Chapter 10
Minority STEM Students' Perspectives on Their Persistence in College

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ABSTRACT

The United States needs to increase the number of science, technology, engineering, and math (STEM) graduates to remain competitive in the global market and maintain national security. Minority students, specifically African American and Hispanic, are underrepresented in STEM fields. As the minority population continues to grow, it is essential that higher education institutions improve minority students' persistence in STEM education. This chapter addresses existing research focused on student retention and obstacles and barriers related to minority students. However, there is little evidence that researches have actually addressed the issue by uncovering the minority students' perspectives. Consequently, the aim of this chapter is to provide a window into the minority student's persistence in STEM programs through a theoretical framework of student retention and the students' experiences.

INTRODUCTION

The ability to produce Science, Technology, Engineering, and Math (STEM) graduates who can compete in the ever-changing global market and maintain national security is a major concern of the United States of America's government officials (Chen, 2009; Gonzalez & Kuenzi, 2012; McGlynn, 2012; Palmer, Maramba, & Dancy II, 2011, Office of Science and Technology Policy, 2019). According to Palmer, Davis, and Thompson (2010) and McGlynn (2012), faculty and administration in higher education institutions within the United States need to produce more STEM graduates. To accomplish this goal, there must be a specific increase in minority enrollment and graduation rates to ensure the economic growth of the United States (Palmer et al, 2010; McGlynn, 2012). This issue is of particular importance as minorities are considered the fastest growing demographic in the United States (McGlynn, 2012). One of the concerns facing higher education administrators is the lack of minority students enrolled in

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STEM programs--minority students are 24% less likely to earn STEM degrees compared to their White counterparts (Museus & Liverman, 2010).

Furthermore, research indicates that minority students begin college interested in STEM; however, over the course of their college years, retention becomes an issue (Gasiewski et al., 2012). While historical trends can speak to the phenomena of retention and persistence in college in general, this chapter focuses on the specific issues that arise for minority students as they tackle challenging STEM curricula and strive to persist to graduation. The amount and severity of barriers and obstacles they face continue to far exceed those of their majority counterparts, and the result is that minority students drop out of college or change majors at alarming rates. The major objective of this chapter is to provide a window into this population's persistence in STEM programs through a theoretical framework of student retention and to delve into the lived experiences that minority students perceive as contributing to their persistence in STEM programs. To help alleviate this problem and ensure their persistence, higher education institutions need to consider the minority students' perspectives as they strive to succeed in this academically challenging, majority-dominated field. Another important objective of this chapter is to provide actionable strategies to assist in that process.

BACKGROUND

History of STEM

According to Gonzalez and Kuenzi (2012), the federal government has always had an interest in STEM, with a special concentration on scientific and technological literacy. In fact, during the first State of the Union address, President George Washington discussed the need to encourage scientific understanding. President Washington said, "Nor am I less persuaded that you will agree with me in opinion that there is nothing which can better deserve your patronage than the promotion of science and literature" (American Presidency Project, 2013, Para. 11).

It is clear that STEM education is rooted deeply in the country's history. In the 19th century the United States began offering engineering degrees at three schools, The United States Military Academy-West Point, Norwich University (under a different name), and Rensselaer Polytechnic Institute (History of Engineering, n.d.). These schools' graduates, particularly those from West Point, played a major part in designing many of the roads, railroads, and bridges in the United States (Jolly, 2009). However, even with the development of these colleges, the United States recognized that additional science and engineering education was needed.

Jolly (2009) discussed that the lack of STEM workers is not new to the United States. In 1862, the Morrill Act was developed to establish colleges where students could learn agriculture and mechanical arts (Engineering), and the colleges also supported basic science. Acknowledging military advancements and giving credit to a highly skilled workforce, the United States intensified STEM education policymaking in an attempt to maintain scientific growth after World War II (Gonzalez & Kuenzi, 2012). In 1950, Congress passed the National Science Foundation Authorization Act encouraging research and science education (Gonzalez & Kuenzi, 2012). After the Soviet Union launched Sputnik into space in 1958, the United States passed the National Defense Education Act (NDEA), providing funding to improve schools and meet the demands of national security (Encyclopedia Britannica, 2015). Malcom (2008)