Board 364: Reinforcing Retention: Engaging with HBCUs to Identify Best Practices for Graduating Low-Income Students

Dr. Brittany Boyd, American Institutes for Research
Dr. Taylor Lightner, QEM Network

Dr. Taylor Lightner is a dedicated educational researcher and advocate committed to empowering historically marginalized groups in STEM education and careers through innovative and equitable educational practices. Her background in Engineering Education and Industrial Systems Engineering enables her to deeply understand how system dynamics influence broadening participation in STEM preparation, training, and careers. Therefore, she has coordinated various research efforts associated with teaching courses, developing workshops, administering surveys, facilitating focus groups, conducting interviews, and evaluating programs at the interface with over 200+ minority undergraduate students, graduate students, faculty, and corporate representatives that have produced meaningful outcomes in the STEM field. Passionate about translating research into actionable change, her efforts continue challenging the status quo, championing the rights of historically marginalized groups, and advocating for a more equitable and just STEM educational landscape.

Mercy Mugo

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Abstract/Introduction

The purpose of this convergence mixed-method study is to identify factors contributing to STEM development at HBCUs within the Hub. Obtaining both quantitative and qualitative results through semi-structured staff interviews, student focus groups, and electronic student surveys at Hub institutions enabled the examination of critical factors that influence student experiences and lead to STEM persistence using the *Black cultural student STEM success model* [1] as the guiding retention theory. The central research question was: *What support structures contribute to student development and persistence at HBCUs* within *the Hub?*

Background

Improving retention and degree attainment among science, technology, engineering, and mathematics (STEM) majors from diverse low-income backgrounds is critical to growing the U.S. workforce and advancing the nation's economy [2]. The National Science Foundation (NSF) Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program strengthens these efforts by providing funding to not only implement programming to support the recruitment, retention, and graduation of low-income S-STEM students; they also fund scholarships exclusively for students that meet designated academic and financial conditions.

Prior research highlights that Historically Black College and Universities (HBCUs) enroll a disproportionately high number of low-income minority students [3]. To determine the appropriate practices and policies to support students at HBCUs, a nuanced understanding of approaches to increase the number and diversity of students who persist through college is needed. An S-STEM Research Hub, referred to as the Hub, was created to conduct research on effective strategies that support low-income STEM students' success at HBCUs. Currently, the Hub partners with 11 HBCUs with active S-STEM grants.

Data Sources

This work is a part of a larger multi-year study examining the ability of HBCUs to encourage student persistence, improve institutional retention, and improve graduation rates among STEM students from low-income backgrounds. Before data collection started, the researchers obtained Institutional Review Board (IRB) approval for the research. The data collected, analyzed, and reported in this poster session are from the first data collection period of the study. Nine HBCUs across 4 states and the District of Columbia with active NSF S-STEM grants participated in the data collection efforts.

Methods and Results

Staff Interviews

The purpose of the staff interviews was to learn more about student experiences by gathering background information including the program's day-to-day operations, administrative information, staffing information, program history, and goals.

Interviews with staff were conducted with 10 principal investigators (PIs) of S-STEM programs at Hub institutions. Analyses of the staff interview data revealed three themes related to STEM student development including faculty engagement through S-STEM programming, peer engagement through S-STEM programming, and students' exposure to applied or experiential learning opportunities.

Focus Groups

The research team hosted four semi-structured student focus groups for S-STEM and non-STEM students to "share and compare" their experiences with one another while discussing various topics (e.g., HBCU selection, S-STEM experiences, interactions with faculty or program staff, academic preparation, financial aid, research or industry opportunities).

Analysis of student focus group data at four institutions identified the importance of faculty and peer engagement to support STEM discipline persistence, financial factors and considerations for STEM majors, and academic and professional development to support degree completion and post-baccalaureate goals.

Student Surveys

The HBCU Student STEM Success Survey was developed and validated by Toldson et al. [4] to provide a reliable and valid tool to capture HBCU STEM students' experiences. The questionnaire included items about school climate, faculty relationships, and personal psychosocial factors related to persistence in low-income students. Then, a useability test with the target audience (i.e., HBCU students participating in an S-STEM program) was conducted before survey administration began for the current study.

S-STEM program principal investigators (PIs) at the select HBCUs shared the survey with all STEM students (regardless of S-STEM program status) at their institution. Student consent was obtained electronically before they started the survey.

Two hundred twenty-eight STEM students from nine HBCUs with active S-STEM grants completed the electronic HBCU Student STEM Success Survey. Data were imported, cleaned, managed, and analyzed using R Studio [5].

We explored characteristics of students that completed the S-STEM survey. Students that completed the survey included current S-STEM program participants (66%), former S-STEM program participants (2%), and non-STEM program participants (32%). Most of the participants identified as female (80.7%) and Black/African American (66.2%). Over 63% of participants identified their class rank as either juniors or seniors and the average age of participants was 22 years old. Income levels for S-STEM and non-S-STEM students were similar, with over 40% of students reporting a family annual income of under $30,000 per year when removing students that preferred not to answer.

NSF requires S-STEM programs to implement curricular and co-curricular activities for students, in addition to providing individual student scholarships. To explore the relationship between S-STEM status and student activities we conducted a series of one-way multivariate analysis of variance (one-way MANOVAs). S-STEM participants spent a higher average of hours preparing from STEM courses and participating in extracurricular activities (organizations, student

government, fraternities/sororities, etc.), while non-participants spent more time participating in social/recreational activities (watching TV, partying, etc.).

Finally, to explore student success we compared students' overall college grade point average (GPA). The results indicate that S-STEM program participants averaged a higher GPA, with 61.8% of S-STEM participants reporting a GPA of 3.75 to 4.0, while only 38.2% of non-S-STEM student participants reported a GPA in the same range.

Future Direction

The findings of the current work highlight experiences of STEM students at HBCUs and echo the findings of previous research connecting campus experiences with student success. This research offers evidence of the importance of support programs for STEM student success at HBCUs. This information can be used by program leaders, faculty, and the HBCU community more broadly to encourage and lead efforts to provide support programs for low-income students. These efforts are essential to combat the inequities faced by low-income Black students and to continue and improve the success of HBCUs in helping these students graduate with STEM degrees.

Future work will support research efforts of S-STEM PIs at Hub institutions by sharing deidentified datasets, including institution specific data, with PIs that sign data use agreements. Additionally, findings from the research across institutions will not only be shared with Hub institutions but disseminated broadly to STEM and HBCUs leaders to share best practices for retaining low-income students at HBCUs.

References

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