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Before the U.S. House of Representatives
Committee on Science, Space, and Technology

Achieving the Promise of a Diverse STEM Workforce
May 9, 2019

Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee, thank you for the opportunity to testify today on this important topic. I am the vice president for research at the American Council on Education, and have been in the higher education field as a practitioner and researcher for over 20 years, with a longtime focus on diversity and inclusion in the STEM fields. Today I am here primarily in my capacity as co-chair of the National Academies of Sciences, Engineering, and Medicine's Committee on Minority Serving Institutions (MSIs), which published the recent report, "Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce."[3]

The report has many key findings, recommendations, and strategies related to strengthening STEM education and research at the more than 700 Minority Serving Institutions across the United States (U.S.). I have submitted a copy of the report highlights for policymakers along with my testimony. Allow me to start with what I believe are the four key messages from the report:

- MSIs are a valuable but underutilized asset for the nation, and with appropriate levels of support and investment from Congress, states, and the private sector, they can contribute in significant ways to local, regional, and national economic development and job creation.

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[1] More than 150 years ago, the National Academy of Sciences was created through a congressional charter signed by Abraham Lincoln to serve as an independent, authoritative body outside the government that could advise the nation on matters pertaining to science and technology. It later expanded to include engineering and medicine. Every year, approximately 6,000 National Academies members and volunteers serve pro bono on our consensus study committees or convening activities. Our consensus study process is considered the gold standard of independent, nonpartisan, evidence-based advice.

[2] The American Council on Education (ACE) is the major coordinating body for the nation's colleges and universities. ACE represents over 1,700 college and university presidents from public and private, two-year and four-year institutions. Members represent two out of every three students in all accredited, degree-granting institutions. ACE also plays an important role as the convening body for higher education in Washington DC.

[3] For the full report, please see https://www.nap.edu/catalog/25257/minority-serving-institutions-americas-underutilized-resource-for-strengthening-the-stem. This study was undertaken with the generous support of the Helmsley Charitable Trust, the Alfred P. Sloan Foundation, the ECMC Foundation, and the Wallace Foundation.

- The nation's roughly 700 MSIs enroll nearly 30 percent of all undergraduates in the U.S., but too often they are under-resourced and required to "make do" with their limited resources. Imagine how substantial the contributions of these institutions could be to our society, and our economy, if they received the resources they need to prepare one-third of our nation's future workforce.

- MSIs typically enroll students who have faced substantial financial and academic challenges over their lifetimes, and yet many MSIs have developed ways to offer a rich set of academic and social support systems for students that help them thrive academically and prepare for meaningful and sustained contributions to the workforce and to our society. Our report focuses in part on those systems, emphasizing "what works" on MSI campuses based on what we know from the scholarly literature and from the MSI community and its many stakeholders. It is because of the creativity and resourcefulness of MSI leadership, faculty, and staff that we know that increased investments would yield a substantial return for the nation's STEM workforce.

- The concept of "intentionality" is a core component of our report, and is something that many MSIs embody. By intentionality, we mean meeting students where they are when they arrive on campus, setting high expectations for student success no matter where they start academically, and tailoring programs, services, and institutional policies to recognize and address students' academic, financial, and social needs—all with cultural mindfulness. There are indeed many lessons learned in our report on how an institutional culture of intentionality serves all students—whether at MSIs or non-MSIs.

With those key points in mind, please allow me to elaborate on the report's findings and recommendations.

Findings and Recommendations from the Report, *Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce*

Although America's STEM workforce has grown more diverse over time, it is still far less diverse than the general population. In 2015, Black, Hispanic, and Native populations represented roughly 10 percent of the STEM workforce,[4] but 30 percent of the U.S. population in that same year.[5] Furthermore, research shows that although White, Black, and Hispanic students declare STEM majors at similar rates in their first year, STEM is

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[4] National Science Board. 2018. *Science and Engineering Indicators 2018*. NSB-2018-1. Alexandria, VA: National Science Foundation.

[5] Espinosa, Lorelle L., Jonathan M. Turk, Morgan Taylor, and Hollie M. Chessman. 2019. *Race and Ethnicity in Higher Education: A Status Report*. Washington, DC: American Council on Education.

the only field in which Black and Hispanic students are significantly more likely than White students to switch majors before graduation.[6]

As a nation, we need to reverse these trends for several reasons, not the least of which concerns an imminent non-White majority in the United States. Put simply, the educational outcomes and STEM-readiness of students of color will have direct implications for America's scientific and technological innovation, economic growth, and global competitiveness.

MSIs and Their Reach

Just as communities of color remain an underutilized resource for advancing America's scientific and technological innovation, so too do the colleges and universities that enroll the greatest number of students of color—namely, the nation's over 700 Minority Serving Institutions, of which there are seven types. The first two—Historically Black Colleges and Universities (HBCUs) and Tribal Colleges and Universities (TCUs) are historically designated.[7,8] This means that they were established to serve a specific population of student.

The other five are designated based on enrollment and financial resources. These are: Hispanic-Serving Institutions (HSIs); Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs); Predominantly Black Institutions (PBIs); Alaska Native-Serving Institutions or Native Hawaiian-Serving Institutions (ANNHIs); and Native American-Serving Nontribal Institutions (NASNTIs).

The number of enrollment-designated MSIs has grown significantly in the past 20 years, and as the country's demographics continue to change, many more MSIs can be expected to emerge. For example, in addition to the 492 existing HSIs, 333 institutions are on their way to reaching HSI status in the coming years. Such growth has led MSIs to become a model of diversity for American higher education, both in terms of undergraduate enrollment and for their role in sending students of color on to graduate study and into the STEM workforce.

While we often talk about MSIs in the aggregate, it is important to acknowledge their unique contexts, missions, student populations, contributions, and financial models:

- MSIs encompass two-year and four-year, public and private, rural, urban, and suburban institutions, enrolling from a few hundred to tens of thousands of

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[6] Riegle-Crumb, Catherine, Barbara King, and Yasmiyn Irizarry. 2019. "Does STEM Stand Out? Examining Racial/Ethnic Gaps in Persistence Across Postsecondary Fields." *Educational Researcher* 48 (3): 133-144.

[7] Espinosa, Lorelle L., Jonathan M. Turk, and Morgan Taylor. 2017. *Pulling Back the Curtain: Enrollment and Outcomes at Minority Serving Institutions*. Washington, DC: American Council on Education.

[8] Gasman, Marybeth, Thai-Huy Nguyen, and Clifton F. Conrad. 2015. "Lives Intertwined: A Primer on the History and Emergence of Minority Serving Institutions." *Journal of Diversity in Higher Education* 8 (2): 120–138.

students, and representing a range from highly selective to open-access institutions. They are found in nearly every state, and every Member of this committee likely has constituents enrolled in an MSI, in or near their district; for example, the University of North Texas at Dallas and Langston University in Oklahoma.

- MSI students vary in terms of race and ethnic origin, but also age, economic background, and enrollment intensity (full or part time). MSI students are also more likely than those at non-MSIs to be the first in their family to attend college and are more likely to come from low-income backgrounds than are students who attend non-MSIs.

- Although MSIs have long provided pathways to educational success and workforce readiness for millions of students, their contributions to STEM education and the workforce are often overlooked. In fact, more undergraduate students are enrolled in STEM fields at four-year MSIs than at four-year non-MSIs, and when taken together, HBCUs, HSIs, and AANAPISIs produce one-fifth of the nation's STEM bachelor's degrees. Moreover, research we have conducted at ACE shows that MSIs do as well as, or better than, non-MSIs in moving students up the income ladder.[9]

- While a larger share of revenue at MSIs come from public investment than at non-MSIs (e.g., federal, state, and local appropriations, grants, and contracts), on average, MSIs experience lower funding per full-time equivalent student. Nonetheless, MSIs have shown success in providing return on investment for students, the STEM workforce, regional and national economies, and their local communities. As the number of MSIs continues to grow, more targeted funding, attention, and support are needed to support these contributions.

The bottom line: As a distinct and vital sector of American higher education, MSIs are primed for STEM-focused investments.

Recommendations

With these and other findings in mind, the study committee set forth ten recommendations to MSI stakeholders in the areas of Institutional Leadership, Public and Private Partnerships, Financial Investments, and MSI Performance and Accountability. The study committee hopes that the report will incentivize the adoption of evidence-based approaches to support and advance STEM education and workforce outcomes for the tens of millions of students enrolled at two- and four-year MSIs.

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[9] Espinosa, Lorelle L., Robert Kelchen, and Morgan Taylor. 2018. *Minority Serving Institutions as Engines of Upward Mobility*. Washington, DC: American Council on Education.

Specific actions we recommend Congress should take include:

- Enhance transparency and accountability for federal investment. It is in the nation's best interest not only to establish new and expand current STEM-focused investments for MSIs, but also to increase the information available about these funds and their impacts. Substantial growth in MSI-specific public-private partnerships could help to bolster domestic achievements in STEM, but more information on the current federally funded initiatives at MSIs and their return on investment for the institutions, students, and STEM workforce is needed in order to inform future partnership initiatives and help to determine which are most needed, underfunded, or unexplored.

- To more effectively measure MSIs' returns on investments, and to inform current and future public-private partnership initiatives, Congress should undertake strategic actions to enhance the clarity, transparency, and accountability for all federal investments in STEM education and research at MSIs, including the production of an annual MSI STEM Research and Procurement report.

- The report further encourages the requirement that any such programs include a strong and rigorous evaluation component, and the resources required to support high-quality evaluation, in order to measure the impact of new initiatives on student learning and on career outcomes for STEM graduates at MSIs.

- Incent greater investments in MSIs and the promising strategies that support their students' success (outlined in the next section). Invest in new and expanded funding mechanisms that strengthen STEM infrastructure, and create and fund programs that encourage innovative teaching, learning, and laboratory experiences in STEM on MSI campuses. Significantly increase annual appropriations to support need-based aid and capacity-building funds for MSIs (e.g., Pell grant and Title III and V funding), and increase funding for programs that support institutional endowment-building activities.

For improvements in the short-term, Congress should:

- Require all relevant federal agencies to identify an MSI liaison, which would become the responsible organization or representative to coordinate activities, track investments, and report qualitative and quantitative progress toward increasing participation in STEM research and development programs.

- Produce an annual procurement forecast of opportunities including but not limited to grants, contracts, or subcontract opportunities, cooperative agreements, and other transactional agreements that will enable increased participation of MSIs in basic, applied, and advanced STEM research and development programs. This report could serve as a critical resource for policymakers, government agencies, and MSIs to assess and benchmark the impact of national investments in underserved high-potential communities.

The findings from this report may also encourage other stakeholders to partner with MSIs in broader STEM research and development initiatives.

- Report on the level of participation of MSIs as prime recipients/contractors or subrecipients/subcontractors, including the type of procurement mechanisms (i.e., contracts, grants, cooperative agreements, and other transactional agreements) and the current investment totals that support STEM research and development programming.

- Categorize MSI investments and distinguish between type of investments (i.e., internships versus training grants versus basic/applied/advanced research actions).

- Track proposal submissions by MSIs (as lead investigators, principal investigators (PIs), or co-PIs) in federal contracts, grants, cooperative agreements, other transactional agreements, and Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) programs.

Practices and Strategies to Consider when Allocating Resources

When considering how to target federal and other forms of investment, the study committee set forth seven broad practices and strategies that hold the greatest promise for strengthening the quality of STEM education, research, and workforce preparation for MSI students—if implemented with *intentionality* and fidelity and sustained over time. These practices are also applicable to colleges and universities on the verge of becoming MSIs, and indeed the study committee recommends that such institutions work to implement them. They include:

1. *Dynamic, multilevel, mission-driven leadership.* MSIs are best served by forward-looking, mission-driven presidents and other senior leaders who have a well-articulated vision and willingness to hold themselves accountable for committing the necessary capital, educational resources, and services to meet the particular needs of their student body.

2. *Institutional responsiveness to meet students where they are.* Because of the student populations they serve, MSIs have a particular need to design and implement policies and practices that intentionally support nontraditional students and students of color, especially those in STEM fields, who may need additional academic, financial, and social support and flexibility.

3. *Supportive campus environments.* A welcoming and nurturing campus climate—one that supports a fundamental sense of community and an equity-oriented culture—contributes to academic attainment and professional commitment at MSIs.

4. *Tailored academic and social supports.* Intentional policies and practices, and holistic, student-centered supports, such as Summer Bridge programs and

supplemental instruction, help guide students through higher education and make an important difference in persistence and success.

5. *Mentorship and sponsorship*. Meaningful, accessible relationships with faculty and other meaningful adults are critical to students' success in STEM education, and their advocacy and support can help to advance students' careers.

6. *Availability of undergraduate research experiences*. Entry into graduate and professional fields increasingly demands high-quality research experience as an undergraduate. Increasing numbers of MSIs are pioneering creative ways to extend such opportunities to more students through course based research experiences and external partnerships with research-intensive colleges and universities, government agencies, and private companies.

7. *Mutually beneficial public- and private-sector partnerships*. Partnerships between MSIs and business, industry, and state and federal governments, as well as other MSIs and non-MSIs, have the potential to provide alternative funding mechanisms and educational and research opportunities for students and encourage collaborations among faculty and industry scientists, engineers, and health professionals.

These practices and strategies take investment at a variety of levels, including by federal science agencies and the U.S. Department of Education.

Recommendations for Improvements to the *STEM Opportunities Act*

The study committee appreciates the intent of previously introduced legislation, including the *STEM Opportunities Act*, to promote more women and underrepresented minorities in the STEM workforce. Our report recommends that future legislation should address a broad set of institutions, including MSIs, and not just the top research institutions, where only a fraction of the already small number of women and minority students and faculty learn, teach, and work.

Our report also recommends investment in *mutually beneficial* partnerships between research universities and community colleges, where a sizeable portion of underrepresented minority students enroll after high school.[10] Moreover, partnerships between research universities and MSIs should prioritize building effective pathways to the doctorate for students of color.

Speaking now in my capacity as a long-standing researcher and practitioner, I would finally recommend that future legislation prioritize institutional research, policy, and practice on campus and STEM disciplinary climates as mutually reinforcing and predictive of STEM success for women and students and faculty of color.

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[10] Espinosa, Lorelle L., Jonathan M. Turk, Morgan Taylor, and Hollie M. Chessman. 2019. *Race and Ethnicity in Higher Education: A Status Report*. Washington, DC: American Council on Education.

In Conclusion

MSIs are essential anchors within the U.S. higher education system—and in the communities they serve. Despite being under-resourced, and despite the fact that they are willing to take chances on students with significant financial and academic challenges, MSIs will continue to grow in importance—especially as the demographics shift in our country and more students from underrepresented populations enroll in institutions of higher education. Let me end with a quote from a recently published National Academies journal, *Issues in Science and Technology*,[11] that summarized our report:

> The historical contributions, current value, and future potential of MSIs are a crucial part of the nation's educational story—as is their relative neglect as key pillars of the educational enterprise. That MSIs are so little recognized and understood is an object lesson in the difficulties of expanding minority representation in STEM fields. But if demography is destiny, then US economic prospects can no longer be separated from the educational prospects of its increasingly diverse student population. A substantial, and potentially uncomfortable, shift in thinking about the potential strategies to expand and diversify the nation's STEM workforce is essential for every American's future.

Thank you for your time and attention, and for your commitment to diversifying and strengthening our nation's STEM workforce.

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[11] Miles Jackson, Leigh, and Tom Rudin. 2019. "Minority-Serving Institutions: America's Overlooked STEM Asset." *Issues in Science and Technology* 35 (2): 46-49.

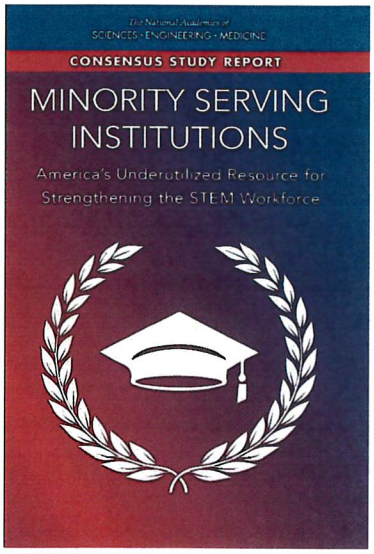
Consensus Study Report

DECEMBER 2018

HIGHLIGHTS FOR CONGRESS

MINORITY SERVING INSTITUTIONS

America's Underutilized Resource for Strengthening the STEM Workforce



America's Minority-Serving Institutions (MSIs) are an important and underutilized source of talent to fulfill the needs of the nation's current and future STEM workforce, says *Minority-Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce*, a report from the National Academies of Sciences, Engineering, and Medicine.

Given the nation's urgent need to expand its domestic STEM-capable workforce and the poised position of MSIs as a national resource for STEM talent, the report recommends a range of actions to support the advancement of MSI students in postsecondary STEM education and to increase the capacity of MSIs to educate an increasingly diverse student body. It identifies promising evidence-based strategies to support students' success, such as strong mentoring, undergraduate research experiences, and academic and social supports tailored to students' needs. And it urges policymakers, foundations, tribal leaders, and other stakeholders to increase MSI-specific funding opportunities and to form partnerships that enable promising strategies to be implemented.

The report recommends two specific actions Congress should take to support these efforts.

* Enhance transparency and accountability for federal investment

It is in the nation's best interest not only to establish new and expand current STEM-focused investments for MSIs, but also to increase the information available about these funds and their impacts. Substantial growth in MSI-specific public-private partnerships could help to bolster domestic achievements in STEM, but more information on the current federally funded initiatives at MSIs and their return on investment for the institutions, students, and STEM workforce is needed in order to inform future partnership initiatives and help to determine which are most needed, underfunded, or unexplored.

Recommendation: To more effectively measure MSIs' returns on investments, and to inform current and future public-private partnership initiatives, Congress should undertake several strategic actions to enhance the clarity, transparency, and accountability for all federal investments in STEM education and research at MSIs, including the production of an annual MSI STEM Research and Procurement report.

For improvements in the short term, Congress should require all relevant federal agencies to:

- Identify an MSI liaison, which would become the responsible organization or representative to coordinate activities, track investments, and report qualitative and quantitative progress toward increasing participation in STEM research and development programs.
- Produce an annual procurement forecast of opportunities including but not limited to grants, contracts, or subcontract opportunities, cooperative agreements, and other transactional agreements that will enable increased participation of MSIs in basic, applied, and advanced STEM research and development programs.

- Report on the level of participation of MSIs as prime recipients/contractors or subrecipients/subcontractors, including the type of procurement mechanisms (i.e., contracts, grants, cooperative agreements, and other transactional agreements) and the current investment totals that support STEM research and development programming.
- Categorize MSI investments and distinguish between type of investments (i.e., internships versus training grants versus basic/applied/advanced research actions).
- Track proposal submissions by MSIs (as lead investigators, principal investigators (PIs), or co-PIs) in federal contracts, grants, cooperative agreements, other transactional agreements, and Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) programs.
- Participate in SBIR/STTR programs to report MSI level of participation, including metrics on level of pursuits.

For sustained, systemic improvements, Congress should require federal agencies to produce an annual MSI STEM Research and Procurement Report that provides an account of specific investments and measurable outcomes on the institutions, faculty, students, and priorities of the national agencies. This report could serve as a critical resource for policymakers, government agencies, and MSIs to assess and benchmark the impact of national investments in underserved high-potential communities. The findings from this report may also encourage other stakeholders to partner with MSIs in broader STEM research and development initiatives.

* Incent greater investments in MSIs and strategies to support their students' success

Despite receiving a fraction of the federal and state funding appropriated for higher education and experiencing deep cuts in public education spending, MSIs have shown success in providing return on investment for students, the STEM workforce, regional and national economies, and the institutions' local communities. As the number of MSIs continues to grow, more targeted funding, attention, and support, are needed to support these contributions.

Recommendation: As it considers regular adjustments to federal higher education policies and programs—including, but not limited to, its reauthorization of the Higher Education Act—Congress should use the legislative process to incent greater investments in MSIs and the strategies outlined in the report.

The report suggests that leaders of congressional committees with oversight on higher education consider the following legislative actions:

- Significantly increase annual appropriations to support need-based aid and capacity-building funds for MSIs (e.g., Pell grant and Title III and V funding). This funding should include institutional endowment-building activities.
- Invest in new and expanded funding mechanisms that strengthen STEM infrastructure on MSI campuses.
- Create and fund programs that encourage innovative teaching, learning, and laboratory experiences in STEM on MSI campuses. The report further encourages the requirement that any such programs include a strong and rigorous evaluation component, and the resources required to support high-quality evaluation, in order to measure the impact of new initiatives on student learning and on career outcomes for STEM graduates.

COMMITTEE ON CLOSING THE EQUITY GAP: SECURING OUR STEM EDUCATION AND WORKFORCE READINESS INFRASTRUCTURE IN THE NATION'S MINORITY-SERVING INSTITUTIONS

Lorelle Espinosa (*Co-Chair*), American Council on Education; **Kent McGuire** (*Co-Chair*), William and Flora Hewlett Foundation, **Jim Bertin**, Chief Dull Knife College; **Anthony Carpi**, John Jay College, CUNY; **Aprille Ericsson**, National Aeronautics and Space Administration Goddard Space Flight Center; **Lamont Hames**, LMH Strategies, Inc.; **Wesley Harris**, Massachusetts Institute of Technology; **Eve Higginbotham**, University of Pennsylvania; **Spero Manson**, University of Colorado, Denver; **James Minor**, California State University; **Leo Morales**, University of Washington; **Anne-Marie Nunez**, The Ohio State University; **Clifton Poodry**, Howard Hughes Medical Institute; **William Spriggs**, Howard University; **Victor Tam**, Santa Rosa Junior College; **Cristina Villalobos**, University of Texas Rio Grande Valley; **Dorothy Yancy**, Johnson C. Smith and Shaw University; **Lance Shipman Young**, Morehouse College; **Thomas Rudin**, Director, Board on Higher Education and Workforce; **Leigh Miles Jackson**, Study Director, Board on Higher Education and Workforce.

For More Information . . . This Consensus Study Report Highlights was prepared by the Committee on Closing the Equity Gap based on the report *Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce* (2018). The study was sponsored by the ECMC Foundation, the Helmsley Charitable Trusts, the Alfred P. Sloan Foundation, the W.K. Kellogg Foundation, and the Wallace Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project. Copies of the report are available from the National Academies Press, (800) 624-6242; http://www.nap.edu.

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