Where are the women of Color professors?: Multicultural career sustainability utilizing participatory action research

Cassandra Puletapuai, Colorado State University

Cassandra Puletapuai is doctoral student at Colorado State University in the Education, Equity, and Transformation with an Emphasis in Construction Management, a graduate teaching assistant and graduate research assistant for the Construction Management Department. Her research interests include sociocultural and participatory action research practices that connect both the academy's and industry's vision for beneficial and tangible outcomes and increasing multicultural education, support, and competency in construction/engineering professional and academic spaces.

Dr. Daniel Birmingham, Colorado State University

Associate Professor of STEM Education in the School of Education and Colorado State University. Dr. Birmingham's research examines potential avenues to bridge community and educational experiences in order to alter modes of participation in STEM and support transformative learning for students from traditionally marginalized communities. A central aspect of his research is focused on the design of collaborative forms of qualitative research necessary for expanding dialog on the enduring challenges we face in the areas of educational equity and opportunity in STEM education.

Dr. Rodolfo Valdes-Vasquez, Colorado State University

Dr. Rodolfo Valdes-Vasquez is an Associate Professor and Graduate Program Coordinator in the Department of Construction Management at Colorado State University. His research, teaching, and engagement align with sustainable design and construction topics. He has received grant funding from federal and state agencies and private organizations. Rodolfo has taught multiple courses at the undergraduate and graduate levels, and he is well-versed in the scholarship of teaching. His efforts in leading the Sustainable Buildings program were recognized with the 2019 Award for Excellence in Education Abroad Curriculum Design. He has also worked as a construction project engineer, consultant, and safety inspector. He believes that educating the next generation of professionals will play a pivotal role in sustainability standard practices.

In terms of engagement, Dr. Valdes-Vasquez has served as the USGBC student club's adviser and the ASC Sustainability Team's faculty coach since 2013. He is currently serving as a CSU President's Sustainability Commission member, among multiple other committees. In addition, he is involved with various professional organizations at the national level, including the American Society for Engineering Education (ASEE), the Associated School of Constructions (ASC), the Construction Research Congress (CRC), and the Center for Infrastructure Transformation and Education (CIT-E). At the international level, he serves as the Associate Editor for the ASC International Journal of Construction Education and Research. He collaborates with faculty members in Brazil, Costa Rica, Ecuador, Panama, and Spain.

Where are the women of Color professors?: Multicultural career sustainability utilizing participatory action research

Abstract

Universities with a multicultural workforce positively impact the quality of services in professional development, mentorship, leadership, administration, advising, and the classroom learning environment. These valuable campus elements contribute to crafting students' learning outcomes and growth. The initial work of this paper will explore and synthesize research literature through critical consciousness lenses to continue illuminating the voices spoken by women of Color and making visible their challenges as faculty members. We present transformative, multidimensional, and participatory action research (PAR) approaches for academic institutions to incorporate, encourage, support, and expand women of Color faculty. PAR seeks collaboratively to comprehend social issues and action to bring about social change. Overall, we identify and summarize existing findings from previous research literature in which articles were selected relevant to women of Color challenges and PAR. The significance of this study is to contribute to building multicultural career sustainability with Women of Color in the construction and engineering education profession to bolster the empowerment and strengthen to increase the number of women of Color members, from students to professionals alike. The infancy stage of work will outline the next steps in future work.

Keywords

Women of Color STEM faculty, Participatory action research, Construction and Engineering Education Challenges

STEM's Women of Color (WOC) Deficiency

Gazing into the vast sea of STEM's scholarly practitioners, the omniscient eyes of inclusion spotlight women's of Color large absence from the academic scene in STEM. Women of Color (WOC) include African American/Black, Asian/Asian American, Hispanic/Latina, and Indigenous [1]. In 2060, women of Color will constitute 60 percent of the female population and 30 percent of the total U.S. populace. Women of Color numbers grew expeditiously in 2017 to 41 percent of the female population and 21 percent of the total U.S. populace [2]. Though the numbers uptick toward growth, stagnation looms in STEM (Science, Technology, Engineering & Mathematics) academically and professionally and in fields similar to engineering. The demographic reporting on engineering faculty with women of Color scholarly reports do not reflect the full scope of their characteristics, often negating gender, race, and specific engineering discipline [1]. The lack of an extensive demographic may lie with confidentiality reasons [1]; however, this discrepancy masks the invisible voice of women of Color [1]. Reduced visibility adds to the difficulty of pinpointing disparities and progress when researching women of Color [1] and limiting the voices of women of Color to impact current conditions in STEM.

While the STEM field lags in participation for women of Color, the engineering field lags even farther behind [1]. This paper aims to contribute to elevating the women's of Color challenges in STEM. In addition, previous research mentions women of Color challenges,

intersecting identities, and recommendations to address issues. Though our predecessors have laid the groundwork, we see using participatory action research (PAR) as beneficial for women of Color to become co-collaborators in research about themselves which works toward addressing the of inclusion of women of Color in the research process. There is little research utilizing PAR empowering and collaborative methodology concerning women of Color faculty in STEM spaces. PAR can reveal through the inclusion of women's of Colors voices/experiences if (1) other issues need to be addressed, (2) gauge if the recommendations are working, (3) empower women of Color to take charge and co-create outcomes for themselves, and (4) merit women of Color lived experiences. This paper digs into the barriers for women of Color faculty in STEM, the opportunity for PAR's employment, and the next phase of this initial work to continue to expand women's of Color experiences.

Voice of Experience Shortage

To contextualize women's of Color current experience, we must understand the past. An emerging theme (Table 1) presented an absence of women of Color voices in more extensive studies and papers and the need to delve into these matters. Many previous literature centers on women's experiences alone or the umbrella of faculty versus STEM faculty. Additionally, the need to capture women's of Color experiences in STEM disciplines similar to construction-engineering. Thus, we must look to several approaches similar to participatory action research (PAR) to capture and build upon the women of Color STEM faculty experiences. Additionally, we need to understand the complexity, the challenges, the successes, the histories, and the culture of their journey.

Table 1. Previous Literature on Women of Color Experiences [17-24].

Author(s)	Population	Findings	Emerging Research Needs Reported
Corneille et al. (2018)	STEM women of Color faculty, meta-analysis of peer-reviewed journal articles from 2001 to 2017	Women of Color faculty experience high teaching loads, unclear tracks to tenure, lack of culturally responsive mentorship	Limited research on women of Color research in leadership roles and minority-serving institutions, more research needed on transformative efforts for women of Color and long-term efficacy strategies
Hurtado & Figueroa (2013)	STEM faculty members, survey of 56 universities with over 1,800 STEM faculty	STEM female faculty member experience low levels of job satisfaction and the intention to quit is higher, regardless of field and sex, professional isolation was a factor in job departure, women of Color are are survivors with experience shaped by underrepresentation	Not explained in detail why few women of Color are STEM professors, many studies do not focus specifically on women of Color experiences, few quantitative studies have large enough women of Color sample sizes to draw conclusions, policies and procedures should cater to the safety and career concerns of women of Color
Fox Tree & Vaid (2022)	women of Color faculty, review of empirical studies	Bias affects teaching, service, and research which influences retention and challenges of faculty of Color	Women of Color faculty experiences are specified often in studies, highlights the voices of the disparities of women or race
Ginther & Kahn (2013)	STEM women of Color, National Science Foundation survey of doctorate recipients in science and engineering from 1993 to 2008	College graduation, receiving an engineering and science PhD, and tenure-track position in predominantly White institutions are less likely compared with White women	Women of Color data difficult to collect with confidentiality constructs, small representation, data aggregated
Lloyd-Jones (2011)	African American, Asian America, Pacific Islander American, Hispanic/Latina, Native American women faculty in predominantly White higher education institution, examination of the two-edited volume of *Women of Color in Higher Education: Turbulent Past, Promising Future*	Numbers increasing but still underrepresented, more women of Color inclusion in academia, challenges pertaining to race and gender, accessibility to opportunity, resources, opportunity	A need for more theories and practices relevant to women of Color
Main et al. (2022)	Women of Color faculty and PhDs in U.S. engineering programs data from 2005 to 2018	Slight uptick in women of Color engineering faculty; however, engineering PhD representation remain low	Several reports of faculty demographics lack relevant data or data restrictions
Strings (2021)	Women of Color faculty & student interactions, autoethnography of two feminist seminars taught at a large public university	Limited & varied findings	Women of Color faculty experience with teaching graduate courses, graduate course in women dominated and social sciences under researched
Turner & Gonzalez (2008)	Meta-analysis of faculty of Color from 1988 to 2007	Issues: intersection of gender, teaching challenges, isolation & marginalization, job satisfaction, bias in hiring, unjust work expectations, language/accent discrimination, lack of diversity, lack of recruitment/retention, -isms (race/ethnicity, class, gender, sexual orientation, tokenism, salary inequities, pipeline issues, history of exclusion, , myths, affirmative action/legal issues, health fields, resiliency, mentorship, teaching & pedagogy, stress & coping, service, tenure & promotion, different ways of knowing	Most literature focuses on faculty of Color at four-year universities, little on intersectionality with race/ethnicity & sexuality, international connection undervalued, nationwide resolution to issues, more research needed on women of Color faculty

Fighting Contorted Outlooks

Setting the stage for women of Color's professional journey appears mounted in intricate and paradoxical experiences influenced by external forces. Socialization is defined as "the process of learning meanings and practices that enable us to make sense of and behave appropriately in that culture" [3, p. 36], while gender refers to the "roles, behaviors, and expectations our culture assigns to those markers" [3, p. 38]. Given the hierarchical structure innate to society, the same question always arises - who decides, who decides? Socialization possesses power as it may message who plays the inferior or superior role in society, which gives rise to oppression, prejudice, discrimination, sexism, and more. Numerous examples include advertising, music videos, and movies regarding sexism. Sexualized and half-witted women become prey in slasher films. In advertising, women athletes commonly grace the commercial scene as a homemaker versus showcasing the skills of their respective sports. Women alter into highly sexualized vixens in music videos [3]. Popular culture paints women of Color without multicultural perspicacity as agamogenetic [4], a commodity, exotic, and sexual beings, [4] or masculine superhumans [4]. These unfounded labels shape perceptions that preserve prejudices similar to racism, homophobia, and sexism [4] that feed into the gender socialization of cultural norms [3] that women of Color attempt to eradicate. The contorted portrayals ferociously fasten themselves to economic and political power. All of which propagate a dehumanizing temperament toward women of Color [4].

The women of Color identities contain intersecting complexity. Women of Color embody the role of not only women but also individuals of Color. Also, known as the "double bind" [5, p. 843] where women of Color suffer from gender and race-related challenges concurrently [5]. As Kimberle Crenshaw stated [5], women of Color face racial and gender discrimination among other biases based on their identities. The two identities are intertwined, and research addressing gender or race erases women of Color's experiences [6]. Identity consists of multiple dimensions: nationality, age, sexuality, ability/disability, and more [7]. Students of Color hold more than one identity, which operates and ties to power, social stratification, and privilege [7]. We do not undermine the multiple layers of identity connected to various forms of oppression women of Color experience beyond gender and race. However, in this context of women of Color, gender, and race are the predominant identifiers as women of Color faculty encounter challenges tied to gender and race simultaneously [8]. The sexist delusions from male coworkers that women of Color must negotiate include: the subservient stereotype [8], passive attitudes [8], and diversity hires [8]. Thus, women of Color faculty positions dare not fathom legitimacy among their colleagues and influence the twisted perceptions before arriving at the STEM threshold.

Women of Color Faculty

As women of Color emerge inspirit through the academic doorway and nestle into faculty positions, it is important to understand the journey. Some challenges women of Color faculty undergo ominously reflect on their days as students. Previous studies outline issues of insufficient cultural representation in the curriculum [7], stereotyping, isolation, faltering DEI (diversity, equity, and inclusion) policies and practices, tokenism, and false impressions of academic achievement [7]. The splendor of academic potential expeditiously dissipates as the impenetrable fog of inequity surrounds and persists, overshadowing their careers. Maltreatment permeates with faulty of Color in their classrooms. The oppression that subverts faculty’s of Color well-being and instructs effectively in their classrooms.

Previous research examines the student of Color perspective and classroom oppression, while little research comes from the angle of the instructors of Color and their experiences with students [8]. Studies have illustrated women [8] and faculty of Color [8] hold more than negative evaluations than their White male colleagues. Women of Color evaluations trend negatively compared to White women or men of Color [8]. Women of Color have examples where they received marks as less plausible and knowledgeable [8]. A study by Harlow [8] reported Black women professors discussed their power and capability were repeatedly challenged by students of the dominant culture. This questioning of authority and competency occurs more widely than in White women professors. A 2004 quantitative study by Kardia and Wright [8] identified women of Color reported double the increase in student challenges compared to White women when instructing content related to identity. In another study, Pittman [8]) revealed four distressing themes from women of Color faculty. They described occurrences with the students from the dominant culture that “challenged their authority, questioned their teaching authority, and disrespected their scholarly expertise" [8, p. 187]. Some participants expressed more aggressive behavior from students of the dominant culture [8].

According to the 2020 National Center for Education Statistics (NCES), women of Color in higher education full-time faculty numbers linger at relatively low rates in the U.S., with

White women at 35 percent, Asian/Pacific Islander women at 5 percent, and four percent Black women. American Indian/Alaska Native individuals and individuals of two or more races at one percent with gender not called out. A large concentration of women of Color occupies positions as instructors, lecturers, and associate professors [8]. Women of Color are mainly employed at two-year high learning institutions, community colleges, and minority education institutions [8]. Historically Black Colleges and Universities (HBCUs) employ a greater segment of Black faculty [5]. Federally funded colleges and public institutions benefit from a more diverse faculty [5]. A higher likelihood of women faculty appears in research institutions with plans to focus on the needs of women. The quantity of African American/Black women and Hispanic/Latina women faculty employed remains small among prestigious engineering and science research institutions compared to other universities and colleges [5]. Women and multicultural faculty bear little presence in selective universities as well [5].

Women of Color professors hold a scintilla of authority with less power and value than their cohorts [8]. Departments hire women of Color to instruct sizeable introduction and new preparation courses [8], which leads to heavy teaching loads and overtax women of Color faculty more than men or White women [8]. Such a burdensome teaching load triggers high stress [8] and isolation [8]. Expectations exclusively link to gender and race as the work culture inaccurately presumes that women of Color will automatically spearhead nurturing roles [8] or race-related task forces [8]. Though women educators confront isolation in their profession [8], women of Color come across a heightened form of exclusion from the networks of White men, White women, and men of Color based on their multicultural identity encompassing race and gender [8]. Other research magnifies Women of Color faculty in STEM, and the struggle with the double bind [5]. Women of Color faculty endure a “chilly climate,” covert and overt “microaggressions” [5, p. 845]; and the “minority tax” [5, p. 845]. STEM Women of Color undergo a whirlwind of an absence of mentoring [5], trailblazing [5], and "pet-to-threat" [5].

So what?

Multicultural staff positively raises learning outcomes for everyone [8]. Prior studies conveyed a strong dovetail between multicultural faculty and the scholastic achievement of students (Main et al., 2020). To underrepresented student populations, women and multicultural faculty may inspire role models or act as brilliant guides through students' majors [5]. Role models serve as an example of perseverance, career achievement, and hope [5], especially with underrepresented students seeing themselves mirrored in leaders [5]. Multicultural faculty fosters a landscape to solve the engineering problems of today [5], multicultural recruitment and retention [5], and instill multicultural role models to dissemble challenges of multicultural students and faculty [5] and expand social justice initiatives [5].

Women of Color faculty serve as an essential resource to enhance and retain women of color engineering students. With identity alignment, women of Color in faculty may improve the diversification of the engineering profession and help increase a profound sense of belonging and identity [5] for multicultural students struggling to find stable footing in the engineering field. Additionally, a diversified faculty steps into a discipline carrying a repertoire of educational pedagogies and curricula steeped in alternative cultural and societal experiences and perspectives that differ from the traditional curriculum. A refreshing approach that may captivate a larger

base of students [5]. Multicultural engineers diversify the profession's mindset on problems and use surrogate approaches to engineering projects, innovation, and multicultural competency among engineering coworkers [5]. A diverse faculty strengthens multiculturalism by attracting and retaining a diverse student and workforce [1]. The increase in diversity widens the diverse role models and mentors, especially for students experiencing challenges based on unjust factors [1]. Expanding diversity among faculty encourages inclusion in policies that preserve STEM monoculture stifling women of Color advancement [1].

Multicultural career strategies

Doing nothing will yield nothing. The "leaky pipeline" [10, p.32] refers to the steady loss of women in a range of disciplines; however, the STEM field hemorrhages substantial losses [10]. The leakage occurs at various professional career stages, and academic transitional phases with several degree levels pointing to an overhaul of faculty employment, promotion, and retention practices [10]. The current trend observing pos-doc to faculty transition rates reflects an increase in multicultural staff in 2080 [9]. Prior research elucidates several designs with the end goal of attracting and retaining women of Color faculty.

Faculty mentoring brings a sense of belonging, support, tenure, and promotion opportunities [11]. Faculty of Color require continuous support in retention as they are laden with unpractical workloads [9]. One study found that peer mentoring programs support STEM faculty women in their retention and advancement and influence influencing changes in an institution overall [11]. Though mentoring contains several studies, the specific forms of mentoring results remain hazy. The attributes of mentoring and the mentoring relationship consist of a few studies compared to the known benefits of mentoring [11]. In other words, women of Color faculty may benefit from a specific form of mentoring than women and others. Nevertheless, mentoring programs unfold as a common strategy to retain women scientists. Women indicate a desire for mentoring, which portends a gap. Mentoring may bring changes in academia and calls for further exploration [11], particularly, those historically marginalized in the STEM fields. A study pointed out a critical struggle with fulfilling the diverse exigence of mentoring circles, which evolved over time. The fluctuation suggests a consistent needs assessment to encourage effective mentoring programs [11].

As mentoring appears to be a commonly used tactic, other intervention strategies have been employed or suggested in past literature. Implicit bias training programs help STEM search committees single out biased hiring practices or protocols when hiring women of Color. If possible, diversifying hiring committees enable a multicultural perspective [10]. Creating social support networks mitigates isolation where women of Color may find their emotional and social needs met [10]. Equal workload distribution policies prevent women of Color from taking on overwhelming and exploitive workloads that hinder equitable promotion which prevents achieving tenure [10]. Institutions should offer better compensation to those with an unequal workload [10]. Therein lies the dilemma - schools are looking to cut costs, and women of Color have to get their foot in the door, which brings about the loop the data reflects.

Placing women of Color on PAR

The sphere of education transpires as "replete with the understanding that educators must listen and draw from the funds of knowledge of students, meaning listen to and honor students' stories, experiences, and identities as a source of knowledge" [12, p. 52]. Expanding on this notion, we add the integral inclusion of women of Color faculty's narratives, knowledge, identity, and culture as common challenges that overlap from both sides of the aisle**.** Participatory action research (PAR) furnishes a landscape beyond empirical research. The "empiricists" [12, p.41] maintain a research description too narrow in quantitative and qualitative approaches that other theoretical methods meet little recognition [12] and proclaim the methods of research. The techniques resonate with greater aplomb than social science investigation work. Hence, it the importance for researchers to broaden approaches to capture the stories of women of Color, the underlying issues hidden from view, and the actions they hope to take to address injustice. The aforementioned mechanisms established by these institutions are not without their challenges and knowledge gaps specifically catering to women of Color faculty.

Participatory action research (PAR) values engaging in collaborative practices at its heart and palpitating the fierce commitment to social change and transformation [4]. PAR concentrates on understanding individuals, especially the voices confined in historical oppression and lived experiences [4], similar to STEM women of Color faculty. PAR emulates the work of feminists and critical race scholars "who have shown how women and people of Color entering the academy, not only an opportunity to transform themselves but also effectively transform the institution" [4, p. 330]. It leaves behind the traditional and social science philosophies as PAR makes a move toward tangible change and not just examines it alone [13]. Peering into PAR's differences, the research and evaluation in psychiatric rehabilitation concluded stark differences against traditional research paradigms [14]. Learning takes place, not only by learning about the participant but also from/with the participant. PAR waffles into obscurity without their stake in the game. Experiences exude subjectivity which carries value. The PAR researcher's role reconstructs to a level playing field as a consultant or educator, eroding the authoritarian and power dynamics. The shift resounds co-collaboration making the participant a member of the research team. Participants become engaged from conceptualization to interpretation promoting the notion they are agents of change to identify and potentially act upon key persistent issues [14]. We view PAR as a multicultural tool propelling and lifting STEM women of Color faculty's voices that could help shape and interpret [14]. It pushes research beyond rigid boundaries into new and inclusive directions [14], and in a time we recognize academia and social change passionately harmonize to create a better world for all of us.

Through collaboration with women of Color, we bring forth the voices and perspectives often overlooked in spaces, for example, the engineering profession. In comparison to other research approaches, PAR allows women of Color to seize the opportunity to become co-collaborators in identifying issues, crafting research questions, choosing relevant methods and results, analyzing and collecting data, and interpreting the research to a call for action orientated in empowerment methodology [13]. The process of co-collaboration reconstructs participants into stakeholders, which encourages participants' sense of empowerment and powers the nucleus of change [13]. The democratic operation seeks consensus and support from those most affected

by the research outcomes, which differs from the research procedure void of stakeholder engagement [13]. By implementing an opportunity to observe the impact and relevance through PAR [13], women of Color STEM faculty may be positively impacted in profound ways. PAR's process contains porosity in which the community percolates and engages in decision-making and debates [13]. This platform allows women of Color STEM faculty, to share in decision-making and debates but also widens the scope to extend to other allied and underrepresented communities within or outside the academy.

The malleable methodology of PAR radiates across diverse contexts as it builds on sharing and collaborating relationships between the researcher and the community on addressing issues and producing meaningful outcomes [13]. Homing in on educational aspects, Photovoice (an example of a PAR approach) captured graduate students and their experiences [13]. Likewise, researchers have employed PAR for educational improvements [15], enhancing attitudes [13], or educational practices and policy transformation [16] by empowering the voices of underrepresented students.

Concluding remarks

Seemingly, women of Color carry burdensome vulnerabilities as the essence of who they are and what to be becomes distorted through society's fabric of cultural norms through socialization. The messaging in movies, marketing, videos, and more consistently features women in deviant and lesser roles, propagating powerful messaging to its audiences of racial commodification, over-sexualization, masculine superhumans, homemakers, exotic, and more. The twisted and flawed character assumptions translate a basic knowledge in the real-world surrounding women of Color, which insidiously feeds into bias and prejudices toward them and follows as a cloud of destruction well into their career space. These inescapable perceptions place women of Color behind the eight-ball, especially when entering the STEM realm as students and faculty members. The nature of the academy signifies a place festooned with reinvention, innovation, career sustainability, and more. Yet, when women of Color reach faculty positions that should convey the height of academic accomplishment and success, they are met with quite the opposite with some of their colleagues and students. Women of Color faculty are viewed as incapable and unworthy of fulfilling their roles, similar to the social portrayals outside the academy. Thus, the career sustainability of women of Color appears unstable as attrition moves in a transgressive manner.

Peering through the lens of intersectionality, women of Color hold the identity of being a woman and a person of Color. Therefore, the experience of challenges occurs to a greater extent than that of a White woman and a man of Color. Some multicultural career measures have been placed in the form of mentoring, bias training, compensation, and improved hiring practices. However, it is unclear whether these strategies were created by women of Color for women of Color, or they address the challenges and needs tied to holding the identity of both woman and person of Color. Multicultural career strategies may have a profound and meaningful effect on sustaining women of Color STEM faculty; however, to what extent is unclear. These obscurities lead to utilizing PAR. PAR's collaborative nature allows participants to have a voice, consensus, and take charge. By sharing power, we democratize the research process. The next steps in our research will be to carry out PAR approaches with women of Color STEM faculty to address the challenges hindering career sustainability. In addition, observe current multicultural career

strategies to examine their effectiveness and make recommendations/improvements. We hope our current and future work continues to contribute to advancing women of Color STEM faculty toward a multicultural STEM future.

References

[1] J.B. Main, E.O. McGee, M.F. Cox, L. Tan and C.G.P. Berdanier, "Trends in the underrepresentation of women of color faculty in engineering (2005–2018)", *Journal of Diversity in Higher Education*, pp. 1–19, 2022. [Online]. Available: http.//web-s-ebscohost.com. [Accessed Jan 10, 2023].

[2] T. Nkrumah and K.A. Scott, "Mentoring in STEM Higher Education: A synthesis of the Literature to (re)present the Excluded Women of Color", *International Journal of STEM Education*, vol. 9, no. 1, 2022, pp. 1–23. [Online]. Available: https://www.proquest.com. [Accessed Jan 10, 2023].

[3] Ö. Sensoy and R. DiAngelo, *Is Everyone Really Equal? An Introduction to Key Concepts in Social Justice Education*. United Kingdom: Teachers College Press, 2017.

[4] C. Cahill, "Including Excluded Perspectives in Participatory Action Research", *Design Studies*, vol. 28, no. 3, pp. 325–340, 2007. [Online]. Available: https://www-sciencedirect.com. [Accessed Jan 10, 2023].

[5] J.B. Main, L. Tan, M.F. Cox, E.O. McGee, A. Katz, "The correlation between undergraduate student diversity and the representation of women of color faculty in engineering", *Journal of Engineering Education*, vol.109, pp. 843–864, 2020. [Online]. Available: https://www-sciencedirect.com. [Accessed Jan 10, 2023].

[6] R.K. Dhamoon, "Considerations on Mainstreaming Intersectionality", *Political Research Quarterly*, vol. 64, no.1, pp. 230–243, 2011. [Online]. Available: https://jounrals-sagepub-com. [Accessed Jan 10, 2023].

[7] H. Curtis-Boles, A.G. Chupina, and Y. Okubo, "Social Justice Challenges: Students of Color and Critical Incidents in the Graduate Classroom", *Training and Education in Professional Psychology*, vol. 14, no. 2, pp. 100–108, 2020. [Online]. Available: http.//web-s-ebscohost.com. [Accessed Jan 10, 2023].

[8] C. Pittman, "Race and Gender Oppression in the Classroom: The Experiences of Women Faculty of Color with White Male Students", *Teaching Sociology*, vol. 38, no. 3 pp. 183–196, 2010. [Online]. Available: http.//web-s-ebscohost.com. [Accessed Jan 10, 2023].

[9] N. Bhalla, "Strategies to improve equity in faculty hiring", *The American Society for Cell Biology*, 2019, vol. 30, no.22, pp. 2744–2749. [Online]. Available: http.//molbiocell.org. [Accessed Jan 10, 2023].

[10] S-N.C. Liu, S.E.V. Brown and I.E. Sabat "Patching the "Leaky Pipeline": Interventions for Women of Color Faculty in STEM Academia / Special edition: Advancing Gender

Equality in the Workplace", *Interventions for Women of Color Faculty in STEM Academia*, vol. 7, no.1, pp. 32–39, 2019. [Online]. Available: http.//web-s-ebscohost.com. [Accessed Jan 10, 2023].

[11] N. Thomas, J. Bystydzienski and A. Desani, "Changing Institutional Culture through Peer Mentoring of Women STEM Faculty", *Innovation Higher Education*, vol. 40, no. 1, pp. 143–157, 2015. [Online]. Available: http.//web-p-ebscohost.com. [Accessed Jan 10, 2023].

[12] C.E. Matias, D. Walker and M. del Hierro, "Tales from the Ivory Tower: Women of Color's Resistance to Whiteness in Academia", *Taboo*, vol. 18, no. 1, pp. 35–58, 2019. [Online]. Available: http.//digitalcommons.lsu.edu. [Accessed Jan 10, 2023].

[13] A.E. Weinberg, C.D. Trott and L.B. Sample McMeeking "Who Produces Knowledge? Transforming Undergraduate Students' Views of Science through Participatory Action Research", *Science Education*, vol. 102, no. 6, pp. 1155–1175, 2018. [Online]. Available: http. //onlinelibrary-wiley-com. [Accessed Jan 10, 2023].

[14] E.S. Rodgers and V. Palmer-Erbs "Participatory Action Research: Implications for research and evaluation in psychiatric rehabilitation", *Psychological Rehabilitation Journal*, vol. 18, no. 2, pp. 3–12, 2018. [Online]. Available: http. //onlinelibrary-wiley-com. [Accessed Jan 10, 2023].

[15] D. Bland and B. Atweh, "Students as researchers: Engaging students voices in PAR", *Educational Action Research*, vol. 15, no. 3, pp. 337–349. 2007. [Online]. Available: http. //psycnet.apa.org. [Accessed Jan 10, 2023].

[16] D. Birmingham, A.C. Calabrese, A. McDaniel, J. Jones, C. Turner and A. Rogers, "'But the science we do here matters': Youth-authored cases of consequential learning", *Science Education*, vol. 101, no. 5, pp. 818–844, 2017. [Online]. Available: http. //onlinelibrary-wiley-com. [Accessed Jan 10, 2023].

[17] M. Corneille, A. Lee, S. Allen, J. Cannady and A. Guess, "Barriers to the advancement of women of color faculty in STEM: The need for promoting equity using an intersectional framework", *Equity, Diversity and Inclusion*, vol. 38, no. 3, pp. 328–348, 2018. [Online]. Available: https://www.emerald.com/insight/publication/issn/2040-7149. [Accessed April 2023].

[18] S. Hurtado and T. Figueroa, "Women of Color Faculty in Science Technology Engineering and Mathematics (STEM): Experiences in Academia", *American Educational Research Association*, pp. 1–27, 2013. [Online]. Available: https://www.heri.ucla.edu/nih/downloads/AERA-2013-WOC-STEM.pdf. [Accessed April 2023].

[19] J.E. Fox Tree and J. Vaid, "Why so few, still? Challenges to attracting, advancing, and keeping women faculty of Color in academia", *Frontiers in Sociology,* vol. 6, no. 7921986, pp. 1–14, 2022. [Online]. Available: https://doi.org/10.3389/fsoc.2021.792198. [Accessed April 2023].

[20] D. Ginther and S. Kahn, "Statistics on the career pathways of Women of Color faculty in academia", *in Seeking Solutions on Maximizing American Talent by Advancing Women of Color in Academia,* Washington D.C.: The National Academies Press, 2013. pp. 4-17. [Accessed April 2023].

[21] B. Lloyd-Jones, "Diversification in higher education administration: Leadership paradigms reconsidered", *in Women of Color in Higher Education: Changing Directions and New Perspectives,* H.T. Frierson and W. Tate, Eds. Emerald Group Publishing Limited, 2011 ch. 1, pp. 3-18. [Online]. Available: https://doi.org/S1479-3644(2011)0000010005. [Accessed April 2023].

[22] J.B. Main, E.O. Mcgee, M.F., Cox, L. Tan and C.G.P. Berdanier, "Trends in the underrepresentation of women of color faculty in engineering (2005–2018)", *Journal of Diversity on Higher Education,* 2022, pp. 1-19. [Online]. Available: https://doi.org/10.1037/dhe0000426. [Accessed April 2023].

[23] S. Strings, "The emergent classroom: Activist tools to transform PhD seminars for Women of Color (and all) faculty", *Feminist Formations,* vol. 33, no. 2, 2021, pp. 185-207. [Online]. Available: https://doi.org/10.1353/ff.2021.0031. [Accessed April 2023].

[24] C.S.V. Turner and J.C. Gonzalez, "Faculty of Color in academe: What 20 years of literature tells us", *Journal of Diversity on Higher Education,* vol. 1, no. 3, 2008, pp. 139-168. [Online]. Available: https://doi.org/10.1037/a0012837. [Accessed April 2023].