

CHAPTER NINETEEN

## Intersectionality AS Praxis FOR Equity IN STEM

### A WiSE Women of Color Program

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The participation of women and underrepresented racial and ethnic groups in science, technology, engineering, and mathematics (STEM) fields remains a persistent social justice issue for educators and policymakers. Black, Latina, and Indigenous women earned 12.6% of bachelor's degrees in STEM in 2014 and accounted for just 7% of faculty at all ranks in STEM departments in the United States (The National Science Foundation [NSF], 2017). As women of Color at all levels of the academy navigate STEM departments, labs, classrooms, and other social and academic spaces, research documents consistent patterns of exclusion from White peers and faculty. Women of Color faced racialized and gendered stereotypes; coped with discouragement and lack of support from faculty; experienced both hypervisibility and invisibility; and felt a diminished sense of belonging and need to constantly prove themselves among faculty and peers (Foor, Walden, & Trytten, 2007; A. Johnson, 2007; D. Johnson, 2012; Ko, Kachchaf, Hodari, & Ong, 2014; Malone & Barabino, 2009). Women of Color experience belonging to and persistence in STEM when they have strong identities as scientists/engineers, are involved in STEM-related professional clubs, feel confident in their academics, participate in research programs, and interact with faculty and peers outside of class (Carlone & Johnson, 2007; D. Johnson, 2012; Espinosa, 2011; Rodriguez, Cunningham, & Jordan, 2017).

Over the past 30 years, colleges and universities have developed women in science and engineering (WiSE) programs to recruit and retain women in STEM

fields (Fox, Sonnert, & Nikiforova, 2011). These programs offer activities such as peer mentoring, tutoring, study spaces, career workshops, faculty mentoring, clustered housing in residential halls, and social activities (D. Johnson, 2011; Fox et al., 2011). There is evidence, however, that WiSE programs struggle with garnering the participation of women of Color (D. Johnson, 2011) and there is little in the published research on how WiSE programs address the needs of women of Color who experience STEM learning environments at the intersections of race and gender. This chapter describes the work of WiSE Women of Color in STEM, an intersectional mentoring and community building program for women of Color in STEM majors at Syracuse University, a private research university located in central upstate New York.

## WOMEN OF COLOR IN STEM AND INTERSECTIONALITY

Malcom and her colleagues (1976) first articulated the intersectional experiences of women of Color in STEM as the *double bind* of gendered racism. *Intersectionality*, coined by critical legal scholar Kimberlé Crenshaw (1989), is a framework useful in recognizing and centering the systemic disadvantage experienced by women of Color, by analyzing how race, gender, socioeconomic class, sexual orientation, disability status, and other social identity group markers interlock as socially constructed systems and structures of power and inequity (Dill & Zambrana, 2009). Intersectionality examines the complexity of inequity within institutional systems and structures (e.g., education, government, media) and specific social, educational, historical, and geographic contexts, by analyzing the junctures of multiple social groups (e.g., queer women of Color; poor disabled women) rather than focusing on a singular group analysis (e.g., women only; Crenshaw, 1991; Dill & Zambrana, 2009). Finally, by centering the experiences of women of Color, intersectional analyses can result in the transformation of systems of inequity through education, policy, and advocacy (Crenshaw, 1991; Dill & Zambrana, 2009).

Recent scholarship on women of Color in STEM has utilized intersectionality as a guiding and analytical framework (e.g., see Espinosa, 2011; Ko et al., 2014; Rincón & Lane, 2017; Ro & Loya, 2015; Rodriguez et al., 2017). This framing has contributed greatly to STEM education research by disaggregating the experiences of women of Color from White women and men of Color and drawing attention to the interlocking nature of racism and sexism in STEM environments (D. Johnson, 2012). Lastly, intersectional frameworks have been used in discussions on policy and practice transformations that would support greater equity in STEM fields for women of Color (e.g., Armstrong & Jovanovic, 2017; A. Johnson, 2006).

## EVOLUTION OF WISE WOMEN OF COLOR IN STEM AT SYRACUSE UNIVERSITY

WiSE Women of Color in STEM (WWoC STEM) is a program that is part of the campus-wide WiSE program at Syracuse University (SU WiSE). In 1999, faculty founded SU WiSE with three key goals: (1) increase retention and representation of women in STEM, (2) sponsor a lecture series to highlight women scholars, and (3) create advising and mentoring programs. SU WiSE provides support to women faculty and students from the schools and colleges of Engineering and Computer Science, Arts & Sciences, Information Studies, and Education. Activities offered through SU WiSE include mentoring and networking programs for faculty and post-doctoral scholars, undergraduate research awards, an aspiring professionals program for graduate students, and an annual lecture featuring a female STEM scholar. Faculty leaders oversee and implement the varying initiatives and receive a small stipend for research or professional development activities.

### Intersectionality as Praxis

In the fall of 2014, a Black woman majoring in chemistry initiated WiSE Women of Color in STEM (WWoC STEM) to build community with other women of Color in science to combat the isolation she experienced in the predominantly White and male learning environments of her major. To illustrate this structural isolation, in 2016, there were 166 full time undergraduate students enrolled in the physical sciences (of which chemistry is a part) at Syracuse (Integrated Post-secondary Educational Data Systems [IPEDS], 2016a). Among these students, seven were Black/African American women. This is reflective of national patterns of degree attainment of Black/African American women in the physical sciences, who represented 3% of bachelor degrees awarded in these fields in 2014 (NSF, 2017). WWoC STEM engages undergraduate, graduate, and post-doctoral women from underrepresented racial and ethnic groups in STEM (defined by the NSF [2017] to include Black/African American, Latina/Hispanic, Native American, Alaskan Native, and Pacific Islander). However, women of Color from other racial and ethnic groups, including international students, have found community in WWoC STEM. With an approximate annual enrollment of 180 undergraduate women from underrepresented racial groups in STEM (among 2,100 full time undergraduates in STEM [IPEDS, 2016a]), 163 women have participated in WWoC STEM programs and events in the last four years.

The small number of women of Color on faculty in STEM at SU necessitated a collaborative approach across race and ethnicity, academic discipline, and academic position, to work with women of Color students in developing the

program. The WWoC STEM advisory group began as a collaboration among Black women faculty in physics and higher education, and a White woman faculty member in mechanical engineering. Since then, the leadership team has grown to include Latina (in biology), White (in biology) and Asian (in mathematics) women faculty, and three graduate women of Color who serve as mentors. Two White women provide part-time administrative support for both SU WiSE and WWoC in STEM, and undergraduate women of Color with work-study funding assist with planning events, connecting with students, facilitating programs, maintaining the program's web site, and providing additional staff support. The leadership team meets at the beginning of every semester to plan the calendar of events.

Grounded in themes drawn from research, WWoC STEM endeavors to empower women of Color through building community, fostering sense of belonging, and promoting academic, professional, and interpersonal excellence. Meetings and activities are planned for 3–4 times per semester, and senior undergraduate students and graduate student mentors frequently facilitate programs and lead discussions. Events have included panels on undergraduate research experiences and the graduate school application process, a screening and panel discussion of the film “Hidden Figures,” and virtual panels featuring women of Color professionals in STEM fields. Student-led discussions have focused on topics such as experiences with bias, strategies for support and success, the imposter syndrome, self-care, and building relationships with faculty.

At the conclusion of program gatherings and events, students completed an evaluation form to assess the impact of the activities on program outcomes. Using a response scale where 1 equals strongly disagree and 5 equals strongly agree, participants responded to a variety of items as indicated in Table 19.1. WWoC STEM appears to foster important outcomes, particularly with respect to an increased sense of belonging in STEM; feeling supported in the STEM journey; connecting with other women of Color; and, strengthened commitment to the institution and continuing in STEM. Areas for improvement include strengthening students' interest in graduate school and increasing connections with faculty on campus.

Open-ended comments underscore the impact of WWoC STEM. One student noted:

I love how this program brings us all together to get a chance to build a community of support. It's hard to find women of Color in STEM, so to have a space where all of them can be in the same space at the same time is great!

Another student expressed a similar sentiment stating, “I wanted to connect with other women of Color who know the struggle. I wanted to have people who understand what it is like being a STEM major on this campus.” With respect to learning from WWoC STEM events, one student wrote that she learned “[h]ow to email professors, how to interact with them, and how to go about getting

research opportunities [and] letters of recommendations,” while another indicated learning “[w]hat imposter syndrome is and that I wasn’t alone in what I was feeling. I’m glad [WiSE] put on the event and gave me insight on this phenomenon [and] advice to handle it.” Finally, a quote from one of our founding students sums up the importance of WWoC STEM:

As an undergraduate, having a space where I was empowered and mentored by WOC in STEM allowed me to overcome imposter syndrome, find professional opportunities and succeed as a bioengineer. Now I am able to do the same for my mentees.

Table 19.1. WiSE Women of Color in STEM Program Outcomes: 2014–2018.

	Mean
Increase sense of belonging	
I am more comfortable being in a STEM major	4.34
I am more confident that I belong in STEM	4.41
This event increased my sense of belonging	4.47
Build community of women of Color in STEM	
I feel supported in my journey to become a scientist/engineer	4.70
I feel I have more peers who I can go to for information	4.20
I feel connected with faculty, graduate mentors, or other resource people that help me in the future	4.24
I have strengthened existing relationships with people I have met through WiSE	4.20
There was sufficient opportunity to connect with other women in STEM	4.72
Increase career planning knowledge and skills	
My interest in pursuing research opportunities is stronger	4.30
My interest in pursuing post graduate education is stronger	4.01
My interest in pursuing a STEM career is stronger	4.38
Increase professional and academic knowledge and skills (not subject specific) that support persistence	
My intent to continue in STEM is stronger	4.43
My intent to graduate from SU is stronger	4.48

Source: Authors.

## CHALLENGES AND FUTURE DIRECTIONS

Many of the challenges faced by WWoC STEM relate to institutional structures and systems that do not easily accommodate the intersectional, multi-disciplinary, and collaborative nature of the program. The most persistent challenge is the lack of women of Color faculty at SU. Recent faculty data indicated that among all faculty across all disciplines, 71% of tenure and tenure-track faculty are White, and only 4% are women of Color from underrepresented racial/ethnic groups (IPEDS,

2016b). WWoC STEM keenly feels this faculty shortage, with few women of Color in STEM available to serve the program in leadership and mentoring capacities. While students of Color in STEM benefit from having mentors with whom they can relate to connect with (Griffin, Pérez, Holmes, & Mayo, 2010), women of Color in STEM often find that White male faculty are unwilling or unable to mentor them (A. Johnson, 2007), and thus are denied the advantages of mentoring relationships when few faculty of Color are available. While we aim to build a pipeline to develop women of Color faculty, this is a long-term effort requiring commitment from multiple parts of the university. In the meantime, WWoC STEM works to build a network of faculty allies among White people and men of Color invested in the success of women of Color.

Consistent institutional funding is another challenge faced by WWoC STEM. SU WiSE began with money from the NSF and struggled to secure consistent institutional financial support once the funds were expended, which is often the case for mentoring programs serving underrepresented groups (Haring, 1997, 2009). Neither SU WiSE nor WWoC STEM fit easily into silo-like institutional budget models and organizational structures because the programs serve individuals at all points in the STEM pipeline (faculty, undergraduates, graduate students, post-doctoral scholars) and across several university schools, colleges, and institutes. As a result, core program faculty have had to advocate for the continuation of funding on an annual basis, and in some years, WWoC STEM programming has been delayed until funds were allocated to SU WiSE. Consistent and timely funding allows WWoC STEM to recruit student participants early in the academic year and secure their involvement, as they manage academic demands, family and personal responsibilities, and other leadership roles on campus.

Reaching the students that WWoC STEM aims to serve is another challenge. While WWoC STEM has attracted many students to its programming over the past four years, there are also women of Color who do not participate in the program. Outreach happens by word of mouth, recruitment of students during new student welcome week, and posting event flyers around campus. Assistance with outreach is needed from the registrar to provide lists of potential students, and from faculty to refer students and promote the program in their classes. Additionally, efforts are needed to find out why some women opt not to participate in the program, which may be due to lack of awareness of the group, lack interest in the programming, or support from other campus programs for students of Color in STEM. Students may also be reluctant to get involved in a group for women of Color, as it may accentuate their minoritized status (Seymour & Hewitt, 1997). This emphasizes the need for university resources to cover issues of importance for women of Color in overall STEM programming activities.

Students, staff, and faculty have identified several areas for future programming for WWoC STEM. The program recently received a grant from the university to

develop a “resiliency network” of students, and faculty and staff allies to learn about the impact of racial and gender bias in the learning environment, develop strategies for resilience, and to interrupt and address bias when it occurs. SU WiSE piloted a summer research program, prioritizing women of Color, to provide opportunities for students to experience full-time research and build strong connections with faculty mentors on campus. This inaugural effort was a collaboration with the Louis Stokes Alliance for Minority Participation (LSAMP) program on campus. There are plans to expand the research program into the academic year, prioritizing women of Color with work-study funding so they can have a paid research experience that will build their resumes, enhance lab skills, and strengthen interests in graduate school.

Other areas of future programming include connecting with women alumni in STEM during a biannual reunion weekend held for alumni of Color, and working collaboratively with the multicultural affairs office, other campus-based programs for underrepresented students in STEM, and student chapters of the National Society of Black Engineers and the Society of Hispanic Professional Engineers. Students also want to deepen their awareness of various resources on campus and have greater faculty involvement. As discussed earlier, such efforts require dedicated and permanent institutional financial and human resources.

## CONCLUSION

In the 2018 spring semester at Syracuse University, video footage from a national engineering fraternity group was made public in which several male students unleashed a barrage of slurs targeted at students of Color, women, disabled students, queer students, and Jewish students. These events serve as a reminder of the intersectional nature of oppression, the need for programs such as WiSE Women of Color in STEM, and the importance of institutional attention to climate issues in STEM. While we have systematically and positively impacted the success of women of Color students on the campus, there is more work to be done. The commitment to equity in STEM requires an intersectional approach, and WiSE Women of Color in STEM at Syracuse University continues in this work.

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