Practices for Social-Spatial Justice: A Community Project for Reclaiming the Local Science Center

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Abstract: In this study, we investigate how educators, researchers and youth collaboratively engaged in a social-spatial political project of disrupting and transforming normalized injustices against youth of Color in STEM. Over the course of two years, educators, researchers and youth worked on "Reclaiming the Science Center", a project focused on re-designing the text, images and experiences in the Center to make visible and amplify the lived lives and wisdom of people of Color and women. Drawing upon conceptual frameworks of social-spatial justice and social practice theories, along with longitudinal critical ethnography, we report on the co-creation of spaces, both discursive and material, for critique and imagination of spatial representation. Implications for working towards social-spatial justice in science centers are discussed.
Keywords: Social-spatial justice, Social practice theory, Informal STEM education

Purpose and research questions

Olga, a Latina and Director of Learning at her Science Center, offered the following words as she reflected on her work with Youth Action Council [YAC], a racially diverse group of about 20 youth, ages 9-16, to rename the educational rooms at the Center: "The injustice of not recognizing female scientists or anybody of Color and how we continued to reinforce that [at the Center], that seed started to grow stronger. Its roots, and the questioning, and just the feeling of 'is this the right thing to do?', even though nobody had done it before." Since the Center's inception, over forty years ago, and not unlike many other Science Centers around the country, the Center's rooms had been named after famous scientists, who were also white and male. Olga had initiated the YAC two years prior to making this statement as a way to incorporate youth's perspectives in the on-going work of the science center. What unfolded over the course of three years was a radical social-spatial transformation of the Science Center, which Olga and the youth began to refer to as a "reclaiming" of the Center. As YAC member, Bella, stated, "Our goal is to reclaim [the Science Center] so that we see ourselves here. We also want to honor the people, like us, who came before us, but whose stories don't get told. . . We want to feel like we can be ourselves here, and not be judged for that." (Bella, age 16).

Whether or not youth are represented – through images, words, and experiences – in a space sends powerful messages about why that space exists and who that space is for. It also reifies here-and-now the historicized marginalization and oppressions people of Color and women have experiences in STEM, as both objects and subjects of STEM. As Bella suggests, science centers are White and patriarchal dominant spaces, despite the embodied presence of the people of Color and females who work there or visit. How people are represented in a space shapes social interaction, including how people talk and value expertise, use their bodies and move, and render judgement on whether or not people are recognized as STEM people. This dialectical relationship between space and social interaction is critical in efforts to promote greater justice in informal science learning. In these social-spatial practices injustices can be reproduced or disrupted in "how the past and present advocate for what the future may look like, or what people should do to shape it" (Watkins, 2015, p. 510). It is not surprising that studies reveal dominant institutional cultures and practices in science centers couple with patterns of non-participation among youth of Color (Dawson, 2014; Feinstein & Meshoulam, 2014). In this paper we ask: 1) How do informal educators and youth co-create spaces and spatial imaginaries for reclaiming science? 2) How does this process promote justice-oriented outcomes for youth and educators?

Conceptual framework

Science centers are white and patriarchal dominant social-spatial places. By this we mean that the dominant narratives that represent and describe how things and people are organized in and by space is shaped through white supremacist and patriarchal ideology. How people and things are in relation to each other both reflects and enacts power and politics (Massey, 2005; Soja, 2010). Spatial relationships produce social relationships in STEM learning environments, where there is an interconnectedness among the physical, social, political, and disciplinary

at any given time. However, central to our stance on social-spatial justice is that because space is socially produced, *it can therefore be socially changed*. Consider Headrick and Hall's (2013) study of Black youth engaged in country-mapping of cities. They illustrated how a group of teenage Black youth leveraged their experiences bicycling to argue for a "new means of access to cultural resources in her city through a network of bicycle lanes". Such a vision is grounded in young people's current realities which opened up new ways of being in their city. The youths' material realities, which included access to bicycles and the presence/lack of bike lanes, intersected with their social realities, including how they thought about and talked about their cities, all of which shaped what mobilities meant to and for them, and their being in the world. Thus we see how spatial imaginaries can reproduce and transform how bodies and livelihoods are perceived through "how the past and present advocate for what the future may look like, or what people should do to shape it" (Watkins, 2015, p. 510) through the social-material practices enacted therein.

We also draw upon social practice theory to make sense of how practices are enacted towards maintaining/disrupting social-space (in)justice. We attend to the concept of local contentious practice. Holland and Lave (2009) conceptualize local contentious practice as practice enacted when people who are local as "historically related, partially united, partially divided" encounter the contentious due to the "tension through different political stances and relations of power" (p. 3). The tensions, which we view as forms of political struggle, are inevitable because they draw on institutionalized struggles that conflict with the people's history-in-person they bring to the present contentious moments. We thus seek to figure out what and how local contentious practices are supported in working towards social-spatial justice.

Methodology

We take a longitudinal critical ethnographic approach to our investigation. Critical ethnography foregrounds power dynamics in communities and the multi-layered factors affecting power dynamics (e.g., actors, institutional norms and practices, culture, history). We take an unapologetic assets-driven approach to foreground 'tensions' and see their disruptive and transformative power to realize youth-desired futures.

Context and participants

The context of our study is the YAC's current project, Reclaiming the Science Center. YAC was collaboratively initiated in 2016 by Olga, the educator-leader of the Science Center, in partnership with Author 1 (a researcher), in order to design a new makerspace at the Science Center. They sought to make the space youth-centered and worked to broaden participation so that those who visited the Center reflected the diversity of their city. Currently, three educators, four researchers and twenty youth participate in YAC. Educators and researchers played multiple, shared roles in co-development of experiences. We developed longitudinal ethnographic case data of three educators and six youths who have participated in the project. Throughout this project, the meaning of "reclaiming space" has been refined by YAC community members as the disruption of normalized representation of STEM spaces and people who are recognized as STEM experts.

Data generation and analysis

Data, generated from the summer of 2018 to the present, include video/audio recordings of YAC meetings, images, artifacts of teaching and design, field notes, and transcripts of interviews with individual educators/youth regarding: 1) the reclaiming space project, and 2) tensions faced in their lives and how they responded to them. Using constant comparative data analysis in grounded-theory tradition (Bryant & Charmaz, 2007), we undertook three phases of data analysis. First, we worked collaboratively with educators and youths to open code and identify episodes of "opening up" or "shutting down" discourse/practice on social-spatial justice related issues. Second, we reflected on these episodes collectively to name themes identified across key episodes. In this paper, we focus on one theme, educator-supported reclaiming, since it was how the Reclaiming Project was first launched and it precipitated other themes. Third, we further analyzed the identified episodes to think carefully about specific enactments of local contentious practice that supported youth in acting toward reclaiming space. This collaborative data generation and analysis respected participants' accounts and practices and addressed the challenges in inter-partner communication within researcher-practitioner participatory research.

Findings

Creating spaces

In this section we describe the co-creation of spaces for critiquing and reimagining spatial representation in the Science Center. One important aspect of this was how educators supported youths' critical dialogue/examination

of what is (in)visible in the Center. This took shape in many ways, including introducing discourse threads on representation, using familiar spaces in new ways, and encouraging youth to leverage multi-sensory observations.

One example was the YAC session where Olga introduced the Reclaiming Project. This took place in early December 2018, after the mid-term elections in the U.S., where the Democratic Party won control of the House of Representatives and Olga used this to start a discussion about the importance of representation. Olga made three main discourse moves in this session: asking youth to discuss how representation made them feel, using different spaces to promote discussion, and asking youth to (re)name spaces.

First, Olga showed youth images of the newly elected members of the House, separated by major political party (Republican and Democrat). Without explaining the images, she asked the group what was different about the two sets of images. Youth called out observations related to race, e.g., "I think top only has white people;" b) gender, e.g., "the top one [Republicans] is mostly men but the bottom one has a lot of women;" c) religion, e.g., I see a "Muslim person" [in the bottom one but not the top]; and d) age, "It looks like most of the people in the top one of old". As Olga had anticipated, during the subsequent discussion about representation, youth indicated that the more diverse group of people felt more welcoming. Olga noted how the youths' responses made palpable their erasure from the world, including the Science Center. While this was not a new idea for her, she said that youths' ideas about what made them feel welcomed, helped solidify for her the importance of this project.

Second, Olga and Chris (one of the educators at the Science Center) used several spaces in the Center in new ways to promote dialogue on representation. For example, Olga and Chris encouraged the youth to visit different spaces of the Center and take careful note of what they saw and heard (e.g., images, words, and people), how they felt, and what mattered to them about the spaces and why. The youth roamed the center on their own, and stayed in the different spaces as long as they wished, taking notes, collecting footage on their iPads, and talking with each other. Being physically present in these different spaces allowed youth to "see/hear/feel" and critique the dominance of White, male figures in these spaces, and the absence of others.

Finally, after touring the Center, Olga asked the YAC members to decide after whom they would want to name the rooms in working towards representational justice. The youth freely navigated on/offline resources and each proposed, and provided reasoning for, up to three STEM figures after whom to name Center spaces. During the subsequent discussion, one of the senior members suggested they decide on criteria for selecting the STEM figures, which helped make explicit youths' ideas about how they wanted to represent STEM. They proposed several criteria including "People who don't get noticed" and "People who have credit taken away from them"; and "People who inspired other people." Educators engaged YAC members in critical examination of politics and power dynamics in representation by introducing new discourse threads regarding issues of (in)visibility in the Center and how this impacted them in multi-sensory ways. The youth took up space at the Center in new ways as they brought their perspectives to bear on the ways in which social-spatial injustices manifest. The youth were positioned as experts, and their ideas were used to filter the group observations.

Centering youth-authored artifacts toward expanding presence

Here we draw on an on-going example that illustrates discursive and material trajectories of transformation in the Science Center: Designing the co-named room.

Designing the co-named room

This example highlights how educators' efforts to center youth-authored material and semiotic artifacts transformed and expanded imaginaries about what a space, symbol, story, and members of the space could/should be. These transformed and expanded imaginaries are evident in the ways youths collaborated with educators to design the co-named room and how youths took their ideas to spaces outside the Science Center.

After YAC members decided to rename a room after Katherine Johnson, they took the next step: designing the room. Olga, Chris, and the youth visited the room while it was still under construction, which gave an authentic sense of creating new material and semiotic reality. YAC members, as co-designers, met around a big table in the room to brainstorm and negotiate ideas for the design of the room sign and decoration. They suggested ways to transform the physical challenges of the room into assets as well as how to tell a story of Johnson's life. To foreground her story, some youth suggested including representations of Johnson's work and how it was important for space travel, such as painting the walls as space, including math equations. Other youth reminded the group to consider incorporating the equations and graphs into the depictions of planets and stars so as not to alienate young people who were not familiar with the equations. Through the design of these artifacts, youth were becoming an integral part of, and visionaries for, the Science Center.

Youth enriched and refined their visions by expanding co-designing practice beyond the regular YAC gatherings to include family and other community spaces. We see this through Trey's interaction with his family and Rose's expanding her practice to include her Club. After the YAC meeting, Trey's family arrived to pick him

up and Trey urged them to follow him to the newly named Johnson room. Along the way, he acted as a docent, explaining the rooms, exhibits, and programs of the Center. When they arrived, he explained the history of naming the room and the future design plans. He, as a Black youth, expressed pride in having Johnson representing the well-lit and frequented spot in the middle of the Center. He refined his vision of the room by discussing how he wanted to depict her life story, and community members' lives, on the walls, ceiling, window, and signage.

Another youth, Rose, maintained her engagement in this reclaiming project across space. She conceived of an idea to make a spaceship in a corner of the room where children could sit and imagine exploration. After this YAC project meeting, Rose shifted her design work in her Community Club by building a rocket ship to realize her ideas for the Center room. Rose expanded the spaces in her community where she felt ownership to include both the Club and the Science Center. She created a bridge between these two spaces and began co-designing and reclaiming spaces beyond adults' imaginaries. As youth shared the Center and ideas for designing the Johnson room, youth demonstrated how these acts of reclaiming are on-going and expanding. This example indicates how efforts to reclaim space can be enacted in ways to ensure youths' material presence in the Center, via their artifacts and spaces they designed, and to expand youths' presence and the presence of those who had been invisible both within and beyond the Center.

Discussion and conclusion

The YAC community's efforts to reclaim space led to youth-engaged disruption of normalized representation in STEM. The co-generated practices also supported new social-spatial imaginaries for youth and adults alike, which critiqued current injustices and offered directions for change-making. These practices opened up new social-spatial discourse threads and experiences which had a cascading effect as they moved across space and time. Material structures were slowly physically transformed through ordinary and extraordinary activity. The re-naming of rooms, accompanied by new signage and experiences is extraordinary activity that required financial backing from the board, and significant infrastructural work. These efforts were accompanied by the ordinary efforts of supporting youth in co-opting designed experiences to make their lives present, display work, and host dialogue on what this all meant. These practices are not absent of tension, or the political struggle to re-author what it means to be in these spaces (Holland & Lave, 2009). Engaging in new discourse threads on social-spatial justice potentially opens youths' fraught histories with/in the Center in ways that pose new challenges and/or disrupt in unanticipated ways. Such tensions reverberate through Center leadership, as they negotiate structural changes within the organization, e.g., the layers of bureaucracy waded through to change signage font and colors.

Science centers are White and male dominant spaces, social-spatially positioning youth of Color and girls as outsiders. Enacting practices oriented towards new spatial imaginaries supported youth and educators in authoring a more rightful presence in their Center. Being rightfully present centered their political struggle to disrupt normative power relations and practices and what that means for who legitimately belongs (Calabrese Barton & Tan, 2019). Such disruptions generatively built over time, and integrated social and material dimensions. This story is not just about reclaiming the Science Center, but also about reclaiming whose voice matters in the reclaiming process itself.

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