Models of Success: Identifying Factors that Contribute to Faculty Production of Minority STEM Graduates - Implications for HBCUs and Beyond

Fred A. Bonner, II Ed.D., College of Education, Prairie View A&M University, Prairie View, Texas

Aretha F. Marbley, Ph.D., College of Education , Texas Tech University, Lubbock, Texas

Sherri S. Frizell, Ph.D., College of Engineering, Prairie View A&M University, Prairie View, Texas

Abstract

The overarching goal of this research is **to create viable solutions to the conundrum of low representation of African Americans in the STEM workforce and to provide formal guidance to all interested stakeholders.** Results will provide tangible data and recommendations to assist higher education institutions in their efforts to develop strategies that they, along with internal and external policymakers can follow to achieve and maintain significant increases in the number of African-American students with STEM degrees. Findings from this project will have implications even beyond HBCUs and PWIs to K-12 education communities, workforce diversification efforts, and beyond.

Background

For more than three decades, both educational and scientific communities have channeled efforts and resources aimed at increasing the number of African-American students completing STEM degrees and subsequently pursuing STEM careers.

HBCUs contributed 19% of the nearly 9% of bachelor's degrees awarded in science and engineering to Blacks in 2010 (Gasman & Nguyen, 2014).

In 2010, approximately 33% of all Black students who earned bachelor's degrees in mathematics and statistics attended HBCUs and HBCUs produced nearly 37% of all Black undergraduates who received bachelor's degrees in the physical sciences (Gasman & Nguyen, 2014).

As minority populations continue to increase, their participation in the STEM workforce will be critical to the health of our growing economy. A significant facet of increasing minority student participation in the STEM workforce is to understand the role faculty should play in preparing these students and assisting with their matriculation to graduation and ultimately their participation in the workforce. Hence, a key emergent question then becomes: **What factors are critical for faculty who prepare HBCU STEM majors for graduate and professional school as well as careers in the STEM workforce?**

Research Design and Methodology

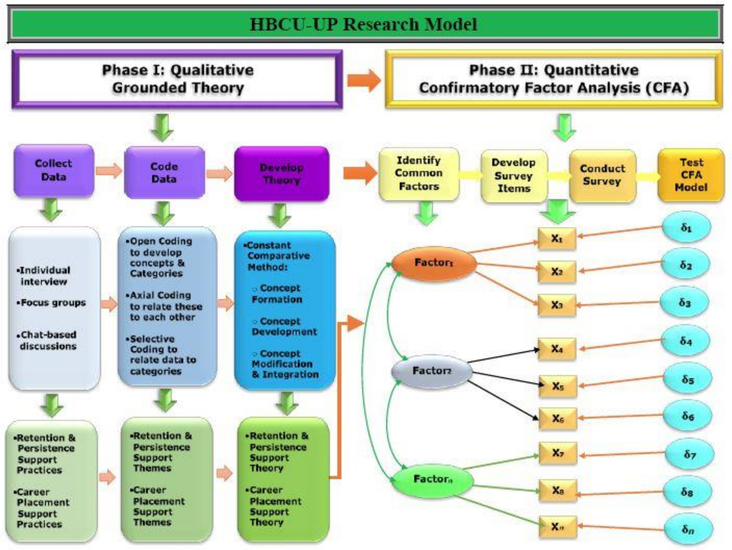

Figure 1: Research Model

A **mixed methods approach** will use both qualitative and quantitative measures to identify the factors that contribute to faculty production of successful minority STEM graduates at HBCUs. This Broadening Participation Research Project is implemented in an effort to better understand how HBCU STEM faculty can structure successful collegiate experiences to impact the quantity and quality of STEM degree graduates. The specific objectives of this project include:

- **Develop** a qualitative protocol informed by findings from a previously funded NSF (HBCU-UP) research project (NSF, Award #0714963)
- **Conduct** an extensive qualitative (focus groups, interviews, virtual chats) investigation with HBCU STEM faculty
- **Develop** and **validate** a quantitative (web-based survey) instrument based on qualitative findings
- **Conduct** a large-scale quantitative investigation with HBCU STEM faculty
- **Disseminate** findings through publications and national presentation

Research Questions and Study Population

Research questions for this study include:

1. What factors by STEM faculty support minority student persistence and retention in STEM?

2. What strategies can faculty implement to effectively prepare minority students for graduate education and careers in the STEM workforce?

HBCU STEM faculty from five institutions that consistently rank among the top 10% for producing African-American STEM (physical sciences, engineering, and technology) graduates (Diverse Issues, 2014).

- North Carolina A&T State University
- Tuskegee University
- Jackson State University
- Prairie View A&M University, and
- Xavier University.

Timeline of Project Activities

Year 1

- Qualitative Protocal Development
- Interviews & Focus Groups at Targeted Institutions
- Preliminary Data Analysis

Year 2

- Complete Qualitative Data Analysis
- Development of Quantitative Instrument
- Validation of Instrument
- Data collection using Web-based Survey Instrument

Year 3

- Complete Data Collection using Web-based Survey Instrument
- Quantitative Data Analysis

References:

MACH-III MINORITY ACHIEVEMENT, CREATIVITY, AND HIGH ABILITY CENTER