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NEED ASSESSMENT FOR ACADEMIC PROGRAMS AND SUPPORT SERVICES FOR
BLACK MALE STEM STUDENTS AT A RURAL HISTORICALLY BLACK COLLEGE
AND UNIVERSITY IN MISSISSIPPI

by

Monica H. Burr

A Doctoral Project Submitted to,
the College of Education and Human Sciences
and the School of Education
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

May 2022

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2022

Published by the School of Education



ABSTRACT

The topic of Black student success in STEM at HBCUs has been extensively documented. This STEM pipeline is a pivotal tool to address the global demand for a STEM educated workforce. The purpose of this study was to assess the awareness of and attitudes of Black male STEM students towards academic programs and student support services at a rural university in the south. A quantitative descriptive survey research design was used to systematically explore factors that Black male STEM students associate with their academic success during the 2021 fall academic semester. Results from the study found that participants were aware of and utilized the existing academic programs and student support services, however the university needed to improve the communication process regarding existing resources. The results also conclude that participants desire an expansion of existing student support services and academic programs. This research adds to the current body of literature that addresses academic success and challenges of Black males in STEM degree programs and offers applications for future practice.

Keywords: STEM, Black males, student support services, academic programs

ACKNOWLEDGEMENTS

I would like to acknowledge Dr. Masha Krsmanovic for her gift of service to me along this journey. You are an amazing teacher and mentor. You went above and beyond to reduce the stress and intimidation of this process for me and my classmates. You never lowered the bar; you just provided the tools to complete the tasks.

To my classmates and cohorts, thank you all for your transparency and comradery along this journey. Dr. Courtney Robinson and Dr. Wallace, thank you both for creating space for exploration and growth along this academic journey.

Dr. Barb Kleiss, your mentorship began long before now and I thank you for being an example of what is possible.

DEDICATION

Thank you, Roy G. Burr, for your unwavering support and patience as I pursued this goal. I could not have completed this task without your love and support. I thank you for the listening ear and thoughtful conversations and I worked through this process.

Dr. Willie D. Humphrey, affectionately known as Dad, I love you and I hope that I have made you proud. You were the first of your generation to earn a terminal degree and now I stand on your shoulders, and I am the first of my generation. Mom, though you are not here, your heavenly presence has kept me company and I hope you are smiling. Octavia Humphrey, my paternal grandmother, this is for you, I kept my promise.

To my children, LaTezeon and Lee E. III, I hope my journey inspires you both to push beyond boundaries and dream big.

Anne Woerner, you are my sister, thank you for your unwavering support.

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LIST OF ABBREVIATIONS

| | |
|-------------|--|
| <i>HBCU</i> | Historically Black College or University |
| <i>PWI</i> | Predominantly White Institution |
| <i>USM</i> | The University of Southern Mississippi |

CHAPTER I – INTRODUCTION

Census data from 2018 shows that the demographics of the United States is shifting with almost 60% of individuals under the age of 40 identifying as Black or Hispanic (Pew Research, 2019). Regrettably, this population lags in academic achievement and success in the K-16 educational system (Hussar et. al, 2020). Completing high school and obtaining a college degree affords political, social, and economic opportunities to an individual regardless of background. However, the pursuit and achievement of a college education for minority students, particularly Black males is met with challenges and disadvantages hinting at the undercurrents of racial and educational inequality in the United States.

Improving the educational attainment of one of the largest predicted demographic populations in the United States is necessary to meet critical demands in relation to careers in Science, Technology, Engineering, and Mathematics (STEM). The need for STEM educated workers surpasses only by the demand for healthcare workers (Funk & Parker, 2018). Yet, the complacency with educational inequality in the United States has jeopardized the nation's ability to meet and sustain the global demand and its position as the world's leader in technology and innovation. Addressing educational disparities among minority populations, especially Black males is vital to the U.S. maintaining its position as a global leader.

Education in the United States for Black Students

Poverty is the most limiting factor for Black students' academic success (Hussar et al., 2020). Approximately one-third of Black students live in poverty, an estimated 32%, compared to only 10% of White student families, with nearly half of Black families led by single-parent mothers (Cai, 2020). Additionally, only 36% of Black students have parents who completed

bachelor's degree or higher, in contrast, to 69% of Asian students and 53% of White students (Cai, 2020).

The 'achievement gap,' which compares the academic underachievement of Black students and other minorities and their White counterparts, is a direct reflection of poverty. For instance, Black students are inclined to attend schools that lack adequate resources, staffed with novice teachers, and have fewer Black teachers on staff (Hussar et al., 2020). Black students had only a 79% high school graduation rate and less than 50% college graduation rate according to research conducted by Orrock and Clark (2018). The economic gap created by poverty combined with the lack of college educated parents creates a limiting environment for the academic success of Black students (Orrock & Clark, 2018; Simmons, 2019).

Historically Black Colleges and Universities (HBCUs) are educational institutions established to educate Blacks at the end of slavery (Wooten, 2016). A total of 51 institutions are public and 50 are private, non-profit institutions all primarily found in the south and along the east coast. These institutions make up 3% of the total number of four-year non-profit colleges or universities in the United States yet enroll 10% of Black students (McFarland et al., 2018).

The typical student attending an HBCUs is either one or a combination of characteristics such as of low-income, first in the family to attend college and academically unprepared for college due to and inadequate K-12 education (Wooten, 2016). Although the graduation rate for HBCUs is less than 40%, statistics show that 68% of all undergraduate degrees and 16% of graduate degrees, including approximately 5% of doctoral degrees, received by Blacks students were awarded by HBCUs. These statistics emphasize the significant role HBCUs play in the educational landscape (McFarland et al., 2018).

Education of Black Males in United States

Many factors limit Black male academic success. For instance, Black males have a lower college enrollment rate and a higher attrition rate than Black females regardless of the institution type (Hicks, 2012). Since 1976, Black males have consistently attended college at a lower rate than Black females (McFarland et al., 2018). However, Black male college enrollment increased from 25% in 2000 to 33% in 2018, while Black female enrollment remained constant (McFarland et al., 2018).

Despite the gap in enrollment rates, the Black male graduation rate increased from 33.1% to 40% between 2013-2016; although less than half of these students received their degree within six years (Shapiro et. al., 2017). Factors that contribute to the higher degree matriculation time for Black male students include, limited access to gifted programs in K-6 (Goings, 2017), limited access to college prep courses (Goings et.al, 2018) and a K-12 environments with micro-aggression and high disciplinary actions (Hotchkins, 2016) creating a compound adverse effect.

Though the historic portrayal for Black male students was dismal, current trends in research highlight the academic success of Black males despite challenges (Bailey, 2019; Fries-Britt, 2017; Fries-Britt et al., 2010, Gasman & Spencer, 2012; McArdle, 2019; Ottley, 2018; Ramon & Shi, 2018). Research emphasizes the importance of mentors, the lack of microaggression on the campuses of HBCUs, the teacher-student relationship, and the importance of feeling connected to the campus environment.

STEM Education and Black Students

Statistics projected that STEM jobs would be in high demand as early as 2014 (Carnevale et al., 2011). Research now shows that the shortage of STEM-educated workers in the United States will have a detrimental effect on the country's economic growth and social influence in

the global market (Gasman & Commodore, 2017). A potential solution would be utilizing the exponential growth of minorities to address the critical shortage of stem-educated graduates.

Black students disproportionately earn fewer degrees in STEM than any other ethnic group, consistent with the low overall college enrollment rate (Lancaster & Xu, 2017; McFarland et al., 2018). Blacks in 2010 consisted of 13.6 % of the U.S. population, yet earned less than 10% of STEM undergraduate degrees, with the majority of those earned by females (National Science Foundation [NSF], 2011). In 2010, HBCUs accounted for 19% of the 9% of Black STEM degree holders, indicating that HBCUs are a conduit for increasing Black STEM degree holders (Gasman & Commodore, 2017; McFarland et al., 2018).

Statement of the Problem

Black student enrollment at HBCUs decreased from 17% to 9% between 1976 and 2010, with no measurable change between 2010 and 2018 (McFarland et al., 2018). Black students attend predominantly white institutions (PWIs), at a higher rate than HBCUs, yet have a lower graduation rate (Reid, 2013). Despite HBCUs higher rate of degree completions, the overall pool of Black students with STEM degrees is still significantly less than other minorities such as Asian students at 17% (Funk & Parker, 2018; Reid, 2011).

The number of Black male students with STEM degrees was 6.1% compared to 10.7% for Black female students (National Science Foundation [NSF] 2011). Further, Wagner (2013) investigated gender at HBCUs in relation to STEM degree graduation rates. The research revealed that had Black men made similar degree attainments as Black women during the 1981 and 2009, there would be an additional one thousand additional Black male Stem degree holders increasing the STEM pipeline by 50%. The NSF has funded research at private and public HBCUs to investigate methods and practices that improve the obtainment of STEM degrees by

Black male (Gasman & Nyugen, 2014; NSF, 2011; Reid, 2011). Determining factors that impact Black male STEM student academic success at HBCUs is essential since HBCUs significantly contribute to overall college educated minorities.

Purpose Statement

There is a need to address factors associated with the academic achievement and degree completion of Black male STEM students in the various settings of HBCUs. The purpose of this study is to investigate the self-reported attitudes of Black male STEM students towards the academic programs and student support services at a rural HBCU in the South. Specifically, this study explores factors that Black male STEM students associate with their academic success. This research adds to the current body of literature that addresses academic success and challenges of Black males in STEM degree programs and offers recommendations for the retention and attrition for the overall success of Black male students.

Research Questions

The study aims to answer the following questions by surveying Black male STEM students at a rural HBCU.

1. To what extent are Black male STEM students aware of and familiar with academic programs and student support services at their institution?
2. What are the Black male STEM students' attitudes towards (utilizing) the academic programs and student support services at their institution?
3. What academic programs and student support services do Black male STEM students desire to be offered at their institution?

Significance of the Study

This research contributes to the growing body of literature addressing the academic success of Black male students in higher education, specifically within STEM programs at HBCUs. This research aims to add to the discussion about access to and opportunity for the development, removal, or modification of academic programs and student support services directed towards Black male students' academic success and degree completion. Research exists about Black male STEM students at a private HBCU (Gasman & Commodore, 2017), student performance at urban HBCUs (Gasman & Commodore, 2017; Hilton & Bonner, 2017), and at predominantly white institutions (Palmer et al. 2011); however, this study fills the gap in the literature regarding rural HBCUs. The knowledge obtained through this research could be used in the on-campus decision-making process by institutions to remove ineffective programs, add new programs, and design effective recruitment, retention, and attrition initiatives for Black male STEM students. Consequently, providing the insights into what motivated these students to remain and matriculate through to degree completion. The fundamental significance of this research aimed to assist institutions in exploring innovative strategies to support the larger Black male populations academic achievement.

Definition of Terms

Academic Achievement. Measured scholastic success through disciplined study (APA Dictionary of Psychology, n.d.).

Academic Isolation. “The lack of a meaningful connection between individuals in the same class or institution” (Tinto, 1993, p. 50).

Critical Race Theory (CRT). A method of examining the impact of structural racism on education and other institutions to find solutions that lead to changes that lead to social and economic justice (McCoy & Rodricks, 2015)

Historically Black College or University (HBCU). An educational institution founded before 1964 whose main purpose is to educate Blacks (U.S. Department of Education, 2015).

Mentor. A person who helps students achieve social and academic success in along their academic journey (Brown, 2013).

Mentoring. A formal or informal process where the individuals who have knowledge and experiences give support to those who are less experienced and assists with their development (Brown, 2013).

STEM. No universally agreed-upon definition. The workers use their knowledge in the field of science, technology, engineering, or math for the purpose of solving problems (Bureau of Labor Statistics, 2017).

Assumptions

Assumptions for this research are defined as suppositions that are accepted without proof. The first assumption underlying this study is that the researcher recruited participants who were willing to share rich and comprehensive insights into their attitudes, experiences, and needs as they relate to the research questions examined. The second assumption is that the recruited volunteers provided truthful and honest responses to the survey questions, thus openly sharing their challenges and attitudes.

Delimitations

Delimitations define the parameters of this research study. The research setting for this study was limited to one institution in the South, thus limiting the generalizability to other

HBCUs of varied sizes and locations. Additionally, only currently enrolled Black male STEM students were recruited as volunteers. The selected institution where this study took place also enrolls male students of other races and majors, as well as female STEM students, but given the research questions examined, they were not the focus of this research.

Summary

The study was organized to include five chapters to provide quantitative research of the Black male STEM students' awareness and attitudes of the academic programs and student support services available to them at their institution. Chapter One provided the background, problem statement, research questions, the significance of the study, delimitations, limitations, definitions of terms, and overview of the study. Chapter Two presents the review of the contemporary literature and includes the scholarship that guided and framed this research.

CHAPTER II – LITERATURE REVIEW

History of Higher Education for Blacks

Institutions that educated Blacks established before 1964 are designated as Historically Black Colleges and Universities (Morgan, 2008). Before the Civil War, formal education of Blacks was nearly non-existent. The Act detailed how the passage of the Morrill Land Grant Acts of 1862 allowed states to sell public lands or land scrip, with the proceeds from these transactions going to establish and maintain at least one state college specifically for the education of Blacks. It also indicated that this paved the way for public institutions of higher education to direct attention towards non-traditional fields such as the agricultural, military, and mechanical arts. The adoption of a second Morrill Act in 1890 exposed Blacks to more educational and academic opportunities. This act helped create 17 Black state-supported institutions, which joined other private HBCU institutions. The consequences of the Morrill Act legalized the segregation of Black and Predominantly White Public Institutions (PWIs) and emphasized a curriculum that focused on mechanics, agriculture, and industrial arts. Although these vocational education opportunities were attractive to many Black students, many of the majority Whites advocated that Blacks had less intellectual capability than Whites. They were creating the belief that Black students should receive a “separate and lower-caliber education” (Harper et al., 2009, p. 395).

Wooten (2016) described how HBCUs funded by the Morrill Acts operated with less funding translating into poorly trained faculty and inadequate infrastructure. The combination of private and public-funded universities, nevertheless, produced more than 3,000 educated Blacks. The *Plessy v. Ferguson* court case of 1896 further rooted the existing belief that segregation of Blacks and Whites in education was legal if facilities were equal. However, public HBCU's

remained disproportionately funded. The combination of the 1954 *Brown v. Board of Education of Topeka, KS* and 1964 Civil Rights Act brought new opportunities for Blacks in politics and education, stimulating the desegregation of PWIs and the unintentional labeling of HBCUs as impediments to desegregation.

HBCU Education Framework

The desegregation of PWIs improved educational access for Black students. Unfortunately, with the opportunity to attend PWI's, enrollment at HBCUs decreased dramatically from 90% of all Black students in the 1950' to 17.2% in the early 1990s (Hurtado et al., 2012). Additionally, many HBCUs initiated recruitment of White students, though no demographic exclusion policy existed. Statistics indicate that PWIs currently enroll more than 75% of black students (Palmer et al., 2013).

Black students who choose to enroll at PWIs face social challenges in addition to academic challenges (Lancaster & Xu, 2017). Black students at PWIs often question their academic performance, self-worth, and identity, in comparison to their White counterparts, unlike students at HBCUs. Black students report feelings of isolation, feeling out of place, and stereotyped as less competent (Perna et al., 2009). Some students encounter the presence of a challenging racial climate with faculty and students or a micro-aggressive climate (Palmer et al., 2011) subsequently resulting in a higher attrition rate of Blacks students than White students at PWIs.

HBCUs are only 3% of the higher education landscape yet, still carry the burden of justifying their existence while carrying the responsibility of educating Blacks at a disproportional rate (Brown, 2013). According to his research, HBCU's are suppliers of social capital providing knowledge content with a proven record of accomplishment that provides

individuals with skills for social and economic empowerment. Data from the 2011 National Center for Education Statistics corroborate that approximately 20% of Black students earn their undergraduate degree from an HBCU. These institutions graduate more than one-third of undergraduate degrees in mathematics and two-fifths of degrees in science a feat worth noting when considering many of the limitation of enrolled students (U.S. Department of Education, 2014).

HBCUs provide a diverse and inclusive community with a network consisting of academic and emotional support and a sense of family many students need (Hicks, 2012; Mallory, 2019; Palmer et al., 2010). An environment known for educating and creating opportunities for Blacks to obtain a sense of culture while achieving academic excellence. As a result, HBCUs are responsible for 85% of Black doctors, 80% of judges, and 75% of Black PhDs. Students that attend HBCUs were identified as more inclined to continue their educational pathway to terminal degrees (Gasman & Nguyen, 2014). Thus, HBCUs serve as feeder schools to professional and graduate opportunities.

Arroyo and Gasman (2014) developed an institution-focused, non-Eurocentric, theoretical framework highlighting Black college success. This research was a synthesis of relevant empirical data on how HBCUs have contributed to Black student success—leading to an original model that may be adaptable by all institution types. Components of the framework enable stakeholders to debate and collaborate on ideas of institutional expansion and reform to foster Black student academic success.

Accessibility and affordability were key components of the framework. HBCUs have a diverse population of applicants, and they educate students at a lower cost than average. These facts are important because 70% of HBCU students are considered low-income, with 85% of all

public HBCU students qualifying for some form of aid (Ashley et al., 2009). Academically HBCUs have a flexible and open admission policy, though more recently, some HBCUs have altered the criteria slightly. Greater access to education is necessary if Black students are to attend.

The framework highlighted the interaction of academic achievement and social connectivity on the formation and development of student identity in a nurturing environment. Among the studies reviewed, no research found a negative achievement effect from attending an HBCU. HBCUs facilitate the development of leadership skills, encourage high student aspirations, better preparing students for graduate school, and the likelihood of entering a professional occupation (Baker, 2013; Kim, 2014). The cultivation of a set of traditional black morals, principles, and norms combined with leadership skill aid in the development of a person of noble character and competency. This framework reveals how all factors intertwine in to a holistic and supportive environment that improves Black student success.

Simms (2014) reviewed the educational outcomes at HBCUs to investigate if these universities were eclectic or cohesive due to their educational production of Black students. This study suggested that HBCUs are interconnected and distinct from other institutional groups strictly based on institutional outcomes (i.e., STEM, GPA, and degree attainment). Capitalizing on the distinctiveness of HBCUs is essential for policymakers and researchers when considering that HBCUs are in jeopardy from factors such as the statutory restrictions that prevent the creation of new institutions, deficient fiscal budgets, and competition from online not for profit universities. Preservation of these educational mammoths while other institutions are developed, is pivotal in shaping the diversity of America's workforce.

Blacks Students in STEM

The small number of Blacks in STEM disciplines has been extensively documented (NSF, 2011; Palmer et al., 2011). According to NCES (2018), Black students account for approximately only 12% of awarded STEM degrees. A disproportionate number of Black students lack access to college preparatory course work, decreasing the preparedness for STEM fields. Those that remain often take over four years to complete degree requirements (Eagan et al., 2011). Approximately 20% of Black students enter 4-year STEM degree, yet only 6% earn their degree; contrasted by 23% of white students with the same intent and a 66.3%-degree completion rate (NSF, 2011).

Black student success in STEM at HBCUs has been extensively documented (Gasman & Nguyen, 2014; Lancaster & Xu, 2017; Palmer et al., 2011). HBCUs create an environment that celebrates participation and accomplishment (Gasman & Nguyen, 2014). Research conducted by Gasman et al. (2017) indicated that Universities such as Morehouse and Xavier University have national reputations of being highly STEM-focused. Black students who desired to pursue a degree in STEM fields revered these schools as offering a culture of success and support promoting self-confidence and retention.

HBCUs award 40% of natural and physical science degrees and 60% of engineering degrees to Black students (Hussar et al., 2020). Research conducted by Sims (2011) corroborated the existing evidence indicating STEM fields as an HBCU hallmark. The study revealed that more than 18% of HBCU students in a national representative sample majored in STEM. They concluded that HBCUs have a higher concentration of STEM majors even compared with other institutions. According to NSF (2011), Black females earned 66% of total STEM degrees than 34% for Black males. More recent data indicated that Black females earned more academic

degrees during the 2016-2017 academic year than any other demographic (NCES, 2018). A recent study investigating high achieving Black females in STEM indicated that HBCU's are the leading producers of Black college graduates. A national retention problem of Black males continues, thus creating inequities for the Black women who continue to exceed Black males academically (Jones, 2020).

Black Male Students in STEM

Prior research documented the poor academic performance of Black male students from kindergarten to college (Orrock & Clark, 2018; Palmer, 2011; Shapiro et al., 2017; Simmons, 2019). Studies have shown that students from low-income and single-parent homes were more likely to drop out or never attend an institution of higher learning at a rate of 46% less in comparison with students who came from different backgrounds and conditions (U.S. Department of Education, 2015). There is also a correlation between Black males who perform poorly in school and the penal system (The Quality Education for Minorities [QEM], 2010). Gofman (2009) indicated that one out of three black males will spend time either incarcerated, on probation, or under some jurisdiction of the penal system. Circumstances such as dropout rates, poverty, legal and illegal residential segregation, violent neighborhoods, and high incarceration rates are unfortunate scenarios for Black men (Gasman et al., 2017).

A report generated from QEM Network (2010), African American Males in STEM workshop, generated a list of factors that contribute to the underrepresentation of Black males in STEM. The factors included the lack of STEM exposure in K-12; the lack of STEM role models/mentors in K-graduate school, peer pressure to not excel in academics, a fear of math and inadequate math skills, the desire to work over attending school, early academic failure resulting in grade repeating, low expectation from teachers along the educational pipeline and inadequate

financial resources to attend college. The report also indicated that a disproportionate number of Black males are in special education, alternative schools, or remedial classrooms. Additionally, Black males are being disproportionately diagnosed as mentally retarded, having learning disabilities, and having severe emotional disturbances. This narrative is dismal and an accurate indication of the need for an intervention to improve the educational pathways of Black males.

More recent research has shifted to offering a narrative about the academic success of Black male students at HBCUs. This recent shift is necessary to address statistics that indicate that Blacks with no education have an unemployment rate of 10.9%, which is three times higher than those who earn an undergraduate degree (Bureau of Labor, 2018). This highlights the socio-economic relationship to improving the academic success and retention of Black male students.

Although, Black male enrollment in higher education remains at or near the same rate as in 1976, which was meager of 4.5% additional data indicate that Black males are attending HBCUs less frequently than in the past, choosing to attend PWI's (Scott et al., 2013). Thus, HBCUs must contend with recruitment as well as retention and attrition of male students.

Gasman et al. (2017) investigated Black male STEM students attending Morehouse College. This qualitative study revealed three themes: brotherhood, an expanded role of faculty, and lab-based education as the key to academic success. The school also described a network of peers that inspired and encouraged academic excellence within students providing a level of accountability. This university has a unique demographic population of being all Black males. This fact alone creates a tone of a same-race support system contradicting the narrative of deficiency in Black males. The presence of committed faculty who support students both inside and outside the classroom was pivotal. The study indicated that the faculty provided more focused attention and offered students an orderly path to scholarly and professional paths

because they were tangible examples of STEM success. Lastly, a structured program exposing the student to research has positively influenced student learning and exposed the path to earning a STEM degree. High expectations are communicated immediately upon arrival to students, and the inadequacies are not considered.

Trawick et al. (2020) examined the "Dream to Teach Program" at Morehouse University. This research emphasized the disparity between Black students and Black teachers, specifically that only 2% of all teachers are Black males. The study also revealed that 88% of Black male students remained in STEM through college, and 62% remained committed to becoming an educator. Though the sample size was limited, preventing an evaluation of the program's full benefits, the retention rate of Black males in STEM was higher than the national average (Estrada et al., 2016). The high retention rate resulted from early intervention through one-on-one mentoring beginning in the last year of high school and throughout college improved the retention of the students who were less academically prepared. Again, reinforcing the need for peers, accountability, and a supportive community for the academic success of Black males in STEM. Similarly, Strayhorn (2017) investigated the academic achievement of Black male STEM students at urban public universities and support and found the same recurrent theme of the importance of a support system, similar backgrounds, and improving academic readiness were pivotal to student success.

HBCUs have the ability and the mechanism in place to produce Black males STEM graduates. Methods of recruiting Black male students highlighting the factors that improve degree attainment and graduation rates need to utilize. Implementing preventative measures must occur swiftly because most of these institutions are primarily tuition-driven with only nominal

endowments. Combining previously mentioned factors could result in closing these universities and a possible reduction in the educated workforce.

Science and technology jobs projections indicate an increase by 10% within the next five to ten years (Bureau of Labor Statistics, 2018). Additionally, the United States has fallen to second place behind China in STEM degree attainment (NSF, 2020). Though the United States is among the top global producers of research and development intensive industry output and publications, its global share has declined because of China's fast growth. Although the U.S. continues to lead the world in research and development and science and technology, their share of the global market is decreasing. Other nations such as China and other developed European countries expand their human capital infrastructure to sustain and compete in a knowledge-oriented economy (NSF, 2020), thus, reducing the role of the United States and eliminating their dominance.

Minorities are the largest growing population in America, and a diversified workforce is needed to compete globally. Businesses that embrace the nation's evolving demographics will have the ability to reap the economic benefits of an inclusive workforce. Companies that recruit Black and other minority graduates position themselves to compete globally by employing people with different backgrounds, skills, experiences, and cultures that make them easier to adapt to change. Therefore, a diverse workforce is essential to nurturing a strong economy built for the present and the future.

Admission forecast for a continual decrease in enrollment at all two- and four-year institution all demographics through 2028 (U.S. Department of Education, 2015). With these projections, recruitment and retention of students is a critical concern at all institutions and is a top priority for university presidents. HBCUs must expand existing knowledge to identify and

remedy retention issues for all students but particularly Black males. Correcting this problem and improving the condition of the Black male through education attainment is beneficial to the student and the entire community by propelling these families into another socio-economic realm (Gasman et al., 2017; Palmer, 2011).

Summary

Much of the literature investigating Black males in STEM is qualitatively based and focused primarily on urban and private HBCUs. The purpose of this chapter was to present a detailed discussion of the research concerning the history of education referencing the establishment of HBCUs and the state of education for Blacks in the United States. The presented research shed light on how socio-economic issues and systemic racism have shaped the educational pathway of these institutions. Regardless of the many described setbacks, HBCUs still contribute the most Blacks with undergraduate degrees. There is a significant amount of scholarship concerning Blacks in higher education and their success (Brown 2013; Fries-Britt, 2017; Scott et al., 2013; Strayhorn, 2017). More recent research addresses the successful degree matriculation of Blacks males in STEM (Gasman et al., 2017; Palmer et al., 2011; Scott et al., 2013; Simmons, 2019; Strayhorn, 2017; Trawick et al. 2020). A gap in the literature exists in the quantitative assessment of Black males STEM students attending public, rural HBCUs. This study explored Black male students majoring in STEM at a rural public HBCU in the South. Specifically, this research investigated the male students' perceptions regarding their knowledge of available academic programs and resources for their academic success and expressed what resources are needed for the students to succeed in these disciplines.

CHAPTER III – METHODOLOGY

The researcher designed and distributed a web-based questionnaire to collect information from a sample of participants. The researcher used a cross-sectional survey method over a 40-day period, allowing a snapshot of the sampled population. (Creswell & Guetterman, 2019).

The researcher is a current student in the Doctor of Education program in higher education at the University of Southern Mississippi (USM). The instrument she developed is based on the research questions listed above. The Qualtrics® system was used to conduct the survey research, evaluation, and record information. The University of Southern Mississippi provided free access to Qualtrics® for the researcher to collect data and analyze responses. The researcher developed the questionnaire to determine the influences that support or do not support Black male STEM students at the institution. The researcher understood the essence of inquiring specific questions for participants to respond in the open ending questions in this study.

Instrument

The instrument developed by the researcher to collect data and address the research questions contained three demographic questions, four open-ended questions, ten Likert scaled questions, eight closed ended multiple-choice questions and one skip question. The skip question pertained to if the participant was STEM major. The demographic questions focused on specific STEM major and classification of student participant. The solicited participants were Black male STEM students currently enrolled during the fall 2021 semester. The survey was designed so it would automatically end if the student did not consent to participate in the study or was not a STEM major, and thus selected no for the first question.

Timeline

The research developed the instrument during the summer of 2021. A higher education professor with expertise in Higher Education and Student Affairs reviewed and provided feedback. The researcher completed modification to increase the validity of the instrument and by extension, the information that the researcher sought to collect and analyze. Following revisions, the researcher applied to the Institutional Review Board (IRB) on August 13, 2021 and received IRB approval on September 8, 2021 (Appendix A). The survey became active on September 21, 2021, and closed on October 31, 2021, for a five-week period of data collection.

Participants

The researcher acquired a list of currently enrolled Black male undergraduate students from the Office of Student Records at the HBCU located in the South. An email announcement to participants informed them of the purpose and importance of the study and encouraged participation. The email announcement also informed participants that there was no reward for participation along with the benefits of participation along with the link to the consent form. The researcher sent a one additional email reminder during the five-week data collection period.

Data Collection and Analysis

Using Qualtrics®, data were obtained from student participants. No personal data was collected at the conclusion of the survey offering each survey participant anonymity. After the five-week data collection period, the researcher noted a total of 66 completed the surveys out of 600 administered surveys which resulted in a 11% completion rate for the research. The researcher used the summary statistics provided by Qualtrics®. Additionally, Microsoft Excel to perform comparative statistical analysis and to generate data tables and graphs.

CHAPTER IV – RESULTS

This chapter summarizes the quantitative results of the perception and knowledge of academic programs and student support services of Black male STEM students at a rural public HBCU in the South. Specifically, the results illustrate students' perceptions regarding their knowledge and use of the programs and support services, as well as desired programs needed for them to succeed in STEM disciplines. This research narrows a gap in the literature regarding quantitative research that addresses Black male students attending public, rural HBCUs. The first section of this chapter presents student participants demographics. These demographics are presented initially so that the readers will better comprehend the results of the research questions. Information obtained included current academic classification, designation as STEM major, and chosen degree matriculation plan. The subsequent sections report student awareness, familiarity and attitudes towards academic programs and student support services followed by the section that describes the academic programs and support services that participants desire to be offered at the university.

Participant Demographics

Student participants were Black male undergraduate students over the age of 18 enrolled in the Fall 2021 semester. An email solicitation was sent in October 2021 to 600 Black male students to complete a student survey. Demographic questions provided the researcher with information regarding program of emphasis and current academic classification. The survey report indicated 66 survey responses however, only 29 respondents met the criteria for participating in the study.

Participants were asked to select the STEM degree plan that best described them. The options included applied science, biology, chemistry, computer networking and information

technology, computer science, mathematics, physics and robotics and automaton technology. Based on the responses 46% of the students were biology majors with chemistry and computer science both tied with 14%. Applied science and computer networking and information technology both had 11% with robotics and automation technology with 4%. The biology department is the largest department on campus, which supports the largest number of student participants. Student participants were also asked to indicate their academic classification as of the Fall 2021 semester. Based on the responses, 57% were seniors, 28% were juniors with sophomore and freshmen both had 7% of the respondent population.

Awareness of and Familiarity with Academic Programs and Support Services

This section reports the extent to which Black male STEM students were aware of and familiar with academic programs and student support services at the institution. Participant responses to the 5-point Likert scaled questions specifying their level of agreement to the questions on the instrument are depicted below (see Table 1). The five-point rating scale for the questions assigned the value of 1 as being extremely familiar to 5 as being extremely unfamiliar. According to student responses, 84% were extremely familiar to somewhat familiar with academic programs, while 73% of respondents were extremely to somewhat familiar of student support services. Student responses indicated that 56% felt that the university did extremely well to moderately well with informing students of the student support services and programs in contrast to the 42% that indicated that the university had not done well.

Table 1*Student Familiarity with Programs and Services*

| Programs and Support Services | Mean | Std Dev | Variance | Count |
|--|------|---------|----------|-------|
| How familiar are you with academic programs (i.e., pre-professional classes, MCAT prep classes and technical writing classes) offered at the University? | 2.12 | 1.01 | 1.03 | 26 |
| How familiar are you with student support services (i.e., pre-professional advisor, subject-based tutoring, and mentoring sessions) offered at the University? | 2.36 | 1.23 | 1.5 | 22 |
| How well did the University do with information you of the academic programs and student support services available to STEM majors | 3.21 | 1.24 | 1.53 | 19 |

When respondents were asked to identify the academic programs that thought were available to STEM majors at the University, most students (38%) identified pre-professional programs, followed by standardized test preparation courses (22%). Fewer students were aware of the technical writing (21%) and computer application courses (19%). With respect to student awareness of student support services available to STEM majors, most students identified pre-professional advisor (18%) followed closely by professor to student mentoring (17%) and access to work related opportunities (17%). Students identified membership in STEM related organization (14%) and access to a computer lab with course simulation (11%) more than one-on-one consultation with the AAMC pre-health advisor (8%).

Academic program use among study participants was favorable with 41% enrolled in pre-professional courses, followed by computer application courses (24%). Respondents equally used standardized test preparation courses and technical writing (18%). In contrast, student

support services most frequently used included the pre-professional advisor and professor to student mentorship (17%), followed by access to a computer lab with course simulation and access to STEM-related national organizations (15%). A small number of respondents had the one-on-one consultation with the AAMC pre-health advisor (7%).

Student participants' attitudes were favorable toward academic programs and student support services with 44% strongly to somewhat strongly satisfied. In comparison to 39% of respondents who were strongly to somewhat strongly dissatisfied, 17% of the respondents were neither satisfied nor dissatisfied. In contrast to their satisfaction with the services and programs, more than half of the respondents (73%) somewhat to strongly agreed with recommending the student support services and academic programs to another student.

Attitudes Towards (Utilizing) Academic Programs and Support Services

This section illustrates students' responses regarding their attitudes toward or experiences with utilizing academic programs and student support services. Table 2 indicates the student participants perception of whether participation in academic programs and use of student support services improved their academic achievement. The first three Likert scaled 5-point questions has the rating scale with 1 as strongly disagree to 5 as strongly agree with the instrument statement. The overall response was not favorable with 28% of responses including somewhat agreeing to strongly disagreeing. It bears mentioning the 22% of the population who responded as neither agree nor disagree.

Table 2*Student Attitudes Towards Programs and Services*

| Academic Programs and Support Services | Mean | Std Dev | Variance | Count |
|--|------|---------|----------|-------|
| I am satisfied with the academic programs and student support services for STEM students offered by the University | 3.06 | 1.22 | 1.50 | 18 |
| I would recommend the academic program and student support services offered by the University to another student. | 3.61 | 1.16 | 1.35 | 18 |
| I feel that my academic achievement improved as a result of participation in the academic programs and student support services offered by the University. | 2.83 | 1.38 | 1.92 | 18 |
| I am overall satisfied with my academic experience at the University | 2.11 | 0.94 | 0.88 | 18 |

Respondents were asked how satisfied or dissatisfied they were with their academic experience at the university and 78% were extremely to somewhat satisfied in contrast to less than 10% extremely dissatisfied. Of concern was the 17% of respondents who were neither dissatisfied nor satisfied. Open-ended questions asked students to share additional information regarding their experience and why they were dissatisfied or satisfied with the role of these programs and services in their academic achievement. Favorable responses indicated that service was polite and helpful, that they had grown academically as a student, and that professors seemed to care about students. In contrast, students mentioned that they were not introduced to many opportunities and that mass emails made the experience feel impersonal. Additionally, a student suggested participating early in the degree matriculation, because there were no programs offered to help seniors.

Desired Academic Programs and Support Services

The last section presents students' feedback regarding the programs and services they desire to be available at their university. In identifying the academic programs, most students selected technical writing (28%) followed by computer application courses (25%). Student participants also indicated a preference for standardized test preparation courses (23%) (i.e., MCAT, DAT and GRE) in comparison to pre-professional programs (22%). An open-ended question was included in the instrument for students to elaborate on why indicated programs were desired, but participants elected to not complete this section.

When asked to select all the support services the participants desired to be offered, computer laboratory with course simulations (17%) and subject based tutoring (16%) had the percent of desirability by participants. Participants indicated a slight preference to professor to student mentoring session (15%) over both access to work related opportunities (13%) and access to the AAMC pre-health advisor (13%). The availability of a pre-professional advisor and access to membership in STEM related national organizations both received the lowest percent of desirability at 12%. An open-ended question followed asking participants to elaborate on other programs not listed that they may desire; unfortunately, no responses were recorded.

Summary

Overall, the results suggest that student participants believed that the university could better inform students of academic programs and student support services. Participant data indicated that 40% of students started using academic programs during their sophomore year, while 40% of participants said that they used student support services in their freshmen and junior year. Unfortunately, the data did not indicate which of the academic programs or student support services were used by participants.

Even though many of the existing programs are used by students, the results of this research revealed that the university could increase the promotion of the wide spectrum of programs available to maximize student use. Additionally, students identified desires for supplemental programs being offered, such additional access to technical writing and computer application courses. Lastly, survey data indicated that 81% of student participants would continue their academic program and over 89% indicated that they would recommend their academic program to friends and other students. Overall, these results indicate that student participants are using existing student support services and academic programs, but desire better communication and an expansion of course and program offerings.

CHAPTER V – DISCUSSION

The purpose of this study was to investigate the self-reported attitudes of Black male STEM students towards the academic programs and student support services at a rural HBCU in the south. This quantitative study attempted to explore factors that Black male STEM students associate with their academic success. The role HBCUs play in providing STEM educated individuals is extensively supported by literature. Therefore, developing strategies that address educational deficiencies within the HBCU STEM pipeline, particularly for Black males, is an essential component in meeting the critical demand for a STEM educated workforce. The role HBCUs play in providing STEM expertise is key to assisting in America maintaining its role as a global leader in STEM.

Discussion: Research Question One

The first research question sought to determine, “To what extent are Black male STEM students aware of and familiar with academic programs and student support services at their institution?” The study found that student participants were very familiar with the academic programs and student support services offered by the university. Demographic data indicated that most of the participants were seniors which may explain the level of familiarity. Research conducted by Fries-Britt (2017) indicated that academic success of Black male students is associated with relationships established between peers and faculty. Although the research question in this study did not ask how the students became familiar with programs and services, data did indicate that the university was inadequate in disseminating this information. This evidence supports the findings of Kim (2014) who indicated that peer relationships and strong relationships with faculty are crucial to reducing attrition rates. Similarly, the participants in this

study expressed the intent to remain at the university and continue to pursue their degree regardless of the level of interaction by the university.

Discussion: Research Question Two

Research question two asked, "What are the Black males' students' attitudes towards (utilizing) the academic programs and student support services?" Student responses were not favorable about their experience with the services and programs. However, students indicated that they were satisfied with their overall academic experience. This finding is consistent with that of Palmer et al. (2011) which indicated students felt that student support services and academic programs complemented their academic course work. The open-ended responses captured in this study, such as the 'professors seem to care about students' and "I've grown academically as a student" are consistent with the literature describing the supportive environment of HBCUs (Gasman & Commodore, 2017; Gasman et. al. 2017). One interesting finding is students felt opportunities were often missed due to the mass emails which made the experience impersonal. This notion contrasts with the 'nurturing' environment presented in the literature about HBCUs (Gasmen & Spencer, 2012; Hicks, 2012).

Discussion: Research Question Three

The third question in this research asked, "What academic programs and student support services do Black males STEM students desire to be offered at their institution?" Results support the findings of Gasman and Nguyen (2014) which indicated that experiential learning experiences, including exposure to standardized test and laboratory-based research experience, were key tools implemented at HBCUs. In this study, students' responses regarding desired programs indicated preference for the expansion of current programs and services. These results

advanced the themes noted in prior research, such as peer groups and faculty relationships as invaluable resources to male STEM students (Palmer et al. 2011).

Still, despite the desired programs not yet being fully available, student participants indicated that they would continue along their STEM discipline and would recommend their academic program to their friends and other students. This evidence further supports the satisfaction of students with the existing programs in their HBCU setting.

Overall, the results of this research indicate a need for improved dissemination of information to students to increase their use of existing services. Incorporating another notification system other than email blast is needed to create a relationship between the students and the university. Overall, the relationship between students, peers, and faculty was the prevalent theme supporting the satisfactory academic experience of the sampled population. This success network has already been supported in the literature and is the mechanism that allows HBCUs to serve as a STEM pipeline for male students.

Limitations

This research has several limitations that should be addressed. The research was limited by its examination of one student population, although the purpose was to address the deficit in the literature regarding Black male STEM students at a rural institution. The population sample for this quantitative study was less than 10% despite a repeated effort to recruit participants, thus data may not adequately represent the target population. Further, this research was conducted at one HBCU in the South. The experiences of these students may be shaped by their socio-economic status, geographical locations of where they were born and raised, and other factors (i.e., size of family, employment status, and housing status) over which the researcher had no control. Incorporating other rural HBCUs would provide a more in-depth understanding of the

experiences of this population. Overall, there was limited quantitative research available addressing student perception of academic programs and student services at both HBCUs and PWIs that could have been used in guiding this study. As a result of these limitations, caution should be taken in generalizing the results across a larger demographic population.

Recommendations for Future Research

Although this research provided new information in a much-needed area of higher education, further quantitative research is needed to investigate the impact of student support programs on grades and scores on standardized test such as the graduate records exam (GRE) or the medical college admission test (MCAT). Additional research should also explore the direct link between peer and faculty relationships regarding the use of academic programs and student support services. Lastly, qualitative studies at rural settings need to be conducted to elicit student experiences regarding demographic differences such as socioeconomic and educational factors not reflected in this data.

Implications for Practice

The main implication of this research stems from the finding that students are using the existing programs and services. Therefore, additional resources need to be provided to modify current communication of STEM-related support services and academic programs to students. These findings also indicated the most used and desired services and programs such as technical writing courses and computer-based simulation courses. A recommendation based on this research is to expand the existing academic programs and student support services, which is more cost effective than the development of new academic programs or student support services.

Though caution should be used in extrapolating the data across institutions, the preliminary data is useful for planning. Administrative staff could develop new academic

programs and student support services based on the most used and desired programs. Department chairs could adapt curricula to introduce desired program sooner in the matriculation process of students to increase student awareness and participation. Department chairs could implement a formalized peer mentoring program utilizing upper classmen to assist incoming freshman in identifying the student support services and academic programs available. Surveys soliciting student feedback can be used by faculty to assist in determining if the existing academic programs and services are addressing the needs and desires of the students.

Additionally, the research communicated the need to develop additional means of communicating information to students. Administrators should consider multiple modes of communication to effectively communicate opportunities to the diverse demographic population of students that attend HBCUs and other institutions. Improved communication by the university in conjunction with building and enhancing existing relationships between their peers and faculty is a model that can be adapted by all academic institutions.

Summary

This research aimed to investigate the self-reported attitudes of Black male STEM students towards the academic programs and student support services offered at their institution. The goal was to explore the factors that students associated with their success in STEM related majors. The most obvious finding was that students were aware of academic programs and student support services. These students also indicated that they were satisfied with their academic progress and would recommend their current academic program to other students. This is an indication of the benefits associated with participating in the programs and services. It is my hope that this research will serve as a resource to improve student support services and

academic programs leading to an increase in the matriculation of Black male STEM students, thus assisting in addressing global demand for STEM educated individuals.

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APPENDIX A

IRB Approval

IRB-21-156 - Initial: Sacco Committee Letter - Expedited and Full

do-not-reply@cayuse.com <do-not-reply@cayuse.com>

Wed 9/8/2021 8:24 AM

To: Masha Krsmanovic <Masha.Krsmanovic@usm.edu>; Monica Burr <Monica.Burr@usm.edu>

Office of
Research Integrity



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NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER: IRB-21-156

PROJECT TITLE: Need Assessment for Academic Programs and Student Support Services for African American Male Students at a Historically Black College and University in Mississippi

SCHOOL/PROGRAM: Educational Research and Admin

RESEARCHER(S): Monica Burr, Masha Krsmanovic

IRB COMMITTEE ACTION: Approved

CATEGORY: Expedited

7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: September 8, 2021

Donald Sacco, Ph.D.
Institutional Review Board Chairperson