Journal of Urban Learning, Teaching, and Research

Volume 17, SPECIAL ISSUE
August 2023

A publication of the AERA Urban Learning, Teaching & Research SIG

2023 Special Issue: *Illuminating Effective Practices, Approaches, and Strategies in Urban Education*

Stepping Out and Stepping Up: Narratives of Women of Color in an Urban STEM OST Program

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Abstract

The science, technology, engineering, and math (STEM) fields have a well-documented racialized and gendered participation gap between males, particularly white males, and women of color (WOC). Through a Critical Race Feminist lens, this qualitative research study uses life-story narrative analysis to understand the experiences of eleven WOC who participated in an urban STEM-focused out-of-school time (OST) program. Data analysis showed students story their experiences around three overarching themes: (1) Experiencing New Opportunities; (2) Cultivating Supportive Relationships; and (3) Expanding STEM Career Possibilities. Findings indicate that an urban STEM-focused OST program can activate an ecosystem of opportunities and support which can empower WOC to step out of their socialized comfort zones and step up to more advanced academic and career paths. Participant narratives demonstrate how their experiences in a particular urban STEM OST program opened doors and encouraged pathways otherwise historically made inaccessible to WOC in STEM fields.

Keywords: women of color, STEAM, out of school time, Critical Race Feminism, life-story narrative analysis

Introduction

In response to an urgent call to improve science, technology, engineering and math (STEM) education in the United States (US), many out-of-school time (OST) programs developed specifically to support student engagement and achievement in these disciplines (Kelley & Knowles, 2016). Often designed with flexible structures distinct from a traditional classroom setting, STEM-focused OST programs provide students with novel experiential learning opportunities that can increase engagement and learning outcomes (Allen-Handy et al., 2020; Roberts et al., 2018). These types of engaging learning experiences promote positive student attitudes towards STEM, increase understanding of complex ideas, empower students in STEM, and improve participants' self-concept (Barker et al., 2014; Fadigan & Hammrich, 2005). STEM OST programs are understood as a valuable contribution to the development of STEM fields (NRC, 2015).

Despite the success of STEM OST programs, the STEM education and career fields have a well-documented racialized and gendered participation gap between males, particularly white[1] males, and women of color (WOC) (National Science Foundation [NSF], 2023; Wade-Jaimes et al., 2019). Many discriminatory policies in public and private institutions have been upheld over time to create this disparate reality (Delgado et. al, 2017; Horsford et al., 2018; McGee & Bentley, 2017). Due to the intersection of the legacy of redlining and school funding policies (Lukes & Cleveland, 2021), K-12 public schools situated in urban environments often have disproportionately higher populations of students of color and are severely underfunded according to documented adequate funding levels (Baker et al., 2022). Consequently, their STEM programs are also often systematically inadequate (McLaughlin, 2014; Morales-Doyle & Gutstein, 2019). Some educators and supporting institutions who recognize this historical injustice have developed STEM-focused OST programs specifically designed to address this gap in urban education (Fadigan & Hammrich, 2005; King & Pringle, 2019). For students of color, emergent research shows that culturally sustaining STEM OST programs can provide supportive spaces for these students to thrive, despite having been historically discouraged from participating in STEM (Alim & Paris, 2017; Emdin, 2010; Perry et

[1] *Guided by Crenshaw's (1990) argument, Black will be capitalized because "Black, like Asians, Latinos, and other minorities, constitute a specific cultural group and, as such, require denotations as a proper noun. By the same token, we do not capitalize white, which is not a proper noun, since whites do not constitute a specific cultural group" (p. 1244).*

al., 2012). There is a burgeoning body of scholarship examining the impacts of STEM OST programs, particularly in urban environments and particularly for WOC (Allen-Handy et al., 2021; Wade-Jaimes et al., 2019).

This narrative study investigates participants' experiences during their freshman year in high school in an urban STEM OST program designed specifically for women of color (WOC) from low-income backgrounds. This free year-round after-school program introduces participants to careers in science and related professions through hands-on science experiences, positive youth development activities, as well as career and college exploration opportunities. The Museum of Science (pseudonym)'s Empowering Women in STEM (EWIS) (pseudonym) program is highly successful in increasing the number of high school WOC who persist in STEM education and who go on to choose STEM-related careers. There are limited studies that explore the experiences of minoritized women who participate in informal STEM programs as youth (Chiu et al., 2015), and this study fills a much-needed gap. Through a Critical Race Feminism (CRF) lens, the study findings shed insight into how an urban OST program can make STEM-education more equitable for marginalized WOC who are often underrepresented in STEM careers.

Literature Review

The Value of Out-of-School STEM Programming in the Urban Context

In 2001, the No Child Left Behind (NCLB) Act brought attention to OST programs and their potential to influence students' academic achievement, especially for students from minoritized backgrounds (Lauer et al., 2006). OST indicates the hours during which school age children are not in school (National Institute on Out-of-School Time, 2003). OST programs have been shown to have many academic benefits for students, both within and outside of school, and are brimming with chances to connect and intermingle with peers (Barker et al., 2014; Denson et al., 2015; Klanderman et al., 2013). Although there is a sense that OST programs are generally effective at producing the primary outcomes that would be expected based on their content and design, Vadeboncoeur (2006) points out the difficulty of evaluating the learning and effectiveness of OST programs as they do not lend themselves well to the traditional, quantifiable data the education system is familiar with using. Hence, the primary benefits of OST programs are often understudied or underreported (McCombs et al., 2017).

Many OST programs have been developed specifically to support student engagement and achievement in STEM (Kelley & Knowles, 2016). STEM-focused OST programs provide students with the opportunity to engage in unique, hands-on projects that extend beyond the constraints of a classroom setting (Roberts et al., 2018). Participation in long-term informal STEM programs have been shown to promote urban students' positive attitudes towards STEM, improve understanding of complex ideas, and increase self-concept and empowerment in STEM (Barker et al., 2014; Fadigan & Hammrich, 2005), as well as increase students' interest in pursuing STEM careers (After School Alliance, 2014; Baran et al., 2016; Dabney et al., 2012). Furthermore, STEM-focused OST programs play an important role by increasing students' access and opportunity to engage in activities that contextualize and give purpose to their formal school-based learning (Roberts et al., 2018). Whereas secondary education in the United States silos STEM subjects within a rigid structure, STEM OST programming can facilitate authentic learning experiences in purposeful contexts and settings (Kelley & Knowles, 2016; Sterin et al., 2022).

The Participation of Women of Color in STEM-focused OST Programs

Scholars have argued that traditional STEM classrooms alienate students of color (Brown, 2019; Wade-Jaimes et al., 2019). By continuing to emphasize cognitive skills within a context and using methods that represent the dominant ideals of mainstream white society and Eurocentric science, schools often fail to appropriately prepare non-white students for success in college and career, especially Black students living in urban environments (Seiler, 2001). Emdin (2010) contends that "the awareness of the austere possible outcomes of one's future after leaving school, the invalidation of students' culture in the science classroom, and the lack of self-worth and confidence that comes with being devalued in the classroom are all important cultural concerns that lead to lack of interest in science" (p. 21).

Given that the learning that occurs in informal programming is "not designed in many instances to meet the formal institutional structures and demands of schooling" (Vadeboncoeur, 2006, p. 239), STEM-focused OST programs can be an important counter-space for students of color to explore and activate their STEM identities. When students of color are given opportunities to mobilize their own funds of knowledge and when these forms of engagement are validated, increased focus and positive emotional energy can be observed in STEM OST environments (Gonsalves, 2014). To address the participation gap of WOC in STEM, OST programs specifically for WOC have emerged. A challenge to these programs for

both participating WOC and program staff is in making a concerted and consistent effort to address learned and internalized ideologies about WOC in STEM that have been reinforced by dominant societal messaging (McGee & Martin, 2011). For instance, ideologies that frame STEM as only being for white students (Wade-James et al., 2019). Fadigan and Hammrich (2004, 2005) found that when STEM OST programming allowed participating WOC to form relationships with staff, feel they were in a safe, stable environment, and acquire skills for adulthood, participants benefited by gaining the confidence and support needed to succeed in STEM and aspire towards STEM careers.

Building a STEM Ecosystem Around Women of Color

Recently, scholars have begun examining STEM learning from an ecological perspective, in which the educational "ecosystem" is conceptualized as a set of environments, in- and out-of-school, which provide students with opportunities to learn (Barron, 2010; Corin et al., 2017; Falk et al., 2016; Jackson, 2013). Within an educational ecosystem, learners construct unique learning pathways, guided by personal goals and interests and supported by sociocultural and physical factors including activities, resources, and relationships that the learner can engage with to support their individual learning goals (Barron, 2006; Bathgate et al., 2014; Crowley et al., 2015). In 2015, the National Resource Council highlighted OST programs as an important part of the STEM ecosystem as they have been found to increase interest and persistence in STEM (NRC, 2015).

Building a strong STEM ecosystem may be a particularly important structure to support women of color as they navigate negative assumptions, biases, stereotypes, and microaggressions about their STEM identities (McGee, 2016). A study by McGee and Bentley (2017) of high-achieving Black women in STEM forecasts that experiences of structural racism, sexism, and race-gender bias were prevalent in undergraduate STEM settings. Throughout their university experiences, all participants in the study encountered stereotyped expectations based on their racialized and gendered identities. Stereotype management, a tactical response to racism and sexism, continues to be a necessary activity for Black students and specifically for Black women to counter stereotypes and maintain resiliency in STEM environments (McGee & Martin, 2011).

The unique and often underexamined levels of risk which burden WOC should be recognized while also acknowledging potential sources of support (McGee and Bentley, 2017). For instance, same-race peers can play a critical role in fostering young women's sense of

belonging in STEM contexts (Harper, 2010). Additionally, a study of teenage Latina and African American girls' persistence and support in STEM showed that the girls' parents played a prominent role in supporting persistence and encouraging STEM career interests (Koch et al., 2019). These studies hint at the importance of the interplay of support networks across multiple settings: home, school, and OST, to impact the lives of young women of color.

Theoretical Framework

To amplify the stories of the young WOC participants, this study is grounded in Critical Race Feminism (CRF). Building from Critical Race Theory (Delgado et al., 2017), CRF adheres to the same tenets, such as anchoring racism as endemic to society, and then hyper-centers the intersection of gender and race as a particular identity construct which needs to be unpacked according to multiple contexts and identity dimensions (Crenshaw, 1989; Wing, 1997). Berry (2010) asserts that centering stories of lived experiences illuminates the distinct experiences of Black women as they navigate through intersecting systems characterized by oppressive mechanisms such as racism, sexism, and classism that disproportionately impact WOC. CRF offers greater insight into how the racism, sexism, classism, and other systems of oppression distinctly and disproportionately impact minoritized women of color (Berry, 2010; Evans-Winters & Esposito, 2010; Patton & Ward, 2016).

In opposition to white supremacy, CRF challenges gender essentialism: "the notion that a unitary, 'essential' woman's experience can be isolated and described independently of race, class orientation, and other realities of experience" (Harris, 1990, p. 585). Viewing identities in the context of experiences as linked and mutually shaping (Patton & Ward, 2016), CRF adheres to the concept of intersectionality, which is captured through the lives of minoritized women. Employing an intersectionality approach (Crenshaw, 1990), CRF places the complex lives of Black women at the center of analysis. Acknowledging the multiple and intersecting points of marginality that impact the lived and educational experiences of Black girls as often *outsiders within* ("the situational identities that are attached to specific histories of social injustice") (Collins, 1986, p. 120) traditional STEM OST programs. The interplay between context and identity construction is inextricably linked. Herein, the intersection of race and gender (Patton, 2009) must be hyper-centered in order to deconstruct, illuminate, and thus sanction the experiences of Black girls and all the WOC in the EWIS program.

Methods

Through a phenomenological study design (Merriam & Tisdell, 2016), this qualitative research study uses life-story narrative analysis (Josselson & Lieblich, 1995; Ochberg, 1994) through a CRF lens to understand how the EWIS students storied their experiences in the urban STEM OST program. According to Merriam & Tisdell (2016) phenomenology is "a study of people's conscious experience of their life-world" (p. 26). This design is appropriate for this study since it seeks to understand how participants have experienced the shared phenomenon of engaging in the EWIS program. The following research question guided this study: How do young women of color story their experiences as participants in the EWIS program?

Positionality

Positionality, "the social and political landscape inhabited by the researcher" (Griffiths, 2009, p. 16), is intricately entwined in the research process. This study included a diverse team of researchers, program coordinators, consultants, and educational leaders, many of whom are STEM educators and/or from a STEM background. Ten of the eleven authors identify as women and four of them as WOC. This mix of shared and unshared elements of gendered and racialized identity between the research team, program coordinators, and the study participants was considered throughout the research process. Of the four leading authors who were involved in data collection and analysis, all are gendered as women and two are racialized as white, one as Asian, and one as Black. The subsequent authors were involved as program coordinators and consultants on the project. As Milner (2007) points out, the racialized and cultural positionality of the researchers are connected to the research process and it's important for researchers to both share their positionality and to continually engage in introspection for accountability and transparency.

Site and Participants

Located in one of the largest urban epicenters in the United States, the Museum of Science (pseudonym)'s Empowering Women in STEM (EWIS) (pseudonym) program is a 40-year-old national award-winning program that has served over 1,000 underrepresented young women since 1982. This 4-year free after-school and summer enrichment program introduces participants to careers in science and related professions through hands-on experiences, positive youth development activities, as well as career and college exploration opportunities.

Each year there are about 25 young WOC from low-income backgrounds who are selected to participate in the EWIS program the summer before starting their freshman year of high school. This study includes six participants from the school year 2020-2021 and five participants from school year 2021-2022. In line with CRF, this study recognizes race as a social construct which exists at many levels and specificities (Crenshaw, 1989) and the material consequences of this construct as it has been historically leveraged (Delgado et al., 2017). At a high-level, there were six participants racialized as Black, three participants racialized as Latina, and three participants racialized as Asian. When asked to describe themselves, participants identified specific countries of family origin, religious affiliation, and geographic location of birth. Eight of the eleven participants shared that they were born and raised in the city where the EWIS program takes place. Two participants shared that they had immigrated to the US as young children. All participants lived in the same city located in the Mid-Atlantic region of the US and while they attended various high schools, they all matriculated within the same large, urban school district. All participants had recently finished their freshmen year of high school at the time of the study. See Table 1 for participant demographics.

Table 1

Participant Demographics (n= 11)

Pseudonym	Cohort	High-Level Racialized Identity	Participant-Identified Cultural Background	Born in Program City
Amina	2020-2021	Black	Jamaican and Caribbean	Yes
Kadijah	2020-2021	Black	N/A	Yes
Vivian	2020-2021	Asian	Vietnamese	No, Immigrated
Mae	2020-2021	Asian	Chinese	No, Immigrated
Saimeera	2020-2021	Black	Muslim	N/A
Elena	2020-2021	Latina	Puerto Rican	Yes
Janice	2021-2022	Latina	Dominican	Yes
Brenda	2021-2022	Asian	Indonesian and Chinese	Yes
Bianca	2021-2022	Black	Latina and African American	Yes
Nina	2021-2022	Black	N/A	Yes
Teresa	2021-2022	Black	N/A	Yes

Data Collection and Analysis

The research team collected qualitative data from semi-structured interviews with eleven total participants (n = 11) at the end of their first year in the program. The EWIS program manager connected the research team with the EWIS students through email to introduce them to the project, gather consent, and schedule interviews. Five interviews were conducted in June of 2021 by one research team member and the six interviews were conducted in June of 2022 by two additional research team members. Collecting data from two distinct cohorts increases the trustworthiness of this study since the data includes participant experiences from multiple programmatic years (Denzin & Lincoln, 2011). All interviews were conducted via Zoom, a web-based conferencing platform, which also captured the recordings and transcriptions. Pseudonyms were used for all participants.

Facilitated by a qualitative coding software, two researchers independently conducted a first-round of open coding using life-story narrative analysis (Josselson & Lieblich, 1995; Ochberg, 1994). The researchers met to discuss codes and create a second-round codebook defined as "a set of codes, definitions, and examples used as a guide to help analyze interview data" (DeCuir-Gunby et al., 2011, p. 138). After applying the second-round of codes the researchers met again along with a third team member familiar with the data and engaged in code mapping strategies to arrive at the overarching themes (Saldaña, 2013). This collaborative analysis process enabled "shared interpretation and understanding of the phenomenon being

studied" (Weston et al., 2001, p. 382). After applying the third-round of codes, the research team met again to review the coded data and strive for intercoder consensus to increase the trustworthiness of the findings (Lincoln & Guba, 1985; Saldaña, 2013).

Findings

Data analysis yielded three overarching themes about how the students story their experiences as participants in the EWIS program: (1) Experiencing New Opportunities; (2) Cultivating Supportive Relationships; and (3) Expanding STEM Career Possibilities.

Experiencing New Opportunities

Across the EWIS students, there was an overarching gratitude for the new opportunities that the EWIS program allowed them to experience. Nina said that when she got into the program, she was really happy because "it was a chance to open a door in my life" and the program inspired a new interest in science that she didn't have before. Several of the EWIS students described how the program made them aware of new possibilities in life; Teresa extolled that "[the EWIS program] gives many kids opportunities, like me, who don't have them".

Several of the EWIS students characterized themselves as shy or introverted when they entered the program but said that EWIS allowed them to "open up" and "step out of their comfort zones." At first, Teresa said that she was hesitant to try new things because she thought that she wouldn't like it, but she discovered that she had a lot of fun "opening up to new experiences and new things – stuff I wouldn't have done if I wasn't in the program." Saimeera shared that the EWIS program was somewhere that she felt safe expressing her cultural identity,

> [My identity as a Black Muslim woman] plays into areas that I feel comfortable around because sometimes people aren't as accepting towards my identity, so it plays into where I put myself and where I want to put myself so that I can always be comfortable in who I am.

Although many of the EWIS students described themselves as reserved or hesitant at first, the program seemed to activate other aspects of their self-described personalities like "being curious" (Saimeera and Janice), "a problem solver" (Kadijah), "determined" (Amina, Kadijah, and Saimeera), and "joyful" (Mae and Elena). Janice expressed that "[through the

program] I got to experience things that I didn't even know that I could. EWIS gave me an open mind and just made me aware of the possibilities in life, you just got to look for them."

When the EWIS students were asked to recall their favorite memory from EWIS, most of them referred to an outdoor education camp that they attended. According to Brenda, the trip included a lot of "hands-on experiences" and several of the EWIS students vividly recalled the experience of touching bugs, frogs, and slugs. Brenda stated that, "one big thing that EWIS has taught me, I used to have a fear of bugs in the beginning. I hated them. But they are okay now." The trip also included hiking which many of the EWIS students hadn't appreciated previously, Nina reported:

> With touching bugs, going hiking, all that stuff I had never done before I was in the EWIS program, and it was really fun. I actually like hiking in the woods and being in nature now - it's really peaceful and I really learned a lot while being there. [The program] has really just changed me and helped me become the person I am now in terms of learning new things and just wanting to discover more about the world because there is more to the world than I know.

The trip was also an opportunity for the EWIS students to connect with each other and the program leaders in a new environment. Teresa shared that she enjoyed the campfire at nighttime where they all bonded and discussed the activities that they had participated in at the camp.

Cultivating Supportive Relationships

As the EWIS students described their experiences, their stories routinely featured the relationships which supported their success not only in the program but also in high school and life outside of these settings. It became clear that the EWIS students drew from a network of supportive relationships from people both within and outside of the program including their mothers, siblings, cousins, friends, schoolteachers, and EWIS program staff.

Many of the EWIS students shared that they looked up to their mothers as role models. As Amina described, "she has been like such a good inspiration to me, especially like how she shows me how hard work can push you in life." While their mothers were mostly not involved in STEM careers, the girls highlighted their mothers' persistence through challenges in life such as immigrating to America as a source of inspiration for them.

Along with their mothers, the EWIS students also referred to their brothers, sisters, and cousins as influential family members during their journey in the EWIS program. Many of the EWIS students shared how their siblings and cousins would help ease their feelings of stress when schoolwork demands were high. A time that stood out as particularly challenging for many of the girls was during their transition from middle school to high school. Kadijah explained how her sister and older cousin came together on a group facetime call and "they just like reassured me that everything was okay, and like they basically calmed me down and like I didn't feel overwhelmed anymore, and I got all my essays in on time." Similarly, Amina recalled how her brother helped her maintain a healthy balance between school and outside life:

> I was freaking out because of my grades and stuff. I remember him telling me that like you don't always have to worry about your grades. You should, but like you don't have to overstress yourself about it and get to a point where like your mental health is bad because of it.

This type of guidance and encouragement supported many of the girls in their ability to persist in both high school and the EWIS program.

In addition to family members, almost all the EWIS students pointed to their teachers, often specifically to their eighth-grade science teachers, as important people who provided guidance and helped open doors for them. Elena described how her teacher was there for her in both personal and academic ways:

> She understands what's going on, like if I like sit down and explain it to her, she knows what's going on, and she can help me through it. She'll give me advice and she gives me different options that I could take. For example, she's the one who gave me the papers to join EWIS.

Many of the EWIS students described similar types of relationships with the science teachers who recommended that they apply to the EWIS program.

The way the EWIS students described their relationships with their schoolteachers was similar to the way they described their relationships with the EWIS program coordinators. For example, Bianca asserted that part of the reason she likes the EWIS program is that the coordinators "make you want to learn." Along with inspiring the students to engage in STEM projects, the EWIS coordinators supported the students in personal ways

as well. Brenda praised one coordinator for this in particular, “She's a big help… Like if you need help with a problem, a personal problem at home or simply need somebody to talk to. She's great. She's amazing.” Teresa further captured the way their relationships with the EWIS coordinators impacted their experiences when she said:

> And they don't just help you with stuff in EWIS, they can help you with stuff outside of EWIS - school, your personal life. You can go to them and actually talk to them. It's not like... it's bigger than just EWIS.

The idea that their involvement in the program was “bigger than just EWIS” as Teresa described extended to the students’ relationships with each other. While the EWIS students talked excitedly about the many innovative STEM experiments and cool field trips they experienced in the program, it was when they talked about their relationships with their program peers that their faces lit up the most. Multiple girls described their program peers as “sisters” such as when Bianca divulged:

> Even when we're not even in the EWIS program and we'll just be there for each other, it’s like kind of a sisterhood almost…We all go to different schools, but yet and still we come together as one during this program.

The EWIS students discussed how they formed strong bonds with each other while in the EWIS program and especially during an end of year field trip. Brenda likened the nature of their relationships to a family: “It's just like a whole new family that's like added to the family tree.”

Expanding STEM Career Possibilities

Many students expressed that their experiences in the EWIS program expanded their understanding of the STEM career landscape. Vivian divulged that participating in EWIS exposed her to the field of biochemistry and how before her experiences in the program she “didn't know that actually existed.” Similarly, Mae shared that prior to participating in the program she had only really considered law as a potential career path, but EWIS showed her that there is a wide variety in the types of engineering possible to pursue:

> After EWIS I realized that there were a lot of fields in engineering and what we focused on was how engineering connected to nature… So, I guess the variety in engineering kind of made it a new career path for me. A possible career path.

The connection of STEM careers with nature resonated with multiple participants. Teresa described how her participation in EWIS influenced her development:

> Doing EWIS helped me see my interest in environmental science and just science overall. It helped me create bonds with nature and stuff and so like this is like step one of me finding out who I am and what I want to do.

Like others, Teresa expressed a feeling of newfound empowerment in her STEM identity and possible pathway as a result of her experiences in the program.

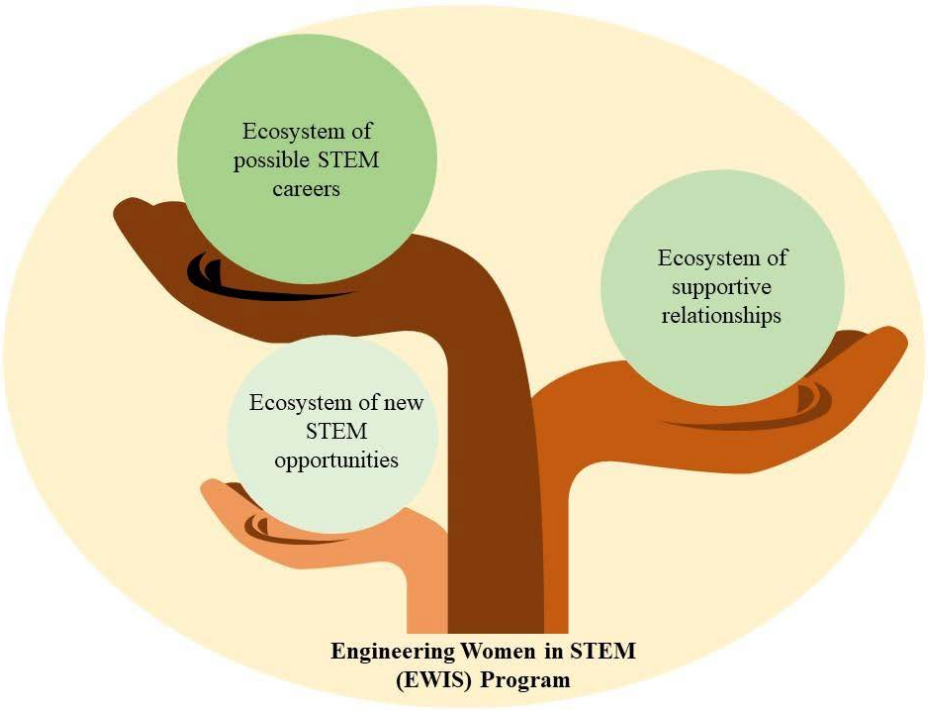
Not only did their awareness of available STEM career paths increase, but also their visions for themselves became more specific and higher-ranking. When asked how her experience in the EWIS program has influenced what career she wants to pursue, Kadijah explained how the program helped her develop a deeper understanding of what an engineer does and while she does not want to pursue the engineering path, she shared that the experience has helped her to "step up the career I want to do." Kadijah said that when she started EWIS, she was sure she wanted to be a nurse practitioner, but now she wants to be a pediatric surgeon. She describes how her vision evolved:

> When I first went to EWIS, I was like, I want to be a nurse practitioner. I'm sure I want to be a nurse practitioner. And then using all the problem-solving steps and everything has made me more like want to be a surgeon… before I thought it was going to be super hard and just like it was going to be too much and too much problem-solving and all of that and now, just like thinking now, I want to be a pediatric surgeon. So now when anybody asks me what career I want to do, I want to be a pediatric surgeon.

Kadijah's response shows how improving her problem-solving skills while in EWIS increased her confidence in her ability to pursue a more challenging career in the STEM field.

Figure 1

Building an Ecosystem of STEM Opportunities and Support for WOC



Discussion

Stepping Out and Stepping Up

Findings indicate that an urban STEM-focused OST program can activate an ecosystem of opportunities and support which can empower WOC to *step out* of their socialized comfort zones and *step up* to more advanced academic and career paths. Participant narratives demonstrate how their experiences in a particular urban STEM OST program opened doors and encouraged pathways otherwise historically made inaccessible and unwelcoming to WOC in STEM fields. The program's effectiveness was recognized by the students in its capacity to set up ecosystems of STEM support around WOC: an ecosystem of new STEM opportunities, an ecosystem of supportive relationships, and an ecosystem of possible STEM careers (Figure 1).

Ecosystem of New STEM Opportunities

Many of the EWIS students reported that they entered the program hesitantly, characterizing themselves as shy or introverted. Although it is not uncommon for students to

enter unfamiliar spaces with reservation, it is possible that the WOC were responding to stereotypes of WOC in STEM contexts. Other studies of STEM OST programs have shown that participants, teachers, and other adults carry learned, internalized ideologies of Black girls as being too loud or disruptive to participate in STEM (McGee & Bentley, 2017; Wade-Jaimes et al., 2019) consistent with a prevailing stereotype in educational settings that only "well-behaved," "nice" girls can be successful in STEM (Renold & Allan, 2006). By entering the program timidly, EWIS students may have been engaging in stereotype management (McGee & Martin, 2011), a tactical response to the presence of stereotype threat about their identities as WOC in a STEM environment. As the program progressed and the students were exposed to an ecosystem of STEM opportunities within the safety of the program and alongside other minoritized peers, the students claimed other aspects of their identity, such as being "curious," a "problem solver," and "determined." By engaging in new STEM opportunities offered through the program, the students expressed their STEM identities more confidently and authentically, as Brenda said "[the EWIS program] gave me a chance to *step out* of my comfort zone."

Ecosystem of Supportive Relationships

A continuum of supportive relationships guided the WOC's experiences in the EWIS program. For any student the ability to participate in an OST program like EWIS requires certain sources of support and points of access (Snellman et al., 2015). Barriers such as economic means, transportation, and parental awareness of OST opportunities have been shown to prevent students of color from low-income backgrounds from participating in OST programs at the similar rates as their white peers (Kitchens & Gormley, 2018; Knop & Siebens, 2018). Many of the EWIS students reported that their eighth-grade science teachers not only recommended the EWIS program to them but helped them through the application process. The close relationships the EWIS students had with their eighth-grade science teachers were pivotal in their decision to apply to EWIS. As Amina described in reference to her teacher, "She was like always there for me."

Once in the EWIS program, relationships both within and outside of the program continued to be important to the WOC's persistence in EWIS. Previous studies have shown that students, particularly students with increased burdens such as WOC from low-income backgrounds, are situated at a high risk for dropping out of OST programs and of high school altogether (Stearns & Glennie, 2010). EWIS students emphasized how their family and friends

supported them through challenging experiences in high school and in EWIS. Many of the WOC noted how their support systems helped them to lower stress levels and reminded them how capable they were of achieving their goals. The combination of academic and personal support from the EWIS coordinators also proved to be a critical component to their perseverance. As Brenda admitted, "when my attendance started to go down, that was when [EWIS coordinator] had a talk with me and I guess that really brought me to attention of wow I haven't been very committed to WINS... I'm going to make that commitment because I love EWIS." An ecosystem of supportive relationships should be understood as integral to the success of WOC in STEM OST programs.

Ecosystem of Possible STEM Careers

Previous studies have shown that students who are exposed to the STEM field either through school, family, or community networks are more likely to pursue a STEM degree and career (Fuesting et al., 2017; Yoel & Dori, 2021). Many of the EWIS students shared that they had previously had little exposure to the STEM field and limited knowledge of the wide range of possible STEM careers. However, findings show that the students' experiences in the EWIS program expanded their understanding of the STEM career landscape by introducing them to specific STEM careers, such as the multiple types of engineering and types of scientists. Among the EWIS students, Amina was able to fine tune her STEM career vision: "Participating in EWIS I just found out like the type of forensic science, I want to be, I think, I want to be a forensic pathologist." Building from this newfound awareness and ability to specify a STEM career for themselves, the EWIS students also discussed how their experiences with STEM activities in the EWIS program increased their self-confidence in pursuing higher-level STEM career goals. At the end of their first year in the EWIS program, these WOC expressed a strong sense of personal agency in their visions for their future STEM careers.

Implications

This narrative study is significant to the future of the STEM field and to OST programs aimed at supporting underrepresented populations in STEM, specifically urban WOC. Findings suggest that programs like EWIS and the stories of the WOC who participate in

them may be critical in the effort to demonstrate how WOC may not only enter the STEM field but also persist and be successful in long-term careers.

The experiences of EWIS program participants indicate that multiple, interlocking ecosystems must be present for a student to have the personal, academic, and professional support necessary to access a STEM career – and that the strength of these ecosystems is of critical importance for WOC. First, the EWIS program engaged the participating WOC in an ecosystem of new STEM opportunities within a context where students felt welcomed to express their cultural, racialized, and gendered identities. This combination of a culturally sustaining environment (Paris, 2012) with authentic learning experiences unlocked the potential for these WOC to be able to *step out* and be their full selves while encountering new STEM activities. It is not enough for urban OST programs to simply offer STEM opportunities; they must incorporate culturally sustaining pedagogies and practices to have meaningful impact.

Concurrently, these WOC were being uplifted by an ecosystem of supportive relationships. From their mothers to family members to teachers to EWIS program staff and, importantly, to each other, a continuum of supportive relationships undergirded the stresses and joys of their lives both within and outside of the program. It's clear that the caring conversations and actions of the people in their relationship ecosystems were integral to these students' success in mitigating and overcoming historic disadvantages for WOC in STEM environments. Programs looking to foster similar success should proactively and continually seek to nurture these types of relationship networks for participants and especially participants from marginalized backgrounds.

Lastly, the EWIS program encouraged the young WOC to *step up* through an ecosystem of possible STEM careers. For these WOC, the exposure to STEM career options while in the EWIS program altered their career path visions. Some students named more specific STEM career options and others claimed a more advanced career goal than they had previously dreamed for themselves. The exposure to an ecosystem of possible STEM careers empowered the WOC to expand their career visions and seek pathways to achieve these new goals. It should be understood that the influence of the ecosystem of possible STEM careers was made possible through the foundation set by the ecosystem of new STEM opportunities in a culturally sustaining environment and the ecosystem of supportive relationships. All

three of these ecosystems worked together to create these young WOC's shared stories of joy and achievement in the urban STEM OST program.

Efforts to diversify the STEM field must move beyond acknowledgment of the many obstacles minoritized students face and begin to make programmatic changes and investments directly into the lives of those who aim to surmount these obstacles. We assert that the EWIS program was instrumental to the STEM empowerment reported by the participating WOC. These types of STEM-focused OST program for WOC should be further understood and replicated as a mechanism for change to begin to rectify the current imbalance of representation in the STEM field.

Acknowledgement

This work is supported through a grant from the National Science Foundation, DRL #1849735. Opinions or points of view expressed in this document are those of the authors and do not necessarily reflect the official position of, or a position that is endorsed by, the National Science Foundation.

References

Alim, H. S., & Paris, D. (2017). What is culturally sustaining pedagogy and why does it matter? In D. Paris & H.S. Alim (Eds.), *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world* (pp. 1-24). Teachers College Press.

Allen-Handy, A., Ifill, V., Schaar, R. Y., Rogers, M., & Woodard, M. (2020). Black girls STEAMing through dance: Inspiring STEAM literacies, STEAM identities, and positive self-concept. In K. Thomas & D. Huffman (Eds.) *Challenges and opportunities for transforming from STEM to STEAM education* (pp. 198-219). IGI Global.

Allen-Handy, A., Ifill, V., Schaar, R. Y., Woodard, M., & Rogers, M. (2021). The emerging critical pedagogies of dance educators in an urban STEAM after-school program for black girls. *Journal of Urban Learning, Teaching, and Research, 16*(1), 58-88.

Afterschool Alliance (2014). *America after 3PM: Afterschool programs in demand.* https://www.afterschoolalliance.org/documents/AA3PM-2014/AA3PM_Key_Findings.pdf

Baker, B., Di Carlo, M. Weber, M. (2022). *Ensuring adequate education funding for all: A new federal foundation aid formula.* Albert Shanker Institute. https://www.shankerinstitute.org/sites/default/files/2022-08/FEDfinalreport.pdf

Baran, E., Bilici, S. C., & Mesutoglu, C. (2016). Moving STEM beyond schools: Students' perceptions about an out-of-school STEM education program. *International Journal of Education in Mathematics, Science and Technology*, *4*(1), 9–19.

Barker, B. S., Larson, K., & Krehbiel, M. (2014). Bridging formal and informal learning environments. *Journal of Extension*, *52*(5), 5.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human Development, 49*(4), 193–224. https://doi.org/10.1159/000094368.

Barron, B. (2010). Conceptualizing and tracing learning pathways over time and setting. *National Society for the Study of Education*, *109*, 113–127.

Bathgate, M., Shunn, C., & Correnti, R. (2014). Children's motivation toward science across contexts, manner of interaction, and topic. *Science Education*, *98*(2), 189–215. https://doi.org/10.1002/sce.21095.

Berry, T. (2010). Engaged pedagogy and critical race feminism. *Educational Foundations*, *24*(34), 19.

Brown, B. A. (2019). *Science in the city*. Harvard Education Press.

Chiu, A., Price, C. A., & Ovrahim, E. (2015). Supporting elementary and middle school STEM education at the whole school level: A review of the literature. *Chicago: Museum of Science and Industry.*

Collins, P. H. (1986). Learning from the outsider within: The sociological significance of Black feminist thought. *Social Problems, 33*(6), 14-32.

Corin, E. N., Jones, M. G., Andre, T., Childers, G. M., & Stevens, V. (2017). Science hobbyists: Active users of the science-learning ecosystem. *International Journal of Science Education*, *7*(2), 161–180.

Crenshaw, K. W. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, *1*(8), 139 - 167.

Crenshaw, K. W. (1990). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review, 43*(6), 1241 – 1299.

Crowley, K., Barron, B. J., Knutson, K., & Martin, C. (2015). Interest and the development of pathways to science. In K. A. Renninger, M. Nieswandt, & S.Hidi (Eds.), *Interest in mathematics and science learning* (pp. 297 – 313). American Education Research Association.

Dabney, K. P., Tai, R. H., Almarode, J. T., Miller-Friedmann, J. L., Sonnert, G., Sadler, P. M., & Davis, K. S. (2002). Advocating for equitable science-learning opportunities for girls in an urban city youth club and the roadblocks faced by women science educators. *Journal of Research in Science Teaching, 39*, 151–163.

DeCuir-Gunby, J. T., Marshall, P. L., & McCulloch, A. W. (2011). Developing and using a codebook for the analysis of interview data: An example from a professional development research project. *Field Methods, 23*(2), 136-155.

Denzin, N. K. & Lincoln, Y. S. (2011). *The SAGE Handbook of qualitative research* (4th ed.). Sage Publications.

Delgado, R., Stefancic, J., & Harris, A. (2017). *Critical race theory (3rd ed.)*. NYU Press.

Denson, C. D., Hailey, C., Stallworth, C. A., & Householder, D. L. (2015). Benefits of informal learning environments: a focused examination of STEM-based program environments. *Journal of STEM Education: Innovations and Research*, *16*(1), 11.

Emdin, C. (2010). Affiliation and alienation: Hip-hop, rap, and urban science education. *Journal of Curriculum Studies*, *42*(1), 1–25. https://doi.org/10.1080/00220270903161118.

Evans-Winters, V. E., & Esposito, J. (2010). Other people's daughters: Critical race feminism and Black girls' education. *Educational Foundations, 24*, 11-24.

Fadigan, K. A., & Hammrich, P. L. (2004). A longitudinal study of the educational and career trajectories of female participants of an urban informal science education program. *Journal of Research in Science Teaching*, *41*(8), 835-860. doi:10.1002/tea.20026

Fadigan, K. A., & Hammrich, P. L. (2005). Informal science education for girls: Careers in science and effective program elements. *Science Education Review*, *4*(3), 83–90.

Falk, J. H., Dierking, L. D., Staus, N. L., Wyld, J. N., Bailey, D. L., & Penuel, W. R. (2016). The synergies research-practice partnership project: A 2020 vision case study. *Cultural Studies of Science Education*, *11*(1), 195–212.

Fuesting, M. A., Diekman, A. B., & Hudiburgh, L. (2017). From classroom to career: The unique role of communal processes in predicting interest in STEM careers. *Social Psychology of Education, 20*(4), 875-896.

Griffiths, M. (2009). Critical approaches in qualitative educational research: The relation of some theoretical and methodological approaches to these issues. Edinburgh Research Explorer. https://www.pure.ed.ac.uk/ws/portalfiles/portal/15324325/Critical_Approaches_in_Qualitative_Educational_Research.pdf

Gonsalves, A. J. (2014). "Science isn't just what we learn in school": Interaction rituals that value youth voice in out-of-school-time science. *Canadian Journal of Education*, *37*, 185–208.

Harper, S. R. (2010). An anti-deficit achievement framework for research on students of color in STEM. *New Directions for Institutional Research*, *148*, 63-74.

Harris, A. P. (1990). Race and essentialism in feminist legal theory. *Stanford Law Review*, *42*(3), 581 - 616.

Hazari, Z. (2012). Out-of-school time science activities and their association with career interest in STEM. *International Journal of Science Education, 2*(1), 63-79.

Horsford, S. D., Scott, J. T., & Anderson, G. L. (2018). The politics of education policy in an era of inequality: Possibilities for democratic schooling. Routledge.

Jackson, N. J. (2013). Learning ecology narratives. In N. J. Jackson & J. Willis, J., *Lifewide learning, education and personal development.* Ebook. http://www.lifewideeducation.uk/uploads/1/3/5/4/13542890/c4._norman_jackson.pdf

Josselson, R., & Lieblich, A. (Eds.). (1995). *Interpreting experience: The narrative study of lives*. Sage Publications.

Kelley, T. R., & Knowles, J. G. (2016). A conceptual framework for integrated STEM education. *International Journal of STEM Education*, *3*(1), 1-11.

King, N. S., & Pringle, R. M. (2019). Black girls speak STEM: Counter stories of informal and formal learning experiences. *Journal of Research in Science Teaching, 56*(5), 539-569.

Kitchens, K. & Gormley, W. (2018). The Hispanic extracurricular participation gap. *Social Science Quarterly, 99*(5), 1776-1790. DOI: 10.1111/ssqu.12534

Klanderman, D. B., Moore, W. M., Maxwell, M. S., & Robbert, S. K. (2013). Creating problems and their solutions: Service-learning through trinity mathematics triathlons, math nights, and math centers. *Problems, Resources, and Issues in Mathematics Undergraduate Studies*, *23*(6), 563–571.

Knop, B., & Siebens, J. (2018). *A child's day: Parental interaction, school engagement, and extracurricular activities: 2014.* US Census Bureau.

https://www.census.gov/content/dam/Census/library/publications/2018/demo/P70-159.pdf

Koch, M., Lundh, P., & Harris, C. J. (2019). Investigating STEM support and persistence among urban teenage African American and Latina girls across settings. *Urban Education*, *54*(2), 243–273.

Lauer, P. A., Akiba, M., Wilkerson, S. B., Apthorp, H. S., Snow, D., & Martin-Glenn, M. L. (2006). Out-of-school-time programs: A meta-analysis of effects for at-risk students. *Review of Educational Research*, *76*(2), 275-313.

Lincoln, Y. G., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Lukes, D., & Cleveland, C. (2021). T*he lingering legacy of redlining on school funding, diversity, and performance*. Annenberg Institute for School Reform at Brown University. https://files.eric.ed.gov/fulltext/ED616673.pdf

McCombs, J. S., Whitaker, A., & Yoo, P. (2017). The value of out-of-school time programs. Rand Corporation. https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE267/RAND_PE267.pdf

McGee, E. O., & Martin, D. B. (2011). "You would not believe what I have to go through to prove my intellectual value!" Stereotype management among academically successful Black mathematics and engineering students. *American Educational Research Journal*, *48*(6), 1347-1389.

McGee, E. O. (2016). Devalued Black and Latino racial identities: A by-product of STEM college culture? *American Educational Research Journal*, *53*(6), 1626-1662.

McGee, E. O., & Bentley, L. (2017). The troubled success of Black women in STEM. *Cognition and Instruction, 35(*4), 265-289.

McLaughlin, C. A. (2014). Urban science education: Examining current issues through a historical lens. *Cultural Studies of Science Education, 9*(4), 885-923.

Merriam, S. B., & Tisdell, E. J. (2016). Qualitative research: A guide to design and implementation (4th Ed). Jossey-Bass

Milner IV, H. R. (2007). Race, culture, and researcher positionality: Working through dangers seen, unseen, and unforeseen. *Educational Researcher, 36*(7), 388-400.

Morales-Doyle, D., & Gutstein, E. R. (2019). Racial capitalism and STEM education in Chicago Public Schools. *Race, Ethnicity, and Education, 22*(4), 525-544.

National Institute on Out-of-School Time. (2003). Making the case: A fact sheet on children and youth in out-of-school time. https://www.niost.org/pdf/factsheet2009.pdf

National Science Foundation (NSF) (2023). *Diversity and STEM: Women, minorities, and persons with disabilities.* National Center for Science and Engineering Statistics. https://ncses.nsf.gov/pubs/nsf23315/

National Research Council (NRC) (2015). *Identifying and supporting productive STEM programs in out-of-school settings.* National Academies. https://nap.nationalacademies.org/catalog/21740/identifying-and-supporting-productive-stem-programs-in-out-of-school-settings

Ochberg, R. L. (1994). Life stories and storied lives. *Exploring Identity and Gender: The Narrative Study of Lives, 2*, 113-144.

Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher, 41*(3), 93-97.

Patton, L. D. (2009). My sister's keeper: A qualitative examination of mentoring experiences among African American women in graduate and professional schools. *The Journal of Higher Education, 80*(5), 510-537.

Patton, L. D., & Ward, L. W. (2016). Missing Black undergraduate women and the politics of disposability: A critical race feminist perspective. *Journal of Negro Education, 85*(3), 330-349.

Perry, B. L., Link, T., Boelter, C., & Leukefeld, C. (2012). Blinded to science: Gender differences in the effects of race, ethnicity, and socioeconomic status on academic and science attitudes among sixth graders. *Gender and Education, 24*(7), 725-743.

Renold, E. & Allan, A. (2006). Bright and beautiful: High achieving girls, ambivalent femininities, and the feminization of success in primary school. *Discourse: Studies in the Cultural Politics of Education, 27*(4), 457-473

Roberts, T., Jackson, C., Mohr-Schroeder, M. J., Bush, S. B., Maiorca, C., Cavalcanti, M., Schroeder, D. C., Delaney, A., Putnam, L., & Cremeans, C. (2018). Students' perceptions of STEM learning after participating in a summer informal learning experience. *International Journal of STEM Education*, *5*(1), 1- 14.

Saldaña, J. (2013). The coding manual for qualitative researchers. Sage Publications.

Seiler, G. (2001). Reversing the "standard" direction: Science emerging from the lives of African American students. *Journal of Research in Science Teaching*, *38*, 1000–1014.

Snellman, K., Silva, J., Putnam, R. (2015). Inequity outside the classroom: Growing class differences in participation in extracurricular activities. *Voices in Urban Education, 40*, 7-14.

Stearns, E., & Glennie, E. J. (2010). Opportunities to participate: Extracurricular activities' distribution across and academic correlates in high schools. *Social Science Research, 39*(2), 296–309.

Sterin, K., Fornaro, C. J., & Struloeff, K. L. (2022). The influence of teacher leaders in informal learning contexts. In N. Bond (Ed)., *The power of teacher leaders: Their roles, influence, and impact (2nd ed.)* (pp. 81-96). Kappa Delta Pi Publications.

Vadeboncoeur, J. A. (2006). Engaging young people: Learning in informal contexts. *Review of Research in Education, 30*, 239-278.

Wade-Jaimes, K., Cohen, J. D., & Calandra, B. (2019). Mapping the evolution of an after-school STEM club for African American girls using activity theory. *Cultural Studies of Science Education, 14*(4), 981-1010.

Wing, A. K. (Ed.). (1997). *Critical race feminism: A reader*. NYU Press.

Yoel, S. R., & Dori, Y. J. (2021). FIRST high-school students and FIRST graduates: STEM exposure and career choices. *IEEE Transactions on Education, 65*(2), 167-176.

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Ian M. Marcus (he/him) received his PhD in chemical and environmental engineering from the University of California, Riverside. Since earning his degree, his research has shifted to pedagogical research. First empowering citizen scientists to collaborate with scientists in their field of interests at the Center for Reseach and Interdisciplinarity in Paris (CRI), then as a Howard Hughes Medical Institute Fellow designing learner-centered curriculum for university students at UC Santa Cruz. Since those postdoctoral experiences he has continued to design curriculum at the high school and college level. Currently, he is operating as a data scientist working with stakeholders to deliver data-driven decision making at Drexel University.

Hillary Blecker, MPH, PCC (she/they) is a leadership coach and facilitator focused on assisting organizations and individuals to better communicate and build inclusive culture. She's a longtime leader of both dialogues and trainings and has a decade of experience in occupational health and safety training, where she learned that relationships and trust were the biggest internal obstacles to groups getting what they want. Now she leads dialogues and coaches groups and individuals to address existing conflicts, locate barriers to engagement, and build trust. She holds a BA in Public Health Social Sciences from Johns Hopkins University, a Master of Public Health in Community Practice from the University of Washington, and a graduate certificate in Diversity Leadership from Temple University. Hillary is a certified professional coach through Leadership that Works and accredited with the International Coaching Federation as a Professional Certified Coach (PCC). Hillary prioritizes connection, warmth, and flexibility in assisting groups and individuals to have productive conflict and get where they need to go.

Sharon L Walker (she/her) is an accomplished and visionary leader in the field of engineering education, dedicated to fostering a culture of diversity, equity, and inclusion (DEI). As the Dean of the College of Engineering at Drexel University, her transformative initiatives and tireless advocacy have left an indelible mark on both her institution and the broader community. Dr. Walker earned her PhD in Environmental Engineering from Yale University, before establishing the Fate and Transport laboratory at the University of California, Riverside. Her research focuses on the environmental and health impacts of colloids in the environment. Beyond her research, she has persistently been an advocate and leader in making engineering a welcoming environment for women. This includes fostering student groups all the way to holding the esteemed role of Executive Director of the Executive Leadership for Academics in Technology, Engineering, and Sciences (ELATES). ELATES is a program that brings in talented women in STEM and gives them the tools to become leaders at their institutions.