Critical Gaps in STEM Education Research on HBCUs and TCU Students

QEM NSF INCLUDES: A National Summit to Survey and Stimulate Broadening Participation Research (BPR) at Historically Black and Tribal Colleges/Universities, March, 2019

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HBCUs produce 40% of Black engineers with only 20% of Black engineering students and the HBCU students have lower SAT scores and high school GPAs.

The top 21 undergraduate producers of Blacks with doctoral degrees were HBCUs.

Black HBCU students are 6-16% more likely to graduate within six years than Black PWI students.

A student among the top third of a less selective institution is has a greater probability of graduating with a science degree than a student in the bottom third of a selective institution, even when they have the same SAT math score.

The only reference to Tribal Colleges in NSF’s Women, Minorities, and Persons with Disabilities in Science and Engineering (2017) other than the definition of a Tribal College was:

Tribal colleges, which mainly offer 2-year degrees, account for a small percentage of S&E bachelor’s degrees to American Indians. This proportion has been on a slight upward trend in the past 4 years.

Challenges

- Defining Success
- Emphasizing Deductive Reasoning
- Applying Dominate Paradigms and Theories to Non-dominate Populations
- Generalizing from PWIs to MSIs
- Aggregating and Disaggregating
- Moving from What to Why and How
- Doing and Sharing Research
Metrics such as retention rate, graduation rate, and postgraduate income are commonly used to assess the quality and success of academic institutions.

These metrics don’t consider factors like students’ SESs, life stage, commitments to work and family, are therefore inadequate metrics for HBCUs and TCUs.

Such measures also inadequately address the progress of students who attend college part time and those who need to take time away from their studies for financial and/or family reasons.

Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce (2019) [http://nap.edu/25257](http://nap.edu/25257) p 65
Defining Success: Value Issues

Valuing:

- Individual achievement over Elevating the family, group or community
- Money, power, status over Happiness, stability, giving back
- Student input measures (i.e SAT, GPA) over Student outcomes (student knowledge and skills)
- Student outcomes over Student gain
- Group gain over Reducing the gap while all gain
- Other
**Deductive reasoning** starts with a possible theory or premise tied to that which is being researched. In deductive reasoning, one moves from theory to hypothesis to data collection to confirmation. It is the basis of the scientific method.

**Inductive reasoning** generates general principles from specific instances. One moves from observation to patterns to tentative hypotheses to theory. Data are examined for possible patterns, similarities and differences. Results are used to generate possible hypotheses, which can then be used to generate conclusions/theories.

Audra Lourde asked “What does it mean when the tools of a racist patriarchy are used to examine the fruits of that same patriarchy? It means that only the most narrow parameters of change are possible and allowable”.

Educational research has been built on the theory and methods of the dominant culture. That culture may not reflect the lived experience of the Native Americans or African Americans and trying to fit their lives into the existing literature/theory can be a mistake. Their lives/experiences may reflect existing literature/theory but that is very different than starting with the existing theory as a frame for their lives/experiences.
“Many of these strategies are not novel to the MSI community; however, with a focus on intentionality, [they] can be replicated (or, as appropriate, adapted) and brought to scale at MSIs to bolster the success of students of color and enrich the campus community at large.

- Dynamic, multilevel, mission-driven leadership;
- Institutional responsiveness to student needs;
- Campus climates that support a sense of belonging for students;
- Student-centered academic and social supports;
- Effective mentorship and sponsorship;
- Undergraduate research experiences; and
- Mutually beneficial public- and private-sector partnerships
- Supplemental Instruction.”

http://nap.edu/25257 p 125
Aggregating/Disaggregating: Combining HBCUs, TCUs and HSIs into MSIs

Sample differences:
- Student body
- Faculty
- Mission
- Resources
- Geographic location
- Age
- Size
- Institutional culture.
A sample what:

Black graduates at HBCUs make less money than comparable Black graduates of PWIs, but the students attending HBCUs appear to demonstrate increased charitable giving, political participation, religious participation, and propensity to major in the physical sciences compared with those who went to PWIs.

A sample why and how:

Define what it means to be more or less effective as an HBCU and a Tribal College and look at some of the similarities and differences among demographically matched more and less effective institutions or programs.

Challenges to Doing and Sharing Research Results

- Small class sizes can make getting appropriate sample sizes difficult
- Teaching and student services a higher priority than research
- High course loads and other academic responsibilities
- STEM faculty lack of familiarity with educational research:
  - literature
  - journals
  - writing conventions.
Intersectionality