



ASSOCIATION OF AMERICAN UNIVERSITIES

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AAU SELECTS EIGHT CAMPUS PROJECT SITES FOR UNDERGRADUATE STEM EDUCATION INITIATIVE

The [Association of American Universities](#) (AAU) announced today that it has selected eight AAU member campuses to serve as project sites for the association's five-year [initiative](#) to improve the quality of undergraduate education in science, technology, engineering and mathematics (STEM) fields at its member institutions. The project, which was [announced](#) in 2011, is designed to encourage departments in these disciplines at AAU universities to adopt proven, evidence-based teaching practices and to provide faculty with the encouragement, training, and support to do so.

Over the next three years, each of the eight campus sites will implement a major undergraduate STEM education project that incorporates key elements of the AAU STEM [framework](#), which is based on these more effective teaching practices.

The eight sites were chosen from among 31 AAU universities that submitted concept papers, based on a number of criteria, such as the degree of department and faculty engagement, institutional commitment, likelihood of sustained organizational change, and commitment to evaluation and assessment. In addition, the process was designed to ensure that projects would address a wide range of the elements outlined in the AAU STEM Framework. The elements focus on various challenges departments face in changing teaching methods, ranging from assessing and rewarding teaching excellence to faculty professional development and assessing student learning.

The AAU initiative received a three-year, \$4.7 million grant from The Leona M. and Harry B. Helmsley Charitable Trust last October which has enabled the association to develop the initiative framework and which will provide a total of \$500,000 seed money to each project site over the next three years for implementing change.

AAU will also create an AAU STEM network in which it expects most or all of its universities to participate. The network will enable faculty and administrators at AAU institutions to share best practices and promote sustainable change in undergraduate STEM teaching and learning.

Last month, AAU [announced](#) that it had received a two-year, \$294,000 grant from the National Science Foundation to develop a set of metrics for the initiative that will allow individual institutions to evaluate their use of evidence-based teaching practices.

“We have reached an exciting milestone in our initiative,” said AAU President Hunter Rawlings. “With the strong support provided by the Helmsley Trust, these eight project sites will each begin—or in some cases continue—to institutionalize evidence-based teaching in STEM fields. These changes will make teaching and learning far more interactive and participatory, and we hope will enhance overall student learning in STEM fields and reduce the number of students who choose to drop out of these majors.”

He added, “The selection committee faced a very difficult task, as many universities submitted concept papers of very high quality. Eventually, it is our hope that all of our institutions will participate in and benefit from this initiative, because the truth is they are all working hard to improve undergraduate STEM teaching and learning.”

Following are brief descriptions of some of the activities planned at the eight project sites:

Brown University

The Brown project will address mathematical competency among STEM majors in order to ensure that all STEM majors are prepared to succeed in interdisciplinary and research-based science courses. Brown will build a teaching community to implement effective teaching practices within several departments across campus and will train graduate students to help develop and deliver revised course content.

Michigan State University

MSU will develop a new “gateway” STEM curriculum for freshmen and sophomores, focused on disciplinary and cross-disciplinary “core ideas” and science practices. Michigan State has formed an alliance of STEM departments and colleges across campus to work together on these reforms. .

The University of Arizona

Arizona will redesign five courses - three introductory STEM courses aimed at life science majors and two engineering courses. Three common themes will cut across all the course redesigns: 1) promotion of information and quantitative literacy, 2) use of real-life applications in problem solving, and 3) use of hands-on demonstrations and experiments to develop conceptual understanding. Arizona also will promote a STEM teaching partners program, where a faculty member with experience in active pedagogy leads a team of other faculty members.

University of California, Davis

The iAMSTEM center at UC Davis will serve as a hub for providing STEM faculty with data on which teaching and learning practices are most effective in their courses. The iAMSTEM hub will also lead the redesign of five large-scale introductory STEM courses that will incorporate evidence-based teaching methods: freshman engineering design and communication, introductory chemistry, biology, mastery math, and math for biologists.

University of Colorado, Boulder

Building on the University’s already-extensive work to promote departmental changes to improve STEM teaching, CU Boulder’s project focuses on using more effective measures to

assess teaching and on increasing the value of teaching in the university culture. CU Boulder will support cultural change by creating community support structures within departments, including designating faculty “anchors” to sustain support for evidence-based educational practices and quality teaching. A major outcome will be changing the institutional incentives and reward system to value effective educational practices.

The University of North Carolina at Chapel Hill

UNC will use a network of "mentor-apprentice" relationships between faculty members to achieve widespread adoption of student-centered, active pedagogy techniques in large courses that have traditionally been taught by the lecture method.

University of Pennsylvania

The University of Pennsylvania will couple its investment in open, online learning with in-class student engagement activities to create "blended" introductory courses in mathematics, chemistry, physics, and engineering.

Washington University in St. Louis

Wash U's project focuses on incorporating effective active-learning techniques in STEM courses throughout the schools of Arts & Sciences and of Engineering and Applied Sciences. The university will design and implement a professional development program in active learning techniques and practices for faculty and graduate students, including a Summer Institute for Teaching. The campus also will promote cultural change by creating a faculty teaching community that integrates and values research and teaching.

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The Association of American Universities is an association of 60 U.S. and two Canadian research universities organized to develop and implement effective national and institutional policies supporting research and scholarship, graduate and professional education, undergraduate education, and public service in research universities.

The Leona M. and Harry B. Helmsley Charitable Trust aspires to improve lives by supporting effective nonprofits in a variety of selected areas. Since 2008, when the Trust began its active grant making, it has committed more than \$900 million to a wide range of charitable organizations. Through its National Education Program, the Trust views education as a lever to advance both American economic competitiveness and individual social mobility. In K-12, the Trust focuses on ensuring all students graduate high school prepared for college or careers by supporting teacher effectiveness and the implementation of high academic standards. In postsecondary education, the Trust is primarily interested in increasing the number of Science, Technology, Engineering and Mathematics (STEM) graduates who can participate in high growth sectors of the economy. The Trust also focuses on policy levers that improve postsecondary completion, particularly for underrepresented populations. For more information, please visit www.helmsleytrust.org.

AAU Undergraduate STEM Education Initiative November 2013 Update

In 2011, the Association of American Universities (AAU) launched a five-year initiative in collaboration with member institutions to improve undergraduate teaching and learning in science, technology, engineering and mathematics (STEM) fields. The overall objective of [AAU's Undergraduate STEM Education Initiative](#) is to influence the culture of STEM departments at AAU institutions so that faculty are encouraged and supported to use teaching practices proven by research to be more effective in engaging students in STEM education and in helping students learn.

AAU institutions have expressed widespread enthusiasm and interest in being engaged in the Initiative. AAU's STEM Initiative current activities are highlighted below.

Framework for Systemic Change in Undergraduate STEM Teaching and Learning

- A three-year, \$4.7 million grant received last October from the Helmsley Charitable Trust has enabled AAU to develop and distribute to all of its member institutions a [Framework for Systemic Change in Undergraduate STEM Teaching and Learning](#). This framework outlines key elements to guide institutional and faculty commitment to using teaching practices proven by research to be effective in STEM education (evidence-based teaching). These practices are well documented by the National Research Council report *Discipline-Based Education Research: Understanding and Improving Learning in Undergraduate Science and Engineering* and the 2012 President's Council of Advisors on Science and Technology (PCAST) report.
- AAU is working to build upon this framework by creating a living document and interactive tool for faculty members and administrators to facilitate the use of evidence-based teaching practices in STEM fields. Over the coming months, based upon information provided to us by our member campuses, we will develop an expanded set of examples and map innovative institutional efforts that are already being conducted by universities to implement elements of the framework. These examples will serve as a resource that can be used by other institutions as they move to improve their usage of evidence-based teaching practices.

AAU STEM Project Sites

- The Helmsley grant is also supporting eight AAU universities that will serve as [STEM Project Sites](#) to implement a major undergraduate STEM education project that incorporates key elements of the framework - pedagogy, scaffolding, and cultural change. The eight project sites were chosen from among 31 AAU universities that submitted concept papers.

AAU STEM Network

- AAU has received seed funding by the Burroughs Wellcome Fund to develop a collaborative network that will enable faculty and administrators at AAU institutions to share best practices and promote sustainable change in undergraduate STEM teaching and learning. This summer thirty AAU universities convened for a workshop to discuss what would make a network meaningful and valuable. Currently, AAU is customizing the [HUBzero](#) platform to serve as the web presence for the STEM Initiative and to support communication among member universities.

Metrics and Evaluation

- AAU has received a two-year, \$294,000 grant by the NSF "Widening Implementation & Demonstration of Evidence-Based Reforms" ([WIDER](#)) program to work on metrics broadly; additionally, we are interested in helping the eight project sites track the progress of their

reform efforts as well as evaluating the overall impact of the AAU initiative. Over the coming year AAU will:

- Develop a set of baseline measures that project sites, and other institutions, may use to better understand the current status of teaching and learning and to begin documenting progress. These measures will align with the [*Framework for Systemic Change in Undergraduate STEM Teaching and Learning*](#), which was earlier produced by AAU in close consultation with its STEM advisory committee and with campuses. Integrated with the development and collection of these baseline measures, AAU will conduct site visits at each of the eight project sites to allow a more qualitative evaluation of the campus climate and set a baseline for progress. These initial visits are intended to inform local evaluation and to aid in an overall assessment of the AAU Initiative.
- Develop a more comprehensive set of measures and metrics, also mapped to the framework that will be disseminated to AAU campuses and beyond. This set of measures and metrics, possibly in the form of a matrix, will provide a comprehensive and customizable way to measure progress along the specific elements identified in the framework.

Coordinated Activities

AAU continues to work closely with other organizations to coordinate our activities relating to undergraduate STEM reform. Among other things, we are:

- active in a new coalition of higher education associations consisting of the Association of Public and Land-grant Universities (APLU), the American Association for the Advancement of Science (AAAS), the Association of American Colleges and Universities (AAC&U), and Project Kaleidoscope that has been meeting monthly in an effort to advance undergraduate STEM reform. This group has been convened under the leadership of Linda Slakey and has recently received support from the Alfred Sloan Foundation;
- participating in a broader National Undergraduate STEM Partnership consisting of disciplinary societies, industry associations, and university organizations that is trying to advance the goals for undergraduate STEM reform established by PCAST. This group hopes to help to foster new partnerships within and between federal agencies and organization and groups that are working to improve undergraduate STEM education.
- mapping major association and disciplinary society efforts in STEM reform and to identify areas of overlap among various organizations. As a part of this effort, AAU has developed a matrix of STEM undergraduate education reform efforts. The focus of the matrix is on national efforts specifically aimed at addressing undergraduate, academic, in-class interventions and not necessarily enrichment programs like mentoring or summer research programs.
- collaborating with a small group of [Cottrell Scholars](#) that have received support from Research Corporation for Scientific Advancement to conduct and survey and workshop on innovative teaching evaluation strategies that are being employed to evaluate faculty teaching and student learning beyond the traditional student evaluation administered at the end of a course. The hope is this effort can help to broaden the information available for reviewing teaching quality in tenure and promotion decisions.



Undergraduate STEM Education Initiative

In 2011, the Association of American Universities launched a five-year initiative in collaboration with member institutions to improve undergraduate teaching and learning in science, technology, engineering and mathematics (STEM) fields.

The overall objective of AAU's Undergraduate STEM Education Initiative is to influence the culture of STEM departments at AAU institutions so that faculty are encouraged and supported to use teaching practices that more actively engage students in STEM education and which are proven by research to be more effective in helping students learn. AAU institutions are serious about advancing efforts to reform STEM teaching and learning and have expressed widespread enthusiasm in engaging with the AAU STEM Initiative.

Momentum



- All AAU member institutions have designated a STEM Campus Point of Contact to serve as a liaison between AAU and his or her campus for the initiative.
- Thirty-eight of sixty-two AAU member institutions have expressed a desire to connect with other institutions around undergraduate STEM education.
- Half of AAU member institutions participated in a summer workshop focused on the creation of an AAU STEM Network.

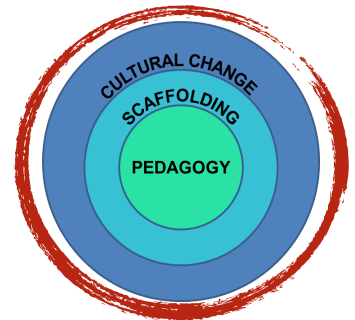
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Framework for Systemic Change in Undergraduate STEM Teaching & Learning

AAU developed and distributed to all of its member institutions a [Framework for Systemic Change in Undergraduate STEM Teaching and Learning](#). This framework outlines key elements to guide institutional and faculty commitment to using teaching practices proven by research to be effective in STEM education (evidence-based teaching).

AAU is working to build upon this framework by creating a web-based interactive tool for faculty members and administrators to facilitate the use of evidence-based teaching practices in STEM fields. Over the coming months, we will map innovative institutional efforts that are already being implemented by AAU member institutions to elements of the framework. These examples will be accessible to and serve as a resource for AAU members and other institutions as they move to improve their use of evidence-based teaching practices.



STEM Project Sites

A three-year, \$4.7 million grant received in October, 2012, from the Helmsley Charitable Trust will enable AAU to support eight project sites. AAU STEM Project Sites will be laboratories for implementing reforms that address teaching and learning in introductory STEM courses. The project sites will focus on three areas of reform: pedagogy, scaffolding, and cultural change. Ultimately, these project sites will be the first phase in an effort to encourage broad-based reform of undergraduate teaching practices particularly at the first-year and sophomore levels, at AAU research universities and beyond.

Data Collection & Assessment

AAU has received a two-year, \$294,000 grant by the NSF “Widening Implementation & Demonstration of Evidence-Based Reforms” ([WIDER](#)) program to develop a set of measures and metrics that will allow individual institutions to evaluate their use of evidence based teaching practices. This set of measures and metrics will align with the Framework and will provide a comprehensive and customizable way to measure progress along specific elements identified in the Framework.



AAU STEM Network

To maintain the interest, involvement, and momentum stimulated by our initiative AAU plans to create an AAU STEM Network. The AAU STEM Network will be a collaborative network that will provide for a forum to facilitate ongoing interaction and exchange of information and ideas between AAU institutions, as well as to cultivate relationships among those leading reform efforts on their own campus. With seed funding from the Burroughs Wellcome Fund AAU is customizing the HUBzero platform to serve as the web presence for the STEM Initiative and to support communication among member universities.

Collaborations

AAU is active in a new coalition of higher education associations consisting of the Association of Public and Land-grant Universities (APLU), the American Association for the Advancement of Science (AAAS), the Association of American Colleges and Universities (AAC&U), and Project Kaleidoscope. This group meets monthly to advance undergraduate STEM reform and has recently received support from the Alfred Sloan Foundation. AAU has also developed a tool to track and categorize several national undergraduate STEM education reform initiatives.



To support our work in reforming the evaluation of teaching practices, AAU is collaborating with a group of [Cottrell Scholars](#) that have received support from Research Corporation for Scientific Advancement to examine innovative teaching evaluation strategies. The hope is this effort can help to broaden the information available for reviewing teaching quality in tenure and promotion decisions.

We are also participating in a broader National Undergraduate STEM Partnership organized by the Business Higher Education Forum (BHEF) that is trying to advance goals for undergraduate STEM reform established by PCAST. This group hopes to help to foster new partnerships within and between federal agencies, industry associations, and university organizations to improve undergraduate STEM education.

Learn about current or future AAU STEM Initiative activities

- Visit the AAU website: www.aau.edu (Hot Topics)
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