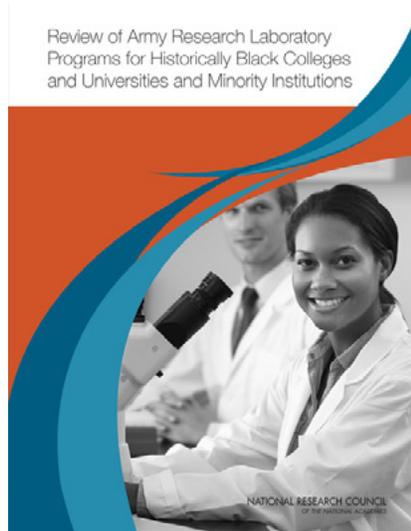


Review of Army Research Laboratory Programs for Historically Black Colleges and Universities and Minority Institutions

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The Army Research Laboratory (ARL) supports research with the goal of improving the combat readiness, efficiency, and survivability of U.S. warfighters. ARL support for extramural research furthers this goal by enhancing science, technology, engineering, and mathematics (STEM) programs at academic institutions, thereby promoting a talented and trained workforce in these disciplines. This report examines ARL programs supporting the enhancement of STEM programs at historically black colleges and universities and minority institutions (HBCUs/MIs). Overall, these programs are strong, well run, and commendable. They have, over many years, provided support to many HBCU/MI individual researchers and institutions, administered through a variety of individual investigator grants and collaborative programs accessible to HBCU/MI researchers and institutions and reported by recipients to be helpful in their development and expansion of STEM programs. Within the narrow confines of the report's task—examining institutional STEM improvements at HBCUs/MIs as a result of ARL funding—these strong programs can be made even stronger.



Background

The term “minority institution” includes academic institutions such as the following: historically black colleges and universities (HBCUs), Hispanic-serving institutions (HSIs), tribal colleges and universities (TCUs), and Asian-American and Native American Pacific Islander serving institutions (AANAPISI). HBCUs are colleges and universities founded before 1964; they were originally intended to provide higher education to African American communities. Although their enrollments are becoming more diverse, the vast majority of HBCUs continue to be predominantly black institutions. HSIs are institutions that receive federal discretionary funding to improve and expand their capacity to serve Hispanic and low-income students. At HIS colleges and universities, undergraduate students that identify as Hispanic make up at least 25 percent of total enrollment.

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Underrepresented minorities (URMs) make up growing parts of the overall U.S. population. Even though HBCUs/MIs are relatively few in number, they continue to enroll a disproportionate share of minority students. Effective science and technology education at HCBUs/MIs depends on the capacity of these institutions to attract and retain capable faculty and students, providing them with appropriate infrastructure to support their scientific activities. For many years, ARL has contributed to building up the human and infrastructural capacities of HBCUs/MIs. ARL grants and programs have helped to build technical infrastructures and have encouraged the enrichment of STEM curricular offerings and graduate student educational opportunities. ARL programs have also provided opportunity for productive scholarship and increased the number of intellectually talented STEM graduates.

ARL has used its very limited—and currently declining—financial resources to have a positive impact on HBCU/MI institutional capabilities. ARL programs in support of HBCUs/MIs prove most effective if they place their primary emphasis on enhancing institutional capacities for STEM disciplines in those institutions.

ARL funding levels to support STEM capabilities at HBCUs/MIs are not substantial in amount, relative to the size of ARL total annual funding or in absolute terms, and are declining. Of the ARL annual budget of approximately \$1.3 billion—of which approximately \$700 million is Army research and development funding and the rest may be generally characterized as reimbursable work for other agencies—the average annual ARL support for all HBCU/MI programs has been approximately \$11 million annually over fiscal years 2011 through 2013. It has become increasingly necessary, therefore, for ARL to consider carefully its strategies for allocating funds to and across these institutions and to regularly and systematically assess the impact of its support on the successful development, maintenance, and growth of the STEM programs at these institutions.

Conclusions and Recommendations

Neither the Army nor, specifically, ARL has put in place written directives or a strategic plan for supporting HBCUs/MIs or for assessing the impacts of that support.

1. ARL should create and disseminate a policy directive regarding its commitment and priorities for a credible and sustainable HBCU/MI support program. Specifically, ARL should articulate a vision and write a strategy to enhance STEM capability within its HBCU/MI-supported community and develop metrics to measure STEM capability improvement; metrics should include progress toward independence, including expanded funding relationships with other funding agencies.

It is important that HBCU/MI participants are fully and successfully engaged in programs within which they participate. On that account, it is important that ARL solicit and receive regular feedback from participants with respect to their experiences. When HBCUs/MIs are subcontractors to non-HBCU/MI institutions on ARL programs, the prime contractors are often relied on to assign and monitor tasks performed by the HBCUs/MIs. It is important that ARL maintain cognizance and control over the task assignment and monitoring tasks to assure that funding is equitable and that the tasking capitalizes on HBCU/MI capabilities. Onsite collaboration of ARL researchers at HBCUs/MIs would help to facilitate ARL mentoring opportunities and to encourage communication between HBCU/MI researchers and ARL

2. ARL should examine the funding of collaborative projects involving HBCUs/MIs and non-HBCUs/MIs to ensure that the funding is equitable and that the tasking takes advantage of HBCU/MI capabilities. ARL should require HBCU/MI participants in ARL-funded collaborative, cooperative agreement projects to provide to ARL regular reports on their experiences with the project planning, execution, management, funding, and other collaborative interactions with the sponsoring ARL program manager and other participants in the collaboration team.

Once ARL has established its strategy to enhance STEM capability at HBCUs/MIs and metrics to measure STEM capability improvement, it can examine the impacts of the institutions' use of ARL support funds and adjust funding to encourage desired impacts.

3. ARL should regularly assess which HBCU/MI activities have the most successful impact on the development, maintenance, and growth of their STEM programs and should rebalance funding according to those assessments.

Over the past 20 years, many minority faculty have left HBCUs/MIs and joined nonminority institutions. Now, many recipients of ARL HBCU/MI funding are not African American, Hispanic, or Native American. Underrepresented minority (URM) funding programs exist at other federal agencies, including the National Institutes of Health (NIH) and the National Science Foundation (NSF), as well as at the Department of Defense (DoD).

4. ARL should consider NIH, NSF, and other URM funding incentive models in allocating support, from within its HBCU/MI funds, for URM U.S. citizen undergraduate and graduate research students, summer interns, postdoctoral fellows, and faculty researchers.

It is important that supportive funding for HBCUs/MIs be sustainable. The overwhelming proportion of ARL funding for HBCUs/MIs has been through grants to individual investigators. While there is value in this process, there is also great value in participation by HBCUs/MIs in multiyear cooperative agreements, which offer broader and longer-term support for building institutional STEM capabilities. HBCUs/MIs would benefit from ARL support to secure and successfully participate in multiyear cooperative programs.

5. ARL should proactively engineer the participation of its HBCUs/MIs in multiyear cooperative agreements to ensure that there is adequate funding and time for those institutions to gain access to and procure equipment, support the completion

of graduate and undergraduate student research, arrange for onsite or virtual internships with ARL laboratories and other laboratories, and develop the capacity to respond to redirection of funded research tasks by ARL program managers. As long as ARL continues its University-Affiliated Research Center (UARC) programs, it should regularly consider HBCUs/MIs for UARC designation or for formal partnerships with existing Army UARCs based on continual adequate technical performance and extant STEM talent and physical capabilities.

The process of initiating proposals and managing grant or contract funding can vary markedly from one institution to another. Those universities farther along on the research university development path will have strong central support systems to support individual or group faculty efforts. By contrast, many HBCUs/MIs still find themselves in the situation that individuals must go it alone in dealing with the highly varied elements of award administration.

6. With HBCUs/MIs in mind, ARL should review its core and cooperative agreement Broad Agency Announcement (BAA) processes to minimize administrative burdens on university respondents and should, with input from HBCUs/MIs, consider mentoring opportunities to enable more awareness of and success in responding to BAA opportunities.

As noted above, the overwhelming proportion of ARL funding for HBCUs/MIs has been through grants to individual investigators, which, without deliberate efforts to connect these individuals to multi-institutional research teams, can result in loss of synergistic opportunities that such collaborations encourage.

7. ARL should gather best practices from other agencies in order to design models of funding that systematically connect and integrate single principal investigator research at HBCUs/MIs, with the efforts carried out by multi-institutional research teams, to facilitate institutional building and the development of entrepreneurial scientific leadership at the HBCUs/MIs.

HBCUs/MIs themselves need to encourage in their researchers and administrators wider recognition of the opportunities available for collaborative interactions and the value of such interactions for institutional STEM building, and they need to seek out more of those opportunities.

8. The HBCUs/MIs should pursue more ARL-supported collaborative research funding. Led by faculty and institutional leadership, HBCUs/MIs should engage in research opportunities that include collaborative grants and contracts as well as single investigator research and development.

To be consistently successful, researchers require the support of institutional administrative offices that perform and assist with such tasks as identifying sponsored opportunities, serving as liaisons with sponsoring agencies and collaborating institutions, following procedures for preparation of proposals, administering financial and other contractual aspects of programs, and supporting student assistants and researchers. These tasks are performed best by professional administrators and can become a counterproductive burden that may not be performed efficiently and effectively by the researchers themselves.

9. The HBCUs/MIs should continuously improve the efficiency and effectiveness of their offices of sponsored programs that assist their faculty in execution of ARL-supported research programs both on and off campus.

ARL is not the sole source of potential funding for HBCUs/MIs, of course. ARL support can be a valuable element within a wider strategy of STEM building that includes partnerships with or support from other sources, including industry and foundations based both here and abroad as well as federal agencies.

10. The HBCUs/MIs should expand their ARL-supported research by partnering with local industry and international sources. The HBCUs/MIs should build relationships with foundations wherein foundational resources are combined with ARL resources to extend the research portfolios of the HBCUs/MIs.

ARL does announce sponsoring opportunities through such traditional channels as the Broad Agency Announcement, with which past recipients of ARL support are familiar. HBCUs/MIs would benefit from additional outreach mechanisms designed to inform potential applicants of available opportunities and of the procedures for becoming involved in ARL-funded programs.

11. ARL should consider sponsoring periodic information dissemination symposia with the dual purpose of featuring the products of HBCU/MI-sponsored research and development and facilitating the active networking and collaboration among the research community.

As noted above, ARL is one of multiple potential sponsors of STEM research at HBCUs/MIs, which have been encouraged to seek and combine resources from additional sponsors to enhance institutional STEM capabilities. By collaborating with other agencies, ARL may assist this strategic effort.

12. ARL should consider collaborating with agencies inside and outside of DoD to seek joint

sponsorship of projects as a means of expanding the support for research and development at HBCUs/MIs.

Dissemination of research results and impacts is an important step in the research and development process. Public awareness and appreciation of HBCU/MI achievements under ARL sponsorship provides benefits to the institutions and to ARL, including the attraction of other HBCUs/MIs to the ARL programs, enhancement of the visibility and stature of the performing institutions and researchers, and attraction of researchers and students to the HBCUs/MIs.

13. ARL should seek ways to provide public recognition for the sponsored research of HBCUs/MIs, especially in the state and local communities where the institutions are located.

Providing financial support in the form of tuition, room and board, books, and supplies is one means to support students at HBCUs/MIs who serve as research assistants. Encouraging and helping students to interact with other students and researchers at their institutions, at other institutions, including industrial and government institutions, and at ARL would expand their professional development. ARL can, with attention, identify means of expanding these and perhaps other forms of support.

14. ARL should seek ways to expand the support at HBCUs/MIs of students serving as research assistants on ARL-sponsored projects.

Unless single principal investigator grants are for a sufficient time period, they will not support the activities required for involved graduate students to achieve their degrees.

15. ARL single principal investigator grants and collaborative/cooperative agreements should be multiyear selections (with a 5-year norm) to enable

graduate student thesis/dissertation success and to adjust to in-term ARL program direction changes.

The Broad Agency Announcement (BAA) is a primary mechanism by which ARL announces its funding opportunities for HBCUs/MIs. Mentoring by ARL of applicant candidates would facilitate their effective participation in the proposal process, and additional instruction in other funding opportunities would help them to expand their potential funding sources.

16. ARL should proactively and regularly mentor HBCU/MI candidates for funding on the BAA-selection-program execution process and on identification of other funding and collaboration opportunities within the Army.

HBCU/MI interactions with and mentoring by other institutions, including other HBCUs/MIs and other DoD agencies, would facilitate the sharing of information, including examples of successful practices. This would encourage beneficial collaborations that help to enhance STEM institutional development as well as individual growth.

17. ARL should create a more comprehensive, proactive strategy for providing exposure of HBCUs/MIs—including their faculty, students, research, and the overall institution—to other HBCUs/MIs and other DoD agencies, and should promote formal discussion venues that link experienced program participants with HBCUs/MIs.

Responsive to its statement of task, the report did not review workforce-related aspects of ARL investments in HBCUs/MIs, although workforce-related considerations could be a future goal of ARL's HBCU/MI programs.

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