



ASSOCIATION OF
AMERICAN UNIVERSITIES

ASSOCIATION OF
PUBLIC AND
LAND-GRANT
UNIVERSITIES



October 11, 2016

President Barack Obama
The White House
1600 Pennsylvania Avenue, NW
Washington, DC 20500

Dear President Obama:

On behalf of our members, which include nearly all of the nation's major research universities, the Association of American Universities (AAU) and the Association of Public Land-grant Universities (APLU) applaud your establishment of Active Learning Day to recognize the importance of improving teaching in the STEM fields.

For our nation to have the skilled workforce it will need to meet the challenges of the 21st century, it is imperative to have a STEM-literate citizenry; to expand and diversify the STEM talent base; to appropriately support the multiple pathways by which students can earn STEM degrees; and to address barriers that hinder students from learning STEM and pursuing STEM courses. To accomplish these goals, we must improve the quality and effectiveness of undergraduate STEM teaching and learning.

As the two major U.S. associations representing research universities, we have engaged our member campuses in ambitious projects that seek to increase the quality of undergraduate STEM education in the nation's top research universities. Our reform efforts are systemic in that they address the fundamental institutional and cultural barriers to change that are specific to research universities.

- The AAU Undergraduate STEM Education Initiative is a significant effort, based on overwhelming existing research, to influence the culture of STEM departments at leading research universities so that faculty members are encouraged, supported, assessed, and rewarded to use student-centered, evidence-based, active learning pedagogy in their classes, particularly at the freshman and sophomore levels. The enclosed attachments highlight major activities that have advanced the goals of the initiative.
- The enclosed attachments also highlight two major APLU initiatives to advance the implementation of active learning in STEM courses. *SEMINAL: Student Engagement through an Institutional Network for Active Learning* focuses on substantially improving instruction in introductory undergraduate mathematics, a priority highlighted by the President's Council of Advisors on Science and Technology. And the Network of STEM Education Centers links university centers to share reforms and enhance their capacity to support effective undergraduate STEM education.

Our member institutions are working hard to increase the number of undergraduate students ready to use their knowledge of STEM wherever their careers might take them. We are optimistic about the progress research universities are making and plan to continue working closely with your administration on these important efforts.

Sincerely,

Mary Sue Coleman
President
Association of American Universities

M. Peter McPherson
President
Association of Public and Land-grant Universities

Association of American Universities' Undergraduate STEM Education Initiative

In 2011, AAU launched the [AAU Undergraduate STEM Education Initiative](#) to improve the quality of undergraduate teaching and learning in science, technology, engineering and mathematics (STEM) fields at member institutions. The initiative's overall objective is to influence the culture of STEM departments at AAU institutions so that faculty members are encouraged and supported to use teaching practices proven by research to be effective in helping students successfully learn STEM. To advance this objective, AAU is engaged in a set of highly focused activities for which it has been awarded 8 grants totaling \$7.2M. To date, the AAU project has resulted in:

- The development and dissemination of a [Framework for Systemic Change in Undergraduate STEM Teaching and Learning](#) that provides a model for improving the quality and effectiveness of STEM teaching and learning at research universities.
- Seed-funding for eight AAU member project sites (Brown University; Michigan State University; The University of Arizona; University of California, Davis; University of Colorado, Boulder; University of North Carolina at Chapel Hill; University of Pennsylvania; and Washington University in St. Louis) to implement reforms that address the core elements of the AAU framework and a specific challenge facing their campus in undergraduate STEM education.
- AAU has actively engaged a broader network of faculty members and administrators at AAU universities committed to improving undergraduate STEM teaching and learning. This AAU STEM Education Network has convened large conferences annually to discuss innovative practices to improve STEM education and hosted a variety of targeted workshops to address critical issues such as the role of STEM department chairs in educational reforms.
- AAU has developed resources and collected data to help member campuses track the progress of their reform efforts, understand progress made across the AAU seed-funded project sites, examine the institutional landscape in which STEM innovations take place, and assess the overall impact of the AAU STEM Initiative. In addition, AAU is examining the role that a national higher education association can play in promoting and scaling systemic institutional reforms in undergraduate teaching and learning.
- In partnership with Research Corporation for Science Advancement's Cottrell Scholars Collaborative, AAU is developing specific guidance to departments and institutions on how to implement new methods for evaluating, recognizing, and rewarding teaching at research universities, particularly relating to how teaching is judged for purposes of promotion, tenure, and annual reviews.
- In partnership with federal agencies, AAU is finding new ways to engage faculty to broaden the impact of their research by becoming more innovative in the classroom and by providing for authentic research experiences to undergraduate students.
- AAU is collaborating with other national associations, organizations, funders, and industry partners to coordinate activities relating to undergraduate STEM reform and to develop effective means to disseminate promising and effective programs, approaches, methods, and strategies. The AAU Undergraduate STEM Education Initiative is engaging multiple stakeholders to promote long-lasting reform to undergraduate STEM education and working to address the cultural and policy barriers within research universities that hamper educational improvement and innovation.

Association of Public and Land-grant Universities

The membership of the **Association of Public and Land-grant Universities** (237 public research universities, land-grant institutions, and state university systems) is committed and well-positioned to address the calls from *Rising Above the Gathering Storm*, *Engage to Excel*, and other national reports for more and better prepared STEM graduates and STEM teachers. APLU members grant 50% of the nation's STEM bachelor degrees, prepare 30% of the nation's secondary STEM teachers, employ nationally ranked science faculties, and produce much of the research on how students learn science, engineering, and mathematics. APLU universities have hundreds of efforts underway to improve student learning in STEM fields, including incorporating more active learning in courses. Given its success in enhanced student learning, we highlight two APLU-wide initiatives to advance the implementation of active learning in K-12 and undergraduate classrooms.

The association began the Mathematics Teacher Education Partnership (MTEP) about 5 years ago to prepare more and better secondary mathematics teachers. Involving about 100 universities and an equal number of schools, the Partnership strives to enhance the pedagogical knowledge and skills in mathematics of teacher candidates, including a focus on active learning. Initiated as part of the MTEP and with 2 prior grants from the Helmsley Charitable Trust, a new 5-year collaborative NSF grant: ***SEMINAL: Student Engagement through an Institutional Network for Active Learning*** (#1624610), faculty from the University of Colorado at Boulder, San Diego State University, and the University of Nebraska-Lincoln will collaborate with APLU to better understand how to implement active learning in undergraduate mathematics classes. Student success rates in undergraduate introductory mathematics (Precalculus through Calculus 2) are unacceptably low on most campuses. Students who do poorly in introductory mathematics significantly reduce their options for majoring in STEM or pursuing STEM related careers. The project will be carried out in two phases. In the first, we will undertake case studies to offer lessons learned from six successful institutions. In phase 2 we will address one of the most challenging aspects of STEM education reform -- how to propagate success. We will select up to nine additional institutions which will attempt to institutionalize active learning in their introductory precalculus to calculus sequence. We intend to develop lessons in how these institutions adopt active learning in mathematics then promote adopting these improved instructional techniques at significantly greater scale across institutions, working with mathematics and university associations.

In 2015, APLU was awarded an NSF grant (#1524832) to create the Network of STEM Education Centers (**[NSEC](#)**), a community of center directors to share reforms/interventions across institutions and to understand the impacts of STEM education centers on their campuses. To date, the network has identified 246 STEM education centers at 182 institutions. STEM Education Centers are hubs of campus efforts leading the transformation of undergraduate STEM education. They drive the discovery, dissemination, implementation, and evaluation of new STEM education knowledge and practices for individuals, into classrooms, and across programs, in part, by providing professional development for K-12 teachers and college faculty. Active learning strategies are a critical piece of this professional development. The purpose of the network is to support and amplify the work of these centers.

These efforts demonstrate the deep commitment that our institutions have for improving the undergraduate experience in STEM for all students.