A Thematic Analysis of HBCU Biology Program Mission Statements

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Abstract: Historically Black Colleges and Universities (HBCUs) demonstrate success in facilitating pathways for STEM graduates into the STEM workforce, and this phenomenon has been widely documented (Gasman & Nguyen, 2014; Upton & Tanenbaum, 2014; Clewell et al., 2016). Although thematic analysis of the mission statements of HBCUs at the institutional level have been conducted (Albritton, 2012; Bryan & Stewart, 2016), similar analysis has not been conducted at the departmental or program level of many discipline- specific STEM areas at HBCUs. In the present thematic analysis, departmental and programmatic mission statements in biology at 28 HBCUs were evaluated to determine the emergent themes that characterize and potentially contribute to student retention and success in biology at HBCUs. Among all Carnegie classes, the 2 most frequent themes included: STEM/ Healthcare Workforce Preparation and Skill Development. The 2 least frequent themes were Diversity & Inclusion and non- STEM Student Science Education. This emphasis on workforce preparation and skill development at the level of the academic unit may provide additional insight into the success of HBCUs in facilitating pathways for URM graduates into advanced training programs and promoting retention of URM professionals in the STEM workforce.

Keywords: HBCU, Thematic analysis, Mission statement, Biology program

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Introduction

The term Historically Black Colleges and Universities, HBCUs, encompasses a diverse network of institutions that promote excellence, equity, and opportunity for scholars of all races across the nation. However, they are unified in that they are majority- minority institutions of higher education, established prior to 1964, with a principal mission of supporting and serving the educational needs of the African American community (Aud et al., 2010). HBCU success in facilitating pathways for STEM graduates into the STEM workforce has been widely documented (Gasman & Nguyen, 2014; Upton & Tanenbaum, 2014; Clewell et al., 2016). Although HBCUs make up only a minority of postsecondary institutions in the U.S. and matriculate a minority of black students nationally (De Brey et al., 2019), one third of STEM doctoral graduates have been conferred

undergraduate degrees by HBCUs (Upton & Tanenbaum, 2014). Likewise, a subset of HBCUs is noted to be the top producers of Black STEM PhDs nationwide (National Science Foundation [NSF], 2011; Upton & Tanenbaum, 2014). Black STEM PhDs that are members of other minoritized groups, for example women, are more likely than not to have received their undergraduate or graduate degree from an HBCU (Upton & Tanenbaum, 2014).

When considering the institutional pathways to graduate degree completion, among STEM PhDs 32% of males and 43% of females completed either their undergraduate, graduate, or both degrees at an HBCU (Upton & Tanenbaum, 2014). These percentages were also found to differ based on STEM discipline, for example, among Black PhDs in biological or biomedical sciences approximately 39% of recipients completed either their undergraduate, graduate, or both degrees at an HBCU (Upton & Tanenbaum, 2014). Approximately 40% of Black STEM PhDs identify as first-generation college students and are more likely to complete their undergraduate education at an HBCU in contrast to non- first-generation Black STEM PhDs (Upton & Tanenbaum, 2014). Participants of the HBCU- Undergraduate Program, funded by the National Science Foundation, have higher rates of graduate degree completion and greater success in entering STEM careers than African American students on the national scale (Clewell et al., 2016).

These outcomes highlight the crucial role of HBCUs in STEM undergraduate education and building successful pathways for minorities into advanced degree programs in STEM and STEM career fields. HBCUs provide nurturing learning spaces for students traditionally marginalized and underrepresented in STEM. These unique institutions can serve as models in best practice for educating and retaining URM students (Rankins, 2019).

A mission statement is a statement of purpose that directs the strategic planning, goal orientation and implementation of activities by an organization. It serves to distinguish one organization from another similar organization (David & David, 2003). Mission statements have versatile utility and can serve as a tool to facilitate communication among internal and external stakeholders, and to facilitate effective strategic planning, as well as guide organizational decision- making (Fitzgerald & Cunningham, 2016). Post- secondary institutions utilize mission statements to communicate their utility and communicate with stakeholders that may have specific expectations for institutions within higher ed (Morphew & Hartley, 2006). Mission statements of post-secondary institutions should integrate elements that form the basis for a mission in higher education (Morphew & Hartley, 2006).

Thematic analysis of the mission statements of postsecondary institutions have reported a myriad of themes relevant to their respective institutional mission, including but not limited to, leadership, citizenship, cultural diversity, life- long learning, academic achievement, and technology (Wang, 2007). Thematic analysis based on institutional criteria, like four- year versus two- year institutional status, identified statistically significant thematic differences between the two classes of institutions (Wang, 2007). Similar analysis of public and private institutions across multiple Carnegie classifications identified notable thematic similarities and differences among institutions (Morphew & Hartley, 2006). Although mission statements exist at the institutional level,

other organizational areas within an academic institution may have their respective mission statements for example, at the school, college, or program level. These mission statements are more focused on the needs of the academic area stakeholders, but still align closely with the overall mission of the institution. Further research is needed to elucidate how institutional mission statements are expressed on the programmatic level (Morphew & Hartley, 2006).

Prior thematic analysis of HBCU institutional mission statements revealed an emphasis and commitment to both liberal arts and professional education for learners at their respective institutions (Gasman & McMickens, 2010). Additional themes that characterized the mission statements of these institutions included a commitment to morals, ethics, and community service (Gasman & McMickens, 2010), as well as village pedagogy (Harris III, 2012) which can be described as intentional awareness and commitment to facilitate community that enhances the educational experience of learners. Institutional missions of HBCUs can be further adapted by departmental units to generate more specific mission statements that meet the targeted goals of the department and the needs of their discipline specific learners (Bryan & Stewart, 2016).

Although thematic analysis of HBCU mission statements at the institutional level have been conducted (Gasman & McMickens, 2010; Harris III, 2012; Albritton, 2012; Bryan & Stewart, 2016), similar analysis has not been conducted at the departmental or program level of many discipline- specific STEM areas. A more focused thematic analysis at a different hierarchical level, notably the academic unit that interacts more directly with STEM students, may facilitate the emergence of additional or discipline specific themes that impact STEM student success among URM students.

In order to better understand the contribution of HBCUs to STEM student success, the current study uses a primarily qualitative approach to investigate the mission statements of HBCUs in a discipline- specific context, specifically at the departmental or programmatic level. The current article reports on the findings of a thematic analysis evaluating the mission statements of biology and biology- related departments/ programs. What are the recurring themes among the mission statements of HBCU biology departments/ programs that contribute to the success of HBCUs in URM biology student retention?

Method

Data Collection

The current study conducted an online survey of Historically Black Colleges and Universities, as identified using the US Department of Education's National Center for Education Statistics (NCES) database. Data from the Integrated Postsecondary Education Data System (IPEDS) was accessed using the College Navigator website. IPEDS provides basic data on postsecondary institutions in the U.S. that participate in student financial aid programs. The Carnegie classification for each institution was recorded. The Carnegie Classification of Institutions of Higher Education is a nationally recognized framework for classifying colleges and universities in the United States. The classification system is based on the degree offerings and research emphasis of the

respective institution.

Initial search criteria included having a specialized mission of being a Historically Black College or University. From these institutions, HBCUs that met the additional criteria of having a clearly indicated mission statement for the biology- related department or program area were selected to be included in the qualitative analysis. Institutions that lacked clearly defined mission statements for their biology departments or programs were excluded from the analysis. This resulted in a final cohort of 28 institutions. Mission statements were identified from two main online sources accessed via the respective university's official website. Online materials included the school, college, department, or program webpage or the most current and accessible university catalog.

Data Analysis

Identified mission statements were subsequently collated based on the respective Carnegie classification of the institution. Delve CAQDAS (computer- assisted qualitative data analysis software) was utilized as the analytic tool to facilitate coding and then organization of initial codes into researcher- generated themes. Two graders independently coded the mission statements. Graders subsequently discussed coding to rectify any differences in coding of the data set. An inductive coding method was used to generate initial codes from the analysis of the mission statement text. Subsequently, codes were analyzed and sorted into categories. The emergent categories were identified as overarching themes.

The frequency of each theme among all HBCUs and the frequency of each theme based on the respective Carnegie class of institutions was calculated. The most frequent and least frequent themes were reported for each Carnegie class, and a comparison was made across all classes. Unique themes, being defined as themes noted in only one Carnegie class or a subset of Carnegie classes were also reported.

Results

An NCES search for HBCUs generated a list of 101 institutions; while, application of the additional criteria resulted in selection of 28 institutions that were selected to perform the thematic analysis of biology department/ program mission statements. This cohort represents approximately 28% of HBCU institutions, and a subset of Carnegie classes found within the original NCES search (see Table 1). Six of the twelve initial Carnegie Classes (50%) are represented within the cohort. These classes include: Doctoral Universities (DU): High Research Activity, Master's Colleges & Universities (MCU): Larger Programs, Master's Colleges & Universities: Medium Programs, Master's Colleges & Universities: Small Programs, Baccalaureate Colleges: Arts & Sciences Focus, and Baccalaureate Colleges: Diverse Fields.

During the qualitative analysis, 92 unique codes were generated. These identified codes were then collated into 8 categories, and subsequently identified as 8 major themes (see Table 2 & Figure 1). The number of themes

represented by each of the 6 Carnegie classes ranged from 4 to 7; no Carnegie class contained all 8 themes. Master's Colleges & Universities: Small Programs represented the fewest themes (n=4), while Master's Colleges & Universities: Larger Programs, Baccalaureate Colleges- Diverse Fields, Baccalaureate Colleges- Arts and Sciences Focus, Doctoral Universities- High Research Activity represented the highest number of generated themes (n= 7). Master's Colleges & Universities: Medium Programs represented an intermediate number of themes (n=6).

Table 1. Carnegie Classification of all HBCUs versus cohort selected for thematic analysis

Carnegie Classification	Count (n= 101)	Count (n=28)
Doctoral Universities: High Research Activity	11	4
Master's Colleges & Universities: Larger Programs	7	5
Master's Colleges & Universities: Medium Programs	11	2
Master's Colleges & Universities: Small Programs	6	2
Baccalaureate Colleges: Arts & Sciences Focus	16	3
Baccalaureate Colleges: Diverse Fields	30	12
Baccalaureate/Associate's Colleges: Mixed Baccalaureate/Associate's	3	0
Associate's Colleges: High Transfer-Mixed Traditional/Non-traditional	1	0
Associate's Colleges: High Vocational & Technical-Mixed Traditional/Non-traditional	9	0
Associate's Colleges: High Vocational & Technical-High Non-traditional	1	0
Special Focus Four-Year: Faith-Related Institutions	4	0
Special Focus Four-Year: Law Schools	2	0

Among all Carnegie classes, the most frequent themes were STEM/ Health Workforce Preparation and Skill Development. The least frequent themes were Diversity & Inclusion and non- STEM student science education. When separated by Carnegie classification, this pattern was primarily found to be consistent for most classes. Diversity & Inclusion represented a unique theme that was only mentioned in Baccalaureate Colleges- Diverse Fields. The emergent themes from most to least frequent included: STEM/ Health Workforce Career Preparation, Skill Development, Engagement in Curricula/ Pedagogy, Enrichment Opportunities, Professional/ Graduate Studies Preparation, Quality Learning Environment, non- STEM student science education, and Diversity & Inclusion.

Several instances of co- occurrence of codes were found throughout the analysis. For example, the code “science- related careers” was found to co- occur with “professional studies”, “graduate studies”, and “health

profession careers". While the code "research experiences" was found to co- occur with "scientific Inquiry", "faculty scholarship", "lab settings", "hands on skills", and "life- long learning". The most frequent co-occurrence was between the codes "graduate studies" and "professional studies".

Table 2. Frequency of themes identified by respective Carnegie Classfiication

	Carnegie Classification						
THEME	MCU: Larger Programs	MCU: Medium Programs	MCU: Small Programs	BC: Diverse Fields	BC: Arts and Sciences Focus	DU: High Research Activity	TOTAL
STEM/ Health Workforce Career Preparation	24	8	3	28	6	13	82
Skill Development	9	17	3	13	3	14	59
Curricula/ Pedagogy	6	8	4	14	4	2	38
Enrichment Opportunities	6	3	0	14	2	4	29
Professional/ Graduate Studies Preparation	4	3	1	13	4	4	29
Quality Learning Environment	11	1	0	7	1	4	24
non- STEM Student Science Education	1	0	0	0	3	1	5
Diversity & Inclusion	0	0	0	5	0	0	5

STEM/ Health Workforce Preparation

Workforce preparation in STEM and health- related disciplines was the most frequent theme among all Carnegie

classes. These departmental units emphasize career readiness in order to "enable students in Biology to become outstanding contributors in their areas of interest and in society at large" and to promote "the development of tomorrow's leaders in professions utilizing biological knowledge", as well as "prepare them for employment or professional advancement" as noted by Philander Smith College, Tuskegee University and Lincoln University. A multipathway approach to participation in the STEM workforce was highlighted by institutions, for example, Alcorn State University "prepare[s] students to excel as professionals, scientist[s], teachers or productive employees to serve the community, the state, the nation and globally in areas related to the life sciences." Likewise, West Virginia State University supports students "planning careers in science, medicine, or allied health sciences; [or] planning careers as science teachers" and Kentucky State University focuses on readiness for "teaching positions in biology and related fields and careers in industry". Alabama A&M University is preparing students "for careers in teaching, research and public services" and to be "well prepared for positions in public and private institutions"; likewise, Tennessee State University is preparing students "for acquisition of entry level positions in the job market or … seeking certification for secondary teaching careers"; while, Alabama State University is getting students "prepared for entry into teaching, research, industry, government and private sector endeavors, as well as further study for entry into scientific research and health professions fields".

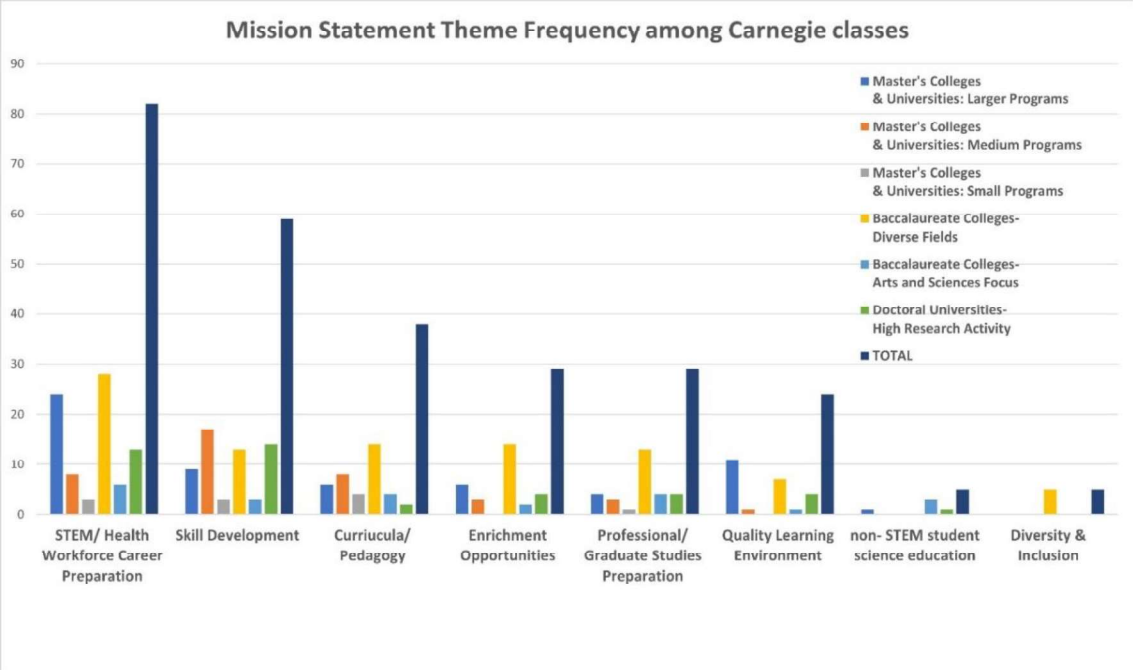

Figure 1. Frequency Histogram of Themes İdentified by Respective Carnegie Classfiication

In some instances, institutions mentioned specific STEM or health-related careers. For example, "science and engineering careers" and "careers as environmental scientists and secondary school biology teachers" as noted by Livingstone College and Grambling State University. Multiple schools explicitly mentioned the STEM Workforce as part of their mission statement. Cheyney University of Pennsylvania's efforts to prepare "students

to join the Science, Technology, Engineering and Math (STEM) workforce" and Bowie State University's efforts "to equip our graduates with the knowledge, skills and abilities required by the future STEM workforce". Terms such as "excel", "productive", and "outstanding contributors", highlight the academic units' mission to generate a cohort of quality STEM professionals that develop the required competencies and proficiencies to meet the demanding needs of the current and future STEM workforce, as well as "further preparation for their field of choice, thus aiding in the transition to the next level of their careers" as indicated by Cheyney University of Pennsylvania.

Skill Development

The learner skills targeted for development included a range of skills, both cognitive and non- cognitive. Many of the skill sets were scientific skills required to be successful in demanding STEM careers. Scientific skills included "scientific reasoning, critical inquiry, problem solving, and the development of research skills", "laboratory-based and analytical skills" "critical reasoning, intellectual inquiry, and mastery of the scientific jargon… practice of scientific inquiry…to formulate testable hypotheses, design experiments and analyze data" "academic, social, scientific, computer, and mathematical skills…. enriched by critical and analytical thinking skills" and "competency in the use of modern biological techniques, critical thinking, analysis, interpretation and presentation of data", as noted by Clark Atlanta University, Kentucky State University, Tuskegee University, Benedict College, and Florida Agricultural and Mechanical University, respectively. Other skill sets included non- cognitive abilities with relevance to advanced training programs or careers in STEM disciplines. These non- cognitive skills include leadership, collaboration, citizenship, and ethics. For example, Tuskegee University and Florida Memorial University "promotes leadership and collaborative skills" and "prepares its students for responsible participation and leadership in an ever-changing technologically advanced global society", respectively.

Southern A&M College and Kentucky State University train students to develop "ethical behavior in experimental design and practice" and "the ethical mindset to be engaged citizens". Likewise, Cheyney University of Pennsylvania aims "to educate and train…. students in the science, technology, and mathematics disciplines to become life-long learners, problem solvers, and environmentally responsible citizens". Also noted is Savannah State University's emphasis on key skills such as scientific literacy and science communication "to acquire and critically interpret knowledge of scientific facts and theories of biology, to relate that knowledge to other subject areas and to communicate his or her understanding to others". Learners are prepared with a toolkit of diversified skills that are translatable and adaptable to multiple fields of STEM such as "a board-based [sic] understanding of the principles of biological sciences that fully exploit existing and emerging technologies", "a solid academic foundation in the biological and environmental sciences with skills for further educational opportunities", and "opportunities for greater specialization in emerging fields" as noted by Alcorn State University, Alabama A&M University, Tuskegee University. This array of diverse skill sets is translatable to multiple fields of STEM, as well as healthcare- related fields. This approach to building both technical and 21st century skills may support multi- dimensional development among student learners.

Curricula and Pedagogy

Many programs emphasized their curricula or pedagogical practices that effectively facilitate student learning and achievement. Southern University A & M College stated that it "recognizes excellent student education as its first priority". This sentiment was implicit in multiple mission statements. Curricula and Pedagogy was described either through description about the curricula or pedagogy or examples of learning activities within the curriculum. For example, Clark Atlanta University "prepares graduates to be competitive in our global society" and Florida Memorial University "provides a challenging and supportive environment that prepares its students". Similarly, University of Arkansas at Pine Bluff offers a "rigorous program for academic instruction in the biological sciences for students" and University of the Virgin Islands' faculty are engaged in "academic and pedagogical advancement". Dillard University provides "a broad background in biology with sufficient flexibility to satisfy a wide variety of individual interests and career objectives", while Savannah State University encourages students "to relate that knowledge to other subject areas" and Tuskegee University offers "opportunities for greater specialization in emerging fields". In a similar manner, Livingstone College "provide[s] students with a world- class education and academic experiences". Curricula was described as "a combination of required courses and electives", "core biology courses supplemented with biology electives", "a proactive undergraduate curricula", "interdisciplinary curriculum experiences which are enriched by critical and analytical thinking skills", "a comprehensive educational program", and "curriculum [that] embraces the breadth of the discipline and values both classical and modern approaches of biological inquiry" by Dillard University, Bennett College , Alcorn State University, Benedict College, Tougaloo College, and Langston University, respectively. Wilberforce University offers "a solid foundation in the fundamental areas of biology necessary for careers in modern biological science" and Alabama State University notes that "students' development is supported through subject competency". Descriptive terms such as "excellent", "rigorous", "world- class", "proactive", "enriched", "comprehensive", "solid foundation" and "breadth of the discipline" emphasize the intended rigor of the curricula.

Enrichment Opportunities

Enrichment Opportunities offered by programs included internships, research experiences and training, as well as participation in course- based undergraduate research experiences. University of the Virgin Islands provides "opportunities to participate in internships as well as research at both the local and national level", Bowie State University noted its use of "high impact educational practices, such as course- based undergraduate research experiences (CURE)", while Alcorn State University offered students an opportunity to "contribute to the advancement of the knowledge and the new truths through scholarly research and inquiry". Additional enrichment opportunities included, community service, teaching/ laboratory assistantships, experiential learning, and access to institutional collaborations. Many of these enrichment opportunities are high- impact educational practices known to promote student success and persistence within higher education, most notably among demographic groups historically underserved in post- secondary education. Enrichment opportunities were identified in every Carnegie class, with the exception of Master's Colleges & Universities: Small Programs.

Professional/ Graduate Studies Preparation

The biological science departments and programs offer educational curricula designed for preparation not only for the STEM workforce, but "designed to prepare undergraduate students for…. advanced studies", as noted by Livingstone College. Reference to training to improve entry or admission into advanced training programs was noted by multiple institutions. Terms included, "graduate and professional schools", "graduate/professional programs" "life science graduate training programs", "graduate school, professional school", "postgraduate education", "professional or graduate studies" as indicated by Wilberforce University, University of Arkansas at Pine Bluff, Tennessee State University, Bennett College, Bowie State University, and Alcorn State University, respectively. Some listed specific disciplines, for example, Tougaloo College supported learners who intend to pursue "graduate school in various fields of Biology or professional school in medicine, dentistry, allied health and other related areas" and Alabama A & M University supported those with interest in "graduate and professional studies in the biomedical, biological, natural resources and environmental fields".

Quality Learning Environment

A commitment to a quality learning environment was explicitly stated by some institutions, while implicitly stated by others. For example, Southern University A & M College "seeks to provide quality instruction" and "aspires to maintain quality instruction"; similarly, Bowie State University "provides quality education" and Alabama State University focuses on "providing quality learning" to students. Noted features of a quality learning environment provided by programs included access to "comprehensive support, [and] resources", "small class sizes and individual attention", and engagement in "scholarly activities", noted by Delaware State University, Lincoln University, and Florida Memorial University, respectively. Also characteristic of the quality learning environment was a scholarly atmosphere inclusive of both faculty and student scholarship. For example, Southern University A & M College highlighted "an atmosphere that encourages a free exchange of ideas", while Bennett College aimed "to develop scholarship…. within the students". Other institutions, like Southern University A & M College and Alabama State University, emphasized the importance of faculty scholarship, by stating the need for "faculty to engage in scholarship" and participate in "continuous faculty scholarship". The University of the Virgin Islands also noted its faculty's commitment to "scientific research". Another feature of the quality learning environment was the unit's commitment to facilitating and supporting academic goal attainment for students. This is illustrated by the University of the Virgin Islands' commitment "to helping students excel academically", Southern University A & M College's aim to "provide the best educational opportunities possible for students to attain their academic goals" and Grambling State University's approach that "strives to help students reach their full potential and academic goals". Some institutions also emphasized their intention to not only meet the academic but also the non- academic needs of learners by purposefully creating a nurturing environment for students. For example, Florida Agricultural and Mechanical University "strive[s] to always provide "Excellence with Caring""; likewise, Cheyney University of Pennsylvania "provides a supporting and nurturing environment" for learners. Quality learning environment was identified in every Carnegie class, with the exception of Master's Colleges & Universities: Small Programs.

Non- STEM Student Science Education

Non- STEM student science education was a minor theme. Although these departments/ programs are committed to science education for their own students, they also provide science learning opportunities for non-STEM students, or service- courses for other majors. For example, Tougaloo College provides courses for "those who take Biology as part of their liberal arts education", and Cheyney University of Pennsylvania provides courses that are "offered for non-majors in order to educate all students in science…". Florida Agricultural and Mechanical University "serves non majors" and "exposes other students to biological concepts that impact their lives", and Southern University A & M College "seeks to provide quality instruction to biology majors, majors in other sciences, and non- science students enrolled in biology courses". Also noted is Tennessee State University's approach to science learning that seeks to integrate formal and informal science learning by attempting "to raise the level of understanding of and interest in life science processes in the scientific and general communities".

Diversity and Inclusion

Diversity and Inclusion was identified in only one Carnegie class, Baccalaureate Colleges- Diverse Fields. Lincoln University utilized diversity in reference to student background and the society at large by stating "for students from various backgrounds to be successful in a complex, technological and diverse society", while West Virginia State University utilized diversity only in reference to its target population of learners, "to serve a diverse community of students". The remaining institutions provided more context for their use of the term diversity by more explicitly clarifying their target populations. For example, University of Arkansas at Pine Bluff noted that it offered a "rigorous program for academic instruction… for students from all socioeconomic levels of the population", Florida Memorial University by highlighting its value of being "broadly inclusive to meet the academic needs of national and international students", and similarly Kentucky State University aims to "prepare our undergraduate students, especially those from underrepresented groups and minorities".

Discussion

The current study utilized a more focused thematic analysis of HBCU mission statements at the hierarchical level of the academic unit as opposed to institutional, and in a discipline- specific context in order to identify emergent themes that contribute to HBCU success in generating URM STEM professionals.

As reported earlier, only 50% of the original 12 Carnegie classes were represented in the cohort selected to perform the thematic analysis. This difference may be attributed to several factors. For example, some institutions may not have STEM departments/ programs but may only offer a few STEM or science related courses as part of a wider curriculum. For example, some institutions as noted by the Carnegie classification have a vocational/ technical emphasis, or another specialized emphasis, like faith or law. In other instances,

institutions may have biology departments, but they did not have mission statements or alternatively mission statements that were accessible for the researchers' analysis.

Diversity and Inclusion was only identified in one Carnegie class, Baccalaureate Colleges- Diverse Fields. One potential reason for limited reference to diversity throughout the cohort of mission statements may be an implied as opposed to an explicit diversity reference due to the unique historical mission of HBCUs. It may already be implied what the primary target population of learners are, for example learners from a particular racial background, or as mentioned by Taylor and Morphew (2010) HBCUs and religious institutions were more likely than non- HBCUs or non- religious institutions to identify their target population in their institutional mission statements. Likewise, an institutional mission statement analysis conducted by Harris III (2012), noted a diversity reference by 67% of HBCUs. Perhaps, departments/ programs omitted diversity references from academic unit mission statements because they were already utilized in an institutional context. Creamer and Ghoston (2012) also note that the use of "diversity" is not a frequent code among engineering units and appeared in less than one third of all mission statements from their random sample of institutions. Non- STEM student science education was also a minor theme and not a primary focus but a supplemental role of the departments/ programs to assist other program areas in meeting their goals.

Previous studies noted that a college's claim to excellence was often in reference to its curriculum (Taylor and Morphew, 2010). Within this cohort of programs, elements such as an emphasis on cognitive and non- cognitive skill development, development of targeted curricula and pedagogy, access to enrichment opportunities, and creation of a quality learning environment were revealed by thematic analysis. Such features may collectively influence the training environment and learning culture within these departments and programs to provide a framework for effectively preparing minority scholars to successfully pursue careers in STEM or healthcare. HBCUs "provide supportive learning environments that encourage the pursuit of academic excellence", and learners at HBCUs "benefit from a strong and committed network of faculty, staff, and professional leaders who seek to offer learning opportunities that will increase possibilities for long-term success" (Albritton, 2012). HBCUs make significant pedagogical contributions that contribute to the persistence of underrepresented groups as academics and intellectuals within the landscape of U.S higher education (Bettez & Suggs, 2012).

As noted, workforce preparation in STEM and health- related disciplines emerged as the most frequent theme. Historically, HBCUs have served a central role in strengthening the academic skill sets of minority learners through a dual emphasis on academic enrichment and career preparation (Albritton, 2012). HBCUs provide opportunity and capacity to build the "educational foundations for continued academic success" of learners beyond undergraduate degree completion and promote success in advanced training programs (Bettez & Suggs, 2012). Career readiness and readiness for advanced training programs in discipline- specific areas are important factors for increasing representation and participation of diverse candidates in graduate and professional training programs and the national STEM workforce (Tsui, 2007; Byars- Winston et al., 2011; Estrada et al., 2018; Kendricks et al., 2019; Odedina et al., 2022).

Conclusion

This emphasis on workforce readiness and the development of translatable skills among learners, as well as the noted features of the training environment may provide additional insight into the success of HBCUs in facilitating pathways for STEM graduates into the STEM workforce and promoting retention of STEM professionals from underrepresented backgrounds in varying STEM fields.

Recommendations

Future studies may find value in investigating the mission statements of other discipline- specific departments or programs in STEM housed at HBCUs. Analysis may identify additional themes relevant to how HBCUs provide support structures to promote URM student success and entry into advanced training programs that serve as a gateway to STEM careers. This investigation may identify common themes among varying STEM disciplines, or alternatively reveal discipline- specific themes that facilitate URM success in a more limited context.

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References

Albritton, T. J. (2012). Educating our own: The historical legacy of HBCUs and their relevance for educating a new generation of leaders. *The Urban Review*, *44*, 311-331.

Bettez, S. C., & Suggs, V. L. (2012). Centering the educational and social significance of HBCUs: A focus on the educational journeys and thoughts of African American scholars. *The Urban Review*, *44*, 303-310.

Bryan, D. M., & Stewart, F. (2016). Valuing the history, missions and traditions of HBCUs: Back to the basics. In *Administrative challenges and organizational leadership in historically Black colleges and universities* (pp. 1-24). IGI Global.

Byars-Winston, A., Gutierrez, B., Topp, S., & Carnes, M. (2011). Integrating theory and practice to increase scientific workforce diversity: A framework for career development in graduate research training. *CBE—Life Sciences Education*, *10*(4), 357-367.

Clewell, B. C., de Cohen, C. C., & Tsui, L. (2016). Capacity building to diversify STEM: Realizing potential among HBCUs. *Urban Institute.*

Creamer, E. G., & Ghoston, M. (2013). Using a mixed methods content analysis to analyze mission statements from colleges of engineering. *Journal of Mixed Methods Research*, *7*(2), 110-120.

David, F. R., & David, F. R. (2003). It's time to redraft your mission statement. *Journal of Business Strategy*, *24*(1), 11-14.

De Brey, C., Musu, L., McFarland, J., Wilkinson-Flicker, S., Diliberti, M., Zhang, A., ... & Wang, X. (2019).

Status and trends in the education of racial and ethnic groups 2018. NCES 2019-038. *National Center for Education Statistics*.

Estrada, M., Hernandez, P. R., & Schultz, P. W. (2018). A longitudinal study of how quality mentorship and research experience integrate underrepresented minorities into STEM careers. *CBE—Life Sciences Education*, *17*(1), ar9.

Fitzgerald, C., & Cunningham, J. A. (2016). Inside the university technology transfer office: mission statement analysis. *The Journal of Technology Transfer*, *41*, 1235-1246.

Gasman, M., & McMickens, T. L. (2010). Liberal or professional education?: The missions of public Black colleges and universities and their impact on the future of African Americans. *Souls*, *12*(3), 286-305.

Gasman, M., & Nguyen, T. H. (2014). Historically black colleges and universities (HBCUs): Leading our nation's effort to improve the science, technology, engineering, and mathematics (STEM) pipeline. *Texas Education Review,* (2)1, 75-89.

Harris III, O. D. (2012). From margin to center: Participating in village pedagogy at historically Black colleges and universities. *The Urban Review*, *44*, 332-357.

Kendricks, K. D., Arment, A. A., Nedunuri, K. V., & Lowell, C. A. (2019). Aligning best practices in student success and career preparedness: An exploratory study to establish pathways to STEM careers for undergraduate minority students. *Journal of Research in Technical Careers*, *3*(1), 27-48.

Morphew, C. C., & Hartley, M. (2006). Mission statements: A thematic analysis of rhetoric across institutional type. *The Journal of Higher Education*, *77*(3), 456-471.

Aud, S., Fox, M., & KewalRamani, A. (2010). Status and trends in the education of racial and ethnic groups (NCES 2010-015). US Department of Education. *National Center for Education Statistics. Washington, DC: US Government Printing Office*, *101*, 695-725.

National Science Foundation, Division of Science Resources Statistics. (2011). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2011. NSF 11-309*. ERIC Clearinghouse.

Odedina, F. T., Behar-Horenstein, L. S., Fathi, P., Kaninjing, E., Nguyen, J., Askins, N., ... & Maduka, M. (2020). Improving representation of underrepresented minority (URM) students in oncology biomedical research workforce: outcome evaluation from the ReTOOL Program. *Journal of Cancer Education*, 1-9.

Rankins, C. (2019). HBCUs and Black STEM student success. *Peer Review*, *21*(1-2), 50-52.

Taylor, B. J., & Morphew, C. C. (2010). An analysis of baccalaureate college mission statements. *Research in higher education*, *51*, 483-503.

Tsui, L. (2007). Effective strategies to increase diversity in STEM fields: A review of the research literature. *The Journal of Negro Education*, 555-581.

Upton, R., & Tanenbaum, C. (2014). The role of Historically Black Colleges and Universities as pathway providers: Institutional pathways to the STEM PhD. *American Institutes for Research*.

Wang, J., Gibson, A. M., Salinas, L., Solis, F., & Slate, J. R. (2007). Thematic differences in mission statements between four-year public institutions and two-year colleges in Texas. *International Electronic Journal for Leadership in Learning*, *11*, 1.