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HOUSE OF REPRESENTATIVES
REPORT
116–269

MSI STEM ACHIEVEMENT ACT

NOVEMBER 5, 2019.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Ms. JOHNSON of Texas, from the Committee on Science, Space, and Technology, submitted the following

R E P O R T

[To accompany H.R. 4372]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 4372) to direct Federal science agencies and the Office of Science and Technology Policy to undertake activities to improve the quality of undergraduate STEM education and enhance the research capacity at the Nation's HBCUs, TCUs, and MSIs, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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99–006

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "MSI STEM Achievement Act".

SEC. 2. FINDINGS.

Congress makes the following findings:

(1) Evidence suggests that the supply of STEM workers is not keeping pace with the rapidly evolving needs of the public and private sector, resulting in a deficit often referred to as a STEM skills shortage.

(2) According to the Bureau of Labor Statistics, the United States will need one million additional STEM professionals than it is on track to produce in the coming decade.

(3) STEM occupations offer higher wages, more opportunities for advancement, and a higher degree of job security than non-STEM occupations.

(4) The composition of the STEM workforce does not reflect the current or projected diversity of the Nation, with Hispanics, African Americans, and other racial and ethnic minorities, significantly underrepresented in the STEM workforce compared to their presence in the workforce more generally.

(5) A stronger national commitment to increasing the diversity of the STEM workforce is needed to help address the STEM skills shortage.

(6) According to a 2019 National Academies of Sciences, Engineering, and Medicine report entitled "Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce", two- and four-year minority serving institutions enroll nearly 30 percent of all undergraduate students—a percentage that is expected to grow in the coming years—in the United States higher education system and play a critical role in providing important pathways to STEM-related education, training, and careers for students of color.

(7) HBCUs, TCUs, and MSIs are highly successful at educating underrepresented minority students in STEM fields and can serve as best practice models for other colleges and universities to further expand participation of underrepresented minorities in the STEM workforce.

(8) Increased investment in STEM infrastructure at HBCUs, TCUs, and MSIs has the potential to increase these institutions' ability to educate even more students in the STEM disciplines.

(9) With the demand for STEM skills exceeding the supply of STEM graduates, success of HBCUs, TCUs, and MSIs in educating and training science and engineering leaders is increasingly important for United States economic growth and competitiveness.

SEC. 3. GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.

Not later than 3 years after the date of enactment of this Act, the Comptroller General of the United States shall report to Congress—

(1) an inventory of competitive funding programs and initiatives carried out by Federal science agencies that are targeted to HBCUs, TCUs, and MSIs or partnerships with HBCUs, TCUs, and MSIs;

(2) an assessment of Federal science agency outreach activities to increase the participation and competitiveness of HBCUs, TCUs, and MSIs in the funding programs and initiatives identified in paragraph (1); and

(3) recommendations of the Comptroller General to increase the participation of and the rate of success of HBCUs, TCUs, and MSIs in competitive funding programs offered by Federal science agencies.

SEC. 4. RESEARCH AND CAPACITY BUILDING.

(a) IN GENERAL.—The Director of the National Science Foundation shall award grants, on a competitive basis, to institutions of higher education or nonprofit organizations (or consortia thereof) to—

(1) conduct research described in subsection (b) with respect to HBCUs, TCUs, and MSIs;

(2) conduct activities described in subsection (c) to build the capacity of HBCUs, TCUs, and MSIs to graduate students who are competitive in attaining and advancing in the STEM workforce;

(3) build the research capacity and competitiveness of HBCUs, TCUs, and MSIs in STEM disciplines; and

(4) identify and broadly disseminate effective models for programs and practices at HBCUs, TCUs, and MSIs that promote the education and workforce preparation of minority students pursuing STEM studies and careers in which such students are underrepresented.

(b) RESEARCH.—Research described in this subsection is research on the contribution of HBCUs, TCUs, and MSIs to the education and training of underrepresented minority students in STEM fields and to the meeting of national STEM workforce needs, including—

(1) the diversity with respect to local context, cultural differences, and institutional structure among HBCUs, TCUs, and MSIs and any associated impact on education and research endeavors;

(2) effective practices at HBCUs, TCUs, and MSIs and associated outcomes on student recruitment, retention, and advancement in STEM fields, including the ability for students to compete for fellowships, employment, and advancement in the workforce;

(3) contributions made by HBCUs, TCUs, and MSIs to local, regional, and national workforces;

(4) the unique challenges and opportunities for HBCUs, TCUs, and MSIs in attaining the resources needed for integrating effective practices in STEM education, including providing research experiences for underrepresented minority students;

(5) the access of students at HBCUs, TCUs, and MSIs to STEM infrastructure and any associated outcomes for STEM competency;

(6) models of STEM curriculum, learning, and teaching successful at HBCUs, TCUs, and MSIs for increasing participation, retention, and success of underrepresented minority students; and

(7) successful or promising partnerships between HBCUs, TCUs, and MSIs and other institutions of higher education, private sector and non-profit organizations, Federal laboratories, and international research institutions.

(c) CAPACITY BUILDING.—Activities described in this subsection include the design, development, implementation, expansion, and assessment of—

(1) metrics of success to best capture the achievements of HBCUs, TCUs, and MSIs and students of such institutions to account for institutional context and missions, faculty investment, student populations, student needs, and institutional resource constraints;

(2) enhancements to undergraduate STEM curriculum at HBCUs, TCUs, and MSIs to increase the participation, retention, degree completion, and success of underrepresented students;

(3) professional development programs to increase the numbers and the high-quality preparation of STEM faculty at HBCUs, TCUs, and MSIs, including programs to encourage STEM doctoral students to teach at HBCUs, TCUs, and MSIs; and

(4) mechanisms for institutions of higher education that are not HBCUs, TCUs, or MSIs to partner with HBCUs, TCUs, and MSIs on STEM education, including the facilitation of student transfer, mentoring programs for students and junior faculty, joint research projects, and student access to graduate education.

(d) RESEARCH EXPERIENCES.—Grants under this section may fund the development or expansion of opportunities for the exchange of students and faculty to conduct research, including through partnerships with institutions of higher education that are not HBCUs, TCUs, or MSIs, private sector and non-profit organizations, Federal laboratories, and international research institutions.

(e) PARTNERSHIPS.—In awarding grants under this section, the Director of the National Science Foundation shall—

(1) encourage HBCUs, TCUs, and MSIs and consortia thereof and partnerships with one or more HBCU, TCU, or MSI, to submit proposals;

(2) require proposals submitted in partnership with one or more HBCU, TCU, or MSI include a plan for establishing a sustained partnership that is jointly developed and managed, draws from the capacities of each institution, and is mutually beneficial; and

(3) encourage proposals submitted in partnership with the private sector, non-profit organizations, Federal laboratories, and international research institutions, as appropriate.

(f) MSI CENTERS OF INNOVATION.—Grants under this section may fund the establishment of no more than five MSI Centers of Innovation to leverage successes of HBCUs, TCUs, and MSIs in STEM education and research training of underrepresented minority students as models for other institutions, including both HBCUs, TCUs, and MSIs and institutions of higher education that are not HBCUs, TCUs, or MSIs. Such centers will be located on campuses of selected institutions of higher education and serve as incubators to allow institutions of higher education to experiment, pilot, evaluate, and scale up promising practices.

(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director of the National Science Foundation $170,000,000 for fiscal year 2020,

$175,000,000 for fiscal year 2021, $180,000,000 for fiscal year FY 2022, $185,000,000 for fiscal year 2023, and $190,000,000 fiscal year 2024 to carry out this section.

SEC. 5. AGENCY RESPONSIBILITIES.

(a) IN GENERAL.—In consultation with outside stakeholders and the heads of the Federal science agencies, the Director shall develop a uniform set of policy guidelines for Federal science agencies to carry out a sustained program of outreach activities to increase clarity, transparency, and accountability for Federal science agency investments in STEM education and research activities at HBCUs, TCUs, and MSIs.

(b) OUTREACH ACTIVITIES.—In developing policy guidelines under subsection (a) the Director shall include guidelines that require each Federal science agency—

(1) to designate a liaison for HBCUs, TCUs, and MSIs responsible for—

(A) enhancing direct communication with HBCUs, TCUs, and MSIs to increase the Federal science agency's understanding of the capacity and needs of such institutions and to raise awareness of available Federal funding opportunities at such institutions;

(B) coordinating programs, activities, and initiatives while accounting for the capacity and needs of HBCUs, TCUs, and MSIs;

(C) tracking Federal science agency investments in and engagement with HBCUs, TCUs, and MSIs; and

(D) reporting progress toward increasing participation of HBCUs, TCUs, and MSIs in grant programs;

(2) to publish annual forecasts of funding opportunities and proposal deadlines, including for grants, contracts, subcontracts, and cooperative agreements;

(3) to conduct on-site reviews of research facilities at HBCUs, TCUs, and MSIs, as practicable, and make recommendations regarding strategies for becoming more competitive in research;

(4) to hold geographically accessible or virtual workshops on research priorities of the Federal science agency and on how to write competitive grant proposals;

(5) to ensure opportunities for HBCUs, TCUs, and MSIs to directly communicate with Federal science agency officials responsible for managing competitive grant programs in order to receive feedback on research ideas and proposals, including guidance on the Federal science agency's peer review process;

(6) to foster mutually beneficial public-private collaboration among Federal science agencies, industry, Federal laboratories, academia, and nonprofit organizations to—

(A) identify alternative sources of funding for STEM education and research at HBCUs, TCUs, and MSIs;

(B) provide access to high-quality, relevant research experiences for students and faculty of HBCUs, TCUs, and MSIs;

(C) expand the professional networks of students and faculty of HBCUs, TCUs, and MSIs;

(D) broaden STEM educational opportunities for students and faculty of HBCUs, TCUs, and MSIs; and

(E) support the transition of students of HBCUs, TCUs, and MSIs into the STEM workforce; and

(7) to publish an annual report that provides an account of Federal science agency investments in HBCUs, TCUs, and MSIs, including data on the level of participation of HBCUs, TCUs, and MSIs as prime recipients/contractors or subrecipients/subcontractors.

(c) STRATEGIC PLAN.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Director, in collaboration with the head of each Federal science agency, shall submit to Congress a report containing a strategic plan for each Federal science agency to increase the capacity of HBCUs, TCUs, and MSIs to compete effectively for grants, contracts, or cooperative agreements and to encourage HBCUs, TCUs, and MSIs to participate in Federal programs.

(2) CONSIDERATIONS.—In developing a strategic plan under paragraph (1), the Director and each head of each Federal science agency shall consider—

(A) issuing new or expanding existing funding opportunities targeted to HBCUs, TCUs, and MSIs;

(B) modifying existing research and development program solicitations to incentivize effective partnerships with HBCUs, TCUs, and MSIs;

(C) offering planning grants for HBCUs, TCUs, and MSIs to develop or equip grant offices with the requisite depth of knowledge to submit competitive grant proposals and manage awarded grants;

(D) offering additional training programs and individualized and timely guidance to grant officers and faculty researchers at HBCUs, TCUs, and MSIs to ensure they understand the requirements for an effective grant proposal; and

(E) other approaches for making current competitive funding models more accessible for under-resourced HBCUs, TCUs, and MSIs.

(d) REPORT TO CONGRESS.—Not later than 2 years after the date of enactment of this Act, and every 5 years thereafter, the Director shall report to Congress on the implementation by Federal science agencies of the policy guidelines developed under this section.

SEC. 6. DEFINITIONS.

In this Act:

(1) DIRECTOR.—The term "Director" means the Director of the Office of Science and Technology Policy.

(2) FEDERAL LABORATORY.—The term "Federal laboratory" has the meaning given such term in section 4 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703).

(3) FEDERAL SCIENCE AGENCY.—The term "Federal science agency" means any Federal agency with an annual extramural research expenditure of over $100,000,000.

(4) HBCU.—The term "HBCU" has the meaning given the term "part B institution" in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

(5) INSTITUTION OF HIGHER EDUCATION.—The term "institution of higher education" has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

(6) MINORITY SERVING INSTITUTION.—The term "minority serving institution" or "MSI" means Hispanic-Serving Institutions as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C 1101a); Alaska Native Serving Institutions and Native Hawaiian-Serving Institutions as defined in section 317 of the Higher Education Act of 1965 (20 U.S.C. 1059d); and Predominantly Black Institutions, Asian American and Native American Pacific Islander-Serving Institutions, and Native American-Serving Nontribal Institutions as defined in section 371 of the Higher Education Act of 1965 (20 U.S.C. 1067q(c)).

(7) STEM.—The term "STEM" has the meaning given the term in the STEM Education Act of 2015 (42 U.S.C. 1861 et seq.).

(8) TCU.—The term "TCU" has the meaning given the term "Tribal College or University" in section 316 of the Higher Education Act of 1965 (20 U.S.C. 1059c).

II. PURPOSE OF THE BILL

The purpose of the bill is to direct Federal science agencies and the Office of Science and Technology Policy to undertake activities to improve the quality of undergraduate STEM education and enhance the research capacity at the Nation's HBCUs, TCUs, and MSIs.

III. BACKGROUND AND NEED FOR THE LEGISLATION

As industries across all sectors become increasingly reliant on advanced technologies, the demand for STEM skills is at an all-time high. There are not enough graduates who are prepared to enter the workforce equipped with the STEM knowledge and skills employers need. The Bureau of Labor Statistics predicts a significant shortage of STEM workers in the coming decade. One of the key challenges facing the U.S. science and engineering enterprise is a lack of diversity in the STEM workforce.

Demographic shifts in the U.S. population are approaching an inflection point. The U.S. Census Bureau projects that by 2045, white Americans will no longer comprise the majority of the population. During that year, non-Hispanic whites will comprise 49.7 percent of the population, while Hispanics will comprise 24.6 percent, African Americans 13.1 percent, Asians 7.9 percent, and multiracial

populations 3.8 percent. Although the Nation as a whole is diversifying, the STEM workforce has been slow to respond.

Compared with their proportions in the U.S. population, members of racial and ethnic minority groups are significantly underrepresented in the STEM workforce. While the representation of American Indians in STEM occupations increased from 1993 (0.2 percent) to 2006 (0.4 percent), that progress was reversed and only 0.2 percent of STEM occupations were held by American Indians in 2015. While Hispanic employment in STEM occupations has steadily increased (from 2.9 to 6 percent) from 1993 to 2015, progress for African Americans has been much slower (from 3.6 to 4.8 percent).

Underrepresented minority students have long been an untapped resource for U.S. science and technology capacity, but as the Nation becomes more diverse the Nation can no longer afford to ignore this valuable source of STEM talent. MSIs have a proven track record of recruiting, retaining, and graduating students from underrepresented groups with the STEM skills employers need. However, more investment and outreach is needed to enable MSIs to fully realize their potential to contribute to the STEM workforce.

The National Academy of Sciences released a 2018 report entitled "Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce" that highlights MSI contributions to the STEM workforce. Included in the Committee's recommendations was a call for funding agencies to continue to develop and expand grant competition programs that serve the nations MSIs.

IV. Committee Hearings

On May 9, 2019, the full Committee held a hearing entitled, "Achieving the Promise of a Diverse STEM Workforce." The purpose of the hearing was to explore the need for a diverse STEM workforce and assess the lessons learned, model programs, enduring challenges, and future opportunities for expanding access to STEM studies and careers.

Five witnesses testified: (1) Dr. Mae Jemison, Principal, 100 Year Starship. Dr. Jemison provided testimony on a National Academies of Science study underway to examine "the evidence behind the most successful policies, practices, and strategies that have demonstrated effectiveness in opening doors to women's participation and success" in STEM. (2) Dr. Shirley Malcom, Senior Advisor and Director of SEA Change, American Association for the Advancement of Science. Dr. Malcom provided testimony on the SEA Change initiative and other AAAS activities in support of increasing diversity in STEM. (3) Dr. Lorelle Espinosa, Vice President for Research, American Council on Education. Dr. Espinosa provided testimony on the findings and recommendations of the 2018 National Academies of Science report entitled *Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce.* (4) Dr. James L. Moore III, Vice Provost for Diversity and Inclusion and Chief Diversity Officer, The Ohio State University. Dr. Moore provided testimony on activities at The Ohio State University institution to address the issue of diversity and the role that public and land-grant universities play in broadening participation in STEM. (5) Ms. Barbara Whye, Chief Diversity and

Inclusion Officer, Vice President of Human Resources, Intel. Ms. Whye provided testimony on efforts underway at Intel to increase the diversity of its workforce.

V. Committee Consideration and Votes

On September 18, 2019, Chairwoman Eddie Bernice Johnson and Representative Michael Waltz introduced H.R. 4372, the *MSI STEM Achievement Act*. The bill was referred to the House Committee on Science, Space, and Technology.

On September 25, 2019, the Committee on Science, Space, and Technology met to consider H.R. 4372. Ms. Johnson offered an amendment to include an authorization of appropriations for NSF to carry out the activities in the Act for fiscal years 2020–2024. *The amendment was agreed to on a voice vote*. Ms. Johnson moved that the Committee favorably report the bill, H.R. 4372, to the House with the recommendation that the bill be approved. *The motion was agreed to by a voice vote*.

VI. Summary of Major Provisions of the Bill

H.R. 4372 directs GAO to compile an inventory of competitive Federal funding programs that are targeted to HBCUs, TCUs, and MSIs and make recommendations for what steps Federal science agencies can take to increase participation and competitiveness of HBCUs, TCUs, and MSIs in such programs. The Act also provides for research on the challenges and opportunities for HBCUs, TCUs, and MSIs to contribute to the STEM workforce and support for effective mechanisms to build the research and STEM education capacity of such institutions.

The Act directs the Office of Science and Technology Policy to work with Federal science agencies to develop and implement a national strategy to increase clarity, transparency, and accountability for Federal science agency investments in research and STEM education at HBCUs, TCUs, and MSIs.

VII. Section-by-Section Analysis (By Title and Section)

Section 1. Short title

MSI STEM Achievement Act

Section 2. Findings

Summarizes the need for increased investment to build on the success HBCUs, TCUs, and MSIs have had in recruiting, retaining, and graduating underrepresented minority students who are ready to enter the STEM workforce.

Section 3. Government Accountability Office Review

Directs GAO to report to Congress an inventory of Federal science agency competitive funding programs targeted to MSIs. Also directs GAO to assess Federal science agency outreach to MSIs and make recommendations for steps agencies can take to increase the participation and competitiveness of MSIs in such programs.

Section 4. Research and capacity building

Directs NSF to support research on the challenges and successes MSIs have had in contributing to the STEM workforce. Also directs NSF to support research focused on building the research capacity of MSIs, encouraging mutually beneficial partnerships, and scaling up successful model programs for use by other universities. Authorizes $170,000,000 for fiscal year 2020, $175,000,000 for fiscal year 2021, $180,000,000 for fiscal year 2022, $185,000,000 for fiscal year 2023, and $190,000,000 fiscal year 2024 for NSF to carry out this section.

Section 5. Agency responsibilities

Directs OSTP to issue uniform policy guidance for Federal science agencies to improve outreach to MSIs with the goal of increasing awareness among MSIs of funding opportunities and building MSI capacity to submit competitive proposals and manage awarded grants. Also directs OSTP to work with Federal science agencies to develop a strategic plan for how to modify existing or develop new programs or processes to make Federal STEM education and research funding more accessible to MSIs.

Section 6. Definitions

Defines terms used in the bill.

VIII. COMMITTEE VIEWS

It is the intent of the Committee that for the purposes of this Act, MSIs include Hispanic-Serving Institutions, Alaska Native-Serving Institutions, Native Hawaiian-Serving Institutions, Predominantly Black Institutions, Asian American and Native American Pacific Islander-Serving Institutions, and Native American-Serving Nontribal Institutions. The Committee recognizes that each HBCU, TCU, and MSI cohort has distinct strengths and challenges and the Committee encourages OSTP and Federal science agencies to carry out the activities of the Act while accounting for the diversity among these institutions with respect to local context, cultural differences, organizational structure, student populations, and institutional mission priorities.

In carrying out the activities in the Act, the Committee expects NSF to support its existing portfolio of STEM education and research programs targeted to HBCUs, TCUs, and MSIs at funding levels no lower than those in fiscal year 2019. The Committee has provided the Director with the flexibility to use the additional funds provided in this Act to expand upon existing programs or create a new grant program as needed to fully achieve the goals and requirements of the Act.

The Committee encourages OSTP to issue guidelines for Federal science agencies to foster mutually beneficial public-private collaboration among government, industry, Federal laboratories, academia, and nonprofit organizations to—promote local economic development by making available to private companies, at reasonable cost, MSI facilities, such as wet labs, machine shops and clean rooms, as well as faculty and researchers as paid professional consultants to assist companies in growing their businesses; engage private sector STEM experts as instructors or co-instructors of

classes to bring real-world experiences and examples to students; engage private sector STEM experts as mentors or co-mentors of students; place students in private sector internships and apprenticeships; and create entrepreneurship programs that promote faculty and student creation of private companies.

IX. Cost Estimate

Pursuant to clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

X. Congressional Budget Office Cost Estimate

U.S. Congress,
Congressional Budget Office,
Washington, DC, November 1, 2019.

Hon. Eddie Bernice Johnson,
Chairwoman, Committee on Science, Space, and Technology,
House of Representatives, Washington, DC.

Dear Madam Chairwoman: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 4372, the MSI STEM Achievement Act.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Janani Shankaran.

Sincerely,

Phillip L. Swagel,
Director.

Enclosure.

At a Glance

H.R. 4372, MSI STEM Achievement Act

As ordered reported by the House Committee on Science, Space, and Technology on September 25, 2019

By Fiscal Year, Millions of Dollars	2020	2020-2024	2020-2029
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	3	414	not estimated

Statutory pay-as-you-go procedures apply?	No	**Mandate Effects**	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

The bill would

- Authorize the appropriation of $900 million over the 2020-2024 period for the National Science Foundation to award grants to improve the capacity of minority-serving institutions of higher education to educate and train students in the fields of science, technology, engineering, and mathematics

Estimated budgetary effects would primarily stem from

- Spending of the authorized appropriations

Detailed estimate begins on the next page.

Bill Summary: H.R. 4372 would authorize the appropriation of $900 million over the 2020–2024 period for the National Science Foundation (NSF) to award grants to improve the capacity of minority-serving institutions (MSIs) of higher education—including historically black colleges and universities and tribal colleges and universities—to educate and train students in science, technology, engineering, and mathematics (STEM) fields.

The bill also would direct the Office of Science and Technology Policy to develop a uniform set of policy guidelines and a strategic plan for certain federal agencies to improve outreach to MSIs and to increase the capacity of MSIs to compete for federal grants and participate in federal programs. Finally, the bill would require the Government Accountability Office to develop an inventory of federal funding programs targeted toward MSIs.

Estimated Federal Cost: The estimated budgetary effect of H.R. 4372 is shown in Table 1. The costs of the legislation fall primarily within budget function 250 (general science, space, and technology).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 4372

	By fiscal year, millions of dollars—					
	2020	2021	2022	2023	2024	2020–2024
National Science Foundation						
Authorization [a]	14	175	180	185	190	744
Estimated Outlays	2	26	86	133	162	409
Other Activities:						
Estimated Authorization	1	1	1	1	1	5
Estimated Outlays	1	1	1	1	1	5

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 4372—Continued

	By fiscal year, millions of dollars—					
	2020	2021	2022	2023	2024	2020–2024
Total Changes:						
Estimated Authorization	15	176	181	186	191	749
Estimated Outlays	3	27	87	134	163	414

[a] H.R. 4372 would authorize the appropriation of $170 million in 2020 for the National Science Foundation (NSF) to award grants. However, using information from the NSF, CBO estimates that $156 million has been allocated on an annualized basis from funds made available under the continuing resolution (Public Law 116–59), which provided appropriations through November 21, 2019. Thus, the estimated authorization for 2020 ($14 million) is equal to the specified amount ($170 million) minus the annualized amount from the continuing resolution ($156 million).

Basis of Estimate: For this estimate, CBO assumes that the legislation will be enacted in early 2020 and that the authorized and necessary amounts will be provided in each year. CBO estimates that implementing H.R. 4372 would cost $414 million over the 2020–2024 period.

National Science Foundation: Section 4 of the bill would authorize the appropriation of $170 million in 2020 and a total of $900 million over the 2020–2024 period for the NSF to award grants to improve the capacity of MSIs to educate and train students in STEM fields. In 2019, the NSF allocated $156 million for those purposes. Because CBO scores continuing resolutions on an annualized basis, in 2020 CBO assumes that the NSF will allocate the same amount from funds made available under the current continuing resolution (Public Law 116–59). As a result, CBO estimates that H.R. 4372 would authorize an increase in spending subject to appropriation in 2020 of $14 million, the difference between the authorized amount and the annualized amount under the continuing resolution. Based on historical spending patterns for the affected grants, CBO estimates that implementing section 4 would cost $409 million over the 2020–2024 period and $335 million after 2024.

Other Activities: Section 5 of the bill would direct the Office of Science and Technology Policy to develop a uniform set of policy guidelines and a strategic plan for certain federal agencies to improve outreach to MSIs and to increase the capacity of MSIs to compete for federal grants and participate in federal programs. CBO expects that six agencies with research expenditures exceeding $100 million annually—the Departments of Agriculture, Defense, Energy, and Health and Human Services, the National Aeronautics and Space Administration, and the NSF—would be subject to the policy guidelines. Some of those agencies are already conducting activities to improve outreach to MSIs. On that basis, and considering the costs of similar tasks, CBO estimates that implementing section 5 would cost $1 million annually over the 2020–2024 period.

Section 3 of the bill would require the Government Accountability Office to develop an inventory of federal funding programs targeted toward MSIs. Based on the costs of similar tasks, CBO estimates that implementing the provision would cost less than $500,000; any spending would be subject to the availability of appropriated funds.

Pay-As-You-Go Considerations: None.

Increase in Long-Term Deficits: None.

Mandates: None.

Estimate Prepared By: Federal Costs: Janani Shankaran; Mandates: Brandon Lever.

Estimate Reviewed By: Kim P. Cawley, Chief, Natural and Physical Resources Cost Estimates Unit; H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

XI. Federal Mandates Statement

H.R. 4372 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee's oversight findings and recommendations are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to clause 3(c) of House Rule XIII, the goal of H.R. 4372 is to direct the Director of the Office of Science and Technology Policy and Federal science agencies to carry out programs and activities to improve clarity, transparency, and accountability for Federal science agency investments in research and STEM education at the Nation's HBCUs, TCUs, and MSIs.

XIV. Federal Advisory Committee Statement

H.R. 4372, does not create any advisory committees.

XV. Duplication of Federal Programs

Pursuant to clause 3(c)(5) of rule XIII of the Rules of the House of Representatives, the Committee finds that no provision of H.R. 4372 establishes or reauthorizes a program of the federal government known to be duplicative of another federal program, including any program that was included in a report to Congress pursuant to section 21 of Public Law 111–139 or the most recent Catalog of Federal Domestic Assistance.

XVI. Earmark Identification

Pursuant to clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 4372 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. Applicability to the Legislative Branch

The Committee finds that H.R. 4372 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVIII. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XIX. Changes in Existing Law Made by the Bill, as Reported

This legislation does not amend any existing Federal statute.

XX. Proceedings of the Full Committee Markup

MARKUPS:
H.R. 4373, THE ENGINEERING BIOLOGY RESEARCH AND DEVELOPMENT ACT OF 2019;
H.R. 4372, THE MSI STEM ACHIEVEMENT ACT; AND
H.R. 4355, THE IDENTIFYING OUTPUTS OF GENERATIVE ADVERSARIAL NETWORKS ACT

MARKUP

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

SEPTEMBER 25, 2019

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C O N T E N T S

September 25, 2019

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MARKUPS: H.R. 4373, THE ENGINEERING BIOLOGY RESEARCH AND DEVELOPMENT ACT OF 2019; H.R. 4372, THE MSI STEM ACHIEVEMENT ACT; AND H.R. 4355, THE IDENTIFYING OUTPUTS OF GENERATIVE ADVERSARIAL NETWORKS ACT

WEDNESDAY, SEPTEMBER 25, 2019

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 10:01 a.m., in room 2318 of the Rayburn House Office Building, Hon. Eddie Bernice Johnson [Chairwoman of the Committee] presiding.

Chairwoman JOHNSON. Good morning. The Committee will come to order. And without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee rule 2(e) and House rule XI, the Chair announces that she may postpone roll call votes.

Pursuant to notice, the Committee meets to consider the following measures: H.R. 4373, the *Engineering Biology Research and Development Act of 2019*; H.R. 4372, the *MSI STEM Achievement Act*; and H.R. 4355, *Identifying Outputs of Generative Adversarial Networks Act*.

Welcome to today's Science Committee markup of these three bipartisan bills. First, we will consider H.R. 4373, the *Engineering Biology Research and Development Act of 2019*.

Engineering biology has the potential to address some of the most serious challenges facing our Nation, from food production to environmental cleanup, to clean energy, and of course health care. It will also drive our economy in the 21st century. U.S. revenues from engineered biological systems reached at least $388 billion in 2017. H.R. 4373 creates the foundation for U.S. leadership in the bioeconomy while also ensuring that the United States is positioned to lead global discussions about responsible development and governance of engineering biology.

H.R. 4373 would establish a Federal engineering biology research initiative and require a national strategy for our investments and a framework for interagency coordination. The legislation would also expand public-private partnerships and expand education and training for the next generation of engineering biology researchers. It authorizes mission-relevant activities for several agencies within the jurisdiction of this Committee. Finally, throughout the legisla-

tion, we ensure that the initiative would address potential ethical, legal, environmental, safety, and security issues associated with engineering biology research.

Next, we will consider H.R. 4372, the *MSI STEM Achievement Act*. Our Nation's underrepresented minority students have long been an underutilized resource for STEM (science, technology, engineering, and mathematics) talent. For our country to remain competitive in the 21st century, this situation must change. Fortunately, America's minority-serving institutions (MSIs) have been working for decades to prepare underrepresented minority students to enter STEM fields. Our MSIs have helped advance participation in STEM fields by developing tried-and-true models for inclusive curriculum, effective student mentoring, and fostering a welcoming campus climate.

The *MSI STEM Achievement Act* provides for increased transparency, accountability, and accessibility of Federal STEM education and research funding for the MSIs. The bill directs the Government Accountability Office to compile an inventory of Federal science agency programs targeted to MSIs and to make recommendations for steps agencies can take to encourage increased participation and success for the MSIs in these programs.

The National Science Foundation is authorized to support research on the challenges and successes MSIs have had—in contributing to the STEM workforce, including approaches to build research competitiveness for them.

Finally, the bill directs the Office of Science and Technology Policy to develop a governmentwide strategic plan and sustained outreach program to support STEM education and research at the MSIs.

The last bill we consider today is H.R. 4355, the *Identifying Outputs of Generative Adversarial Networks Act*. This very technical topic is more commonly known as "deep fakes." The National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST) both have critical roles to play in the research and standards development to counter the spread and consequences of deep fakes. Importantly, this legislation also emphasizes public-private partnerships in this area.

I want to thank Mr. Gonzalez and his bipartisan cosponsors for introducing this good bill, and I urge my colleagues to support it. I think these are all good bills, and I look forward to a productive markup today.

[The prepared statement of Chairwoman Johnson follows:]

Welcome to today's Science Committee markup of three bipartisan bills.

First we will consider H.R. 4373, the *Engineering Biology Research and Development Act of 2019*. Engineering biology has the potential to address some of the most serious challenges facing our nation, from food production to environmental cleanup, to clean energy, and of course healthcare. It will also drive our economy in the 21st century. U.S. revenues from engineered biological systems reached at least $388 billion in 2017.

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nally, throughout the legislation, we ensure that the Initiative would address potential ethical, legal, environmental, safety, and security issues associated with engineering biology research.

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The *MSI STEM Achievement Act* provides for increased transparency, accountability, and accessibility of Federal STEM education and research funding for MSIs. The bill directs the Government Accountability Office to compile an inventory of Federal science agency programs targeted to MSIs and to make recommendations for steps agencies can take to encourage increased participation and success for MSIs in these programs. The National Science Foundation is authorized to support research on the challenges and successes MSIs have had in contributing to the STEM workforce, including approaches to build the research competitiveness of MSIs. Finally, the bill directs the Office of Science and Technology Policy to develop a government-wide strategic plan and sustained outreach program to support STEM education and research at MSIs.

The last bill we will consider today is H.R. 4355, the *Identifying Outputs of Generative Adversarial Networks Act*. This very technical topic is more commonly known as "Deep Fakes". The National Science Foundation and the National Institute of Standards and Technology both have critical roles to play in the research and standards development to counter the spread and consequences of Deep Fakes. Importantly, this legislation also emphasizes public-private partnerships in this area. I want to thank Mr. Gonzalez and his bipartisan cosponsors for introducing this good bill and I urge my colleagues to support it.

I think these are all good bills, and I look forward to a productive markup today.

Chairwoman JOHNSON. I now recognize our Ranking Member, Mr. Lucas, for his opening remarks.

Mr. LUCAS. Thank you, Chairwoman Johnson, for holding this markup.

Today, we'll consider three bipartisan bills. The first is H.R. 4373, the *Engineering Biology Research and Development Act of 2019*. I'm proud to join Chairwoman Johnson, as well as Representatives Jim Sensenbrenner and Zoe Lofgren, in introducing this bill. H.R. 4373 promotes a national research strategy around engineering biology to ensure that the U.S. remains the global leader in biology and biotechnology. I will speak further on this bill when it's brought up for consideration in a moment.

Our second bill this morning is H.R. 4372, the *MSI STEM Achievement Act*, sponsored by Chairwoman Johnson and Representative Michael Waltz. The bill continues our Committee's bipartisan work to support, encourage, and develop the next generation of STEM students.

Minority-serving institutions, including historically black colleges and universities, Hispanic-serving institutions, and tribal colleges and universities, have a long record of success in recruiting, training, and graduating underrepresented students in STEM fields.

In my own district, I have seen the unique value of minority-serving institutions. For more than 100 years, Langston University, a historically black college and land-grant institution, has educated students of all backgrounds and influenced people's lives beyond the boundaries of the classroom in service to the community in both rural and urban Oklahoma. This legislation will help schools like Langston prepare their students to fill the STEM jobs of the

21st century. I want to thank the Chairwoman and Mr. Waltz for their work on this legislation and urge my colleagues to support it.

Finally, we'll consider H.R. 4355, the *Identifying Outputs of Generative Adversarial Networks Act*, introduced by Representative Anthony Gonzalez. Generative adversarial networks (GANs) use machine learning to manipulate videos and other digital content to produce misleading and false products, commonly known as deep fakes. These technologies are becoming more sophisticated, and, in the wrong hands, they present a serious security threat. Bad actors already seek to use disinformation to disrupt civil society and sow division among Americans.

This bill supports the fundamental research necessary to better understand the underlying technology, to develop tools to identify manipulated content, and to better understand how humans interact with this generated content. The bill also tasks NIST with bringing together the private sector and government agencies to discuss how to responsibly advance innovation in this area.

I applaud Mr. Gonzalez's bipartisan work on this bill, and his leadership on the issue of technology and security. I appreciate his staff working with Committee staff on both sides of the aisle to address technical feedback from the agencies in an amendment that we'll take up later.

Finally, I want to thank the Chairwoman and her staff for working in a bipartisan and collaborative fashion on these three bills. Today's markup demonstrates what we can accomplish in this Committee when we work together on our shared priority of maintaining American leadership in science and technology.

And with that, Madam Chair, I yield back.

[The prepared statement of Mr. Lucas follows:]

Thank you, Chairwoman Johnson, for holding this mark-up.

Today we will consider three bipartisan bills.

The first is H.R. 4373, the *Engineering Biology Research and Development Act of 2019*.

I was proud to join Chairwoman Johnson as well as Representatives Jim Sensenbrenner and Zoe Lofgren in introducing this bill. H.R. 4373 promotes a national research strategy around engineering biology, to ensure the U.S. remains the global leader in biology and biotechnology.

I will speak further on the bill when it is brought up for consideration in a moment.

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Minority serving institutions- including Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges and Universities - have a long record of success in recruiting, retaining and graduating underrepresented students in STEM fields.

In my own district, I have seen the unique value of minority serving institutions. For more than 100 years, Langston University, a historically black college and a land-grant institution, has educated students of all backgrounds, and influenced people's lives beyond the boundaries of the classroom in service to the community in both rural and urban Oklahoma.

This legislation will help schools like Langston prepare their students to fill the STEM jobs of the 21st Century.

I want to thank the Chairwoman and Mr. Waltz for their work on this legislation and urge my colleagues to support it.

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I appreciate his staff working with Committee staff on both sides of the aisle to address technical feedback from the agencies in an Amendment that we will take up later.

Finally, I want to thank the Chairwoman and her staff for working in a bipartisan and collaborative fashion on these three bills.

Today's mark-up demonstrates what we can accomplish in this Committee when we work together on our shared priority of maintaining American leadership in science and technology.

I yield back.

Chairwoman JOHNSON. Thank you very much.

H.R. 4372

Chairwoman JOHNSON. We will now consider H.R. 4372, the *MSI STEM Achievement Act*. The clerk will report the bill.

The CLERK. H.R. 4372, a bill.

[The bill follows:]

.....

(Original Signature of Member)

116TH CONGRESS
1ST SESSION

H. R. _____

To direct Federal science agencies and the Office of Science and Technology Policy to undertake activities to improve the quality of undergraduate STEM education and enhance the research capacity at the Nation's HBCUs, TCUs, and MSIs, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Ms. Eddie Bernice Johnson (for herself and Mr. Waltz) introduced the following bill; which was referred to the Committee on

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A BILL

To direct Federal science agencies and the Office of Science and Technology Policy to undertake activities to improve the quality of undergraduate STEM education and enhance the research capacity at the Nation's HBCUs, TCUs, and MSIs, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "MSI STEM Achievement Act".

SEC. 2. FINDINGS.

Congress makes the following findings:

(1) Evidence suggests that the supply of STEM workers is not keeping pace with the rapidly evolving needs of the public and private sector, resulting in a deficit often referred to as a STEM skills shortage.

(2) According to the Bureau of Labor Statistics, the United States will need one million additional STEM professionals than it is on track to produce in the coming decade.

(3) STEM occupations offer higher wages, more opportunities for advancement, and a higher degree of job security than non-STEM occupations.

(4) The composition of the STEM workforce does not reflect the current or projected diversity of the Nation, with Hispanics, African Americans, and other racial and ethnic minorities, significantly underrepresented in the STEM workforce compared to their presence in the workforce more generally.

(5) A stronger national commitment to increasing the diversity of the STEM workforce is needed to help address the STEM skills shortage.

(6) According to a 2019 National Academies of Sciences, Engineering, and Medicine report entitled "Minority Serving Institutions: America's Underuti-

lized Resource for Strengthening the STEM Workforce", two- and four-year minority serving institutions enroll nearly 30 percent of all undergraduate students – a percentage that is expected to grow in the coming years – in the United States higher education system and play a critical role in providing important pathways to STEM-related education, training, and careers for students of color.

(7) HBCUs, TCUs, and MSIs are highly successful at educating underrepresented minority students in STEM fields and can serve as best practice models for other colleges and universities to further expand participation of underrepresented minorities in the STEM workforce.

(8) Increased investment in STEM infrastructure at HBCUs, TCUs, and MSIs has the potential to increase these institutions' ability to educate even more students in the STEM disciplines.

(9) With the demand for STEM skills exceeding the supply of STEM graduates, success of HBCUs, TCUs, and MSIs in educating and training science and engineering leaders is increasingly important for United States economic growth and competitiveness.

SEC. 3. GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.

Not later than 3 years after the date of enactment of this Act, the Comptroller General of the United States shall report to Congress—

(1) an inventory of competitive funding programs and initiatives carried out by Federal science agencies that are targeted to HBCUs, TCUs, and MSIs or partnerships with HBCUs, TCUs, and MSIs;

(2) an assessment of Federal science agency outreach activities to increase the participation and competitiveness of HBCUs, TCUs, and MSIs in the funding programs and initiatives identified in paragraph (1); and

(3) recommendations of the Comptroller General to increase the participation of and the rate of success of HBCUs, TCUs, and MSIs in competitive funding programs offered by Federal science agencies.

SEC. 4. RESEARCH AND CAPACITY BUILDING.

(a) IN GENERAL.—The Director of the National Science Foundation shall award grants, on a competitive basis, to institutions of higher education or nonprofit organizations (or consortia thereof) to—

(1) conduct research described in subsection (b) with respect to HBCUs, TCUs, and MSIs;

(2) conduct activities described in subsection (c) to build the capacity of HBCUs, TCUs, and MSIs to graduate students who are competitive in attaining and advancing in the STEM workforce;

(3) build the research capacity and competitiveness of HBCUs, TCUs, and MSIs in STEM disciplines; and

(4) identify and broadly disseminate effective models for programs and practices at HBCUs, TCUs, and MSIs that promote the education and workforce preparation of minority students pursuing STEM studies and careers in which such students are underrepresented.

(b) RESEARCH.—Research described in this subsection is research on the contribution of HBCUs, TCUs, and MSIs to the education and training of underrepresented minority students in STEM fields and to the meeting of national STEM workforce needs, including—

(1) the diversity with respect to local context, cultural differences, and institutional structure among HBCUs, TCUs, and MSIs and any associated impact on education and research endeavors;

(2) effective practices at HBCUs, TCUs, and MSIs and associated outcomes on student recruitment, retention, and advancement in STEM fields,

including the ability for students to compete for fellowships, employment, and advancement in the workforce;

(3) contributions made by HBCUs, TCUs, and MSIs to local, regional, and national workforces;

(4) the unique challenges and opportunities for HBCUs, TCUs, and MSIs in attaining the resources needed for integrating effective practices in STEM education, including providing research experiences for underrepresented minority students;

(5) the access of students at HBCUs, TCUs, and MSIs to STEM infrastructure and any associated outcomes for STEM competency;

(6) models of STEM curriculum, learning, and teaching successful at HBCUs, TCUs, and MSIs for increasing participation, retention, and success of underrepresented minority students; and

(7) successful or promising partnerships between HBCUs, TCUs, and MSIs and other institutions of higher education, private sector and nonprofit organizations, Federal laboratories, and international research institutions.

(c) CAPACITY BUILDING.—Activities described in this subsection include the design, development, implementation, expansion, and assessment of—

(1) metrics of success to best capture the achievements of HBCUs, TCUs, and MSIs and students of such institutions to account for institutional context and missions, faculty investment, student populations, student needs, and institutional resource constraints;

(2) enhancements to undergraduate STEM curriculum at HBCUs, TCUs, and MSIs to increase the participation, retention, degree completion, and success of underrepresented students;

(3) professional development programs to increase the numbers and the high-quality preparation of STEM faculty at HBCUs, TCUs, and MSIs, including programs to encourage STEM doctoral students to teach at HBCUs, TCUs, and MSIs; and

(4) mechanisms for institutions of higher education that are not HBCUs, TCUs, or MSIs to partner with HBCUs, TCUs, and MSIs on STEM education, including the facilitation of student transfer, mentoring programs for students and junior faculty, joint research projects, and student access to graduate education.

(d) RESEARCH EXPERIENCES.—Grants under this section may fund the development or expansion of opportunities for the exchange of students and faculty to con-

duct research, including through partnerships with institutions of higher education that are not HBCUs, TCUs, or MSIs, private sector and non-profit organizations, Federal laboratories, and international research institutions.

(e) PARTNERSHIPS.—In awarding grants under this section, the Director of the National Science Foundation shall—

(1) encourage HBCUs, TCUs, and MSIs and consortia thereof and partnerships with one or more HBCU, TCU, or MSI, to submit proposals;

(2) require proposals submitted in partnership with one or more HBCU, TCU, or MSI include a plan for establishing a sustained partnership that is jointly-developed and managed, draws from the capacities of each institution, and is mutually beneficial; and

(3) encourage proposals submitted in partnership with the private sector, non-profit organizations, Federal laboratories, and international research institutions, as appropriate.

(f) MSI CENTERS OF INNOVATION.—Grants under this section may fund the establishment of no more than five MSI Centers of Innovation to leverage successes of HBCUs, TCUs, and MSIs in STEM education and research training of underrepresented minority students as

models for other institutions, including both HBCUs, TCUs, and MSIs and institutions of higher education that are not HBCUs, TCUs, or MSIs. Such centers will be located on campuses of selected institutions of higher education and serve as incubators to allow institutions of higher education to experiment, pilot, evaluate, and scale up promising practices.

SEC. 5. AGENCY RESPONSIBILITIES.

(a) IN GENERAL.—In consultation with outside stakeholders and the heads of the Federal science agencies, the Director shall develop a uniform set of policy guidelines for Federal science agencies to carry out a sustained program of outreach activities to increase clarity, transparency, and accountability for Federal science agency investments in STEM education and research activities at HBCUs, TCUs, and MSIs.

(b) OUTREACH ACTIVITIES.—In developing policy guidelines under subsection (a) the Director shall include guidelines that require each Federal science agency—

(1) to designate a liason for HBCUs, TCUs, and MSIs responsible for—

(A) enhancing direct communication with HBCUs, TCUs, and MSIs to increase the Federal science agency's understanding of the capacity and needs of such institutions and to

raise awareness of available Federal funding opportunities at such institutions;

(B) coordinating programs, activities, and initiatives while accounting for the capacity and needs of HBCUs, TCUs, and MSIs;

(C) tracking Federal science agency investments in and engagement with HBCUs, TCUs, and MSIs; and

(D) reporting progress toward increasing participation of HBCUs, TCUs, and MSIs in grant programs;

(2) to publish annual forecasts of funding opportunities and proposal deadlines, including for grants, contracts, subcontracts, and cooperative agreements;

(3) to conduct on-site reviews of research facilities at HBCUs, TCUs, and MSIs, as practicable, and make recommendations regarding strategies for becoming more competitive in research;

(4) to hold geographically accessible or virtual workshops on research priorities of the Federal science agency and on how to write competitive grant proposals;

(5) to ensure opportunities for HBCUs, TCUs, and MSIs to directly communicate with Federal

science agency officials responsible for managing competitive grant programs in order to receive feedback on research ideas and proposals, including guidance on the Federal science agency's peer review process

(6) to foster mutually beneficial public-private collaboration among Federal science agencies, industry, Federal laboratories, academia, and nonprofit organizations to—

(A) identify alternative sources of funding for STEM education and research at HBCUs, TCUs, and MSIs;

(B) provide access to high-quality, relevant research experiences for students and faculty of HBCUs, TCUs, and MSIs;

(C) expand the professional networks of students and faculty of HBCUs, TCUs, and MSIs;

(D) broaden STEM educational opportunities for students and faculty of HBCUs, TCUs, and MSIs; and

(E) support the transition of students of HBCUs, TCUs, and MSIs into the STEM workforce; and

(7) to publish an annual report that provides an account of Federal science agency investments in HBCUs, TCUs, and MSIs, including data on the level of participation of HBCUs, TCUs, and MSIs as prime recipients/contractors or subrecipients/subcontractors.

(c) STRATEGIC PLAN.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Director, in collaboration with the head of each Federal science agency, shall submit to Congress a report containing a strategic plan for each Federal science agency to increase the capacity of HBCUs, TCUs, and MSIs to compete effectively for grants, contracts, or cooperative agreements and to encourage HBCUs, TCUs, and MSIs to participate in Federal programs.

(2) CONSIDERATIONS.—In developing a strategic plan under paragraph (1), the Director and each head of each Federal science agency shall consider—

(A) issuing new or expanding existing funding opportunities targeted to HBCUs, TCUs, and MSIs;

(B) modifying existing research and development program solicitations to incentivize ef-

fective partnerships with HBCUs, TCUs, and MSIs;

(C) offering planning grants for HBCUs, TCUs, and MSIs to develop or equip grant offices with the requisite depth of knowledge to submit competitive grant proposals and manage awarded grants;

(D) offering additional training programs and individualized and timely guidance to grant officers and faculty researchers at HBCUs, TCUs, and MSIs to ensure they understand the requirements for an effective grant proposal; and

(E) other approaches for making current competitive funding models more accessible for under-resourced HBCUs, TCUs, and MSIs.

(d) REPORT TO CONGRESS.—Not later than 2 years after the date of enactment of this Act, and every 5 years thereafter, the Director shall report to Congress on the implementation by Federal science agencies of the policy guidelines developed under this section.

SEC. 6. DEFINITIONS.

In this Act:

(1) DIRECTOR.—The term "Director" means the Director of the Office of Science and Technology Policy.

(2) FEDERAL LABORATORY.—The term "Federal laboratory" has the meaning given such term in section 4 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703).

(3) FEDERAL SCIENCE AGENCY.—The term "Federal science agency" means any Federal agency with an annual extramural research expenditure of over $100,000,000.

(4) HBCU.—The term "HBCU" has the meaning given the term "part B institution" in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061).

(5) INSTITUTION OF HIGHER EDUCATION.—The term "institution of higher education" has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

(6) MINORITY SERVING INSTITUTION.—The term "minority serving institution" or "MSI" means Hispanic-Serving Institutions as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C 1101a); Alaska Native Serving Institutions and Native Hawaiian-Serving Institutions as defined in sec-

tion 317 of the Higher Education Act of 1965 (20 U.S.C. 1059d); and Predominantly Black Institutions, Asian American and Native American Pacific Islander-Serving Institutions, and Native American-Serving Nontribal Institutions as defined in section 371 of the Higher Education Act of 1965 (20 U.S.C. 1067q(c)).

(7) STEM.—The term "STEM" has the meaning given the term in the STEM Education Act of 2015 (42 U.S.C. 1861 et seq.).

(8) TCU.—The term "TCU" has the meaning given the term "Tribal College or University" in section 316 of the Higher Education Act of 1965 (20 U.S.C. 1059c).

Chairwoman JOHNSON. Without objection, the bill is considered as read and open to amendment at any point.

I recognize myself to briefly talk on the bill.

As I previously noted, we have to engage our full citizenry if we want to have a competitive STEM workforce. Minority-serving institutes provide a ready means to tap into groups that are underrepresented in the STEM fields. This bill will help us do just that.

I want to thank Representative Waltz for joining me in introducing this bill and for his leadership on this issue. I also want to thank Representatives Tonko, Fitzpatrick, Cohen, Foster, and Jackson Lee for agreeing to cosponsor the bill.

Finally, I want to thank the following organizations for endorsing the bill: The United Negro College Fund, the Thurgood Marshall College Fund, the Computing Alliance for Hispanic-Serving Institutions, the American Indian Science and Engineering Society, and the STEM Education Coalition. I'm grateful to all of you and many other stakeholders for providing valuable input and feedback on this legislation. I urge my colleagues to support this important bill.

Anyone wish to be recognized?

Mr. Waltz.

Mr. WALTZ. Thank you, Madam Chairwoman.

And as the Republican lead on H.R. 4372, the *MSI STEM Achievement Act*, I want to thank you, Chairwoman Johnson and Ranking Member Lucas, for working with me to improve participation in STEM at minority-serving institutions.

As we've discussed, the supply of STEM workers is not keeping pace with the rapidly evolving needs of our 21st-century economy, resulting in a STEM skill shortage. In fact, over the next decade the STEM shortage is anticipated to reach one million professionals according to the Bureau of Labor Statistics.

The STEM workforce, in addition to its overall shortage, has a diversity problem. Minorities are severely underrepresented in STEM fields, only accounting for 11 percent of the workforce, and therefore, a much stronger national commitment to increasing diversity in the STEM workforce is needed to help address these shortages.

The *MSI STEM Achievement Act* seeks to fulfill a more concerted national commitment by focusing on minority-serving institutions like Bethune-Cookman University in my district in Daytona Beach. MSIs currently enroll nearly 30 percent of all undergraduate students in the U.S. higher education system and play a critical role in providing pathways to STEM-related education, training, and careers for students of color.

This proposal, this bill seeks to increase capacity for students in STEM curricula, encourage partnerships with industry and Federal laboratories, and establish liaisons for MSIs within the Federal science agencies. All of these things will improve participation in successful STEM programs. These are goals that the White House shares and have included in their December 2018 strategy report on increasing diversity, equity, and inclusion in STEM education. And they've also reiterated it in their 2019 National Academies of Science's report on strengthening the STEM workforce. Additionally, we included many of the White House Office of Science and

Technology Policy and the National Science Foundation recommendations in this bipartisan bill.

I am proud to have worked with the Chairwoman and the Ranking Member on this proposal. I look forward to doing more to encourage STEM workforce development.

Chairwoman Johnson, just in the remainder of my time, I digress for a bit. I promise not to lose focus on getting this bill signed into law, but I'd also like to take this opportunity to mention the importance of focusing on female participation in STEM, leveraging private sector best practices, and encouraging female students in STEM at a very young age.

I have said in this Committee room multiple times this year and will continue to say, from my experience across the globe, fighting and being involved in Third World countries and in developing nations all over the world where women thrive in business, civil society, and politics, good things happen and extremism does not thrive. And so for that reason diversity in STEM must be a national security issue.

And in my district in Volusia County just north of Cape Canaveral and the Kennedy Space Center we are seeing countless businesses participate in workforce development programs like the Space Coast Consortium Apprenticeship Program. This program and others are making huge strides to advance STEM curriculum and workforce development.

And in my view there is no better example of engaging youth at the elementary, at a very young age, at the elementary and middle school age in STEM than in my district where we have the Burns Science and Technology Charter School.

I want to close by urging my colleagues to support H.R. 4372. And I thank you, and I yield back.

Chairwoman JOHNSON. Thank you, Mr. Waltz.

Anyone else seeking recognition?

We will now proceed with the amendments in order of the roster. The first amendment on the roster is an amendment offered by the Chair, and the clerk will report the amendment.

The CLERK. Amendment No. 1, amendment to H.R. 4372——

[The amendment of Chairwoman Johnson follows:]

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AMENDMENT TO H.R. 4372

OFFERED BY M.S. JOHNSON

Page 9, after line 7, insert the following:

(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director of the National Science Foundation $170,000,000 for fiscal year 2020, $175,000,000 for fiscal year 2021, $180,000,000 for fiscal year FY 2022, $185,000,000 for fiscal year 2023, and $190,000,000 fiscal year 2024 to carry out this section.

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Chairwoman JOHNSON. I ask unanimous consent to dispose of the reading, and without objection, so ordered.

The Chair recognizes myself for 5 minutes to explain the amendment.

The amendment includes a provision to authorize appropriations for the National Science Foundation to carry out the activities in the Act. The amendment provides $170 million in Fiscal Year 2020 with a $5 million-per-year increase over the subsequent 4 years. The amounts of the modest increase in funding for the NSF portfolio of programs targeted to support STEM education for research at the MSIs. I think it is important that we signal to the National Science Foundation that funding is needed in this area, and I urge support of this amendment.

I might further say, Mr. Waltz—I meant to mention this earlier—the *STEM Opportunities Act* is on the floor tomorrow that focuses a great deal on women.

Is there any further discussion on this amendment?

Mr. LUCAS. Madam Chair?

Chairwoman JOHNSON. Mr. Lucas.

Mr. LUCAS. Thank you, Madam Chair.

I want to speak in support of the amendment. I again appreciate you and your staff working with us on a bipartisan consensus on the authorization of appropriation levels for this bill. This amendment may give the appropriators in the National Science Foundation a good and realistic roadmap for implementing the legislation. I urge my colleagues to support this amendment, and I yield back.

Chairwoman JOHNSON. Thank you.

Are there any other persons seeking recognition?

Seeing none, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, no.

The ayes have it, and the amendment is agreed to.

A reporting quorum being present, I move that the Committee on Science, Space, and Technology report 4372, as amended, to the House and a recommendation that it be approved.

Those in favor of the motion, signify by saying aye.

Those opposed, no.

The ayes have it, and the bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table, and I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

Members will have 2 subsequent calendar days in which to submit supplementary minority and additional views on the measure.