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RESEARCH BRIEF

It Takes a Village: STEM Mentoring for Undergraduate Women of Color

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Introduction

The current national science agenda for education makes a point to discuss increased science and math performance and global competitiveness in STEM related fields. In an effort to improve the quality of STEM education and create a more sustainable pipeline to STEM careers, researchers, policymakers and educators have begun to examine the underrepresentation of women of color in undergraduate STEM majors. An important concern for American colleges and universities has been, and continues to be, how to increase gender and racial diversity in math and science fields (George-Jackson, 2014). This due in part to increase the representation of women of color in STEM careers. A study conducted by the Center for American Progress (2013) states females of color comprise nearly 20 percent of the total US population. That percentage is projected to grow in the next 50 years. Females of color will comprise approximately 53 percent of the U.S. population. However, women of color earn fewer than 10 percent of computer science undergraduate degrees (Scott & Elliott, 2020). Workforce in STEM remains 75 percent White, with women of color comprising only 10 percent of the professional STEM workforce (Feller, 2012). This research brief offers a discussion on the experiences of women of color in STEM fields, mentoring in STEM undergraduate programs, and suggestions or improving mentoring of women of color in STEM fields through culturally relevant training and mentorship incentives.

Women of Color in Undergraduate STEM Programs

In further examination of colleges and universities researchers find that "women, Blacks, and Hispanics are less likely to be in a science or engineering major at the start of their college experience, and less likely to remain in these majors by its conclusion" (Landivar, 2013, p.1).2 Women of color consist of 12 percent of total STEM Bachelor of Science degrees conferred as compared to White women who received degrees was twice this number, standing at 25 percent (Espinosa, 2011). Research indicates that women of color in STEM often experience systematic barriers, gender and ethnic microaggressions (Sosnowski, 2002). In addition, women of color felt unwelcomed, unsupported (Varma, Prasad, & Kapur, 2006), or invisible (Ong, 2005) due to how their gender and ethnic status affect the nature of their relationships with peers and faculty (Justin-Johnson, 2004; Ong, 2005). The aforementioned further perpetuates women of color's lack of participation in STEM majors in their undergraduate careers. One such barrier is the lack of role models or mentors to help situate women of color in undergraduate majors (Cole & Espinoza, 2008; Malone & Barabino, 2009; Robinson et al., 2016). Thus, we can only conclude that environment is important to the success of women of color among STEM undergraduates as well as faculty support and involvement as a critical component for their success. Faculty interaction at all levels can be instrumental in keeping more women of color on a STEM career path (Espinosa, 2011). In addition, University leadership must put in place the supports that faculty need to make teaching and mentoring a priority (Espinosa, 2011).

Mentoring in Undergraduate STEM programs

Mentoring is an essential part of college student success. Mentoring can be defined as "a relationship between two individuals whereby the more experienced person is committed to providing developmental support to the other, less experienced person" (Crisp et al., 2017, p. 16). The benefits of mentoring include better academic performance (Dahvig, 2010), persistence (Gross et al., 2015), social integration (Zaniewski & Reinholz, 2016), and increased career ambition (Parks-Yancy, 2012). Peer mentoring increases sense of belonging, and faculty-student mentoring enhances positive academic interactions (Zaniewski & Reinholz, 2016). Research shows factors of effective mentoring at the college level. Some of the essential factors that describe mentors include, psychological or emotional support, a role model, assistance in goal setting and career paths, and subject-specific expertise (Nora & Crisp, 2007). Mentoring in STEM fields can be described as efforts to engage students "in research with graduate students and faculty who serve as mentors in guiding and supporting students' career aspirations and sense of belonging on campus" (Crisp et al., 2017, p. 12). Shanahan et al. (2015) also describe ten salient practices in mentoring undergraduate STEM students. These practices include strategic pre-planning in order to be responsive to students' needs, setting clear expectations, teaching research skills, offering emotional support, providing sufficient time for the mentees, promoting independence in the research process, helping students' network in their discipline, facilitating peer mentoring, and offering opportunities to share findings and accomplishments. Research confirms the benefits of mentoring in STEM programs. For example, Thiry et al. (2011) conducted research among four universities, where mentees reported that effective mentoring improved their confidence and skills in conducting research.

Mentoring is valuable, especially for diverse students. "There is growing evidence that mentoring programs may be an effective means to diversify the science, technology, engineering, and math (STEM) pipeline and workforce" (Crisp et al., 2017, p. 9). Byars-Wistonet et al. (2015) found that underrepresented minorities in STEM reported it was crucial to have mentors that look like them. Blake-Beard at al. (2011) also argues that it is crucial, especially in STEM fields, that mentors reflect mentees in terms of race and gender in order to foster positive mentoring relationships. Eby et al. (2008) assert that mentoring of women of color in STEM can help them in socialization and career development. Kahveci et al. (2006) adds that mentoring helps in retention and matriculation of women of color in STEM fields.

University Incentives for Faculty Mentorship

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The development and implementation of quality mentoring programs for undergraduate students involves a significant amount of time and effort on the part of program faculty. While managing the many teaching, research, and service-related responsibilities and expectations associated with being a faculty member, university administrators should not expect faculty to devote sufficient amounts of time and energy to quality mentorship without incentives. To promote the type of mentorship initiatives to increase undergraduate women of color successful matriculation through college in STEM majors, college leadership should review faculty members responsibilities and incentives. In research, the universal language of exceptionality is the number of publications in top field journals, an easily countable and recognizable measure (Zhang et al., 2010). Tenure and promotion are a powerful motivator to faculty (Colebeck, 1994). However, the increased prominence of the research enterprise and lack of rewards for public service have contributed to the socialization of faculty away from public service and mentorship(Jaeger & Thornton, 2008). Ensuring faculty mentorship is part of undergraduate STEM programs for women of color is vital to successful participation of women of color in STEM majors. In addition, assuring faculty that mentorship will be incentivized could be one way to get buy-in and guarantee that mentorship is as important of an obligation as publications.

Conclusion

Continuous low numbers of women of color in STEM programs can be changed by taking active steps by the universities. Mentoring is one of the most important ways to retain students in college, especially women of color. Therefore, this research brief calls for culturally relevant training and incentive for faculty mentorship as solutions to improve retention and experiences of women of color in STEM programs.

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