almost everything was possible; and as a result, a wide diversity of projects, were produced there. However, due to the open and volunteer-based nature of the space problems resulted. For instance, machine that did not work, tools or work damaged, clutter and lack of documentation on tools or previous projects.

Togetherness. Some of the makerspaces realized the prevalence of members working alone, and tried to shift the atmosphere toward more interactive community. For instance, James and organizer of *Freeside*, tried to increase this type of community work by incorporating collaboration as a characteristic of their community's identity. "Freeside is intentional about saying, "don't come and be a member here to do it yourself, come here to do it together." Because when you do making together, there's more synchronicity, and more learning." They altered their space by building a stage in the center of and bringing in chairs and couches that one could sit on while watching a presentation or for just hanging out. The community changed with this alteration. The furniture encouraged makers to hang out and socialize even when they did not have projects to work on.

Collaboration. Peer production collaboration rarely happened in AHA, contrary to Ryan, its founders' visions. "Hey, let's create a place where people can build things, share knowledge, learn from one another, etc.…That being said, there might only be one or two group projects going on at any given time at AHA, and a dozen active members working on their own projects beyond this." In less regulated spaces, it was difficult to negotiate the peer production process and the design itself. As Ethan said, "Different people will have different opinions about how something should be done, or how fast or how perfectly...since it is just a hobby you can't always depend on being able to work on what you particularly want to work on if you are depending on other people." However, the *fluid* and *unregulated* makerspaces were typically smaller, messy, and open. The structure of these spaces fostered opportunities for participants to get to know each other and initiate informal interactions. These interactions occasionally resulted in novel project ideas and new shared project collaborations.

Learning. Many makers in *fluid* and *unregulated* communities embraced the "alone together" atmosphere as one that offered the opportunity for legitimate peripheral participation [2], and side-by-side working provided an important first step in learning opportunities for makers. Participants reported that the smaller scale of *fluid* and *unregulated* maker communities resulted in closely-knit communities. This lowered the barriers for members to approach one another for help and increased accessibility of expert members to learn from. Many makers from *fluid* and *unregulated* communities remarked about how they learned from makers with different expertise. Some expressed that they were once newcomers to the community; but peer learning led them to becoming experts. However, while there were options for less skilled members to progress within the community, developing their knowledge, there seemed to be an aging-out process for old-timers in the community, with experts leaving the community once they determined there was nothing else left for them to learn.

4.3 Structured and Unregulated

Instructables, a website catering to the maker community, allowed members share tutorials of projects. The site was structured, hosting a wide variety of projects organized into six distinct categories: technology, workshop, living, food, play, and outside. One of the unique aspects was that it brought together the technology-focused making with craft-centered and cooking cultures. The easiest way to participate in the *Instructables* community was by lurking on the site and browsing. Once signed up for an account, participants could also create their own projects, "Favorite" other members' projects and commented on them, and indicated that they have made or replicated a project on the website through the "I Made It!" button. The sign-up process and formulaic communication tools contributed to the structure of Instructables. However, the large size of the population participating, made the site unregulated, in that the social norms smaller sites or spaces establish are less prevalent.

Togetherness. Many makers built upon each other's projects, and remixed them by capturing the idea, downloaded patterns or 3D models, and took pieces of code to use in their individual projects. Alex said, "[My projects] were taking other people's ideas and building from them. I think that's the common thing with the maker movement… there's so much sharing." However, similar to the fluid and unregulated offline sites, as some participants moved to more expert roles, they detached themselves from the online maker communities. For example, a participant with a long history of making, did not take part in open, online communities anymore. Instead, he shared projects on his personal website, because that seemed more professional.

Collaboration. Online creative collaboration was complicated by issues of completion, subjectivity, originality, and ownership [3]. Likely because of these issues, and required physical sharing of tangible making, peer production was not observed on *Instructables*. Yet, collaboration was still a viable through remixing. Keith told us, "The best part of that community aspect is that you get a lot of idea exchange. It's not like hidden or cutthroat... Generally speaking, when someone makes something and figures out how to do it, they publish it." The culture of remixing was a common practice within these communities, and unlike the physical makerspaces, there was little anxiety or hesitation for incorporating other makers' ideas into one's personal project.

Learning. Currently, sharing project details during an ongoing project is no explicitly supported in most larger online communities, such as *Instructables*. In online communities, comments section often include suggestions on how to improve a project or do it differently but these were posted after a project was complete.

4.4 Fluid and Regulated

TyMkrs was an Internet Relay Chat (IRC) chat space, where makers and engineers from different parts of the world went to socialize, talked to each other about their projects. *TyMkrs* was an example of a *fluid* and *regulated* spaces. It was originally created as a channel for two makers who ran a small, local hackerspace from their home basement with the goal of keeping in touch with people who saw their YouTube videos and wanted to ask questions about the space or the projects. But soon, it grew to include members from all over the world. *TyMkrs* do not actively seek members, one needs to learn about *TyMkrs* from other members or be "in the know." This acted as a barrier to entry into the community. While *TyMkrs* was a friendly and open place, members were generally skilled makers before they began interacting in the community. Yet, spaces that the *TyMkrs* community interact are very fluid and include YouTube videos, email, and often keeping in touch via other social media tools or meeting offline.

Togetherness. Jim was involved in starting one of the first publicly-facing hackerspaces. He used to actively take part in the space and worked on shared projects with other members. While motivated by the idea of working with other groups of makers to discuss different projects, he mostly works alone due to difficulties finding 'a good group of makers' and considers working alone 'meditative.' Instead, he found a new community by interacting with the small group of makers he had grown to know in *TyMkrs'* chat room and occasionally met up with them in person to work on projects. But he found it was 'too much' to actively participate in a more public makerspace. **"**I used to, but that's changed as I got older.... Collaboration usually is in the form of asking questions and chatting on #tymkrs."

Collaboration. As the above example demonstrates, shared-project collaboration was not limited to maker communities with a shared physical location. We observed a very strong sense of community and several instances of collaboration among members of *TyMkrs. Such as Brianna,* "Even though we're not in the same physical space, we are very much involved in each other's projects… I wanted to design a circuit board. So everyone else started designing circuit boards, which led to us talking about circuit board design programs."

Learning. In some cases, a more regulated place made it easier to create a sense of community, as members were more likely to understand the norms for interacting. This was often matched with a smaller number of participants or work on similar projects. In the example within the above collaboration section, we saw members from *TyMkrs* share knowledge and skills as they learned about circuit board printing together. Characteristics of *fluid* and *regulated* maker community often led members to share current projects, progress they made, and difficulties faced.

5 DISCUSSION

The physical spaces and organization of online spaces are fundamental markers for the understanding of community in makerspaces and can serve as examples with designing or exploring learning patterns in makerspaces. For example, the *structured* and *regulated* maker communities left little room for happenstance collaboration, yet served makers who were focused on for-profit ventures well. In contrast, the *fluid* and *unregulated* communities were at times difficult to navigate, but provided opportunity for peer-production and simply *messing around*. The organization of online communities prioritized what was important to the community by providing a structure on how content was presented and accessed. This accessibility of the content created a hierarchy of what was considered valuable to the community. Other online communities listed messages chronologically, allowing the community interactions to make conversations more or less visible.

Proximity of features in these spaces shaped how the makerspaces created community as well. The *structured* and *regulated* communities generally had more tools and resources on hand, providing easier access to create more refined objects. In contrast, some of the *fluid* and *unregulated* communities created break areas (containing sofas and comfortable chairs) in the middle of their spaces, which made social interaction a central part of their community. Online, we saw links to other resources and projects, which encouraged a similar proximity to resource, and highlighted what was important in a community.

The ways that makerspace communities created barriers or partitions between physical or vertical spaces, also shaped the community. Some *structured* and *unregulated*, communities, like *Instructables,* made divisions between maker interest, such as technologists and foodies, in order to keep those communities partitioned. This established the identity of each of these communities and reinforced those identities by attracting more new members comfortable with those identities even though the large scale of the community made regulation of social norms difficult. The open profile of *AHA* made it a vibrant community with diverse members. In contrast, the members of *TyMkrs* kept their online group relatively low profile, which in turn shaped the types of members and community they had.

6 CONCLUSION

Maker communities have become a point of interest for understanding how people learn with making activities. This study provides a framework for contextualizing and articulating differencing between maker communities.

This work was funded by NSF DUE award 1431984.

REFERENCES

[1] Casey Fiesler and Amy S. Bruckman. 2014. Remixers' understandings of fair use online. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*, 1023–1032. Retrieved May 21, 2015 from http://dl.acm.org/citation.cfm?id=2531695

[2] J Lave and E Wenger. 1991. *Situated learning: Legitimate peripheral participation*. Cambridge Univ Pr.

[3] Kurt Luther and Amy Bruckman. 2008. Leadership in online creative collaboration. In *Proceedings of the 2008 ACM conference on Computer supported cooperative work*, 343–352. Retrieved July 29, 2015 from http://dl.acm.org/citation.cfm?id=1460619

[4] Robert D. Putnam. 1995. Bowling alone: America's declining social capital. *Jouenal of Democeacy* 6: 68.