

## Chapter 7

# Strategies to Enhance the Role of HBCUs in Increasing the Science, Technology, Engineering, Mathematics, and Medical (STEMM) Workforce

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### ABSTRACT

*Historically Black Colleges and Universities (HBCUs) have a long history of student engagement and institutional commitment to developing STEMM degrees. To become even better at fostering a diverse STEMM field, HBCUs must assess their strengths, weaknesses and challenges as well as opportunities in order to remain competitive in the 21st century. This chapter explores factors related to improving STEMM student academic preparation, retention and engagement. The authors provide recommendations to enhance experiential learning and offer educational pathways that lead to long-term retention and engagement of minority students. Furthermore, in the face of the need to advance and diversify the scientific workforce, we examine whether and how specific institutional contexts shape student interactions with faculty and institutional cultures. Historically black colleges and universities have played an important role in diversifying the Science Technology, Engineering, Mathematics, and Medicine (STEMM) workforce. In this paper we offer practical suggestions to clarify and strengthen their roles in student recruitment, retention, engagement, and advancement in STEMM. Preparatory summer*

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## INTRODUCTION

Occupations in science, technology, engineering, mathematics, and medical occupations (STEMM) are key components for innovation and economic prosperity (Landivar, 2013). Increasingly STEMM occupations have become central to economic competitiveness and growth for the United States (Jobs for the Future, 2007). The Obama Administration's project "Educate to Innovate" seeks to train 100,000 new STEM teachers in public schools by broadening participation with the goal to inspire a more diverse STEMM talent pool (Whitehouse.gov, 2015). Throughout his term, President Barack Obama has pressed for cooperation between industry, private donors, and educational institutions to help young women and men – especially those from underrepresented groups – to take up training in STEMM fields.

STEMM occupations extend across many disciplines e.g. (1) Life and Physical Science, (2) Engineering, (3) Mathematics, (4) Information Technology, (5) Social Science, (6) Architecture (7) Medicine (SOS, 2012). Despite STEMM professions becoming the fastest growing segment of U.S. occupations (Langdon, McKittrick, Beede, Khan & Doms, 2011; Richards & Terkanian, 2013) there remains a lack of diversity with regard to both education and professional opportunities for under-represented minorities (Chubin & Malcolm 2008; NSF, 2013; American Institutes for Research, 2012).

The lack of diversity in medicine is evident. Although the number of minority faculty and students has increased in recent years, the number remains far below proposed targets in academic medicine (Rodriguez, Campbell & Pololi, 2015). Historically, the majority of African American physicians graduate from three HBCU medical schools: Howard University, Meharry Medical College and Morehouse School of Medicine (Harp, Shim, Johnson, Harp, Wilcox & Wilcox, 2015). In 2012, there were only 217 African American men among more than 20,000 graduating medical students (Association of American Medical Colleges, 2012). In 2016, African Americans constituted only 6.3% of the 86,746 students enrolled in accredited medical schools, and Hispanics constituted only 5.1% (Figure 1).

It is even more troubling that between 2008 and 2016, the percentage of African Americans with faculty positions in medical schools has actually declined, from 2.3% in 2008 to a dismal 1.3% in 2016 (Figure 2).

Historically Black Colleges and Universities (HBCUs) must continue to play a critical role in the development and education of minority physicians if there is to be diversification of the STEMM workforce. While HBCUs represent 3% of all U.S. higher education institutions, they account for 10% of all African American college students (Gasman, 2013). Moreover, HBCUs have made significant contributions to the education of African American graduates who receive baccalaureate or doctoral degrees in STEM fields (Upton & Tanenbaum, 2014). In 2010, HBCUs awarded 19% of all STEM baccalaureate degrees (Gasman & Nguyen, 2014) and nearly 10% of all doctoral degrees (Upton & Tanenbaum, 2014). Further, HBCUs represent 21 of the top 50 baccalaureate degree granting institutions for African American STEM doctoral recipients (Fiegener & Proudfoot, 2013).

Research suggests that the scientific and institutional environments at HBCUs are more collaborative and supportive than found at predominately white institutions (PWIs). African American students are more likely to leave STEM disciplines while attending PWIs than is the case at HBCUs (Chang et al., 2008). Therefore HBCUs may be uniquely positioned to serve as a strong source of students who want to pursue careers in the fastest-growing segment of the U.S. economy. But broad challenges exist in the recruitment, retention and advancement of STEMM students (Chen, 2013). For example, between 2003 and 2009, the attrition rate among all students enrolled baccalaureate STEMM programs was 48%, and

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