



Federal Research and Development Funding at Historically Black Colleges and Universities

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Summary

The historically black colleges and universities (HBCUs), which have traditionally educated a significant number of the nation's blacks, have faced, and continue to face, substantial challenges in attempting to enhance their academic and research capabilities. Some of these institutions have a myriad of problems—aging infrastructures, limited access to digital and wireless networking technology, absence of state-of-the-art equipment, low salary structures, small endowments, and limited funds for faculty development and new academic programs for students. While many of these problems exist in other institutions, they appear to be considerably more serious in HBCUs. In addition, those HBCUs damaged by recent hurricanes, tornadoes, and other weather disasters have the added costs in the millions of replacing facilities and research equipment and rebuilding their infrastructure. This is an issue for Congress because the distribution of federal funding for HBCUs is one of the critical issues facing these institutions.

HBCUs comprise approximately 2.3% of all institutions of higher education, and enroll approximately 11.6% of all black students attending post-secondary institutions. Approximately 33.0% of the undergraduate degrees in science and engineering earned by blacks were awarded at HBCUs. Some of the most successful programs designed to attract and retain underrepresented minorities into the sciences and in research careers have been initiated at HBCUs. Data compiled by the National Science Foundation (NSF) reveal that in 2006, HBCUs provided the education for approximately 20.1% of blacks earning bachelor degrees in engineering, 35.3% in the physical sciences, 25.3% in computer sciences, 32.8% in mathematics, 32.3% in the biological sciences, 44.9% in agricultural sciences, 15.4% in social sciences, and 21.1% in psychology.

On March 30, 2010, President Obama signed into law the Health Care and Education Affordability Reconciliation Act, 2010 (P.L. 111-152). The act includes, among other things, select provisions of the Student Aid and Fiscal Responsibility Act (SAFRA). SAFRA provisions are contained in Title II, and make changes to and extend mandatory appropriations for several Higher Education Opportunity Act (HEOA) programs for HBCUs and other minority serving institutions. The legislation continues two-year funding for HBCUs and minority serving institutions as outlined in the HEOA. HBCUs and other minority serving institutions would be funded at \$255.0 million for each of the years FY2010 through FY2019. Estimated support would be approximately \$1.1 billion over a 5-year period and approximately \$2.1 billion over a 10-year period.

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Introduction

The historically black colleges and universities (HBCUs), which have traditionally educated a significant number of the nation's blacks, have faced and continue to face substantial challenges in attempting to enhance their academic and research capabilities and develop programs to compete with other institutions of higher education.¹ Some of these black institutions have a myriad of problems—aging infrastructures, limited access to computer resources and digital network technology, absence of state-of-the-art equipment, low salary structures, small endowments, and limited funds for faculty development and new academic programs for students.² While many of these problems exist in other institutions, they appear to be considerably more serious in HBCUs.³ In addition, those HBCUs damaged by recent hurricanes and tornadoes have the added costs in the millions for replacing facilities and research equipment and rebuilding their infrastructure.⁴

The changing external environment (increasing public demand for institutional accountability and effectiveness) and new competitive conditions in higher education (varying levels of state support coupled with spiraling costs of research) have made it increasingly harder for HBCUs to develop and expand their research programs.⁵ Because of their level of financial support (federal, state,

¹ See for example Egwu, Chetachi A., "HBCUs: Still Relevant in the 'Post-Racial' Era?," *Education Nation*, September 27, 2011, <http://www.thegrio.com/specials/education-nation/hbcus-stii-relevant-in-the-post-racial-era.php>, and Howell, Whitney L.J., "Symposium: Education Leaders Recommend Priorities for HBCUs," *Diverse Issues in Higher Education*, June 4, 2010, <http://diverseeducation.com/cache/print.php?articleId=13855>.

² See for example Kelderman, Eric, *Colleges to Confront Deep Cutbacks*, January 2, 2011, <http://chronicle.com/article/Higher-Education-Faces-Deep/125782/>, Stripling, Jack, "Data May Show HBCUs at Best, Worst," *Inside Higher Ed*, <http://www.insidehighered.com/layout/set/print/news/2010/04/23/hbcu>; House Committee on Education and Labor, *America's Black Colleges and Universities: Models of Excellence and Challenges for the Future*, 110th Cong., 2nd sess., March 13, 2008, Written testimonies of Hazel O'Leary, President, Fisk University and Earl S. Richardson, President, Morgan State University. See also Stuart, Reginald, "UNCF Wrestles with New Economy, Old Issues," *Diverse Issues in Higher Education*, April 30, 2009, pp. 6-7, and Field, Kelly, "Historically Black Colleges Seek Continued Supplemental Aid," *The Chronicle of Higher Education*, June 3, 2009, <http://chronicle.com/daily/2009/06/19250n.htm>.

³ See for example Dervarics, Charles, "Earmarks Helpful for Minority-Serving Institutions Struggling in Tough Economy," *Diverse Online*, March 13, 2009, http://www.diverseeducation.com/artman/publish/article_12384.shtml; Blum, Jordan, "Official: Black Colleges 'Stuck in Survive'," *Advocate Capitol News Bureau*, October 17, 2009, p. 1B; and Jaschik, Scott, "New Approach on Black Colleges," *Inside Higher Ed*, July 21, 2009, <http://www.insidehighered.com/news/2009/07/21/wilson>.

⁴ See for example Gasman, Marybeth, "The Educational Effectiveness of HBCUs," *The Chronicle of Higher Education*, December 15, 2010, <http://chronicle.com/blogs/innovations/the-educational-effectiveness-of-hbcus/28040>, U.S. Department of Homeland Security, Office of the Press Secretary, "Secretary Napolitano Announces \$32 Million in Funding for Rebuilding Projects at Southern University at New Orleans," August 17, 2009, http://www.dhs.gov/ynews/releases/pr_1250524465581.shtml; Minor, James T., *Contemporary HBCUs: Considering Institutional Capacity and State Priorities*, Michigan State University, College of Education, January 2008, 37 pp.; Southern Education Foundation, "Education After Katrina: Time for a New Federal Response," Atlanta, GA, August 2007, 35 pp.; Hamilton, Kendra, "Restructuring, Restoring and Rebuilding," *Diverse Issues in Higher Education*, vol. 23, March 23, 2006, pp. 24-27; and Schuman, Jamie, "Southern U. At New Orleans May Have to Rebuild From Scratch, at a Cost of \$300-Million or More," *The Chronicle of Higher Education*, vol. 52, September 23, 2005, p. A16. See also the Southern Education Foundation, with support and assistance from the Ford Foundation, "New Orleans School Four Years After Katrina: A Lingering Federal Responsibility," Atlanta, Georgia, 2009, 21 pp.

⁵ See for example Gee, Gordon, "Colleges Must Find Innovative Ways to Finance Their Missions," *The Chronicle of Higher Education*, October, 30, 2011, http://chronicle.com/article/Colleges-Must-Find-Innovative/129568/?sid=at&utm_source=at&utm_medium=en; Wilson, John Silvanus, "A Multidimensional Challenge for Black Colleges," *The Chronicle of Higher Education*, September 18, 2011, <http://chronicle.com/article/A-Multidimensional-Challenge/129046>; Issa, Jahi, "No Need to Overhaul America's Black Colleges," *The Chronicle of Higher Education*, October 30, (continued...)

and private), some believe many HBCUs are unable to engage in the level of cutting-edge scientific research conducted by many non-HBCUs.⁶ Many HBCUs face difficulty competing for federal research dollars with other research-performing universities.⁷ Coupled with limited federal support, HBCUs have experienced a decline in state support. While states are cutting funding to address revenue declines and decreases in their operating budgets, some of these HBCUs are simultaneously viewed as partners in further developing the economy of their respective states. In addition, a report of the Southern Education Foundation found that HBCUs have received attention and support from only a few private foundations.⁸

Federal stimulus spending provided additional revenues to some HBCUs for the past few years. Some of these institutions have reported that they used stimulus monies⁹ provided under American Recovery and Reinvestment to improve operational efficiencies. Stimulus funding, however, is now coming to an end.¹⁰ The end of stimulus funding for many of these institutions equates to a loss of operating support.¹¹

Amid criticism by officials and representatives of HBCUs concerning the disparity in their receipt of federal science and engineering support, several executive orders were issued beginning in 1980 designed to strengthen and increase the participation of the HBCUs in federally sponsored

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2011, <http://chronicle.com/article/No-Need-ro-Overhaul-Americas/129565/?sid=at&utm-source=at&utm-medium=en>; Coleman, Toni and Joan Matthews, “*Black Colleges Step Up Pursuit of Sponsored Research*,” *Diverse Issues in Higher Education*, January 6, 2011, <http://diverseeducation.com/cache/print.php?articleId=14582>, Stuart, Reginald, “UNCF Wrestles with New Economy, Old Issues,” *Diverse Issues in Higher Education*, vol. 26, April 30, 2009, pp.6-7, Educational Testing Service, *A Culture of Evidence III: An Evidence-Centered Approach to Accountability for Student Learning Outcomes*, Princeton, NJ, February 2008, 24 pp.; Department of Education, *A Test of Leadership, Charting the Future of U.S. Higher Education, A Report of the Commission on the Future of Higher Education*, September 2006, 76 pp.; Carey, Kevin, “Make Universities Accountable for What Matters,” *Education Sector*, November 2007; Redden, Elizabeth, “Explaining State Spending on Higher Ed,” *Inside Higher Ed*, October 11, 2007, <http://www.insidehighered.com/news/2007/10/11/spending>; and National Science Foundation, “Universities Report Stalled Growth in Federal R&D Funding in FY2006,” *InfoBrief*, NSF07-336, Rhonda Britt, Arlington, VA, September 2007, 6 pp.

⁶ Phillip, Amara, and Frank L. Matthews, “Preserving the Legacy,” *Diverse Issues in Higher Education*, August 18, 2011, pp. 21-22, and Kiley, Kevin, “Initiatives try to Improve Historically Black Colleges,” *Inside Higher Ed*, September 28, 2011, <http://www.usatoday.com/news/education/story/2011-09-14/alcorn-university-black-colleges/50402948/1>.

⁷ See for example The Southern Education Foundation, *Igniting Potential, Historically Black Colleges and Universities and Science, Technology, Engineering and Mathematics*, Summer 2005, 36 pp.

⁸ *Ibid.*, pp. 22-23. See also Gasman, Marybeth, University of Pennsylvania, “Comprehensive Funding Approaches for Historically Black Colleges and Universities,” 2010, 14 pp.

⁹ The American Recovery and Reinvestment Act, 2009 (P.L. 111-5) was an economic stimulus package enacted in February 2009.

¹⁰ Stimulus funding—American Recovery and Reinvestment Act (ARRA), FY2009 provided funding for the period FY2009-FY2011. For expanded discussion of the ARRA see, for example, CRS Report R40537, *American Recovery and Reinvestment Act of 2009 (P.L. 111-5): Summary and Legislative History*, by (name redacted) et al..

¹¹ See for example Ashley, Dwayne, Marybeth Gasman, “HBCUs/Stimulus Funding,” Thurgood Marshall College Fund, New York, June 2009, 10 pp; “HBCU Stimulus Funding 2009-10,” *Diverse Issues in Higher Education*, September 2011, <http://diverseeducation.com/hbcu/recovery/>; Congressional Black Caucus, *The American Recovery & Reinvestment Act of 2009, A Resource Guide for African Americans*, 24 pp., and Kelderman, Eric, “Colleges to Confront Deep Cutbacks,” *The Chronicle of Higher Education*, January 2, 2011, <http://chronicle.com/article/Higher-Education-Faces-Deep/125782>, p. 2.

programs and to improve the administrative infrastructure of the institutions.¹² The current executive order, signed by President Obama on February 26, 2010, states that

Each executive department and agency designated by the Secretary of Education shall prepare an annual plan of its efforts to strengthen the capacity of HBCUs through increased participation in appropriate Federal programs and initiatives. where appropriate, each agency plan shall address, among other things, the agency's efforts to: (i) establish how the department or agency intends to increase the capacity of HBCUs to compete effectively for grants, contracts, or cooperative agreements and to encourage HBCUs to participate in Federal programs; (ii) identify Federal programs and initiatives in which HBCUs may be either underserved or underused as natural resources, and improve HBCUs' participation therein; and (iii) encourage public-sector, private-sector, and community involvement in improving the overall capacity of HBCUs.¹³

An August 2008 report of the NSF reveals that for the academic year 2006, approximately 33.0% of the black science and engineering doctorate recipients had earned their bachelor degrees at an HBCU.¹⁴ While HBCUs have played an important role in providing the undergraduate preparation for many of those black students entering highly specialized science and engineering disciplines, forecasts indicate that their efforts at attracting, retaining, preparing, and graduating students in the sciences and engineering may need to be expanded in order to respond to changing demographics.¹⁵ A September 2009 report of the Department of Education (ED) states that between 2007 and 2018, enrollment in degree-granting institutions is projected to increase 26% for black students, 38% for Hispanic students, 32% for Native American/Alaskan Natives, 29% for Asian/Pacific Islanders, and 4% for white students.¹⁶ These groups, the “new majority,”¹⁷ on

¹² The various executive orders include Executive Order 12232, August 1980; Executive Order 12320, September 1981; Executive Order 12677, April 1989; Executive Order 12876, November 1993; Executive Order 13256, February 2002; and Executive Order 13532, February 2010.

¹³ The White House, Executive Order 13532, “Promoting Excellence, Innovation, and Sustainability at Historically Black Colleges and Universities,” February 26, 2010, <http://www2.ed.gov/about/inits/list/whhbcu/edlite-exec-order.html>.

¹⁴ National Science Foundation, “Role of HBCUs as Baccalaureate-Origin Institutions of Black S&E Doctorate Recipients,” *InfoBrief*, NSF08-319, Joan Burrelli and Alan Rapoport, Arlington, VA, August 2008, 8 pp. For expanded discussion of minority enrollments in the sciences see for example National Science Foundation, “Two Decades of Increasing Diversity More than Doubled the Number of Minority Graduate Students in Science and Engineering,” by Peter Einaudi, National Center for Science and Engineering Statistics, NSF11-319, Arlington, VA, July 2011, 10 pp.

¹⁵ Reid, Karl, “Historically Black Colleges and Universities: A Vital Resource for a Diverse Workforce,” *Diverse Issues in Higher Education*, August 18, 2011, p. 40; Lomax, Michael, “The HBCU Mission: A Fresh Look for a New Congress,” *Diverse Issues in Higher Education*, vol. 24, February 22, 2007, p. 51, Allen, Walter R., Joseph O. Jewell, Kimberly A. Griffin, and De’Sha S. Wolf, “Historically Black Colleges and Universities: Honoring the Past, Engaging the Present, Touching the Future,” *Journal of Negro Education*, Summer 2007, pp. 263-281, and *Igniting Potential, Historically Black Colleges and Universities and Science, Technology, Engineering and Mathematics*, 36 pp.

¹⁶ Department of Education, National Center for Education Statistics, *Projections of Education Statistics to 2018*, NCES2009-062, September 2009, p. 10. Note: Demographic data indicate that blacks, Hispanics, Native Americans/Alaskan Natives, and Asians/Pacific Islanders will comprise more than 52% of the undergraduate population (18-24 years old) of the United States by 2050, an increase from the recorded 34% in 1999. National Science Foundation, *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2007*, NSF07-315, Arlington, VA, February 2007, p.4. See also National Science Board, *America's Pressing Challenge—Building a Stronger Foundation*, NSB06-02, Arlington, VA, January 2006, p. 3.

¹⁷ The U.S. Census Bureau defines majority-minority as that in which more than 50% of the residents are other than single-race, non-Hispanic whites. The Census Bureau reports that 309 counties in the nation, out of a total of 3,142, have a “majority-minority” population—more than 50% racial/ethnic minority. It is estimated that racial and ethnic minorities will be the majority population by 2042 and will comprise approximately 54% of the U.S. population by the year 2050. U.S. Census Press Releases, “Census Bureau Releases County/State Data,” June 4, 2009. See also Johnson, (continued...)

which the economy must increasingly rely, have traditionally been underrepresented in the sciences compared to their fraction of the total population.¹⁸ There are those observers who believe that the problem of underrepresented minorities in science, mathematics, engineering, and technology could compromise the United States' ability to develop and advance its traditional industrial base and to compete in international marketplaces.¹⁹ Freeman A. Hrabowski, President, University of Maryland, Baltimore County, states that "... [T]he paucity of minority scientists is not simply a minority issue; it is an American issue."²⁰

Historical Background²¹

HBCUs are defined as those institutions that were established prior to 1964, with the principal mission of educating black Americans.²² While three HBCUs were established prior to the Civil War, the majority of these institutions were established after the War, several with the public support of land grants through the Freedman's Bureau.²³ The National Land-Grant Colleges Act of 1862 (P.L. 37-108), otherwise known as the 1862 Morrill Act, provided public lands to various states for the purpose of constructing educational institutions.²⁴ Funds appropriated under this act were distributed to the states "with the intention that they would foster equal educational

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Kenneth M. and Lichter, Daniel T., "Growing Diversity Among America's Children and Youth: Spatial and Temporal Dimensions," *Population and Development Review*, vol. 36, March 2010, pp. 151-176.

¹⁸ For discussion of the participation of underrepresented groups in the sciences see for example *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2007*, 304 pp., Maton, Kenneth L., Mariano R. Sto Domingo, Kathleen E. Stolle-McAllister, J. Lynn Zimmerman, and Freeman A. Hrabowski, III, "Enhancing the Number of African-Americans Who Pursue Stem Ph.D.s: Meyerhoff Scholarship Program Outcomes, Processes, and Individual Predictors," *Journal of Women and Minorities in Science and Engineering*, vol. 15, 2009, pp. 15-37, Lord, Susan M, Michelle Madsen Camacho, Richard A. Layton, Russell A. Long, Matthews W. Ohland, and Mara H. Wasburn, "Who's Persisting in Engineering? A Comparative Analysis of Female and Male Asian, Black, Hispanic, Native American, and White Students," *Journal of Women and Minorities in Science and Engineering*, vol. 15, 2009, pp. 167-190, White, Jeffrey L., James W. Altschuld, and Yi-Fang Lee, "Persistence of Interest in Science, Technology, Engineering, and Mathematics: A Minority Retention Study," *The Journal of Women and Minorities in Science and Engineering*, vol. 12, 2006, pp. 47-64, and CRS Report 98-871, *Science, Engineering, and Mathematics Education: Status and Issues*, by (name redacted).

¹⁹ See for example Heriot, Gail, "Civil Rights Commission to Explore Ways to Encourage More Minorities to Enter Science, Technology, Engineering & Math," *The Right Coast*, September 4, 2008, <http://rightcoast.typepad.com/rightcoast/2008/09/civil-rights-co.html>, The National Academies, *Rising Above the Gathering Storm, Energizing and Employing America for a Brighter Economic Future*, Committee on Science, Engineering, and Public Policy, Washington, DC, National Academy Press, 2007, pp. 165-168, and Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development, *Land of Plenty - Diversity as America's Competitive Edge in Science, Engineering and Technology*, September 2000, 91 pp.

²⁰ Pluviose, David, "The Meyerhoff Model," *Diverse Issues in Higher Education*, vol. 25, July 10, 2008, pp.18-19.

²¹ For an expanded history of HBCUs see for example Jackson, Cynthia L. and Eleanor F. Nunn, *Historically Black Colleges and Universities, A Reference Handbook*, Santa Barbara, California, 2003, 253 pp, and Peltak, Jennifer, *History of African-American Colleges & Universities*, Philadelphia, 2003, 120 pp.

²² Department of Education, National Center for Education Statistics, Snyder, Thomas D., Stephen Provasnik, and Linda L. Shafer, *Historically Black Colleges and Universities: 1976 to 2001*, NCES2004-062, Washington, DC, September 2004, p. 1. Federal regulations, specifically 20 U.S. Code, Section 1061 (2), allow for certain exceptions to the founding date.

²³ The Freedman's Bureau operated from 1865-1873 to provide assistance for newly freed slaves. *Ibid.*, p. 2.

²⁴ The establishment of a public land-grant system is considered to be one of the most significant developments in U.S. higher education. Prior to the First Morrill Act, higher education opportunities were limited to the very elite.

opportunities for all students, especially newly freed Blacks.”²⁵ However, the land-grant higher education system resulting from the 1862 Morrill Act failed to provide equal educational opportunities. Black students were excluded from enrolling in traditionally white institutions.

Funds from the Morrill Act began to flow systemically to schools offering only all-white education. Congress attempted by various legislation to force racial equality, including equality of educational opportunity. However, the U.S. Supreme Court initiated a series of interpretations of the post-Civil War constitutional amendments which ultimately defeated these various legislative efforts. Culminating with its landmark 1882 decision finding the first Civil Rights Act [1866] unconstitutional, the Supreme Court held that the 14th amendment only protected against direct discriminatory action by a State government.²⁶

A Second Morrill Act was passed in 1890, which included language mandating States with dual systems of higher education to provide land-grant institutions for both systems. As a result, 19 institutions were established as black land-grant institutions, enrolling those black students who had been excluded under the 1862 legislation. While there was the creation of two land-grant systems—one established under the 1862 Land-Grant Act (1862 Morrill Act) and the other under the 1890 Land-Grant Act (Second Morrill Act)—the level of support for the 1890 institutions (both federal and state) never approximated the level received by the 1862 land-grant institutions.²⁷ In particular, during the expansion of program offerings and disciplines at the 1890 institutions, the disparity in funding for research infrastructure between them and the earlier established institutions severely limited their efforts to support basic and applied research.²⁸ In written testimony before the House Committee on Agriculture in support of legislation providing assistance to 1890 institutions, then Honorable Harold E. Ford noted that

The 1890 institutions were never adequately funded the way they should have been by the various states. With assistance from the various states and Federal Government, the 1862 institutions were permitted to thrive and expand, while the 1890 institutions received meager funding from both their respective state and Federal Government.

Furthermore, the 1890 institutions were not eligible to participate in the facilities programs provided in the late 1960s and early 1970s by the Federal Government. Under the Research Facilities Act of 1963, only the 1862 land-grant institutions were permitted to participate in this program. Not until 1967 did the Federal Government start to provide research funds to the 1890 programs. These funds were for research projects, and not for constructing research facilities.²⁹

²⁵ *Historically Black Colleges and Universities, 1976 to 2001*, op. cit., p. 1.

²⁶ Ibid.

²⁷ For a discussion of the history of land-grant institutions, see McDowell, George R., “Land-Grant Colleges of Agriculture: Renegotiating or Abandoning A Social Contract”, *Choices*, Second Quarter 1988, p. 18-21, Schuh, G. Edward, “Revitalizing Land-Grant Universities,” *Choices*, Second Quarter 1986, p. 6-10, National Research Council, Board on Agriculture, *Colleges of Agriculture at the Land Grant Universities: A Profile*, Washington, DC, 1995, and Bonnen, James T, “Land Grant Universities Are Changing,” November 1996, <http://www.adec.edu/clemson/papers/bonnen1.html>.

²⁸ Most HBCUs began as “normal” schools—with the fundamental mission to train teachers. Beginning in the late 1960s and early 1970s, there was a shift in that focus to other professions. HBCUs do, however, continue to graduate and award a large number of degrees in the field of education.

²⁹ In 1967, the federal government provided \$285,000 to be divided among 16 1890 land-grant institutions (approximately \$17,812.50 per institution). House Committee on Agriculture, Subcommittee on Department Operations, Research, and Foreign Agriculture, *Hearing on H.R. 1309, 1890 Land-Grant Colleges Facilities*, 97th Cong., 1st sess., June 4, 1981, p. 13-15.

Classification of HBCUs

The diversity of HBCUs parallels that of other institutions of higher education. HBCUs are composed of public and private institutions, single-sex and coeducational, predominantly black and predominantly white,³⁰ two-year and four-year institutions, research universities, liberal arts colleges, professional schools, and community colleges. An April 2010 report of ED provides statistical data on 99 HBCUs—40 public four-year colleges, 11 public two-year colleges, 47 private four-year colleges, and 1 private two-year college.³¹

HBCUs comprise almost 2.3% of all institutions of higher education and enroll approximately 11.6% of black students attending post-secondary institutions.³² Approximately 33.0%, on average, of the undergraduate degrees in science and engineering earned by blacks were awarded by HBCUs. In addition, some of the most successful programs designed to attract underrepresented minorities into the sciences and in research careers have been initiated at HBCUs.³³ An analysis of ED 2006-2007 preliminary data shows that Xavier University, an HBCU, ranks first nationally in the number of blacks earning undergraduate degrees in the biological and biomedical sciences.³⁴ The institution has received national recognition for its model science program and has participated in NSF's Model Institutions for Excellence program. North Carolina A&T State University, also an HBCU, ranks first in the number of blacks earning undergraduate degrees in engineering.³⁵ Data compiled by the NSF reveal that in 2006, HBCUs

³⁰ Fall 2005 enrollment data reveal that three HBCUs have predominantly white student populations—Bluefield State College (88.5%), West Virginia State College (84.5%), and Lincoln University, Missouri (60.4%). In addition, St. Phillip's College, San Antonio, a two-year institution, has a large Hispanic enrollment—47.7%. St. Phillip's College is the only institution with the dual designation of being both an HBCU and a Hispanic-serving institution. The black student enrollment at St. Phillip's is 16.2%, and the white student enrollment is 33.8%. See also Goldman, Russell, ABC News, "Changing Face of Historically Black Colleges," May 19, 2008, <http://abcnews.go.com/print?id=4874870>.

³¹ Department of Education, *Digest of Education Statistics 2009*, NCES2010-013, Washington, DC, April 2010, Table 240, pp. 353-354. Documents provided by the White House Initiative on Historically Black Colleges and Universities list, as of September 2008, a total of 105 HBCUs. The list of the 99 institutions detailed in the *Digest of Education Statistics*, excludes those HBCUs that are not participating in Title IV programs (Higher Education Act). Title IV eligible institutions are required to meet certain criteria in order to receive federal student financial aid. A Title IV eligible institution must have, among other things, "acceptable accreditation and admission standards, eligible academic program(s), administrative capability, and financial responsibility." *Digest of Education Statistics 2007*, p. 666.

³² *Digest of Education Statistics 2009*, Tables 218 and 231, pp. 314, 350. ED data reveal that for the academic school year 2008-2009, there were 2,719 four-year institutions, and 1,690 two-year institutions. Disaggregated data show that HBCUs are approximately 3.2% of all four-year institutions and less than 1.0% of all two-year institutions. See also Hernandez, Arelis, "Survey Shows More Diversity and Higher Graduation Rates at Public HBCUs," *Diverse Online*, September 14, 2009, <http://diverseeducation.com/article/13045/survey-shows-more-diversity-and-higher-graduation-rates-at-public-hbcus.html>. It has also been found that HBCUs enroll more first-generation, low income students requiring additional course preparation than predominantly white institutions.

³³ The underrepresented minorities include blacks, Hispanics, Native Americans, and women. Asian Americans are excluded because they are not statistically underrepresented in science, mathematics, and engineering. See for example National Science Foundation, *Women, Minorities, and Persons with Disabilities in Science and Engineering*, Figure D-2, p. 10; Tsui, L., "Overcoming Barriers: Engineering Program Environments That Support Women," *Journal of Women and Minorities in Science and Engineering*, vol. 16, 2010, pp. 137-160; Su, L.K., "Quantification of Diversity in Engineering Higher Education in the United States," *Journal of Women and Minorities in Science and Engineering*, vol. 16, 2010, pp. 161-175; and Mack, Kelly M., Linda R. Johnson, Kamilah M. Woodson, Alan B. Henkin, and Jay R. Dee, "Empowering Women Faculty in STEM Fields: An Examination of Historically Black Colleges and Universities," *Journal of Women and Minorities in Science and Engineering*, vol. 16, 2010, pp. 319-341.

³⁴ Borden, Victor M. H., "Top 100 Undergraduate Degree Producers—Interpreting the Data," *Diverse Issues in Higher Education*, vol. 25, June 12, 2008, p. 28.

³⁵ *Ibid.*, p. 34.

provided the education for approximately 20.1% of blacks earning bachelor degrees in engineering, 35.3% in the physical sciences, 25.3% in computer sciences, 32.8% in mathematics, 32.3% in the biological sciences, 44.9% in agricultural sciences, 15.4% in social sciences, and 21.1% in psychology.³⁶

Federal Research and Development Support at HBCUs

The National Science Foundation (NSF) provides data on federal academic science and engineering support to colleges and universities in six categories: research and development (R&D); fellowships, traineeships, and training grants; R&D plant; facilities and equipment for instruction; general support for science and engineering; and other science and engineering activities.³⁷ An important issue in the academic community, and in science and technology policy in general, is the distribution of federal R&D funds to colleges and universities. A major criticism of federal R&D funding patterns is that there is concentration in certain colleges and universities, restricting the development and expansion of scientific and technical capabilities in other institutions. In an analysis of 650 research-performing institutions, NSF found that the top 100 institutions accounted for approximately 80% of all academic R&D funding in FY2006. Those institutions falling in the top 100 category showed only minimal changes in more than 20 years.³⁸ The charge is that the elite institutions (“haves”) continue in their status, and the less-prestigious research institutions (“have-nots”) continue to struggle for research funding.³⁹ While various measures of equity can be calculated based on the number of institutions, geographic distribution, student enrollments, science and engineering students, graduate students, and so forth—the following analysis will examine federal obligations for R&D to HBCUs as a percentage of all institutions receiving R&D expenditures.

A March 2009 report of the NSF reveals that in FY2006, approximately 900 U.S. colleges and universities received R&D support.⁴⁰ Of that total, 71 are HBCUs.⁴¹ Trend data reveal that these

³⁶ National Science Foundation, *Science and Engineering Degrees, by Race/Ethnicity of Recipients: 1997-2006*, NSF10-300, Arlington, VA, November, 2009, Table 13. Note: An expanded discussion of HBCUs is contained in Department of Education, *Characteristics of Minority-Serving Institutions and Minority Undergraduates Enrolled in These Institutions*, NCE2008-156, November 2007, 196 pp.

³⁷ Other science and engineering activities are defined as “... technical conferences, teacher institutes, and programs geared to increase the scientific knowledge of precollege and undergraduate students. Such activities comprise some of the building blocks of science education and future research capability.” National Science Foundation, “The Extent of Federal S&E Funding to Minority-Serving Institutions,” *InfoBrief*, NSF04-325, Richard J. Bennof, Arlington, VA, June 2004, p. 2.

³⁸ National Science Foundation, “Universities Report Stalled Growth in Federal R&D Funding in FY2006,” NSF07-336, *InfoBrief*, September 2007, 6 pp.

³⁹ In 1990, the first Bush Administration proposed to categorize and classify HBCUs based on their missions and programs. The premise was that it would allow federal agencies to select the appropriate group for developing linkages, rather than having them work with the various programs in all the institutions. Considerable criticism voiced by presidents and department chairs of HBCUs contributed to the withdrawal of the proposal. Opposition was based on the concern that only a small group of the institutions would receive funding—those that were already considered to be the research “elite.” It was believed that the remainder would be abandoned. Mercer, Joye, “White House Scraps Classification Plan for Black Institutions,” *Black Issues in Higher Education*, vol. 8, May 23, 1991, p. 7.

⁴⁰ National Science Foundation, “FY2005 Federal S&E Obligations Reach Over 2,400 Academic and Nonprofit Institutions; Data Presented on Minority-Serving Institutions,” NSF07-326 (Revised), *InfoBrief*, Richard J. Bennof, October 2007, p. 2. A total of 1,227 academic institutions received federal S&E support in FY2005 (with R&D being (continued...))

research-performing HBCUs have not shared proportionately in the distribution of federal R&D obligations to colleges and universities.⁴² Although funding to HBCUs has increased in the past 10 years in absolute terms, it remains only a small fraction of the total awarded to all U.S. colleges and universities. A 2009 report of the NSF reveals that for FY2006, HBCUs received approximately \$237.5 million for R&D, a decrease of \$39.5 million (6.8%) from the FY2006 level of \$277.1.⁴³ Data from FY1999-FY2007 show that while research-performing HBCUs are approximately 6.0% of all U.S. institutions conducting R&D, they receive approximately 1.0%, on average, of all federal academic R&D support.⁴⁴

Research Funding at HBCUs

An analysis of federal academic R&D support finds that funding is concentrated at selected institutions. Funding for non-HBCUs also is concentrated at selected institutions.⁴⁵ In FY2007, the top 10 HBCUs (in terms of receipt of federal R&D to HBCUs) accounted for approximately 58.6% of total federal R&D support, and the top 20 HBCUs accounted for approximately 76.3% of total R&D support.⁴⁶ (In FY2000, the top 10 HBCUs received 54.2% of funding to these institutions, and the top 20 institutions received 72.2% of funding.)

Table 1 provides a listing of the top 20 HBCUs and their level of total academic science and engineering support.⁴⁷ The rankings (by R&D amounts received in FY2007) reveal that there has been only relative change in the concentration of federal R&D support among the top 20 HBCUs since FY2000. Seven of the top 10 HBCUs in FY2007 for R&D support also were ranked in the top 10 for FY2000 (in different ordinal positions). In addition, 14 of the top 20 institutions for

(...continued)

one of the six categories of S&E support).

⁴¹ National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: FY2007*, Detailed Statistical Tables, NSF09-315, Arlington, VA, September 2009, Table 24.

⁴² See for example Anderson, Lauren Bayne, "Black Colleges Continue Fighting for Federal Funds," *The Wall Street Journal*, October 29, 2003, p. B.4J, "Pork Barrel Grants: Tidbits for Black Colleges," *The Journal of Blacks in Higher Education*, Autumn 2003, pp. 68-69, and Salandy, Anthony, "Correcting the Inequities in Federal Research Funding," *Black Issues in Higher Education*, vol. 19, May 23, 2002, p. 42.

⁴³ The data on federal support to academic R&D result from a compilation of 19 agencies. R&D includes all research activities, both basic and applied, and all development activities that are supported at colleges and universities. Obligations reported do not include funds to federally funded research and development centers (FFRDCs). The institutions compiling this population are those receiving current year obligations. Caution should be exercised in reviewing the data. Because of the relatively small number of HBCUs, data from a few institutions can skew the quantitative findings and have a marked effect on the resulting analysis. National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: Fiscal Year 2007*, Tables 1, 22, and 24.

⁴⁴Ibid.

⁴⁵In FY2008, approximately 29.6% of the total federal academic R&D expenditures in science and engineering went to the leading 20 institutions. See National Science Foundation, "Federal Government Is Largest Source of University R&D Funding in S&E; Share Drops in FY2008," NSF09-318, *InfoBrief*, Richard J. Bennof, Arlington, VA, September 2009, p. 4.

⁴⁶National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: FY2007*, Table 24.

⁴⁷ NSF reports that federal academic science and engineering support for HBCUs, and minority institutions as a whole (includes Hispanic-serving institutions and tribal colleges), is "allocated relatively less for R&D and relatively more for S&E capacity building activities when compared to non-minority-serving institutions. National Science Foundation, "The Extent of Federal S&E Funding to Minority-Serving Institutions," p. 1.

R&D support in FY2007 also were among the top 20 institutions in FY2000. However, a few institutions have received increased support so as to change their ranking. In FY2007, Lincoln University (Jefferson City, MO) ranked thirteenth in R&D support; in FY2000, it ranked twenty-ninth. Delaware State University, fourteenth in FY2007, ranked thirty-seventh in FY2000. Morehouse College, ranked nineteenth in FY2007, was thirty-second in FY2000. Allen University, which registered no R&D support in FY2000, ranked thirty-sixth in FY2007. A decrease in support was noted for Xavier University. Having to rebuild its infrastructure following Hurricane Katrina⁴⁸ and other hurricanes and tornadoes, Xavier University ranked forty-sixth in FY2007.⁴⁹ It had ranked eleventh in FY2004.⁵⁰

Table I. Federal R&D Support and Total Academic S&E Funding to the Top 20 HBCUs in FY2007, Ranked by R&D Support
(in millions of dollars)

Institutions	R&D	Total S&E
All HBCUs	\$237.5	\$406.1
Top 20 HBCUs		
1. Howard University	22.1	32.5
2. Meharry Medical College	19.2	25.4
3. Jackson State University	17.8	22.6
4. Morehouse School of Medicine	16.4	23.3
5. Southern University and A&M College (all campuses)	15.1	23.4
6. North Carolina A&T State University	11.0	19.8
7. Tuskegee University	10.8	20.2
8. Florida A&M University	10.3	15.8
9. Alabama A&M University	9.6	13.3
10. Tennessee State University	6.8	12.7
11. Prairie View A&M University	4.9	10.4
12. Hampton University	4.7	7.1
13. Lincoln University (Jefferson City, MO)	4.7	8.3
14. Delaware State University	4.4	7.8
15. Clark Atlanta University	4.2	5.9

⁴⁸ Hurricane Katrina, which struck the Gulf Coast in August 2005, was the most destructive and costliest natural disaster in the history of the United States. It was a Category 5—the highest possible rating.

⁴⁹ See for example “Black Pre-Med College Struggles After Katrina-Hurricane Batters Xavier University to Brink of Financial Collapse,” U.S. News, November 7, 2005, <http://www.msnbc.msn.com/id/9960795/>; “Xavier University Katrina Restoration, New Orleans, LA,” *South Central Construction*, December 2006, p. 31; and “New Orleans’ HBCUs Find Hope-Xavier University,” *Black College Wire and The Black Collegian*, July 9, 2008, <http://www.blackcollegian.com/index.php?view=article&catid=87%3A20071stsem&id=26>.

⁵⁰ Please see *Federal Science and Engineering Support to Universities, Colleges, and Selected Nonprofit Institutions: Fiscal Year 2007*, Table 24. Hampton University, and Morehouse School of Medicine continue to receive top rankings in R&D support. For expanded discussion of academic support to HBCUs see National Science Foundation, “Federal S&E Obligations Decline in FY2007 to Three Types of Minority-Serving Institutions,” NSF09-319, Arlington, VA, September 2009, 6 pp.

Institutions	R&D	Total S&E
16. Fayetteville State University	4.0	5.2
17. University of the Virgin Islands	3.9	6.0
18. Norfolk State University	3.8	5.8
19. Morehouse College	3.8	5.4
20. Alcorn State University	4.7	7.5

Source: National Science Foundation, *Federal Science and Engineering Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 2007*, Detailed Statistical Tables, NSF09-315, Arlington, VA, September 2009, Tables 21 and 24. Total academic S&E includes R&D; R&D plant; facilities for instruction in S&E; fellowships, traineeships, and training grants; general support for S&E; and other S&E activities. See footnote 47.

Research Facilities at HBCUs

Facility construction/modernization/maintenance probably represents the largest capital investment for institutions of higher education. Many in academia contend that the quality of an institution's facilities is directly linked to the quality of education offered. While estimates vary on the level of deferred research facilities expenditures at all institutions of higher education, the amount of deteriorating physical plant and backlog of maintenance at HBCUs may be more pronounced.⁵¹ Approximately 70% of the HBCUs were established prior to 1900 (55% date from before 1890). Some have aging facilities with electrical systems that are inadequate for the loads that complex computer systems and other state-of-the-art equipment (if available) would require.

In the mid-1980s, hearings were held in both the House and the Senate to examine the condition of the nation's scientific and engineering research facilities.⁵² In addition to congressional interest, there was particular concern by those in the academic and scientific community about the quantity and quality of research space at nondoctorate-granting institutions, minority-serving institutions, and biomedical institutions. As a result of the hearings, NSF was directed to collect and analyze data on a range of academic research facilities issues (How much space is there for conducting scientific research?, What is the condition of the existing space?, How much of the space requires renovation or repair?, Is there enough space to meet the Nation's scientific research needs?, How do colleges and universities fund their research projects?, etc.). In October 2000, the NSF released a topical report on the needs and requirements of academic research

⁵¹ House Committee on Science, Subcommittee on Research, *H.R. 2183, the Minority Serving Institutions Digital and Wireless Technology Opportunity Act*, 108th Cong., 1st sess., July 9, 2003, House Committee on Education and the Workforce, Subcommittee on Select Education and the Subcommittee on 21st Century Competitiveness, *Responding to the Needs of Historically Black Colleges and Universities in the 21st Century*, 107th Cong., 1st sess., April 23, 2001, pp. 69-98, 107th Cong., 2nd sess., February 13, 2002, pp. 77-94, and 107th Cong., 2nd sess., September 19, 2002, pp. 51-60.

⁵² See for example House Committee on Science and Technology, *Improving the Research Infrastructure at U.S. Universities and Colleges*, 98th Cong., 2nd sess., May 8, 1984.

facilities.⁵³ This particular survey and analysis included 660 research-performing institutions, of which 57 were HBCUs.⁵⁴

In a 1998 survey of 57 research-performing HBCUs, the institutions reported having approximately 2.3 million net assignable square feet (NASF) of science and engineering research space.⁵⁵ The majority of the space was in the biological sciences, agricultural sciences, and engineering. However, 88% of the institutions reported that the amount of existing science and engineering research space was insufficient for meeting current research efforts. When asked to evaluate the condition of the existing space, 48% of the HBCUs indicated that their existing research space was effective for most levels of research, but required limited repair/renovation. An additional 15% determined that their institutions' existing space required major renovation in order to be used effectively for research in the science and engineering disciplines.

The NSF survey revealed that for FY1996 and FY1997, approximately 15% of HBCUs initiated repair/renovation projects, and 14% began major construction projects. In the 1998 survey, HBCUs reported \$331.0 million in construction and repair/renovation projects and campus infrastructure projects that had to be deferred due to lack of funding.⁵⁶ This constitutes 2.4% of all deferred projects reported by research-performing institutions.

Aggregate data were collected from a reduced sample of 29 institutions in order to compare research facility construction with similar surveys beginning in 1988.⁵⁷ This separate analysis of 29 HBCUs revealed that the amount of science and engineering research space increased from 1.1 million NASF in 1988 to 1.9 million in 1998 (72.7%). Between the 1996 survey and the 1998 survey, research space at the original 29 HBCUs increased by 88 thousand NASF (4.9%). The amount of research space increased the most in engineering and the agricultural sciences. During the period 1988 to 1998, research space increased in every field except the medical sciences in medical schools and computer science.

An additional analysis of the 29 HBCUs revealed that in 1996 and 1997, 11 of the 29 HBCUs initiated research facility construction projects, the same number of institutions that began construction startups in the 1988 survey. During the intervening years, specifically 1992-1995,

⁵³ National Science Foundation, *Scientific and Engineering Research Facilities at Colleges and Universities, 1998*, Topical Report, NSF01-301, Arlington, VA, October 2000. For this particular survey and analysis, research-performing institutions were defined as (1) those institutions that offer a master's or a doctorate degree in science and engineering; (2) report in excess of \$50,000 expenditures in 1993 academic R&D survey; and (3) all HBCUs, non-HBCU-black institutions, and Hispanic-serving institutions with any research expenditures.

⁵⁴ The other minority institutions in the survey included 13 non-HBCU-black institutions, and 9 Hispanic-serving institutions. Non-HBCU-black institutions are those colleges and universities with at least a 25% black student enrollment according to the Integrated Postsecondary Education Data System, but do not have the designation as HBCUs.

⁵⁵ National Science Foundation, *Scientific and Engineering Research Facilities at Colleges and Universities, 1998*, NSF01-301, Arlington, VA, October 2000, 232 pp. Since 1986, the NSF has collected, on a biennial basis, data on scientific and engineering research facilities in higher education. Different analyses and various reports are released. This topical report contains data from the 1998 survey that included a total of 80 research-performing, minority-serving institutions—57, HBCUs; 13, non-HBCU-black institutions; and 10, Hispanic serving institutions. (This is the most current published data available for an analysis of this type.) Note: "Net assignable square feet (NASF) is defined as the sum of all area, in square feet, on all floors of a building assigned to, or available to be assigned to, an occupant for specific use." p. 2.

⁵⁶ *Ibid.*, p. 79.

⁵⁷ These were the "original" HBCUs that reported separately budgeted R&D expenditures and science and engineering research space in the 1988 survey (FY1986 and FY1987).

only 4 of the 29 HBCUs initiated science and engineering research construction projects on their campuses. In the 1998 survey, FY1996 to FY1997, the 29 HBCUs provided \$64.3 million in support of new construction projects. (The projects cost in excess of \$100,000.) It was anticipated that the new projects would translate into 335 thousand NASF of new research space, 18% above the current available space.⁵⁸

For the periods 1986-87 and 1992-93, the federal government was the largest source of funding for science and engineering research construction projects at the 29 HBCUs. The primary source of funding changed, and during 1994-95 and 1996-97, state and local governments provided the bulk of funding to these institutions for construction projects. Federal support to the 29 institutions did increase from 1994 to 1997, but the increase had slowed relative to other funding sources. **Table 2** details the source for research facility funding (in constant dollars) for the sample of 29 HBCUs.

Table 2. Source of Funds for Science/Engineering Research Facilities at the Original 29 HBCUs: 1986-1997

(in millions of constant 1997 dollars)

Funding Source	Construction			Repair/Renovation		
	1986-1987	1990-1991	1996-1997	1986-1987	1990-1991	1996-1997
Federal Government	43.5	14.5	4.6	11.6	4.2	2.2
State/Local Government	34.3	7.6	50.5	6.5	9.6	1.8
Private Donations	14.8	0.0	3.0	0.7	0.1	0.0
Institutional Funds/Other	3.1	5.0	6.1	0.0	0.1	3.6
Total	95.5	27.0	64.3	18.8	14.0	7.6

Source: Scientific and Engineering Research Facilities at Universities and Colleges: 1998, op. cit., pp. 83-84. Components may not add to totals due to rounding.

Various Agency Programs to Enhance Support of Research at HBCUs⁵⁹

The NSF has several programs supporting HBCUs and other minority institutions. The Historically Black Colleges and Universities-Undergraduate Program (HBCU-UP) funds projects to improve the quality of undergraduate scientific and technical programs through curricular reform and enhancement, faculty development, upgrading of scientific instrumentation, and improvement of research infrastructure.⁶⁰ The FY2010 estimated level is \$32.0 million. Centers

⁵⁸ Ibid., p. 81.

⁵⁹ This is not a complete compilation of federal agency support, but illustrates the various efforts to address the support of research infrastructure at HBCUs. Many of the programs in the various agencies are an outgrowth of Executive Orders 12232 and 12320. Note: For an expanded discussion of federal support to HBCUs see Department of Education, White House Initiative on Historically Black Colleges and Universities, Office of Postsecondary Education, *Fulfilling the Covenant—The Way Forward 2004-05 Annual Report to the President on the Results of Participation of Historically Black Colleges and Universities in Federal Programs*, by the President’s Board of Advisors on Historically Black Colleges and Universities, November 2007, 53 pp.

⁶⁰ Since 2001, the HBCU-UP has provided funding for science and mathematics education and research programs at 80 (continued...)

of Research Excellence in Science and Technology (CREST) seeks to upgrade the research capabilities of the most productive minority institutions. HBCUs and other minority-serving institutions develop alliances with other universities, laboratories, and centers in order to provide their students with direct experience in science, technology, engineering, and mathematics. The FY2010 estimated level for CREST is \$30.5 million.⁶¹

In January 2008, NSF announced a collaborative project involving eight HBCUs and seven major research institutions to encourage black students to pursue degrees in robotics and computer science.⁶² The Advancing Robotics Technology for Societal Impact (ARTSI) initiative would offer outreach programs at the K-12 and college levels and support research activities at HBCUs, internships for minority students in university laboratories, and provide mentoring programs for undergraduates. ARTSI would be funded at \$2.0 million for a period of three years.

The Department of Agriculture, National Institute of Food and Agriculture (NIFA),⁶³ administers a Capacity Building Grants Program to assist the 1890 land-grant institutions and Tuskegee University strengthen their research and teaching capabilities in high priority areas of the food and agricultural sciences. These activities include obtaining state-of-the-art scientific instrumentation for laboratories. For FY2010, approximately \$20.0 million will be directed to this program.⁶⁴ In addition to the Capacity Building Grants Program, NIFA provides funding for research at the 1890 institutions through the Evans-Allen formula. The FY2010 estimated level for this program is \$45.8 million.

The National Aeronautics and Space Administration (NASA) has established a University Research Centers (URC) program to fund research projects in space science and applications, advanced space technology, and advanced astronautics technology. Currently, NASA supports URC at 11 HBCUs and three other minority institutions. Each institution is eligible to receive up to \$1.0 million per year for a period of five years, based on their performance and availability of funding. The Curriculum Improvements Partnership Award for the Integration of Research (CIPAIR) will strategically enhance teaching and education strategies across academic programs.⁶⁵ CIPAIR, which became effective in FY2008, will provide \$100,000 to \$200,000 per year for three years. NASA Science and Technology Institute for Minority Institutions (NSTI-MI) has two main components—student internships and research clusters. Underrepresented and

(...continued)

HBCUs. This includes support of programs at 82.0% of four-year HBCUs and to 46.0% at two-year HBCUs. The FY2011 request proposes a new EHR-managed program—Comprehensive Broadening Participation of Undergraduates in STEM (science, technology, engineering, and mathematics). This proposed program in the FY2011 budget request would merge the Historically Black Colleges and Universities Undergraduate Program, the Louis Stokes Alliances for Minority Participation, and the Tribal Colleges and Universities Program with new activities. The FY2011 request for Comprehensive Broadening Participation of Undergraduates in STEM is \$103.1 million.

⁶¹ See also Robinson, Natasha, “NC Historically Black College 1st to Get NSF Grant,” September 8, 2008, <http://www.dailyadvance.com/news/state>. North Carolina A&T State University will receive approximately \$18.0 million over a period of five years to develop and operate the Engineering Research Center for Revolutionizing Metallic Biomaterials.

⁶² Currently, approximately 2 million computer and information scientists are in the United States, of which 4.8% are black.

⁶³ Formerly the Cooperative State Research, Education and Extension Service.

⁶⁴ Some matching funds are required.

⁶⁵ This program was formed with the merger of the Curriculum Improvement Partnership Award and the Partnership Award for the Integration of Research into the Undergraduate STEM Curriculum.

underserved students from minority institutions compete to conduct research with NASA scientists and engineers. Clusters of minority institutions also engage in specific NASA-related research at one of the 10 NASA Centers. Funding for NSTI-MI in FY2010 is \$2.4 million.

P.L. 111-84, The National Defense Authorization Act, FY2010 (H.R. 2647)⁶⁶ provides support for science and technology programs. Contained in that support is funding for, among other things, the Historically Black Colleges and Universities and Minority Institutions Program (HBCU/MI). This program is intended to enhance the R&D capacity of these institutions, develop approaches to inter-university research in defense critical technology and homeland security areas, and to increase their personnel in these areas. It is anticipated that participating HBCUs and other minority institutions will expand their involvement in the performance of defense research and in the scientific disciplines critical to the national security functions of the Department of Defense (DOD). P.L. 111-84 provides approximately \$66.6 million in FY2010.

Policy Options

In testimony before the House Science Committee, Sebetha Jenkins, President, Jarvis Christian College, stated that “[G]iven the demographic changes taking place in this nation, investing more in HBCUs is, in actuality, about the future prosperity of this nation.”⁶⁷ Jenkins proposed the establishment of a program for minority institutions that is similar to the Experimental Program to Stimulate Competitive Research (EPSCoR). EPSCoR is designed for those states and institutions that are perceived as being the “have-nots” and are in the most need of R&D support.⁶⁸ This proposed EPSCoR-like program would build new and expanded capacity and capability for minority-serving institutions. Key elements of the EPSCoR-like program would be technical assistance and the development of partnerships between major research institutions and minority-serving institutions. This initiative would support also an HBCU centers program for the education and training of professionals in the scientific and technical disciplines. Jenkins, and others in the academic community, believe that an EPSCoR-like program would stimulate the competitive R&D capacity of HBCUs. Success of the HBCU centers would be dependent on unfettered resources, with funding being provided until the centers were self-sustaining.

The viability of any academic institution is a function of its ability to provide a quality education for its student population. Data reveal that many HBCUs have provided their black student population with a quality education, especially in the scientific and technical disciplines. In testimony before the House Committee on Education and Labor, Dorothy Cowser Yancy, President, Johnson C. Smith University, stated that

HBCUs today represent only 4% of all higher education institutions, but they graduate approximately 30% of all African-American students, 40% of African American students receiving a four-year degree in [science, technology, engineering, and mathematics], and 50% of African American teachers.... The successes were achieved despite the fact that in

⁶⁶ Signed into law on October 28, 2009.

⁶⁷ House Committee on Science and Technology, Subcommittee on Research, *Preparing a 21st Century Workforce: Strengthening and Improving K-12 and Undergraduate Science, Math, and Engineering Education*, 107th Cong., 2nd sess., April 22, 2002, Written statement of Sebetha Jenkins, President, Jarvis Christian College.

⁶⁸ CRS Report RL30930, *U.S. National Science Foundation: Experimental Program to Stimulate Competitive Research (EPSCoR)*, by (name redacted), *U.S. National Science Foundation: Experimental Program to Stimulate Competitive Research*, by (name redacted).

recent year's federal support for HBCUs has only increased in very modest amounts; and in spite of the fact that HBCUs continue to receive significantly less funding for research, facilities, and programs than their historically white counterparts.⁶⁹

However, these institutions are faced with an increased challenge of attracting and preparing an increasingly larger number of blacks in the scientific and technical disciplines. Demographic data show a student population and workforce increasingly composed of minority groups that have been historically underrepresented in science, mathematics, and engineering. Shirley Ann Jackson, President, Rensselaer Polytechnic Institute, contends that this demographic pattern may affect the development of the scientific and engineering workforce and, consequently, the conduct of R&D during the 21st century.⁷⁰ The success of research programs at HBCUs is inextricably linked to their ability to provide an environment for fostering additional scientific talent.⁷¹ The National Academies report, *Rising Above the Gathering Storm*, states:

Increasing participation of underrepresented minorities is critical to ensuring a high-quality supply of scientists and engineers in the United States over the long term. As minority groups increase as a percentage of the US population, increasing their participation rate in science and engineering is critical if we are just to maintain the overall participation rate in science among the US population. Perhaps even more important, if some groups are underrepresented in science and engineering in our society, we are not attracting as many of the most talented people to an important segment of our knowledge economy.⁷²

The distribution of federal funding for HBCUs is one of the critical issues facing these institutions. Some say that past and current policies have not provided effective remedies for their problems of infrastructure necessary to develop strong scientific programs.⁷³ Many HBCUs are attempting to expand their research capacity by developing expertise in areas such as homeland security and national defense, cyberinfrastructure, environmental observatories, food security, energy expenditures, genomics, and material science. They contend that improved funding for facilities and instrumentation is needed to strengthen the capability of these colleges and universities to contribute to the nation's long-term economic vitality. While many HBCUs have engaged in strategic planning in order to obtain a more competitive research base, Congress may continue to consider options that would bring HBCUs closer to an equal footing with other institutions and enable them to move toward full partnerships in conducting research. This issue may be examined when assessing the capacity of HBCUs and other minority-serving institutions

⁶⁹ House Committee on Education and Labor, *America's Black Colleges and Universities: Models of Excellence and Challenges for the Future*, Written statement of Dorothy Cowser Yancy, President, Johnson C. Smith University, p. 3.

⁷⁰ Jackson, Shirley Ann, President, Rensselaer Polytechnic Institute, "The Quiet Crisis and the Future of American Competitiveness," Speech before the American Chemical Society, August 29, 2005.

⁷¹ Kimbrough, Walter M., "Black Colleges Still Play a Vital Role in Education," *The Chronicle of Higher Education*, June 26, 2011, http://chronicle.com/article/Black-Colleges-Still-Play-a/128038/?sid=wb&utm_source=wb; Wiseman, Rachel, "Leaders of Historically Black Colleges See Key Role for Their Institutions in Obama's 2020 Goal," *The Chronicle of Higher Education*, June 23, 2011, http://chronicle.com/article/Leaders-of-Historically-Black/128022/?sid=at&utm_source=at; Davis, Edrea, "Town Hall Addresses Role of Black Colleges in Sustainability, Green Efforts," June 20, 2011, http://www.associatedcontent.com/shared/print.shtml?content_type=article&content_type_; Roach, Ronald, "The Journey for Jackson State," *Diverse Issues in Higher Education*, v. 23, February 8, 2007, pp. 22-27, and Suits, Steve, "Fueling Education Reform: Historically Black Colleges are Meeting a National Science Imperative," *Cell Biology Education*, vol. 2, July 2, 2003, pp. 205-206.

⁷² The National Academies, *Rising Above the Gathering Storm, Energizing and Employing America for a Brighter Future*, pp.166-167.

⁷³ Dervarics, Charles, "New House Bill Cuts Funds for HBCUs, Others," *Diverse Education*, October 3, 2011, <http://diverseeducation.com/cache/print.php?articleId=16464>.

to contribute to the health of the nation's higher education system, and in producing an increasingly larger number of trained scientific and technical personnel needed to meet the challenge of a highly competitive international economy.⁷⁴

Congressional Action

During the 110th Congress, the House passed, as amended, H.R. 694, Minority Serving Institution Digital and Wireless Technology Opportunity Act. The bill would provide, among other things, funding to acquire equipment, instrumentation, networking capability, hardware and software, digital and wireless networking technology, and infrastructure to improve the quality and delivery of educational services of these institutions. The institutions eligible for participation include (1) HBCUs; (2) Hispanic-, Alaskan Native-, or Native Hawaiian-serving institutions; (3) tribally controlled colleges and universities; and (4) institutions with a sufficient enrollment of needy students as defined by the Higher Education Act of 1965. Support also would enable these institutions to obtain capacity-building technical assistance through remote technical support and technical assistance workshops, and to advance the use of wireless networking technology in an effort to improve research and education, including scientific, engineering, mathematics, and technology instructions. Funding would be available through grants, cooperative agreements, or contracts. Non-federal matching requirements would be required in the amount equal to one-quarter of the award, or \$500,000, whichever is the lesser amount. Matching requirements could be waived for an institution with little or no endowment. The bill would authorize \$250.0 million for FY2008 and such sums as may be necessary for each of FY2009 through FY2012.⁷⁵

Similar legislation, S. 1650, Max Cleland Minority Serving Institution Digital and Wireless Technology Opportunity Act of 2007, was reported in the Senate (S.Rept. 110-257). S. 1650 would authorize, also, \$250.0 million annually for each of FY2008 through FY2012. The bill would strengthen the ability of minority institutions to provide course offerings, faculty development, and capacity-building technical assistance in digital and wireless network technologies. S. 1650 is designed to narrow the "economic opportunity divide" that currently exists between students in minority serving institutions and their counterparts in other institutions.⁷⁶ Similar to H.R. 694, funding would be awarded through a peer-review process in the form of grants, contracts, or cooperative agreements. An eligible institution could receive as much as \$2.5 million annually. The Senate committee bill would also establish an office in the Department of Commerce and there would be cost sharing requirements from grant recipients

⁷⁴ P.L. 110-84, the College Cost Reduction and Access Act, added a program entitled "Predominantly Black Institutions." Predominantly Black Institutions (PBIs) are defined as those institutions with at least 1,000 undergraduates in which blacks comprise 40% or more of the total enrollment. In addition, 50% of the enrollment must be either low-income or first-generation students. Grants of at least \$250,000 would be provided for the eligible institutions. In introducing the measure, then Senator Barack Obama stated that "To restore America's competitiveness, we must invest in the success of traditionally underrepresented groups." (Press Release, May 29, 2007). For discussion of this proposal for PBIs see CRS Report RL34283, *Higher Education Act Reauthorization in the 110th Congress: A Comparison of Major Proposals*, coordinated by (name redacted).

⁷⁵ Authorizations are to be appropriated to the Technology Administration of the Department of Commerce to carry out section 5(c) of the Stevenson-Wydler Technology Innovation Act of 1980.

⁷⁶ Senate Committee on Commerce, Science, and Transportation, *Max Cleland Minority Serving Institution Digital and Wireless Technology Opportunity Act*, S.Rept. 110-257, Report to accompany S. 1650, 110th Cong., 2nd sess., January 8, 2008, p. 1.

similar to that contained in H.R. 694. Cost sharing would be waived for those institutions with no endowment or an endowment valued at less than \$50.0 million.⁷⁷

On August 14, 2008, President Bush signed into law P.L. 110-315, the Higher Education Opportunity Act (HEOA).⁷⁸ The HEOA established a new program in Title III, Section A to provide federal support to Predominantly Black Institutions (PBIs). These PBIs that qualify for funding fall outside of the definition of an HBCU.⁷⁹ To be eligible as a PBI, the institution must have, among other things, an enrollment of undergraduate students that is at least 40.0% black, and must have a total enrollment of at least 1,000 undergraduates, with half of them being in degree programs. Grant proposals for PBIs could be in the areas of science, technology, engineering, and mathematics, in addition to teacher preparation, health education, and international issues. Title III, Part E of the HEOA provided funding for two new minority science and engineering improvement programs. A partnership grant program would be directed at increasing the participation of underrepresented minority youth or low-income youth in science, technology, engineering, and mathematics education. Activities to be supported include outreach, hands-on, and experiential-based learning projects. Partnership grants to be awarded would be for a period of five years in an amount not less than \$500,000. Non-federal matching funds would be required. An additional program would be directed at encouraging minorities to pursue careers in science, mathematics, engineering, and technology.

The HEOA provided authority for loans for repair and renovation of academic research facilities, among other facilities. Language in Title III, Part B, Investing in HBCUs and Other Minority Institutions, provided formula grants to eligible institutions. The percentage of funds allocated to each institution would be based on several factors, and no institution could receive less than \$250,000.⁸⁰ Also under Title III, Part B, the HEOA provided assistance to Historically Black Graduate Institutions to increase the number of blacks in certain professional disciplines.⁸¹ Title III, Part D, HBCU Capital Financing, established a bonding authority to raise capital to be lent to HBCUs for repair and renovation of facilities. The total amount that would be available for financing was \$1.1 billion.⁸² The aggregate authority principal and unpaid accrued interest on these loans would be made for two types of institutions in the amounts of \$733.3 million and \$366.7 million.⁸³

⁷⁷ See Dervarics, Charles, "Hard-Fought MSI Technology Plan Needs Jump Start," *Diverse*, vol. 26, March 19, 2009, p. 6-7 and Schmidt, Peter, "New Congressional Caucus Formed to Fight for Black Colleges," *The Chronicle of Higher Education*, vol. 55, September 19, 2008, p. A16.

⁷⁸ Signed into law on August 14, 2008, P.L. 110-315 authorizes, amends, and establishes programs under the Higher Education Act of 1965. (See H.R. 4137, H.Rept. 110-803.) The Higher Education Opportunities Act, also known as the College Opportunity and Affordability Act, was last fully authorized by P.L. 105-244. During that period of time, there were 14 extensions to the Higher Education Act. For expanded discussion of the legislation see CRS Report RL34654, *The Higher Education Opportunity Act: Reauthorization of the Higher Education Act*, by (name redacted) et al.

⁷⁹ An HBCU is defined as an institution established prior to 1964 and have as its primary mission the education of blacks. Please see footnote 28.

⁸⁰ Previous Higher Education Act amendments set the minimum award for institutions at \$500,000.

⁸¹ The act adds six institutions to the list of eligible institutions, with restrictions. The six institutions are Alabama State University, Prairie View A&M University, Delaware State University, Langston University, Bowie State University, and the University of the District of Columbia, David A. Clarke School of Law.

⁸² Previous Higher Education Act amendments set the level of funding at \$375.0 million.

⁸³ Previous Higher Education Act amendments set the awards at \$250.0 million and \$125.0 million.

On March 30, 2010, President Obama signed into law the Health Care and Education Affordability Reconciliation Act, 2010 (P.L. 111-152).⁸⁴ The act includes, among other things, select provisions of the Student Aid and Fiscal Responsibility Act (SAFRA).⁸⁵ SAFRA provisions are contained in Title II, Section 2103, and make changes to and extend mandatory appropriations for several HEOA programs for HBCUs and other minority serving institutions.⁸⁶ The legislation continues two-year funding for HBCUs and minority serving institutions as outlined in the HEOA.⁸⁷ HBCUs and minority serving institutions would be funded at \$255.0 million for each of the years FY2010 through FY2019.⁸⁸ Estimated support would be approximately \$1.1 billion over a 5-year period and approximately \$2.1 billion over a 10-year period.

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⁸⁴ H.R. 4872.

⁸⁵ H.R. 3221.

⁸⁶ The legislation includes, also, increased support for community colleges and an increase for federal Pell grants. For expanded information see CRS Report R41127, *The SAFRA Act: Education Programs in the FY2010 Budget Reconciliation*, coordinated by (name redacted).

⁸⁷ Originally a onetime allocation.

⁸⁸ Authority to award grants expires at the end of FY2019.

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