

YOUTH MAKERSPACES

HISTORY, EQUITY, AND INNOVATION FOR PUBLIC GOOD

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ABSTRACT

This paper investigates the history of makerspaces and the maker movement in relation to youth makerspaces as dedicated places for young people to develop tech literacy skills. In addition, the paper assesses diversity and equity in youth makerspaces, and how those youth makerspaces can be used to innovate for public good. The purpose of this study is to understand where the maker movement came from and why we are experiencing diversity and equity issues in makerspaces. Likewise, the paper seeks to understand what an equity-oriented makerspace might look like, and why it is meaningful to youth in the Twin Cities and abroad. Finally, this paper highlights ways that makerspaces can be used to promote public good by exploring the digital divide and disseminating the practices youth can engage in at a community-based makerspace.

INTRODUCTION

Best Buy is building 4 brand new Teen Tech Centers in the Twin Cities this year, the St. Paul Public Library system has developed the robust Createch youth makerspaces, and schools as well as museums across the world are making room for makerspaces in their programming. A lot of people are investing in and proclaiming the positive outcomes of makerspaces for youth, but not many individuals are writing about or researching how these spaces shape youth learning and identity. I've seen for myself how amazing makerspaces can be for young people who are gaining access to civic, social, educational, career, and creative opportunities while tinkering with and mastering technological devices in a shared community space. Many makerspaces operate as a *ThirdSpace* outside of the scheduled school structure and the home environment; they are a place where teens can express themselves while simultaneously learning new skill sets and gaining hands-on experience with current technology by 3D printing, recording music, shooting and editing film, playing video games, sewing, exploring circuitry, programming, and much more. As an artist and educator, I love what I do, and I want to see makerspace culture better funded with the help of learning theories and research to back up the benefits of those ThirdSpaces. With that in mind, I will be dissecting a brief history of the maker movement, issues of diversity and equity within youth makerspaces, and ways we can use youth makerspaces to innovate for public good.

HISTORY

According to Burke (2014), the *maker movement* is distinguished by the impact of its community-building and collaboration practices in a single shared makerspace, as compared to people making things in more individual settings as hobbyists, arts-and-crafts groups, shop classes, etc. The maker movement has its roots in many places, but the establishment of Make Magazine in 2005 was a distinct catalyst for the movement. The magazine publishes projects and information related to makers and the process of making. From Make Magazine came the idea of maker-faires, places for makers to convene and share their creations as a collective, and this served as fuel for the maker movement.

Equally important in the history of the maker movement is the Massachusetts Institute of Technology (MIT) in Boston. The MIT Media Lab has been in operation since 1985, and has been working in conjunction with The Clubhouse Network in order to fund and develop youth makerspaces since 1993. The Clubhouse Network supports community-based Clubhouses around the world, currently providing over 25,000 youth per year with access to technology resources, skills, and experiences to help them succeed in their careers, contribute to their communities, and lead outstanding lives (The Clubhouse Network, 2018).

It is important to note that the maker movement's discovery of making is fundamentally a rediscovery— and a social class issue, as well as a gender and race issue. As Mike Rose states in *The Mind at Work*, “Working class folks have not had the luxury of rediscovering making and tinkering; they’ve been doing it all of their lives to survive—and creating exchange networks to facilitate it. Somebody across the street or down the road is a mechanic, or is wise about home remedies, or does tile work, and you can swap your own skills and services for that expertise” (2005). Shirin Vossoughi (2014) urges us to note that makerspaces and making are by nature democratizing (meaning that anyone can make), and we must endeavor to re-envision the current maker communities, makerspaces, and maker movement which have been overwhelmingly dominated by the work, ideas, and images of middle class white men. It’s not hard to see that the normative representations of making and makers by race and gender have historically been heavily skewed. Across the first 9 years and 39 issues of its publication, *Make Magazine* had covers featuring 85% white boys and men, with a focus on electronics, robotics, and vehicles (Buechley, 2013).



EQUITY

The very few studies existing to address diversity and equity in makerspaces have criticized the fact that the maker movement has not been very successful in involving diverse groups of participants, in particular

African Americans, female students, youth from low-income families, and youth with diverse cultural backgrounds. What we can see immediately is that the design of makerspaces must be made inclusive for youth from non-dominant communities. According to Vossoughi (2017), in order to have a framework for equitable design and research in making, there must be (a) critical analysis of educational injustice, (b) an understanding of making as a historical and cross-cultural activity, (c) explicit attention to pedagogical philosophies & practices, and (d) ongoing inquiry into the socio-political values and purposes of making. This requires that practitioner ask these fundamental questions when designing makerspaces for young people:

- Whose forms of making count as making?
- Whose values and goals inform definitions of making?
- In what ways are young people being invited to identify as the type of maker represented by the makerspace brand in order to participate in making?

It is likewise imperative to look at the power dynamics of makerspaces that may change how youth participate, learn, and form identities while in those spaces. In promoting youth from non-dominant communities in makerspaces, practitioners must take note of youths' everyday experiences, informal funds of knowledge, community resources, and cultural practices. According to Myunghwan Shin (2016), these informal knowledge bases play significant roles in promoting interest and engagement in developing STEM-related identities. Therefore, if we want to design makerspaces that are inclusive and transformative learning environments where youth can gain agency over STEM concepts and identities, it is necessary to expand our learning frameworks to explore young people's transformations of personal experiences and knowledge.

We are now living in an era that is heavily focused on the “digital divide”, which keeps many members of our society in a state of inequity and information poverty. Globally, many people lack access to the Internet and technological devices—and the opportunities they can bring. The reasons people are still offline and disconnected from technology can encompass infrastructure, affordability, awareness, and skillsets. Makerspaces are currently working to address these hurdles, but so much more could be done. Over the next decade, institutions across the world will need to find integrative and comprehensive ways to not just make computers and other tech devices accessible, but to better engage patrons and help them accrue technological skills that are necessary for succeeding in a technological revolution that is fundamentally changing the way we live, work, and relate to each other.

In every community, there are people who are discounted, underrepresented, and in need of better social support systems. Vast inequalities exist between youth of marginalized communities and their more affluent counterparts. The lack of resources designated to youth that struggle with having their most fundamental needs met is demonstrated by gaps in achievement (Helmstetter, 2016), disproportionate representation within the juvenile detention system (Swayze & Buskovich, 2011), and higher rates of chronic illness (Ferris, 2012).

Both technological resources and the proper training to utilize them in meaningful ways are scarce. This culmination of realities makes it increasingly difficult for youth of marginalized communities to use technology to develop skills relating to digital media and technology literacy. Not only do digital media and technology literacy function as tools to create meaningful media, but they also can promote a greater sense of agency, promote social justice, and help generate creativity. These technological skills are an investment in young people and the boundless things they can create. The production of alternative media also serves



the vital function of debunking and revising negative dominant media imagery surrounding marginalized communities. As Chimamanda Ngozi Adichie states, “Many stories matter. Stories have been used to dispossess and to malign. But stories can also be used to empower, and to humanize. Stories can break the dignity of a people. But stories can also repair that broken dignity.” Media literacy has vast importance in today’s media-suffused culture. Media literate people are better equipped to both generate impactful media and decode the messages behind the media they consume (Hobbs & Frost, 2003). Despite their increasing importance, these skills have not been prioritized within the current educational framework for struggling youth (Warschauer & Matuchniak, 2010). Makerspaces attempt to put technology in operation in communities around the world to provide a variety of services, so that groups of people can gain these necessary skills to become more self-sufficient.

INNOVATION FOR PUBLIC GOOD

But how can youth innovate for public good within a STEM-identity in makerspaces? Design problems are frequently tied to human rights, economics, and oppression, and there are many ethical dimensions to both defining problems and proposing solutions. Typically engineers design solutions for problems in the real world, which often include difficult, interdisciplinary problems that are grounded in crisis, conflict, and access. The process they go through should require community-based and participatory forms of research, and it is important for youth engineers to have opportunities to explore interactions among technological and social outcomes. By having youth focus on design solutions for community concerns, they are able to both acknowledge community needs and humanize the engineering/STEM process. One example of this is the Girls Who Code group at Brian Coyle Community Center. Upon assessing their community needs, the Somali participants concluded that the civil war in Somalia has left a lasting impact on the mental health of the elders in the community, while at the same time there remains a strong stigma against acknowledging and addressing mental health issues. The participants sought to leverage their insider knowledge to humanize mental health through a photo series and app that would let people tell their stories and show faces connected to those stories, while providing resources for those who may still be struggling. When youth merge culturally relevant knowledge with design solutions, innovation for public good has a basis for happening.

CONCLUSION

This paper included a brief history of makerspaces and the maker movement, representation within the movement, and its relevancy to the current issues of diversity and equity within youth makerspaces. Likewise, a framework for addressing equitable design and research in makerspaces was assessed, along with important questions that practitioners should ask themselves when creating makerspaces for youth, and an exploration of how to promote youth from non-dominant communities in developing STEM-related identities within makerspaces. Finally, understanding the digital divide and how we can use youth makerspaces to innovate for public good was evaluated. This involves encouraging youth to look at the ethical dimensions of both defining engineering problems and proposing solutions, and being responsive to community needs.

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I am a painter, activist, and Teen Technology Coordinator at Brian Coyle Community Center. I've been working in makerspaces since 2014, pursuing opportunities to engage teens in creative STEM learning and promoting them in expressing themselves through digital means. I am very passionate about giving young people choices and resources to meet their goals in our current technological environment.
