Chapter 12
The Barriers Ethnically Diverse Girls Face in STEAM

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ABSTRACT

The increase of STEM- and STEAM-related jobs and the power associated with STEAM industries creates an equity issue. This qualitative study explores the underrepresentation of ethnically diverse females in science, technology, engineering, art, and math professions through a STEAM (science, technology, engineering, art, and math) for girls aged 7-18. Throughout this study, the words STEM and STEAM will be used synonymously. The researcher will seek to explore how using gender-specific role models to mentor females of this age group will increase the numbers of young women of color graduating with STEAM degrees and entering those professions. This qualitative study is based on a meta-ethnographic analysis of dissertations and peer-reviewed literature related to barriers ethnically diverse girls perceive they encounter in pursuing STEAM careers. The approach was through the lens of critical race theory, empowerment theory, and feminist theory.

PROBLEM STATEMENT

The increase in STEM (science, technology, engineering, and math) and STEAM (science, technology, engineering, art, and math) related job fields and the power associated with STEAM industries creates an equity issue as it pertains to STEAM careers (Nation et al., 2019). STEM education is a crucial engine of global innovation, economic progress, and human opportunity. In the United States alone, the STEM sector is predicted to sustain 69 percent of GDP and produce $2.3 trillion in federal tax income each year (Myers & STEMconnector, 2021). The National Science Board (Fry, Kennedy, & Funk; 2021; Varma, 2018) says that women make up almost half of the workforce today. Nonetheless, they make up nearly a quarter of the current science and engineering workforce. Women of color make up about 5% of this percentage. According to research, despite making up nearly half of the U.S. workforce, women are still vastly underrepresented in the areas of science, technology, engineering, and math (STEM). The percent-

age of female STEM workers increased from 8% in 1970 to 27% in 2019, but men still dominated the field. Men make up 52% of all workers in the United States, but 73% of STEM workers (United States Census Bureau et al., 2021). There is a big difference between how many women are in STEM and how many women are from groups that have been underrepresented in the past.

Females of color in the United States are disproportionately represented in each of the STEAM fields of study at an alarmingly low rate (National Academies Press et al., 2020). According to current research, Hispanic, Asian, and African American women earn fewer than 5% of STEM bachelor's degrees in the United States. People of color are underrepresented in business, academia, and the government's STEM workforce. Increasing women and minorities in STEM would increase diversity, creativity, and innovation (Kricorian et al., 2020). There is minimal data on minority STEM students' participation factors. A crisis is on the horizon as a result of the disproportionate number of people of color in STEM careers in their communities, which has resulted in those communities having significantly less access to employment and education that could help ensure their success in these fields. To address the under-representation of women of color in STEM fields, it is crucial to comprehend the forces that hinder and support their career development, beginning with early childhood experiences and extending through K-12 education and the workplace (Alfred et al., 2018). Many factors contribute to the low percentage of women, particularly women of color, in the STEM workforce. Among these factors are lack of mentors and role models, microaggressions in the workplace, gender-based biases, and socioeconomic barriers.

Students of color, particularly African American young women, are more likely to experience environmental challenges that interfere with academic performance and to feel like outsiders in the STEM field. Having a mentor, or a close relationship with someone in a STEM field, improves mentees' science identity and self-efficacy for conducting research and contributes to a greater interest in and commitment to pursuing a STEM career (Stelter et al., 2021). Interventions promoting diversity, equity, and inclusion must start in early elementary and secondary education and continue through academia and the workplace (Alfred et al., 2018). This issue must be addressed by increasing the diversity of mentors and learning opportunities outside the classroom in order to increase the participation of these students in STEM mentoring programs.

The gap in the literature attempts to ascertain why women of color are not represented in STEM fields. As mentioned previously, statistical data documents the fact that the numbers of females of color in STEAM do not compare to those of their European American counterparts. Therefore, the purpose of this study is to explore perceptions of the barriers that prevent females of color from pursuing interests in the STEAM industry.

THE PURPOSE OF THE STUDY

In the United States, three racial and ethnic groups have traditionally been underrepresented in the STEM workforce: Black and African Americans; Hispanics and Latinos; and American Indians and Alaska Natives. Each group encounters distinct hurdles, yet there are similarities in their rates of representation and experiences in STEM (Myers & STEMconnector, 2021). The purpose of this study is to explore the lack of diversity in science, technology, engineering, art, and math careers through a look at the barriers that hinder middle and high school-aged ethnically diverse females from pursuing STEAM careers. The literature displays a continuous need for diversity and inclusion for all people interested in STEAM-related professions. However, it claims that ethnically diverse females are disproportionately underrepresented

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