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WE ARE STEM: Black Girls' Perspectives on Engaging in an Informal Culturally Sustaining STEM Enrichment Program and its Influence on the Development of Their STEM Identity

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Abstract

Despite Black female students demonstrating their STEM interests and aptitudes, this affinity towards STEM is not translating to representation within STEM fields. The literature suggests a critical factor influencing Black girls' pursuance and persistence in STEM fields is the development of their STEM identities within formal and informal STEM environments. Informal culturally sustaining STEM environments provide Black girls with a space where their STEM identities can be cultivated and nurtured and where they can create counternarratives to the negative and deficit thinking surrounding Black girls as STEM learners. This pilot study will utilize a qualitative case study to examine the perspectives and experiences of Black girls as they participate in an informal culturally sustaining STEM setting. This examination can provide valuable insights on how to effectively foster the formation of Black girls' STEM identities that can lead to sustained engagement and participation in STEM fields.

Aim

The purpose of this study is to examine the experiences of Black adolescent girls who are participating in an informal culturally sustaining STEM enrichment program by utilizing a case study design. Critical Race Feminism and Yosso's Community Cultural Wealth (Delgado, 1995; Wing, 1997; Yosso, 2005) will be used to explore the experiences of the Black adolescent girls who participated in the informal culturally sustaining STEM enrichment program in my study. Specifically, the research will explore the girls' experiences using the constructs of (a) STEM identity, (b) STEM self-efficacy, and (c) racial and gender identity. The goals are to investigate the following research questions:

1. How do culturally sustaining STEM enrichment programs foster the formation of STEM identities in their Black adolescent girls?
2. How do Black adolescent girls navigate their multiple identities (i.e., racial identity, gender identity, and STEM identity) while participating in an informal culturally sustaining STEM enrichment program?

Problem

In the United States, STEM career fields are high-growth industries (Collins, 2018). However, Black women remain underrepresented in advanced STEM degrees and as STEM professionals. While existing research has identified different factors explaining the issues of Black students' persistence and recruitment in STEM fields (Ong et al. 2018; Ortiz et al. 2019; King & Pringle, 2019), gaps in the literature exist concerning the impact of informal culturally sustaining STEM enrichment programs on fostering the formation of STEM identities in their Black students. Critical to increasing representation in STEM pathways is fostering the formation of Black students' STEM-scholar identity.

Methodology

To address my research questions, I will utilize a qualitative case study design that will occur during an academic school year (9 months, September – June). A qualitative research approach was chosen for this study because qualitative research methods "are valuable in providing rich descriptions of complex phenomena; tracking unique or unexpected events; illuminating the experience and interpretation of events" (Sofaer, 1999, p. 1101). Specifically, the case study method will be used to "gain a holistic and in-depth view of the research problem" (Baskarada, 2014, p. 1). Researchers state that utilizing case study research requires an intensive analysis of an individual unit (Baskarada, 2014). Therefore, the case study design method lends itself useful in providing an opportunity for the researcher to gain a deeper understanding of the research problem being investigated (Baskarada, 2014). In addition, the use of a case study design will be necessary for this study given our limited knowledge about the experiences of Black girls in informal culturally sustaining STEM enrichment programs. Furthermore, it will allow me to develop a comprehensive understanding of the small population of Black adolescent girls that have access to and will participate in this kind of informal STEM learning environment. The qualitative data collection methods that will be utilized in this study are video observations, self-expressive artifacts, demographic questionnaire, and semi-structured interviews.

Potential Limitations

The proposed pilot study will take place at an informal culturally sustaining STEM enrichment program that is within the community. A potential limitation is that I am not in control of the inner workings and running of the program and therefore, there are elements that are out of my control.

Research Implications

As noted by Burt and Johnson (2018) "Developing talent in science, technology, engineering, and mathematics (STEM) remains a national priority, one for which increasing the number of STEM participants from historically underrepresented populations is germane" (p. 257). Therefore, gaining more perspectives and insights directly from Black girls participating in an informal culturally sustaining STEM enrichment program is critical to gaining insights on how Black girls' STEM talents and abilities can be nurtured and supported. Furthermore, learning from the experiences of this unique population of students can inform instructional practices, curriculum, and policies that are necessary in education reform.

Conclusion

As Collins (2018) asserts, acknowledging the STEM talent and achievement gaps by race and gender requires "understanding the critical aspects of Black student STEM identity (BSSI)" (p. 144). By showcasing the voices of Black adolescent girls who engage in an informal culturally sustaining STEM enrichment program, this study is committed to sharing how these experiences impact the development and nurturing of Black girls' STEM identities. Black girls are often overlooked in STEM learning contexts, and current pedagogical practices tend to ignore the significant element of culture in fostering the formation of Black girls' STEM identities. Moreover, the literature often focuses on deficit-oriented frameworks to explain the lack of representation of Black girls and women in STEM without valuing the positive cultural experiences that Black girls

bring to STEM. Cultivating and nurturing Black girls' STEM identity is critical to increasing representation in STEM fields. Utilizing culturally sustaining pedagogical practices is significant in fostering the formation of Black girls' STEM identities. In looking at a synthesis of the literature that explores Black girls' STEM identity, a significant factor that must be included in the research is the impact of culturally sustaining informal STEM spaces in fostering the formation of their Black students' STEM identity. This research can also inform effective STEM talent development for Black students and other historically marginalized students.

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Author Biography

Tajma Cameron, MS, is a 2nd year PhD student, a graduate research and teaching assistant in the School of Education at Drexel University. Tajma's overall research focuses on how culturally affirming, sustaining, and creative pedagogical practices can be utilized to cultivate and nurture Black girls' STEM identity in formal school settings and informal STEM environments.