College of Education

Understanding the Relationships Between the Racial Identity, Science Identity, and Science Self-Efficacy Beliefs of African American Students at HBCUs

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Problem
Traditionally, science and science-related careers were designated as privileges for White elite, specifically White males (Russell & Atwater, 2005). African Americans are considered underrepresented because the percentage of African Americans with science degrees and working in science-related careers is dramatically lower than the percentage of African Americans in the U.S. population; however, Whites and Asians are overrepresented (NSF, 2013; Fries-Britt, S., Younger, T., Hall, W. 2010). Today, the majority of African American college students are enrolled in predominantly White institutions (PWIs) (Fries-Britt & Tanner, 2001); however, historically Black colleges and universities (HBCUs) produce a disproportionately high number of minority graduates in science, technology, engineering, and mathematics (STEM) (Shorette & Palmer, 2015). The disparity between the number of African American STEM graduates from HBCUs and PWIs is a sign that there is a problem at the institutional level as it relates to educating African American students in science.

Theoretical Framework
The theoretical framework utilized in this study synthesizes four isolated theoretical constructs into one comprehensible framework. The substantive theories of this framework include social cognitive theory (Bandura 1977a, 1977b, 1986), situated-mediated identity theory (Murrell, 2007), science identity (Carlone & Johnson, 2007) and Multidimensional Model of Racial Identity (Sellers, Smith, Shelton, Rowley, & Chavous, 1998). In addition to the aforementioned substantive content theories, this study has been informed by the central tenets of my inquiry worldview of Critical Race Theory.

Quantitative Results
Table 4: Concurrent Nested Mixed Methods Design based on Creswell & Plano-Clark, 2011

Sample Data Integration
- Data integration through merging and weaving approaches (Fetters, Curry, & Creswell, 2013)
- CONFIRMATION: Quant findings show a negative correlation between the number of science college courses taken by students and their public regard, which is confirmed by qual interviews.
- EXPANSION: Quant findings indicate a significant relationship between Science Identity and Racial Assimilationist Ideology, while qual findings reveal that students are strongly encouraged by science faculty to participate in conferences, programs, and undergraduate research experiences, which require constant interaction with predominantly white researchers/science students. In these cases, African American students are one of few if not the only African American student; therefore, interactions with HBCU faculty and peers under such conversations or skill development that foster the ability to assimilate. These findings support H1 for Research Question 1.
- DISORDER: Quant findings do not provide evidence of a statistically significant relationship between Racial Centrality and Science Identity Science Self-efficacy Beliefs, however, qual findings reveal that the HBCU environment exposes them to a “pervasive Blackness” and “racial homogeneity” that contribute to how African American students see themselves as scientists as well as their ability to perform science-related tasks.

Discussion
- The structural characteristics of HBCUs (i.e. small class sizes) promote both black racial and STEM cohesion, thus facilitating stronger racial and science identities
- Strong faculty-student and student-student interactions facilitate development of science identity and science self-efficacy when students experience no or minimal experiences of social or academic challenges, verbal persuasion, and exposure to African American role models
- African American science students enrolled at five HBCUs have relatively high science identity (M=3.12 - based on 4-point Likert Scale), but relatively low Science Self-Efficacy (M=1.77 - Based on 5-point Likert scale)
- Overall, students had a higher score for Assimilationist ideology (M=4.86) than Nationalist ideology (M=4.11)
- Moderation and mediation hypotheses were not supported by the data, findings did reveal significant relationship between the constructs.
- The qualitative findings further reveal that African American students who attend HBCUs prefer “Black Spaces” because they are essential for the construction of their racial identity; however, they struggled to assimilate (while maintaining their Black connections) due to the Eurocentric nature of their respective science disciplines.

References