BOARD # 419: Observations and Challenges for Data-Driven Institutional Transformation at an HBCU

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Desirée Jackson Ph.D., Texas Southern University

Dr. Desirée Jackson has been working as the Assistant Dean in the College of Science, Engineering and Technology (COSET) at Texas Southern University (TSU) for over 12 years. She earned her Ph.D. in Biomedical Science at Meharry Medical College in Nashville, TN. Her postdoctoral work in molecular genetics was completed at Baylor College of Medicine in Houston, TX. During her tenure at Texas Southern University, she has also served as Interim Chair of the Biology Department. In her capacity as a Professor of Biology, she has been the mentor for Ph.D. students and Masters students at TSU and has been a member of various University level committees. She is remarkably familiar with student data collection such as data related to student retention, graduation, placement etc. She once served on the AGEP STRIDES executive leadership board (ELB) and has continued to serve alongside the TSU evidence team continuing to contribute to the research. She is currently serving as a TSU Co-PI on the NSF funded AGEP STRIDES project.

Dr. Mahesh Vanjani, Texas Southern University

Dr. Mahesh Vanjani is a Professor of Management Information Systems and currently serves as Dean of the Graduate School at Texas Southern University. He previously held roles as Associate Dean of the Graduate School, Chair of the Department of Business Administration, and Director of Graduate Programs in Business at the Jesse H. Jones School of Business. Dr. Vanjani earned his Ph.D. in MIS, with minors in Managerial Economics and Production Operations Management, as well as an MA in Economics and an MBA from the University of Mississippi. He holds a Bachelor of Commerce from the University of Calcutta. He co-led the Evidence Team for Texas Southern University's participation in the NSF-funded AGEP grant, which supported the research underlying this paper. Dr. Vanjani is a strong advocate for the value of graduate education.

Dr. Yvette E. Pearson P.E., University of Texas at Dallas

Dr. Yvette E. Pearson is Associate Dean for Academic Affairs and Strategic Initiatives in the School of Natural Sciences and Mathematics and Associate Dean for Effectiveness and Accountability in the Erik Jonsson School of Engineering and Computer Science at The University of Texas at Dallas. A Fellow of the American Society of Civil Engineers (ASCE) and the American Society for Engineering Education (ASEE), she is recognized globally for 30 years in higher education, particularly for her work to advance sustainability, access, and opportunity in STEM education and practice. Her university-based and consulting efforts have led to over $40M in funding for projects to support initiatives in STEM and changes to policies and practices of global engineering organizations.

Dr. Pearson is an HBCU alumna, earning both her B.S. and M.S. degrees from Southern University A&M College and serving on the Civil and Environmental Engineering faculty there for the first 12 years of her career. Since 2019, she has collaborated on ˜$8M in research projects with HBCU partners. Part of her research portfolio includes studies of partnerships, specifically the effectiveness of multi-sector, multi-team systems (MTS).

Among her awards and honors are ABET's Claire L. Felbinger Award for Diversity and Inclusion, ASCE's Professional Practice Ethics and Leadership Award, the Society of Women Engineers' Distinguished Engineering Educator Award, the UT System Regents Outstanding Teaching Award, and ASCE's President's Medal, one of the highest honors awarded in this global organization of over 150,000 members. Dr. Pearson is a registered Professional Engineer, an ENVISION® Sustainability Professional, and a Commissioner on ABET's Engineering Accreditation Commission.

Her book - Making a Difference: How Being Your Best Self Can Influence, Inspire, and Impel Change - chronicles her journey and her work's focus on "making sure other 'Yvettes' don't fall through the cracks." Her podcast, ENGINEERING CHNGE®, has audiences in over 80 countries on six continents.

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Observations and Challenges for Data-Driven Institutional Transformation at Texas Southern University with NSF AGEP Program Support

Abstract

This study explores institutional transformation efforts at Texas Southern University (TSU) as it strives for Carnegie R1 research status. Leveraging data from a National Science Foundation (NSF) Alliance for Graduate Education and the Professoriate (AGEP) project, we analyze patterns in graduate student success, retention, and postdoctoral career trajectories in STEM disciplines at TSU. Our findings reveal differences in faculty development participation, financial support, and degree completion rates, highlighting systemic challenges and opportunities for improvement. This study provides data-driven recommendations for TSU specifically and for similar institutions, aiming to strengthen research capacity and enhance graduate student outcomes

1. Introduction

The goal of the NSF's AGEP program is to "increase the number of historically underrepresented minority faculty in STEM" [1]. TSU partnered with Rice University and University of Houston to launch an AGEP alliance in 2019 with the aim of identifying and mitigating barriers to doctoral and postdoctoral scholars from racially and ethnically minoritized (REM) identities entering the STEM professoriate. The project supports TSU's goal of reaching Carnegie R1 status as it partially helps identify barriers to doctoral degree completion – a key metric in attaining Carnegie R1 status. This study partially examines TSU's institutional transformation, analyzing graduate education metrics such as degrees awarded, attrition, time to degree completion, and access to opportunities. It also explores doctoral and postdoctoral career outcomes across academia, industry, and other sectors to assess institutional support for professional success. By tracking demographic trends, we assess diversity efforts and guide inclusion strategies. Our research identifies key factors affecting student retention, success, and equitable access, as well as challenges to academic progress.

2. Institutional Transformation

Institutional transformation is a critical component of achieving equity goals in the Equity Scorecard framework at a university because it addresses the systemic, structural, and cultural barriers that perpetuate inequities. Bensimon [2] explores how the Equity Scorecard functions as a tool for identifying and addressing inequities in higher education through practitioner-based inquiry. Bensimon and Harris [3] provide an overview of the Equity Scorecard as a structured, evidence-based process to address disparities in student outcomes in higher education. Robinson-Armstrong, King, Killoran and Fissinger [4] discuss why the Equity Scorecard can be used as an effective tool for assessing diversity initiatives. Dowd and Bensimon [5] investigate how the Equity Scorecard facilitates discussions about race and accountability in higher education, providing case studies and implementation strategies. Bensimon, Malcom-Piqueux and

Longanecker [6] study the confront equity issues and discuss the implementation of the equity scorecard in theory and practice.

2.1. University's Access to Institutional Programs and Resources

TSU offers two STEM doctoral programs: Pharmaceutical Sciences and Environmental Toxicology. We analyzed STEM doctoral student access to institutional programs and resources by race, ethnicity, and gender. We define REM in alignment with the NSF's definition of the AGEP population, which includes domestic Black/African American, Hispanic/Latino/a, Native American, Alaska Native, Native Hawaiian, and Native Pacific Islander students. Thus, our comparison groups were domestic students – REM and Non-REM – and international students. The analyses used aggregated data for international students; Although our data was collected during the period from 2017 to 2024 due to its more detailed information, the key findings summarized below reasonably represent the current status at TSU.

- **Faculty Development Participation:** International students: 3.67 times/year; REM students: 1.33 times/year; REM students participated 16.06% less than international students but 9.52% more than domestic non-REM students (who had no participation).
- **Financial Support (Assistantships):** International students: 10.67/year; REM students: 4/year; Non-REM students: 12.67/year; REM students received 9.52% less support than non-REM but 16.06% more than international students; Average funding: $24,000/year per student across all groups.
- **Data Gaps & Recommendations**: Participation in professional development, dissertation support, and non-financial aid programs is unknown due to a lack of centralized records. The university should require all programs to track student participation by category (international, REM, non-REM) to improve data-driven decision-making.

2.2. Retention and Graduation

We collected data on graduate student outcomes, including degrees awarded and matriculants who withdrew before degree completion (2014-2017). The findings indicate:

- More than half (over 50%) of REM students withdrew without completing the PhD program.
- There is a REM gap in the number of master's degrees awarded to REM students compared to international students and Non-REM domestic students.
- Without clear data on withdrawal reasons, effective graduate-level retention strategies cannot be formulated or implemented.

2.3. Measure of Excellence and Achievement

As part of this research, data was collected to assess measures of excellence and achievement among STEM doctoral scholars. The key findings are as follows:

- **Student Demographics & Degree Completion**: In the doctoral student sample, 48.4% were classified as REM, with 64.3% male and 35.3% female; a 40% overall gap exists in PhD completion within five years for REM students, with gaps of 44.4% for males, and 33.3% for females compared to non-REM students.
- **Time to Candidacy & Completion**: No REM gap was observed between REM students and their peers in semesters to candidacy or completion among those finishing within five years; However, male REM students required one semester less, while female REM students

needed one semester more than their non-REM counterparts, highlighting a gender difference that warrants further investigation.

- **Post-Graduation Employment**: REM students had lower industry employment rates compared to non-REM students, with the gap being more pronounced for males. In postdoctoral appointments, no overall REM gap was found, but female REM students had the highest number of postdoctoral appointments, a trend that merits further study. No REM vs. non-REM gap was observed in tenure-track appointments, but international students secured more tenure-track positions than both REM and non-REM graduates, across both genders.

As state universities face increasing accountability for student success outcomes, a centralized doctoral student and alumni tracking system would be invaluable for reporting to oversight and accrediting bodies such as a State Higher Education Board and SACSCOC. A well-developed system would ensure consistent, uniform, and credible data collection, facilitating compliance with reporting requirements while also informing strategies to enhance doctoral programs, student success, and career trajectories.

3. Challenges and Implementation

3.1. Challenges and Proposed actions

This case study highlights key challenges faced by TSU and other HBCUs:

- **Resource Allocation**: Limited funding and infrastructure hinder research expansion.
- **Student Support:** Financial and academic barriers impact retention and success rates.
- **Data-Driven Decision-Making**: Robust data systems are needed to track progress and guide strategies.

3.2. Implementation Suggestions/Recommendations for Addressing Equity Gaps and Overall Improvement

3.2.1 Academic Progress and Achievement

- **Student Data Collection:** Establish a structured and intentional doctoral student data collection process. Assign responsibility within the academic unit, ensuring it is formally incorporated into the designated position's job description.
- **Applicant Pool Analysis:** Collect and analyze data on applicants to assess acceptance and enrollment yield rates. This includes demographic information, admitted student details, and program enrollment data.
- **Enrolled Student Tracking:** Update **each doctoral student's record at the end of every semester**, noting milestones (e.g., comprehensive exam completion) and all funding details (scholarship amounts and sources). If a student does not enroll, document the reason and reach out for clarification. Identify recurring issues affecting progression and implement solutions, following up to assess effectiveness; Generate an **annual summary report** at the start of the **fall semester**, covering the previous academic year (fall–summer). Upon graduation, extract and archive a **complete student record**, including post-graduation professional details.

- **Exit Survey:** Develop and administer a **mandatory** exit survey in the student's final semester of enrollment.
- **Tracking Non-Completers:** For students who do not complete the program and do not respond, use publicly available or paid data sources to determine if they completed their degree elsewhere.

3.2.2 Professional Development

- **Future Faculty Development Workshops:** Offer two workshops per academic year -- a fall workshop focused on research and publishing with discipline-specific content, and a spring workshop focused on teaching and academia.
- **Conference Participation:** Provide financial support for each doctoral student to present and participate in a discipline-related conference.
- **Thesis/Dissertation Workshops:** The Graduate School should host a workshop each fall and spring, with attendance required for all doctoral students at least once.
- **Tracking Participation:** Maintain records of doctoral student attendance and participation in professional development and mentoring activities. Collected data should be used to assess program effectiveness and student engagement.

3.2.3. Professional Achievement - Alumni Data Collection:

Begin tracking doctoral graduates immediately upon graduation, as feasible:

- **Initial Employment:** Collect data on academic and non-academic employment, categorized by demographic factors.
- **Ongoing Updates:** Contact alumni at least every two years for updates, continuing for a minimum of **10 years**.
- **Social Media Engagement:** Utilize platforms like LinkedIn to connect with and track alumni career progress.
- **Alternative Tracking Methods:** For non-responsive alumni, use publicly available or paid data sources to obtain employment information.

3.3. Recommended Actions:

Based on the above analysis, we propose the following brief recommendation

- **Enhance Funding Strategies:** Partner with federal agencies, private foundations, and industry to secure resources.
- **Expand Student Support Services**: Increase financial aid, mentorship, and professional development opportunities.
- **Invest in Data Infrastructure**: Develop centralized systems for data collection and analysis to support strategic planning.

4. Conclusion

Although this case study focuses on a single institution at TSU, its findings offer valuable insights for other HBCUs and minority-serving institutions pursuing similar goals. By sharing strategies and lessons learned, this work contributes to broader efforts to enhance research capacity and improve graduate student outcomes. The pursuit of Carnegie R1 status is a transformative goal for HBCUs, requiring data-driven strategies and systemic change to

strengthen diversity and inclusion in academia. This research highlights the importance of strategic planning, resource allocation, and student support, providing a roadmap for HBCUs to advance equity in the STEM workforce and shape the future of higher education

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