

From Needs Analysis to Power Analysis:
A Framework to Examine & Broker Power in Makerspaces

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This chapter presents a power analysis framework that extends an entry point to examine how power is wielded, concentrated, and systemically embedded within a makerspace. Power analyses are not novel concepts. People, especially women, LGBTQ+ and Black, Indigenous, and People of Color (BIPOC), assess power dynamics in their lives routinely. Research shows that the marginalization of these communities are especially pronounced in tech-centric environments such as makerspaces (Meyer, 2018; Lewis 2015). This is especially baffling because makerspaces are notoriously promoted as open, collaborative environments where everyone is considered to be a maker (“Be a Maker”). This is where this power analysis framework intervenes: How do purportedly open and collaborative makerspaces continue to attract a narrow demographic of users, while simultaneously marginalizing certain communities (Britton 2015; Vossoughi, S., Hooper, P., & Escudé, M., 2016; Warnshuis, 2014)? This framework provides structured, not prescriptive, guidance to support persons interested in analyzing the power dynamics within a makerspace (or by extension other (in)formal STEM-rich learning spaces). In particular, the analysis offers users an instrument to examine the phenomenological properties of power with a structured approach. The intention is to give language and semblance to power -- an otherwise abstract entity (Pachecho 2018). This tool is meant to generate insights and data for the user, and is comprised of open-ended questions/suggestions on several domains where power resides. The following domains comprise this burgeoning framework: “people,” “space and equipment,” “events and programming,” and “outputs” -- these areas are further detailed later in the chapter. Similar to a 360 image, there isn’t one place to start because power is multi-directional and complex. Users are encouraged to begin with any domain of their choosing.

This framework was developed with practitioners and scholars in mind. Specifically for those who acknowledge that equity, diversity, and inclusion (EDI) are challenges in their makerspace, but are unsure of what needs to be changed, how to identify challenges, and/or how to create pathways towards action. We’re sharing this framework in hopes to help users narrow these knowledge gaps. EDI work is labor intensive, but it’s labor that should be shared by a community and not undertaken alone. We recommend that several people within a community conduct the power analysis framework. Each individual experience offers critical perspectives that one person alone cannot provide. A rich collection of data from multiple perspectives creates opportunities to talk about EDI and power in a way that strives to mitigate silencing and resists settling on stereotypes and assumptions.

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Defining Power

Power can be defined in a multitude of ways, but in this chapter we situate our definition within the field of Library and Information Science. Our underlying premise on power is that library spaces are not neutral. As Meredith Farkas states in the article “Critical librarianship and technology”: “[N]eutrality is not only unachievable, it is harmful to oppressed groups in our society. In a world that is fundamentally unequal, neutrality upholds inequality and represents indifference to the marginalization of members of our community.” As authors and brokers of power within our own maker communities, we recognize that our environments are ideologically charged with a host of values, attitudes, and perceptions. This is why we decided to focus on examining power, first, as a way to intervene. To put a finer point on power, we draw from Emily Drabinski’s article “What is critical about critical librarianship?” to define power in this chapter. Drabinski, critical pedagogy librarian, describes power as a means to produce order, to facilitate “some ways of knowing and not others, representing certain ideological ways of seeing the world, and, crucially, not others” (p. 50). We extend Drabinski’s conceptualization of power as a guiding definition, while also aiming to respond to the article’s call to “interrogate the works of power in structures and systems” (p. 51).

Background

The desire to create the power analysis framework emerged during a workshop in Durham, NC: the Racial Equity Institute (REI). The instructor and REI co-founder, Suzanne Plihcik, asked participants to stop correlating the facilitation of user needs analyses to achievement of inclusion and equity. *What do women need in our makerspaces? What types of workshops would attract transgender users? What types of technologies are people of color interested in?* The problem with this mindset is that it centers a community or individuals as the problem. It assumes that the simple knowing of what *they* need will bring forth justice and equity. However, systemic change doesn’t solely focus on people but intervenes at the structural level of the environment as well: the policies, the hiring, training, the spatial arrangement of the space. Equity isn’t about focusing on getting more sewing workshops, but also interrogates why sewing workshops are desired and framed the solution from the outset. People aren’t the problem; fixing problems at the people level doesn’t fix the deep-seated challenges. We should move from needs analyses, to *power* analyses. This chapter is inspired by Suzanne’s declaration, and is specifically situated within the makerspace environment: how can we analyze power within the makerspace, and what kind of data can we generate to become better brokers of power in makerspaces?

Authors’ Positionality

Creat’R Lab - Brianna Marshall

The Creat’R Lab was founded in 2017 as a partnership between the University of California, Riverside (UCR) Library and the UCR Office of Research and Economic Development. It was envisioned as a student-driven space with a focus on innovation, entrepreneurship, and

creativity. I was hired as Director of Research Services and took responsibility for overseeing the fledgling makerspace and staff just weeks after it opened. In the two years that have followed, my colleagues and I have figured out how to run a makerspace in real time, experiencing triumphs and failures large and small along the way. I am proud of our work building a maker community, onboarding dozens of new tools and equipment, developing research and instructional partnerships, and setting up a robust 3D printing service, among other successes. Despite this progress, our team has many lingering questions about how to further embed EDI values into our makerspace operations and programs.

Conversations tend to happen in fits and starts, sometimes spurred by limitations we know about and sometimes by situations that arise. How should we approach the clear gender disparity in our space? We are located in a science library; how do we ensure that non-STEM users know that they are welcome? How should we encourage low tech and no tech approaches to making? How can we empower makers with the knowledge and skills to share and build on their creations? How do we best support our neurodiverse makerspace users? What does a genuinely student-driven makerspace look like?

The questions go on and on. It has been admittedly challenging to gauge our overall progress in the day-to-day chaos and churn of managing an increasingly busy and complex space. We need a more holistic approach to thinking about EDI as a team. I also welcome the opportunity to examine my own power and positionality. I've often questioned how I should navigate my identity as a cisgender white woman in a middle manager role, and especially how I can make room to invite other perspectives to shape our makerspace. This framework is an appealing entry point for individuals and teams to move beyond pockets of conversation or anyone's gut feeling about the power dynamics in a makerspace. It is a tool for structured conversations about our own practices and assumptions and I am eager to use it to more actively and intentionally cultivate an EDI-centered environment in the Creat'R Lab.

iSpace and Be A Maker (BeAM) Makerspaces - Maggie Melo

My first exposure to the maker movement started with my involvement with the launch of the iSpace at the University of Arizona in 2014. This was the university's first interdisciplinary makerspace. I helped co-found the space with two other partners: InnovateUA (student-led entrepreneurship organization) and the University of Arizona Libraries. I, at the time, represented the third partner: Digital Humanities from the English Department. I was a Ph.D. student and was interested in learning about ways to support faculty and students who were interested in exploring experiential, tech-supported learning. The launching of the iSpace was very much a grassroots endeavor, and we had a lot of creative freedom to dream up and create the space.

Early on, my optimism around the makerspace was put into check. I realized my introductory involvement with the makerspace spurred questions that I really didn't know the answers to. Many of these questions have turned into research questions that engaged closely with equity

and anti-oppressive theories and frameworks. For example, I vividly remember working with colleagues to generate a tech purchase list for the makerspace. We sat in the empty makerspace generating the list. 3D printers, micro-controllers, Oculus SDK, and the other usual makerspace tools and tech enthusiastically made it onto the list. I didn't know much about makerspaces, but I knew that it was space to create and learn with tech, so I said aloud: "Let's add a couple of sewing machines to the list." My colleague's response remains so clear in my mind's eye. He leaned over and said: "Don't you think having sewing machines would make men feel excluded from the space?" Many thoughts and emotions coursed through my body, but the main recurring thing was two questions: "What narratives, values, and perceptions was my colleague prescribing to? How does a learning environment signal or communicate who belongs in a space?" Like Brianna, I wanted a framework to begin formulating responses to these complicated questions. I wanted a framework to identify the oppressive mechanisms at play that continue to marginalize communities who have been historically underrepresented in tech-centric environments like makerspaces.

As a new assistant professor at the School of Information and Library Science, I immediately began immersing myself in the BeAM Makerspace network on campus. Currently, I'm partnering with Drew Robertson, BeAM technical supervisor, to facilitate staff conversations on ways to define and explore EDI within our maker community. This chapter's power analysis framework will serve as an exploratory entryway to define and take action on many of the EDI-related challenges.

Framework

This analytical framework includes subsections focused on people, space and equipment, events and programming, and outputs in your makerspace. Each subsection includes an exercise, guiding questions, and concrete suggestions, all intended to help you examine power within your organizational context.

In its current state, the framework is relatively simple; it's intended to be a low-barrier-to-entry way to kickstart a broader organizational conversation. It focuses mostly on reflective, open-ended questions. Future expansions on this work include testing the framework with different use cases to highlight gaps, pulling framework components into handouts or other formats that might increase its usefulness to practitioners, and expanding the framework's scope to delve deeper into more specific questions.

People

Exercise: Create a power flow network. Sketch out the various entities who are involved in the space: as users, or in an operational or advisory capacity. Think broadly! Some affiliations may be informal.

Guiding Questions

First, situate yourself (the person(s) conducting the analysis) in the power flow. Where do you fall?

Consider the other people or organizational entities involved in administrative and operational roles in your makerspace.

- Who has provided funding for your makerspace? Consider past and current funding. How does this influence how decisions are made?
- Is the decisionmaking structure top down, down up, or lateral?
- Is there a shared governance or advisory group?

Consider day-to-day makerspace operations and staffing.

- Who, if anyone, interfaces with users in your makerspace? What kind of training has this person had?

Consider the transparency around decisionmakers and decisionmaking.

- Is there any documentation that notes how decisions are made?
- Is there a documented mission and vision for the space? If so, who compiled and/or updates it? Is your document current?
- Is there a strategic plan? If so, who compiled and/or updates it? Is your document current?
- What types of data are collected for and used to support decisionmaking? Scholarly research? Online forums? Surveys? User feedback?

Consider equity, diversity, and inclusivity within your makerspace.

- What demographic information do you know about your users? (major / disciplinary affiliation; year in school; ethnicity; gender; etc.)
- Based on what you know about who is using your makerspace, who *isn't* using your makerspace? Jot down some reasons why this might be and ideas for actively inviting and engaging these potential users.
- Is there a code of conduct? If so, who compiled it? Who enforces it, and following what process? Is it visible to makerspace users?
- How could users provide direct feedback regarding their experience? How could users report code of conduct violations?

Suggestions

- ❑ Create documentation! Transparently describe and display the who and how of decisionmaking, including how the space is being funded and supported. Make this visible in your space and readily available to users who want to learn more.
- ❑ Create and display an enforceable code of conduct, community agreement, or similar document. Make sure you have a process in place for enforcing it.
- ❑ Provide inroads for users who want to participate in decisionmaking by creating a shared governance or advisory structure whose composition reflects a diverse array of

perspectives. Also consider inviting feedback in ways that are less time-intensive for users, for example by having an anonymous suggestion box.

Space and Equipment

Exercise: Take pictures of your space from a variety of angles and vantage points. Don't tidy up. Capture your space as it is on an average day. We suggest that you use these images to help you objectively reflect on the guiding questions below (as opposed to just thinking about it, which relies on your potentially fallible mental image of the space!). If you are in a hurry, observe your space and sketch out a map of where items are located.

Guiding Questions

Consider the location and accessibility of your space²

- Is the makerspace located in an “agnostic” space (e.g. a library)? Or is it located in a space that is associated, either by name or location on campus, with a particular disciplinary focus?
- Have you considered the needs of users with physical disabilities? Does your space comply with the Americans with Disabilities Act (ADA) regulations?

Consider users' first impressions, signage, and wayfinding.

- What does the check-in or sign-process entail? Are users stopped at the door?
- What do new users see at the threshold or window? What is their first impression? What could they infer is done in that space?
- How do new makerspace users *know* how to engage with the space?
- List the types of signs or flyers you see in your makerspace. Who created them, and what do they convey to users? What is missing?

Consider the overall layout of your makerspace.

- Does it feel like an open stage? Are there sectioned off spaces?
- Which equipment is front and centered? Highlighted?
- Which equipment takes up the most space? The least?
- List the types of projects you see displayed in your makerspace. Who created them? What types of project or creator is missing? (Note: We consider “display” to mean that they are intentionally featured in the space, not just projects that are out because they're being worked on.)

² For many more excellent questions about makerspace accessibility, we recommend that you look to “Making a Makerspace: Guidelines for Accessibility and Universal Design.” The general questions we've included in the tools and equipment section are pulled from this fantastic resource.

Consider your tools and equipment.

- Are tools and equipment kept in designated areas? Can they be reached from a seated position?
- Are tools and equipment labeled with large print and braille labels? (Easily created with your 3-D printer or laser cutter!)
- Can both right- and left-handed people use tools?
- Are power cords, including those suspended from the ceiling, kept out of walkways? Are their positions easily adjustable? (“Making a Makerspace”)

Do you have any other observations on how space is allocated?

Suggestions

- ❑ Learn about accessibility and universal design; apply what you have learned to your space. Strive to cultivate mixed-ability maker culture, defined as “a collaborative culture within which people with and without disabilities can co-exist and co-create as they work to maximize and develop their own skills” (Alper).
- ❑ Think about ways to lower the barrier to entry for new users. Use signage to make it very clear who your makerspace is open to and why. If your makerspace is only open to undergraduates, for example, create signage that clearly conveys this. Consider having someone greet all new users to ensure that they are welcomed into the space.
- ❑ Showcase a diverse array of project types and creators in your makerspace. This signals that your makerspace values different ways of making and dispels the idea that some maker approaches (and some makers!) are inherently better than others. For example, you might highlight low-tech or no tech creations alongside technical projects.

Events and Programming

Exercise: Review a list of events and programs associated with your makerspace over the past 1-2 years. If you don’t have this documented yet, create a list with as much information as you can with a particular focus on capturing what you know about the topics, instructors, and learners, as well as the variety of programs you offer (workshops, hackathons, etc.)

Guiding Questions

Consider and reflect on events that are held in or associated with your makerspace.

- Which skills and equipment are spotlighted?
- What is the format for most learning opportunities - peer learning or sage on the stage?
- Who is invited to facilitate or lead events? Who is doing the inviting?
- Who is consistently facilitating? Are facilitators being compensated?
- Have you offered programs that are led by and/or actively invite participation from specific user groups, particularly those who have been historically marginalized in makerspaces? (for example, BIPOC, women, or members of the LGBTQ+ community)
- How do you compensate workshop facilitators?

- What do you know about who is attending?

Suggestions

- ❑ Diversify your pool of facilitators and event types with an intention of increasing peer learning. If your core audience is undergraduate students, connect with student-led organizations. If you want to reach out to faculty, perhaps you could support a series spotlighting faculty members who are makers. This will help ensure that your makerspace is driven by your community's interests.
- ❑ Build community in your makerspace with events and workshops that welcome underrepresented communities' access to your makerspace during a designated time and day. For example, the University of Arizona, Northern Arizona University, and Arizona State University makerspaces collaborated to create a Women, Trans, Femme Night to center ways of making and knowing that are often dismissed within the maker movement writ large. Don't be dismayed if attendance is low (1-2 people) at the beginning -- communities and trust are developed over time!
- ❑ Consider ways you can make events even more inclusive for attendees. For example, you might ask facilitators to review the code of conduct or community values before an event starts in order to remind everyone that all are welcome.

Outputs

Exercise: Reflect on the variety of things a user might create in your makerspace. Consider why makers are creating: just for fun, to serve a specific function, for instructional or research purposes, etc. Jot down any possible creations that come to mind.

Guiding Questions:

- Does your organization claim intellectual property ownership rights when something is created in your makerspace? How are intellectual property considerations communicated to makerspace users?
- How does your makerspace invite users to share what they have created?
- How does your makerspace connect users to entrepreneurial resources?
- How does your makerspace invite users to ask questions? To seek help?

Suggestions

- ❑ Ensure that makerspace users understand the intellectual property of their creation.
- ❑ Invite users to share what they have created. For scholarly outputs, explain open licenses and point to open platforms where files can be uploaded alongside additional project data and narrative to give context for the work. For non-academic audiences, users may want to create a digital portfolio to showcase their work; this could be a useful workshop topic to offer.
- ❑ Connect with local entrepreneurial programs or begin to build expertise in-house. Regardless of the initial purpose of a user's creation -- something that's just for fun, a

purely functional object, or having a particular research or instructional purpose -- invite users to view it as a creative output that they could build on.

- ❑ Overall, give your users a rich context for exploring how to think about and where to go next with something they have created. Advocating for sharing openly may seem to be in tension with providing entrepreneurial resources, which often has the goal of creating a business and monetizing an idea, but both are possible paths for users. We are in a position to empower users to make these choices for themselves.

Conclusion

The development of the power analysis framework is in its nascent stages. We expect that the framework will evolve in the same way our makerspaces and users continue to change. This is just the start of a larger body of work. While we informally posited questions from the power analysis framework in our own makerspaces, we are eager to apply the framework in the way it's outlined in this chapter. We are also equally curious to hear about the framework's application in other makerspace environments.

This power analysis framework emerged from our collective desire to approach inequity from a structured, multi-perspective manner. The purpose of this chapter was to both extend this framework, and to extend a small peace of mind: EDI work is hard work, and it's often easier to confront when done as a community. EDI work is messy. Users may find that the application of the framework may yield more questions than answers -- this is totally okay. The open dialogue will create opportunities for conversations on power to emerge which is no small feat. Extend the data from the framework to generate more dialogue, to ask more questions, to identify possibilities, and to take steps (no matter how big or small) towards change. Recognizing oppressive, unjust systems is one part of the equation. While it's critical to recognize the systemic mechanisms in place that produce racist, patriarchal, gendered, and neoliberal structures, the next step forward is to use this awareness to create pathways to disrupt these oppressive structures. We hope this chapter supports that initial step.

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