

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

Abstract: This study investigates how educators, researchers and youth collaboratively sought to engage in a socio-spatial political project of disrupting and transforming normalized injustices against youth of Color in STEM in their local Science Center. Over the course of a year (and still on-going), educators, researchers and youth worked on a project they named, “Reclaiming the Science Center” because it focused on re-designing the text, images and experiences in different spaces of the Science Center towards making visible and amplifying 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. We also describe how educators centered youth-authored material artifacts toward expanding presence. 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

The injustice of not recognizing female scientists or anybody of Color and how we continued to reinforce that [at the Science Center], I think, it's that that seed started to grow stronger and its roots and the questioning and just the feeling of ‘is this the right thing to do?’ and even though nobody had done it before. I guess I questioned, why it had not been done before? ~
Olga, Science Center Director of Learning

Olga offered this statement as she reflected on why she initiated the Reclaiming the Science Center project (“Reclaiming Project”) with the Science Center’s Youth Action Council (YAC), a diverse group of about 20 youth, ages 9-16. The Reclaiming Project began in 2018 when Olga, a woman of Color in science herself, introduced to the YAC the idea of re-naming the rooms of the Science Center, as the Center’s rooms were exclusively named after famous, White, male scientists (e.g., Galileo, Tesla, Newton, etc.). Over the course of a year (and still on-going) the project expanded to also include re-designing signage (text, images) and visitor experiences in these rooms, as well as other spaces at the Center (e.g., the major stairwell). As one YAC member 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 but whose stories don’t get told” (Bella, age 16).

As Bella intimates, science centers are White and male dominant spaces, despite the embodied presence of the people of Color and girls/women who may work there or visit. By White and male dominant spaces, we refer to how the dominant narratives that represent and describe how things and people are organized in space is shaped through White supremacist and patriarchal ideology (Winkler, 2018). This includes how spaces are represented through images and text, how rooms are named, and how people are expected to be/become in these spaces. The social-spatial practices of these White and male spaces render judgement on whether and how people are recognized as science people. These social-spatial practices also can reproduce injustices 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 have been coupled with patterns of non-participation among youth of Color (Dawson, 2014a; Feinstein & Meshoulam, 2014).

This challenge is one that we have taken up centrally in our long-standing RPP, which has brought together Science Center leaders and educators, university researchers, community educators and youth to promote and realize the powerful potential of the informal space as embodiment of the community’s youths’ intersectional political struggles in and desires for positioning themselves as rightfully present (Authors, 2019). In this work, we have been committed to identifying and enacting justice-oriented pedagogical and research practices for youth in informal STEM communities. Among those practices, this study focuses in on the practices which disrupt and transform the normalized social-spatial injustices against youth of Color in STEM in their local Science Center – practices in support of *reclaiming space*.

Two research questions guided our study: 1) What practices that support reclaiming space are enacted by educators, researchers and youth?; 2) In what ways do these practices reflect local political struggle for new meanings and legitimacy across scales of activity in the Science Center?

Conceptual framework

Our study brings together two frameworks: social-spatial justice and social practice theory. Social-spatial justice calls attention to the ways in which injustice is produced and reproduced through the dialectical relationship between space and social interaction. Soja (2010) remarks that “everything that is social (justice included) is simultaneously and inherently spatial, just as everything spatial, at least with regard to the human world, is simultaneously and inherently socialized” (pp. 5-6). Important to this stance is that because space is socially produced, it can therefore be socially changed. Social-spatial justice centers the role of space in producing justice and injustice. We view space as the interaction of material and ideological relations that are formed by but also contribute to social relations (Soja, 2010).

Social-spatial justice is always enacted in practice. How people and things interact in relation to each other – their spatial ordering – both reflects and enacts power and politics (Massey, 2005). Spatial relationships produce social relationships in STEM spaces, where there is an interconnectedness among the physical, social, political, and disciplinary at any given time. As Davis and Schaeffer (2017) remind us, making visible the social-spatial is particularly important for Black students, who systematically experience oppression “by how power and injustices in science manifest in locally-specific ways” (p. 4).

We draw upon research from urban planning and racial justice, and in particular on work that foregrounds Black spatial imaginaries, and how they open up possibilities for creating different narratives of “Black presence, sometimes contesting and sometimes dodging all together the White gaze on Black bodies, communities, and geographies” (Bates, Towne, Jordon & Lelliott, 2018, p. 254). While not all of the youth we work with are Black, the majority are, and we wish to center how the Black spatial imaginary has pushed for ways of representing and describing spaces that “not merely anti-colonialist or anti-racist” but are also “otherwise” (Bates, et al., 2018, p. 255). Rendering the “otherwise” calls attention to the fraught and oppressive past, while simultaneously calling forward community wisdom and values to work in the present, disrupting and countering dominant – White – imaginaries. In this work, the term spatial imaginary describes the sociopolitical narratives used to represent and describe places and spaces (Wainright, 2005). Spatial imaginaries can both 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 further draw upon social practice theory to make sense of how the practices are enacted towards maintaining/disrupting social-space (in)justice. In so doing, 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. In this proposed study, the community of Youth Action Council in the Science Center, which includes youth, educators and researchers, as detailed below, sought to work toward reclaiming by critically recognizing the political struggles represented as an institutionalized representational injustice in STEM and the Science Center.

We integrate the two perspectives, Social-spatial Justice, and Social Practice Theory, to inform our analysis of longitudinal and participatory ethnographic data regarding the project of Reclaiming the Science Center. We 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 a given community and the multi-layered factors affecting power dynamics, including actors (e.g., youth, educators, and administrators), institutional norms and practices, culture and history of the institution and actors. In this work, we view “practices” as cultural and relational. There are no cultureless or neutral ways of being in the world. We also take an unapologetic assets-driven and desire-based approach to foreground ‘tensions’ and see their disruptive and transformative power that works in ways to realize youth-desired futures (Tuck, 2009). We refuse the damage-centered narrative in STEM education that may frame tension as deficit. As Tuck (2009) reminds us, “desire-based research frameworks” require epistemological shifts accounting for “the loss and despair, but also the hope, the visions, the wisdom of lived lives and communities. Desire is involved with the not yet and, at times, the not anymore” (p. 417).

Context and participants

The context of our study is the current project of the Youth Action Council, 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. Together, they sought to make the place youth-centered (not just youth-friendly). They also sought to broaden participation so that collectively those who visited and belonged to the Center reflected the diversity of their city, rather than the primarily White, middle class demographic indicated by the membership. For example, they leveraged long-time partnerships Author 1 with some of the Community Organizations serving youth of Color, to create new pathways to YAC membership, including providing resources in support of participation (e.g., rides to and from YAC, free family membership to the Science Center, free enrollment in summer programming, etc.). Currently, three educators, four researchers and twenty youth participate in YAC. Educators and researchers played multiple, and often-times shared, roles of co-development of experiences. However, generally, during YAC sessions, the Center educators would lead sessions, with researchers engaged as participant-observers, often working with small groups of youth. We have developed longitudinal ethnographic case data of all three educators, and six out of twenty youth who have consistently participated in the current project.

The YAC undertook two major projects over the course of three years (Table 1). The first project, “Makerspace,” involved the co-design of the Center’s makerspace, including its physical design and the design of activities and experiences. In this way, youth claimed the makerspace by creating and displaying their manifesto on justice-oriented making and by designing a space meant to serve the emotional needs of all people, but adolescents in particular. As we describe elsewhere (Authors, 2018), the co-design of the makerspace opened up new discourses regarding what it meant for youth be present at the Center, and how their lived lives mattered in ways that extended beyond the makerspace itself. This led Olga to propose the Reclaiming Project, which has featured prominently in the YAC’s activities since 2018. 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.

Table 1: Timeline of Youth Action Council

Project Title	Period	Enactment
MakerSpace	Spring, 2016- Spring 2018	-Co-designing the new makerspace -Prototyping new programs possible in the makerspace (e.g., Nameplates activity) -Establishing Manifesto of the YAC
Reclaiming Science Center	Summer, 2018- Present	-Critical examination what is (in)visible in STEM to rename the rooms in the Science Center -Suggesting youths’ vision of whose presence matters in STEM -Co-designing the renovated rooms in the Science Center

Data generation and analysis

Data, generated from the summer of 2018 to the present, include video/audio recordings of YAC meetings (including the reclaiming space project and others), images of moments and space, artifacts of teaching and design, field notes, and transcripts of interviews with individual educators/youth regarding: 1) the reclaiming space project, and 2) the tensions they faced in their lives and how they had responded to them. Using constant comparative data analysis (Strauss & Corbin, 1998) 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 salient to us regarding the practices, norms, and discourses toward/against social-spatial justice. Salient episodes were those defined as “opening up” or “shutting down” discourse/practice on social-spatial justice related issues, and were identified by researchers, educators and/or youth. For example, if a youth noted that a moment was important in their exit survey and/or reflection, it was recorded as a salient episode, even if that moment was not also identified by an educator or a researcher. Second, we reflected on these episodes collectively to name themes we identified across some of the key episodes. The three themes we identified were educator-supported youths’ reclaiming; youth-initiated reclaiming; and in-the-moment tensions from different desires and visions of reclaiming. In this paper, we attend to the first theme, educator-supported reclaiming, since it was how the Reclaiming Project was first launched and allowed the following two themes to emerge. 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 was an important way to respect participants’ accounts and practices. Collaborative data analysis was also important to us in order to address the challenges in the inter-partner communication of conducting our researcher-practitioner participatory research (Henric et al., 2017).

Findings

In our findings, we report on how educators, researchers and youth co-created spaces, both discursive and material, as they critiqued and reimagined spatial representations of STEM. We also describe how educators centered youth-authored material artifacts toward expanding presence, in ways that not only bore witness to youths' systematic erasure, but also transformed adults' spatial imaginaries. We articulate what these practices are, and how they oriented towards disrupting and transforming representations in/of STEM, shifting whose presence and presentations matter in science centers.

Creating spaces

In this section we describe the co-creation of spaces for critiquing and reimagining of 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 (e.g., what they see, what they hear, how they feel, etc.).

Take, for example, the YAC session where Olga introduced the Reclaiming Project, which 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. As the first activity of the day, and not without trepidation, Olga had printed out two large images of headshots of the newly elected members of the House, separated by major political party (Republican and Democrat). Without explaining what the images were of or why, she asked the group to observe what was different about the two sets of images. Youth called out observations (Figure 1a) related to race, e.g., "this one has a lot of people of Color" and "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, when the youth indicated that the more diverse group of people felt more welcoming, she made two further discourse moves: asking youth to discuss how representation made them feel, and using different spaces to promote discussion.

First, Olga asked the youth if they knew what the pictures were of (some, but not all of the youth knew this was the newly elected House). She used this to share her views that it is not just who you are ("Who") but also what you believe and practice ("What") that can make someone feel included or not, but that there is power in representation. Olga and one of the researchers (Author 1) had co-planned this activity, after Olga wondered if the contrast in images would provide a context to talk about representation. After we planned the activity, she expressed concern that she might be wading into territory that was "too political". However, she decided that by talking about both "who" and "what" she could use the activity to raise questions without positioning any one person as being right/wrong for their political affiliations. She also noted that representation in science was political. Afterwards, she noted how the youths' responses made palpable – through their talk and emotions – the youths' erasure from the world, including the Science Center. While this was not a new idea for her, she noted 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 with the youth to promote dialogue on representation. For example, Olga and Chris encouraged the youth to visit the different rooms and spaces of the Center, taking careful note of what they observed in terms of what they saw and heard (e.g., images, words, and people) and how they felt. As they walked with the youth through the Center, they also encouraged the youth to consider what else about the spaces mattered to them and why. The youth were also encouraged to roam the center on their own, and to stay 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 offered youth the space to "see/hear/feel" and critique the dominance of White, male figures in these spaces, and the absence of others. It also helped to link those observations to how youth felt. For example, after touring the Center, Olga asked the YAC members to investigate in small groups, whom they would want to name the rooms after in working towards representational justice. The youth freely navigated on/offline resources. Based on their individual or small-group investigation, they each proposed, and provided reasoning for, up to three STEM figures after whom to name Science Center spaces (Figure 1b). During this discussion, one of the senior members of the YAC suggested that 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 and reasoned why each criterion was important (Figure 1c), such as "People who don't get noticed" and "People who have credit taken away from them"; and "People who inspired other people."

To sum up, educators engaged YACers in critical examination of politics and power dynamics in representation by introducing new discourse threads regarding issues of (in)visibility in the Science Center and

how this impacted them in multi-sensory ways. The youth also took up space at the Center in new ways as they sought to bring their perspectives to bear on how the layered ways in which social-spatial injustices manifest. The youth were positioned as experts of their experiences, and their ideas were used to filter the group observations.



Identifying issues in institutional representation

Proposing youths' ideas for naming

Youths' criteria to narrow down the candidate names

Figures 1a, 1b, and 1c. YACers' examination of what is (in)visible in STEM and the Science Center

Centering youth-authored material artifacts toward expanding presence

In this second findings section, we describe how educators centered youth-authored material artifacts toward expanding presence in ways that not only bore witness to youths' systematic erasure, but also transformed adults' spatial imaginaries. We draw on two on-going examples that illustrate discursive and material trajectories of transformation in the Science Center: 1) Nameplates: from YAC to the community, and 2) Designing the co-named room.

Nameplates: from YAC to the community

Consider the following example of how members of the YAC helped to prototype the Nameplate activity, and its expansive outcomes. Olga worked with the YAC to develop activities that would support young people in learning to use power tools in ways that mattered to them. Initially, Olga introduced the idea of building simple pinball machines to the YAC and provided them with tools and materials with which to play around to explore what such an activity could look and feel like. She wanted the youth to be able to have games they could take home or leave in the makerspace room to inspire others. Youth had access to wood of different shapes and sizes, nails, screws, power tools, crafts, and other materials. One of the youths, however, decided to make a sign for his local afterschool club. He used the craft materials available to spell the club's name out by hammering nails into a board.

The project transformed into one of making "nameplates" where youth used these same materials to design their name, or some representation of their name, on a board (Figures 2a). As excitement for the nameplates grew, new discussions arose among the YAC as to what to do with them. Youth agreed that they wanted to hang their nameplates in their Center's new makerspace. Olga worked with her staff to permanently affix the plates to the main wall of the makerspace to recognize the work of those who helped create that room.

Olga noted that as people visited the room, the nameplates helped to solidify a set of discourses and practices around youth as co-designers of Science Center spaces. For example, visitors asked about the name plates, asked to make their own, and over time, the activity became a central activity in which visitors could make and bring home their own nameplate. As they observed these impacts of the Nameplate activity, the Science Center staff began to use the activity in outreach work around the city. One of these outreach activities was with the local refugee center, where Science Center staff worked with refugee youth to construct their own nameplates and to write stories of home that went with them. The Science Center then hosted a temporary exhibit on the main exhibit floor with the nameplates made by local refugee youth, and their accompanying stories. When combined, the exhibition of nameplates and their descriptive notes (or as Olga called it, "a living entity of oneself") attracted and engaged many visitors. Through their nameplates, these youths were able to share, not only their names, but complex dimensions of their lives as captured by the ways they organized, decorated, and described their nameplate. For example, one nameplate, created by a youth from Kenya, included his name, a crafted map of his country, and his country's flag. He wrote:

I use yellow and blue because they are my favorite colors. I use fabric to make my country's flag and pipe cleaners to make my country's map using colors exactly as they look on the flag. I want people to know more about Kenya and where I am from. I want people to get the feeling of how beautiful Kenya is from the map. The flag is a perfect expression of how beautiful Kenya is and its fantastic, lovely people. The land of agriculture. Lovely Kenya.

One of the YAC members, upon seeing the Nameplate exhibit produced by the refugee youths, noted, “I was just like, WOW! These are so amazing. It just really helps me to think more about what refugees are feeling right now. I love the nameplates. It is really hard to believe that we actually started it [with our nameplates]. It really shows, like, how important [reclaiming space] is.” Olga reflected on the outreach as an expansion from YAC. She learned by engaging with YAC that the new program with refugee people should not position them as un-knowing guests, rather the Science Center should be a space to learn from and listen to their knowledge, stories and desires. When implemented, she found that the refugee community members wanted to express themselves with the tools and resources in the Science Center, and gave meanings to the texture, color, and configuration of the resources put on the nameplates.

In the refugee Nameplate program, Chris, the educator, also participated as an immigrant. By placing himself as a maker alongside the refugee youth, not just as the educator, he saw and felt the power of presenting himself in the form of a nameplate, and bringing one’s knowledge and skills to do STEM. Accordingly, he included the Nameplate activity in his own “Make with Wood” summer camp. Chris introduced the nameplates to the campers by showing them the YAC’s nameplates on the wall, and hosting a discussion about making and spatiality. He also brought the campers to the exhibition where, at that time, the refugee’s nameplates, including his, were displayed. Chris reflected that two youths, who had exhibited little interest in the camp, dramatically changed their participation. They became actively engaged in the activity, and sought to use resources in the makerspace to make the nameplates multidimensional (Figure 2c). The history of Nameplates both as a program and an outcome of social-spatial justice work, originated from YAC initiative and transcended through the refugee program, played a pivotal role in inspiring other youth beyond YAC to present and claim themselves in STEM works. Furthermore, how educators centered youth-authored material artifacts toward expanding presence, bore witness to youths’ systematic erasure, and transformed adults’ spatial imaginaries for how spaces could be re-created, for whom, and why.



Example of a nameplates in YAC initiative (in 2016)

Exhibition of Refugee nameplates (in 2019)

Nameplates from Make-with-wood camp (in 2019)

Figures 2a, 2b, and 2c. Nameplates as artifacts reclaiming whose presence and presentation matter

Designing the co-named room

This example highlights how educators’ efforts to center youth-authored material and semiotic artifacts transform and expand 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 (Figure 3a). Visiting the room 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 sign for the room and how the room should be decorated (Figure 3b). Educators asked youth to choose and build on one of the four prototype room signs the Science Center’s graphic designer provided. Youth brainstormed the important elements that should be included in the sign so that it represented Katherine Johnson and what they thought she represented about STEM. The YAC members’ brainstorming did not stop at designing the room sign. They began planning the design of the room itself. They suggested ideas of how to transform the physical challenges of the room into assets (e.g., using the load-bearing pillar in the room as a showcasing spot, Figure 3c) as well as how to tell a story of Katherine Johnson’s life. To foreground her story, some youth suggested including representations of Katherine 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 that the space is for community members who will visit the room in the future. Particularly considering younger visitors, they suggested ways to include mathematics in the room in ways that celebrated Katherine Johnson but did not intimidate or alienate young people who were not familiar with the equations, by incorporating the equations and graphs into the depictions of planets

and stars. Through the design of these artifacts (e.g., room sign, artwork), youth were becoming an integral part of and visionaries for the adult staff and educators in the Science Center.

Youth enriched and refined their visions by expanding the space and time for co-designing practice beyond the regular YAC gatherings. Youth shared the co-designed space and their ideas for design with family and in other community spaces. We see this through Trey's interaction with his family and Rose's expanding her practice to include her Community Club. After the YAC meeting for co-designing the Katherine Johnson room was over, Trey's family arrived to pick him up and Trey urged them to follow him to the newly named Katherine Johnson room. Along the way, he acted as a docent, explaining the rooms, exhibits, and programs of the Science Center. When they arrived, he explained the history of naming the room and the future design plans. He, as an African American youth, expressed his personal pride in having Katherine Johnson as an African American female STEM figure representing the well-lit and frequented spot in the middle of the Science Center. He refined his vision of the room by discussing with his family members how he wanted to embrace and depict her life story, as well as community members' lives, on the walls, ceiling, window, and signage.

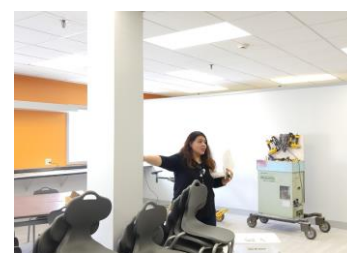
Another youth, Rose, maintained her engagement in this reclaiming project across space. She recently learned about YAC from educators in a neighboring Community Club she visits daily. Rose was one of the youths who inspired Olga and Chris to imagine the new room as a space for community members. She focused on younger visitors in particular and conceived of an idea to make a spaceship in a corner of the room where children could sit and imagine exploration. After this YAC Reclaiming project meeting, Rose began building a rocket ship at the makerspace in her Community Club, shifting her design work in her Community Club to realize her ideas for the Science Center room. Rose expanded the spaces in her community where she feels a sense of ownership to include both the Community Club and the Science Center. She created a bridge between these two spaces and begun co-designing and reclaiming spaces beyond adults' imaginaries. As youth shared the Science Center and their ideas for designing the Katherine Johnson room, youth demonstrated how these acts of reclaiming are on-going and expanding.



Visiting the room under renovation



Designing and Meaning-making of the room and signage



Identifying design-challenges (e.g., the ventilation cylinder)

Figures 3a, 3b, and 3c. Fully incorporating youth' ideas to design the rooms of Science Center

Taken together, the two examples – Nameplate activities and co-designing the Katherine Johnson room - indicate how the educators' and the YAC's efforts to reclaim space can be enacted in ways to ensure youths' material presence in the Center, via their artifacts (e.g., Nameplates) and spaces they designed (e.g., Katherine Johnson room), and to expand youths' own presence (from the MakerSpace to a larger area of the Science Center) and the presence of those who had been invisible (e.g., refugee community, summer campers, younger people who may visit the room in the future, and YACers' family and friends, such as Trey's family and Rose's peers in Community Club) both within and beyond the Science 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 both 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. The initial nameplate activity legitimized youth as co-designers in visitors' eyes, and launched outreach activities, which then further transformed the exhibit floor of the Center. Both Chris and Olga, as immigrants to the U.S. themselves, more visibly positioned themselves with the youth of Color and refugee youth through the Nameplate exhibit. And as YAC members who initially designed the activity noted, the Center was beginning to look and feel different.

The social-spatial work was both subtle yet pervasive at times, as material structures were slowly but physically transformed through ordinary and extraordinary activity. The re-naming of rooms, accompanied by

new signage and experiences reflects the kind of extraordinary activity that required financial backing from the board, and significant infrastructural work. However, these efforts were accompanied by the ordinary efforts of supporting youth in co-opting designed experiences towards their ideas for making their lives present, displaying work, and hosting dialogue on what this all meant.

Yet, 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). When the Science Center was brought into a city project to create an outdoor classroom on the Riverwalk next to the Center, the city rejected the idea of having youth as co-designers at the table. Whether it was an issue of trust, or liability, the felt impact of outsidership is the same for Olga and the youth.

Further, engaging in new discourse threads on social-spatial justice potentially opens youths' fraught histories with/in the Science Center in ways that pose new challenges and/or disrupt in unanticipated ways (Watkins, 2015). One YAC member likened his experience in YAC's reclaiming project as similar to his afterschool STEM club, but more stressful and high-risk though also potentially high-reward, as he stated, "This is a lot like Green Club except it is public. . . like everyone is watching you." Such tensions reverberate through the Center leadership, as they work to respond in negotiating structural changes within the organization, e.g., the layers of bureaucracy waded through to change signage font and colors.

As we noted earlier, science centers are White and male dominant spaces, social-spatially positioning youth of Color and girls as outsiders (Winkler, 2018). However, enacting practices oriented towards new spatial imaginaries supported youth and their educators in authoring a more rightful presence in their Science Center (Authors, 2019). Being rightfully present centered their political struggle to disrupt normative power relations and practices of the space and what that means for who legitimately belongs. 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. The initial vision of the reclaiming project conceived by educators has become disrupted and restructured by members of the YAC, who suggested new, radical, and caring visions for reclaiming. In this way, educators not only supported youth to reclaim, but also, they were open to learning how they disrupt and restructure. This led them together to form the community of trust sharing and enacting the commitment of reclaiming, as Olga called, "the most bold move" of disrupting prescribed structure and redefining the presentation of the space.

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