HBCUs: America’s Innovative Asset

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MINORITY SERVING INSTITUTIONS: America’s Underutilized Resource for Strengthening the STEM Workforce

Free report available at: https://www.nap.edu/catalog/25257
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MSI Types

- Historically Black Colleges and Universities (HBCUs)
- Tribal Colleges and Universities (TCUs)
- Hispanic-Serving Institutions (HSIs)
- Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs)
- Alaska Native-Serving and Hawaiian Serving (ANNHIs)
- Predominately Black Institutions (PBIs)
- Native American-Serving Nontribal Institutions (NASNTIs)
Contributions and Reach

• Roughly 700 two- and four-year colleges and universities, enrolling nearly 30 percent of all undergraduates in U.S. higher education
• Constitute nearly a third of all two-year institutions or looked at another way, over half of all MSIs are two-year institutions
• More undergraduate students (from all backgrounds) are enrolled in STEM fields at four-year MSIs than at four-year non-MSIs
• Taken together, HBCUs, HSIs, and AANAPISIs produce one fifth (20%) of the nation’s STEM bachelor’s degrees
101 Accredited HBCUs
HBCUs are 3% of the Nation’s Colleges & Universities
HBCUs enroll 10% of the Nation’s Black students (300,000)
HBCUs produce 20% of all Black graduates
HBCUs generate $14.8B in economic impact
HBCUs account for 24% of Blacks in STEM fields (30% in engineering at the bachelors level)
The top eight institutions which produced Blacks who went on for STEM PhDs were HBCUs

* Source: UNCF
HBCUs: Where Are They Located
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* Source: National Science Foundation FY18 HERD Survey
ABET ACCREDITED ENGINEERING HBCUs

- Alabama A&M University (M1)
- Florida A&M University (R2)
- Hampton University (R2)
- Howard University (R2)
- Jackson State University (R2)
- North Carolina A&T State University (R2)
- Morgan State University (R2)
- Norfolk State University (M2)
- Prairie View A&M University (M1)
- Southern University & A&M College (M1)
- Tennessee State University (R2)
- Tuskegee University (M2)
- University of the District of Columbia (M2)
- University of Maryland – Eastern Shore (R2)
- Virginia State University (M2)
NASA and MUREP
Investments and Engagement at Historically Black Colleges and Universities

Funding from Agency to MSIs
(By Institution Type)

Out of the AGENCY dollars that went to all MSIs, what percentage went to each MSI type?

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<td>1%</td>
<td>1%</td>
<td>0.35%</td>
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<td>37%</td>
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<td>43%</td>
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Note: ANNH and NASNTI did not exist as a separate category in 2018.
This chart further analyzes the funds that were awarded to the Minority Serving Institutions (MSIs) by MSI type.
INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

MUREP FY2019 – FY2020 Engagement at HBCUs
CIAA Conference Support

President/Chancellor Meetings
Middle School Day
High School Day
Career Fair
Exhibit Booth

White House Initiative on HBCUs

Interagency Working Group
Student Engagement
Strategic Planning
Training Workshops/Sessions
Networking

NASA Aeronautics Research Mission Directorate (ARMD)

Two MUREP HighVolume Awardees – Tuskegee/Virginia State;
New Lead HBCU – North Carolina A&T
Additional Funding Opportunities
MUREP HBCU ENGAGEMENT

 MSI Capability Gateway
https://msigateway.larc.nasa.gov/
Externally Available
Database of MSIs
Listing of Research Capabilities
Searchable by HBCU

HBCU/MSI Road Tour
Agency 1% Contracting Goal for MSIs
Training Workshops Networking
Matchmaking

MUREP Institutional Research Opportunity (MIRO)
Seven HBCUs funded out of 20 Existing Awardees
Recent Awards

- Professional Research Engagement Program (PREP) $7M for 5 years
- Center of Research Excellence in Science & Technology (CREST) $4.8M for 5 years
- Center for Advanced Manufacturing in Space Technology & Applied Research $3M for 3 years
- AMP3 Additive Manufacturing Post Processing Partnership $2.8M for 3 years
NASA External Advisory Committee
Meeting February 7, 2020

EAC Lead, Dr. Henry Molintas, Lead Mechanical Engineering for Department of Defense Innovation Program, Booz Allen Hamilton

Dr. Jack Price, Director of Research, Naval Surface Warfare Center, West Bethesda, MD

Susan E. Dunnings, the Vice President and Associate General Counsel, Employment and Labor Law, for Lockheed Martin in Bethesda, Maryland

Walter Falconer, President of Space Consultant, member of the NOAA Science Advisory Board as well as the NASA JPL Science Advisory Board

Patrick Hill, Parker Solar Probe project manager, Space Department, Johns Hopkins University Applied Physics Laboratory

Michelle Pourciau, Former Director, Department of Transportation, Baltimore, MD
TOTAL VALUE OF AGENCY AWARDS TO HBCUS

FY2016: $21,860,373
FY2017: $20,974,794
FY2018: $18,983,663
FY2019: $23,330,270

*FY2019 data is preliminary
MUREP CONTRIBUTION TO HBCU AWARDS

**FY2016**
- MUREP Funded: $7,014,733 (32%)
- Agency Funded: $14,849,640 (68%)

**FY2017**
- MUREP Funded: $5,106,257 (24%)
- Agency Funded: $15,522,475 (76%)

**FY2018**
- MUREP Funded: $3,461,188 (18%)
- Agency Funded: $16,764,378 (82%)

**FY2019**
- MUREP Funded: $6,560,882 (28%)
- Agency Funded: $16,764,378 (72%)

*FY2019 data is preliminary*
NUMBER OF AGENCY AWARDS TO HBCUS

*FY2019 data is preliminary

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<td>189</td>
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Total U.S. R & D Expenditures in 2010 and 2011

- **Total R&D Expenditures**
  - 2011: $65,073,411,000
  - 2010: $61,190,610,000

- **Total HBCU R&D Expenditures**
  - 2011: $542,471,000 (0.83% of total)
  - 2010: $465,922,000 (0.83% of total)

Source: J. Lee, Association of Public & Land Grant Universities
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* Source: National Science Foundation FY18 HERD Survey
NSBVision@nsf.gov

nsf.gov/nsb/publications/vision2030.pdf

NSB Vision 2030 Task Force:
Roger Beachy, Chair
Ellen Ochoa, Vice Chair
Vicki Chandler
Bob Groves
Julia Phillips
Maria Zuber
FOCUS ON THE FUTURE: NSB ROADMAP

DELIVER BENEFITS FROM RESEARCH

DEVELOP STEM TALENT FOR AMERICA

EXPAND THE GEOGRAPHY OF INNOVATION

FOSTER A GLOBAL S&E COMMUNITY
Developing STEM talent for America

The U.S. must make education a federal, state, and local priority and hold itself accountable with reliable, up-to-date data.
CONTEXT: U.S. SHARE OF R&D DECREASING AS GLOBAL S&E GROWS
MISSING MILLIONS: FASTER PROGRESS IN INCREASING DIVERSITY NEEDED TO REDUCE SIGNIFICANT TALENT GAP

While the number of people from under-represented groups in the S&E workforce has grown over the past decade, faster increases will be needed for the S&E workforce to be representative of the U.S. population in 2030. To achieve that goal, the NSB estimates that the number of women must nearly double, Black or African Americans must more than double, and Hispanic or Latinos must triple the number that are in the 2020 U.S. S&E workforce. These estimates are based on projections from the U.S. Census and Bureau of Labor Statistics, together with data from the National Center for Science and Engineering Statistics, and assume that participation of these groups in the S&E workforce increases at current rates.
The Skilled Technical Workforce: Crafting America’s Science & Engineering Enterprise

Victor McCrary, VP for Research & Graduate Programs, University of the District of Columbia; Vice-Chair, National Science Board
Why is NSB Focusing on the STW?

- Increased need for S&T skills and knowledge across many sectors and at all educational levels
- National prosperity and security in a competitive, S&T-intensive world
- Long-term health of the U.S. S&E enterprise
- Near-term workforce needs
- Opportunities for all Americans
LISTENING SESSION & PARTICIPANT LOCATIONS

Advanced Technological Education Conference
Washington, D.C. - 45 Attendees, 31 Participant Locations
- Academia - 45

Community College Innovation Challenge
Alexandria, Virginia - 56 Attendees, 10 Participant Locations
- Academia - 45
- Industry - 1

Florence Darlington Technical College
Florence, South Carolina - 40 Attendees, 9 Participant Locations
- Academia - 20
- Industry - 14
- Government - 2
- Non-Profit - 4

Macomb Community College
Warren, Michigan - 22 Attendees, 10 Participant Locations
- Academia - 10
- Industry - 8
- Government - 3
- Non-Profit - 1

Baton Rouge Community College
Baton Rouge, Louisiana - 21 Attendees, 2 Participant Locations
- Academia - 12
- Government - 5
- Non-Profit - 4

* Translucent circles represent listening session locations
* Solid circles represent attendee locations
Workers with high school or some post-secondary training: 2017

- Skilled technical workers
- All other workers

Salary

Unemployment rate

Skilled technical workers, by occupation: 2017

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</tr>
<tr>
<td>Healthcare Practitioners and Technical</td>
<td>20.5%</td>
</tr>
<tr>
<td>Installation, Maintenance, and Repair</td>
<td>19.7%</td>
</tr>
<tr>
<td>Production</td>
<td>15.5%</td>
</tr>
<tr>
<td>Computer and Mathematical</td>
<td>7.8%</td>
</tr>
<tr>
<td>Architecture and Engineering</td>
<td>4.8%</td>
</tr>
<tr>
<td>All other</td>
<td>10.8%</td>
</tr>
</tbody>
</table>

Source(s):
- American Community Survey (ACS) (2017) public use microdata.
- Science and Engineering Indicators
STW Data Portrait

The Skilled Technical Workforce by Race and Ethnicity: 2017

- **White non-Hispanic**: Overall Workforce 64%, Skilled Technical Workforce 66%
- **Hispanic**: Overall Workforce 17%, Skilled Technical Workforce 18%
- **Black**: Overall Workforce 21%, Skilled Technical Workforce 20%
- **Asian**: Overall Workforce 4%, Skilled Technical Workforce 5%
- **Other**: Overall Workforce 3%, Skilled Technical Workforce 3%

The Skilled Technical Workforce by Gender: 2017

- **STW**: Female 27.6%, Male 72.4%
- **Overall Workforce**: Female 52.9%, Male 47.1%
Systemic Challenges and Opportunities

- **Designing STW education** to meet the needs of individuals
- **Building partnerships among** industry, government, and educational institutions to leverage resources and knowledge, and respond to local industry/community needs
- **Conveying accurate information** about the STW, including employment and career opportunities
- **Addressing data gaps and data silos** to maximize effectiveness of programs and initiatives
Recommendations

• **Change the Message**: The NSB and NSF, and other S&E leaders should communicate the importance of the STW to the nation’s S&E enterprise, individual economic prosperity, national security, and U.S. global competitiveness.

• **Focus on the Data**: To understand and begin to address data gaps, NSF’s NCSES, with additional federal resources and collaborating with other statistical agencies, should collect nationally representative data on the education, skills, and workforce characteristics of the STW. NSF should promote partnerships between governmental and non-governmental (industry, academia) stakeholders in the STW to share data and develop tools for public use and workforce planning.
Recommendations

• **Leverage the Portfolio of Federal Investments**: NSF should conduct a full portfolio analysis of its STW investments. The analysis could publicize and inform stakeholders about the breadth of NSF’s contributions to the STW, build awareness of funding opportunities, and maximize and leverage the impact of these investments.

• **Build Partnerships**: Two-year colleges and four-year colleges (e.g. HBCUs) and universities should work as partners, together with business, to grow the STEM-capable U.S. workforce via programs tailored to the needs of local communities. Policymakers can encourage this by developing federal programs that require partnership participation from stakeholders in multiple sectors.
Points to Consider Going Forward - PCAST

- Focus on nurturing, diverse domestic STEM talent:
  - Establish research centers at HBCUs/MSIs for national priorities in AI, quantum information processing, and cyber
  - Programs to introduce students early to National Security R&D and the value of holding a security clearance
The Value Proposition of HBCUs:
“We Are Essential for the National Security of the US Research Enterprise”

DIVISION B—COMMERCE, JUSTICE, SCIENCE, AND RELATED AGENCIES APPROPRIATIONS ACT, 2018

NATIONAL SCIENCE FOUNDATION

This Act includes $7,767,356,000 for the National Science Foundation (NSF). This strong investment in basic research reflects the Congress' growing concern that China and other competitors are outpacing the United States in terms of research spending, as noted in the 2018 Science and Engineering Indicators report of the National Science Board.

Omnibus Budget, signed into law March 23, 2018
Dr. Vic’s ‘Asks’ of the UAG

- UAG members visit NASA-funded HBCUs this year
- Increase NASA’s budget commitment to HBCUs (from <1% to 2%) for FY21
- Partner w/ NSF/AFOSR/ONR/ARO to leverage HBCU budget portfolios & programs for FY21
- NASA Administrator meet new NSF Director to discuss building research capacity at HBCUs – next 30 days- DONE
Thank You

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