The case of an undergraduate mathematics cohort of African American males striving for mathematical excellence

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Historically Black Colleges and Universities (HBCUs) provide a different milieu as it pertains to supporting students academically in all disciplines, and this study champions an HBCU effort within the context of undergraduate mathematics. Specifically, it highlights the case of a cohort of 16 African American male mathematics majors at an all-male HBCU. The overarching research question sought to delve deeper into these participants' educational experiences to ascertain factors that influenced their mathematical persistence. Using qualitative research methods grounded in critical race theory, preliminary data show that these African American male mathematics majors were affirmed racially and mathematically in their undergraduate mathematics space.

Keywords: Undergraduate mathematics education, African American males, Equity

Introduction

This preliminary research report analyzes the mathematics experiences of a cohort of 16 African American male mathematics majors at an all-male Historically Black College/University (HBCU) in the southeastern region in the United States. More specifically, this research work seeks to ascertain intrinsic and extrinsic factors that led to their persistence in undergraduate mathematics. This study adds to the body of scholarship on the schooling experiences of African American male students (see, e.g., Berry, 2008; Duncan, 2002; Jett, Stinson, & Williams, 2015; Noguera, 2008). With respect to African American male students' college experiences, some studies focus on how African American men experience and grapple with racism in college settings (see, e.g., Bonner & Bailey, 2006; Cuyjet, 2006; Davis, 1994; Harper, 2015; Seymour & Hewitt, 1997). Research specifically on African American men's college mathematics experiences highlights the fact that many of them often experience difficulties with mathematics (see, e.g., Stage & Kloosterman, 1995).

Despite some of these reported findings regarding African American students in mathematics, there are, however, African American students who achieve in undergraduate mathematics. Thus, it is important to gain insights from studying African American male students who are persisting in college mathematics. African American male students' stories of mathematical persistence are largely absent from the research literature. This research project is designed to fill this void in the research literature and shift the discourse concerning the mathematics experiences of African American male mathematics collegians.

Review of the Literature

There have been fruitful efforts designed to improve the mathematics achievement outcomes of African American students. One effort that has been successful in promoting high levels of undergraduate mathematics performance among African American (and other underrepresented) students is the Mathematics Workshop Program (MWP) at the University of California, Berkeley (Fullilove & Treisman, 1990; Treisman, 1992). The MWP is cited as being successful for the following reasons: the workshops create environments that promote

mathematics academic excellence among peers; the students spend more time on learning activities and learning tasks as opposed to just solving mathematics problems; and the students who participate in MWP are believed to continue in college longer than those students who do not participate in the workshop because they obtain social and study skills that can be used throughout their college matriculation.

A research team at the University of Maryland Baltimore County studied high-achieving African American men (Hrabowski, Maton, & Greif, 1998). At this institution, researchers became concerned about the status of African American male students in college science, mathematics, and engineering (SME; SME is synonymous with STEM) majors and decided to learn more about this group by studying the habits of the highest-achieving students who were enrolled in the Meyerhoff Program. Although the program now serves students from all racial and ethnic backgrounds who desire to pursue a doctorate in the sciences or engineering, the first year consisted of African American male students only. Hrabowski et al. (1998) hoped to identify attitudes, behaviors, habits, perspectives, and strategies of the highest-achieving African American male students in the program. According to Hrabowski et al. (1998), the following factors are critical for success in college among African Americans in mathematics and science: an adequate high school academic preparation, analytical skills, strong study skills, time management skills, advising, academic as well as social integration, and motivation and support.

McGee's (2005) work studied 14 high-achieving African American mathematics and engineering majors in their junior and senior years of college. She found that these students exhibited positive racial identities and continued in the African American spiritual tradition. She also found that parents were important factors in the students' success. Furthermore, she found that most students embraced a "succeeding against the odds" ideological paradigm. In sum, Hrabowski et al.'s (1998) findings support other findings of mathematical persistence and success factors among African American students. Early exposure to and access to rigorous and culturally specific mathematics provides the crux for which later mathematics success is attained. Moreover, the MWP (Fullilove & Treisman, 1990) and the work of McGee (2005) buttress the claim that efforts must be made to transform the undergraduate mathematics education discourse.

All in all, this study builds on scholarship from scholars who believe in the gifted mathematical abilities of African American students (see, e.g. Cooper, 2004; Ellington & Frederick, 2010; Jett, 2010; Leonard & Martin, 2013; Noble, 2011; Stinson, 2006; Thompson & Lewis, 2005; Walker, 2014). This work extends my own scholarly efforts concerning the importance of HBCUs as it relates to producing African American male mathematics majors (Jett, 2013). Moreover, this study reveals how complexities about the constructs of race and/or gender may influence the undergraduate mathematics education of African American male students. This study, too, complements and expands existing research efforts in the field.

Theoretical Framework

Critical Race Theory (CRT) was employed as the theoretical framework for this research project. Historically, African Americans in the United States have experienced this hierarchical race system that places Europeans at the top and people of color at the bottom since slavery (Bell, 1992; DuBois, 1903/2003). Racism is an institutionalized force that has been used both historically and currently to dismiss and oppress people of African descent and other people of color. Solórzano and Yosso (2002) argue that "substantive discussions of racism are missing from critical discourse in education" (p. 37). As it stands, issues of race and racism have been underexplored in mathematics education research (Martin, 2009). In an attempt to utilize CRT in

undergraduate mathematics education research, CRT was used to analyze the experiences of a cohort of 16 African American male mathematics majors.

There are five foundational tenets of CRT, and these tenets are the hallmarks driving this theoretical perspective. These philosophical underpinnings include the following:

1) CRT asserts that "racism is normal, not aberrant, in American society" (Delgado & Stefancic, 2000, p. xvi).
2) CRT adheres to interest convergence, which advances that the dominant culture advances racial justice and other race based initiatives when it serves their interest (Delgado & Stefancic, 2001).
3) CRT asserts that race is orchestrated as a social construction (Ladson-Billings, 2013).
4) CRT explores the intersectionality of various constructs such as race, sex, class, gender, and sexual orientation to explore how these intersections make for broader understandings of these constructs (Delgado & Stefancic, 2001).
5) CRT utilizes voice to serve as a counter-narrative to the dominant discourse surrounding racial groups (Dixson & Rousseau, 2005).

These tenets of CRT were be used to frame the interview questions and to analyze the data.

Research Question

The overarching research question for this study was as follows:
How do African American male mathematics majors describe their educational experiences?

Methodology

The qualitative research data collection methods included the following: 1) a pre-survey, 2) a semi-structured interview, and 3) a member checking prompt (Bogdan & Biklen, 2007).

1) The pre-survey was given to the participants prior to the first interview. This pre-survey solicited information from the participants pertaining to their demographics, family dynamics, and education. The information obtained from the pre-survey was used to inform the first interview as well as to substantiate the data for coding and analysis. 2) The interview allowed the participants' voices to be heard using their own words. The utilization of "voice" as well as narratives aligns with qualitative research methods and CRT. Additionally, the semi-structured interview caused the participants to reflect upon and (re)construct their mathematics experiences in their own words. Each interview lasted anywhere between one and two hours chronicling their mathematics schooling experiences as African American male students. 3) The member checking aspect allowed the participants to verify whether I reported their words, findings, and interpretations accurately.

Preliminary Findings

Data have been collected and coded for this research project, and the data are in the early stages of analysis (Saldaña, 2013). However, preliminary data indicate that these 16 African American male mathematics majors were affirmed at their HBCU. Preliminary findings from the study also indicate these 16 African American men had a sense of mathematical brotherhood in college, benefited from an affirming Mathematics Laboratory at the college, solidified mathematics passions during their early childhood experiences, and largely expressed that their high school preparation did not fully prepare them for collegiate mathematics, which is in stark contrast to the research literature.

Discussion Questions

The following discussion questions will allow participants in this session to engage in dialogue, offer feedback for strengthening the work, and recommend suggestions for future areas of scholarly exploration:

• Please share any stories of your experiences working with African American male mathematics majors.

• What are your thoughts and feedback concerning the aforementioned study of this cohort of 16 African American male mathematics majors at this HBCU?

• What are the implications of this work for mathematics instructors as it pertains to making the undergraduate mathematics space a more inclusive one at different institution types?

• What are the implications of this work as it pertains to future research regarding African American male undergraduate mathematics students' experiences?

Goals

A goal of this session is to highlight the robust and longstanding history of mathematical excellence at this all-male HBCU. This particular institution has a legacy of producing many African American male mathematics majors. Another goal is to disseminate more stories of mathematical persistence to influence and filter more African American male students into the mathematics pipeline who have a desire to explore mathematical pursuits. Finally, a goal is to generate more conversations concerning the participation and underrepresentation of African American male students in undergraduate mathematics.

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