



Science & Mathematics Teacher Imperative



A•P•L•U

January 2010

SMTI: A One-Year Anniversary

Fifty years ago, the launch of Sputnik and fear of the Soviet Union prompted sharply increased U.S. investment in science and mathematics education and research, ushering in a new age of technological advancement and prosperity. Today, the United States faces challenges as daunting as reaching the moon—developing clean energy while meeting energy needs, protecting biodiversity while increasing crop yields, advancing communications technologies while securing cyberspace, and many others. Meeting these challenges will require not only more engineers, scientists and mathematicians, but a greater science and mathematics literacy among all of our citizens. Yet, there is a critical shortage of well-qualified science and mathematics teachers who can educate and inspire learning in these crucial fields.

LARGEST STEM TEACHER PREPARATION INITIATIVE IN THE COUNTRY

In November 2008, the Association of Public and Land-grant Universities (A•P•L•U)—the nation’s public research universities—announced an initiative, known as the Science and Mathematics Teacher Imperative (SMTI), to transform middle and high school science, technology, engineering and mathematics (STEM) education by preparing a new generation of world-class science and mathematics teachers. With their heavy involvement in research and education in STEM disciplines, A•P•L•U’s 188 member universities and 27 university systems are ideally positioned to make significant contributions to the critical need for highly qualified and diverse

science and mathematics teachers. In just one year, the SMTI initiative has grown to include 121 public research universities—including 11 university systems. Collectively, SMTI members prepare more than 7,500 science and mathematics teachers annually—making it the largest STEM new teacher initiative in the country.

UNIVERSITY SUCCESSES AND PROMISING POTENTIAL

SMTI institutions and systems are already at the forefront of addressing the national need for exemplary science and mathematics teachers.

SMTI Commitment

SMTI participating universities are committed to:

- Substantially increasing the number and diversity of high-quality science and mathematics teachers in middle and high schools.
- Identifying the immediate and long-term needs for science and mathematics teachers in their states.
- Building partnerships among universities, community colleges, school systems, state governments and other stakeholders to address statewide needs for teachers on a sustained basis.

SMTI Institutions Committed to Double the Number of STEM Teachers They Prepare

Alabama A&M University
Ball State University
Boise State University
California Polytechnic State University,
San Luis Obispo
California State University, Fresno
California State University, Fullerton
Colorado State University
Cornell University
Florida International University
Florida State University
Georgia State University
Indiana University-Purdue University
Indianapolis
New Mexico State University
Northern Arizona University
San Francisco State University
South Dakota State University
The University of Memphis
The University of Montana
University of Cincinnati
University of Colorado at Boulder
University of Colorado Denver
University of Georgia
University of Houston
University of Idaho
University of Illinois at Chicago
University of Kansas
University of Kentucky
University of Maryland College Park
University of Missouri - Kansas City
University of New Mexico
University of North Carolina at Charlotte
University of North Texas
University of South Carolina - Columbia
University of South Florida
University of Tennessee, Knoxville
University of Texas at Arlington
University of Utah
University of Wyoming
Virginia Tech
Wichita State University

The California State University System and the University of California have committed to double the number of science and mathematics teachers they graduate. The University System of Maryland is part of a statewide initiative to triple the number of science and mathematics teachers who graduate annually. And, the University System of Georgia plans to double the number and diversity of teachers they prepare “to become the primary provider of high-quality teachers for Georgia’s public schools.”

The university systems are not alone—individual institutions are demonstrating significant potential as well. Forty SMTI members have announced plans to at least double the number of science and mathematics teachers they prepare. Even if severe state fiscal conditions force some revisions, these member universities are making significant efforts to enhance science and mathematics teacher preparation.

INSPIRING INSTITUTIONAL CHANGE AT UNIVERSITIES

The National Science Foundation (NSF) awarded A·P·L·U a three-year, \$1.5 million grant to promote institutional change and strengthen science teacher preparation. By creating a network of collaboration among 26 of the 121 SMTI members, the multi-year effort seeks to understand the conditions that promote institutional change while participating institutions implement strategies to strengthen their science teacher preparation programs. This project is a partnership between A·P·L·U and science disciplinary societies such as the American Physical Society (APS).

Participating universities are submitting institutional plans for strengthening science teacher preparation and are engaged in identifying common challenges and sharing successful strategies. Results will be shared with all SMTI institutions as they become available.

BENCHMARKING TEACHER PREPARATION PROGRAMS

The nation lacks a single comprehensive source of information about effective programs and practices to prepare science and mathematics teachers. To fill the void, a SMTI co-director, along with some of the nation’s leading STEM educators, developed the Analytic Framework. Funded by grants from NSF and the Carnegie Corporation of New York, this framework provides

a structure to document key features of teacher preparation programs in science and mathematics, facilitates the comparison of programs to one another, and should enable the identification of particularly successful programs and the features responsible for that success.

The Analytic Framework has undergone extensive review by deans of education and natural sciences, professors of science and mathematics who engage in research on teacher preparation, professional organizations, and other key stakeholder groups. It is currently being field tested by several selected teacher preparation programs to assess feasibility, utility, and content validity. It will be migrated to an online environment by late 2010.

HOW MANY TEACHERS DO WE NEED?

One of the principal goals of SMTI is to help participating member universities respond to the needs of their states and the nation for science and mathematics teachers. However, there is no single comprehensive source of information about how many teachers are needed or the qualifications of current STEM teachers. With funding from NSF, SMTI staff are developing a set of online tools to outline and explain the steps states can take to carry out a more precise and rigorous analysis of the supply and demand of science and mathematics teachers. This new tool is expected to launch in early 2010.

SMTI ANNUAL MEETINGS

Seventy-four of 86 member institutions participating in SMTI at the time, including eight of 11 systems, attended the first SMTI meeting in Boulder, CO, May 17-18, 2009. Conference highlights included presentations by the University of Colorado at Boulder featuring its Learning Assistant Program and the University of Kansas and the University of Houston on being UTeach replication sites. The second annual meeting is scheduled for June 2010.

A·P·L·U will soon establish an executive committee

Institutional Accomplishments

SMTI encompasses 121 public universities and 11 university systems spanning 41 states and the District of Columbia. Collectively, SMTI members prepare more than 7,500 science and mathematics teachers annually.

ROBERT NOYCE TEACHING SCHOLARSHIP
A·P·L·U institutions have awarded \$70 million in Noyce Scholarships accounting for more than half of the program since its inception.

TEACHER QUALITY PARTNERSHIP GRANTS
The Department of Education awarded 14 of the 28 new Teacher Quality Partnership Grants, totaling \$23 million, to A·P·L·U institutions. Ten of these institutions are SMTI members.

UTEACH
UTeach, begun at the University of Texas at Austin (a SMTI member), has expanded nationally: 14 of 16 UTeach sites are A·P·L·U institutions. Ten of these institutions are SMTI members.

PHYSICS TEACHER EDUCATION COALITION
Nine of the 12 Physics Teacher Education Coalition (PhysTEC) sites are in SMTI.

of university leaders to help guide the initiative's efforts as well as help design summer meetings and sessions at the A·P·L·U Annual Meeting.

A COMMUNITY EFFORT

America's public universities already graduate some of the best scientists and engineers in the nation. SMTI institutions are working to enhance teacher preparation programs to address the national need for well-qualified science and mathematics teachers. But these institutions will not attract talented young people to teaching without reform in K-12 schools, districts, and states. SMTI is working with other national and state organizations engaged in STEM education reform to augment university efforts and contribute to the broader national agenda. Reform efforts center around introducing new technologies to enhance student learning as well as establishing clearer, more consistent, and higher science and mathematics standards that challenge schools to provide the best education possible.

SMTI INSTITUTIONS AND SYSTEMS



The 121 SMTI institutions include 91 universities and 11 systems with 30 A•P•L•U-member universities.

SYSTEMS

City University of New York
Oregon University System
State University of New York
The California State University System
The University System of Maryland
University of California
University of Minnesota
University of Nebraska
University of North Carolina System
University of Wisconsin System
University System of Georgia

INSTITUTIONS

Alabama A&M University
Arizona State University
Auburn University
Ball State University
Boise State University
Bowling Green State University
California Polytechnic State University,
San Luis Obispo
California State University, Fresno
California State University, Fullerton
Central Michigan University
Clemson University
Cleveland State University
Colorado State University
Cornell University
Delaware State University
Florida International University
Florida State University
Georgia State University
Indiana University-Purdue University
Indianapolis
Iowa State University

Lincoln University
Michigan State University
Montana State University
New Mexico State University
North Carolina State University
Northern Arizona University
Northern Illinois University
Ohio University
Oklahoma State University
Oregon State University
Portland State University
Purdue University
San Francisco State University
South Dakota State University
Stony Brook University, SUNY
Texas A&M University
Texas State University, San Marcos
Texas Tech University
The Ohio State University
The Pennsylvania State University
University of Alabama at Birmingham
University of Arkansas, Fayetteville
University of California, Santa Barbara
University of Central Florida
University of Cincinnati
University of Colorado at Boulder
University of Colorado Denver
University of Connecticut
University of Delaware
University of Georgia
University of Houston
University of Idaho
University of Illinois at Chicago
University of Illinois at Urbana-Champaign
University of Iowa
University of Kansas

University of Kentucky
University of Louisville
University of Maryland, College Park
University of Massachusetts Amherst
University of Memphis
University of Minnesota-Twin Cities
University of Missouri-Columbia
University of Missouri-Kansas City
University of Montana
University of Nevada, Reno
University of New Hampshire
University of New Mexico
University of North Carolina at Charlotte
University of North Texas
University of Oklahoma
University of Pittsburgh
University of South Carolina
University of South Dakota
University of South Florida
University of Tennessee, Knoxville
University of Texas at Arlington
University of Texas at Austin
University of Texas at San Antonio
University of the District of Columbia
University of Utah
University of Vermont
University of Virginia
University of Wisconsin-Milwaukee
University of Wyoming
Utah State University
Virginia Polytechnic Institute & State
University (Virginia Tech)
West Virginia University
Western Michigan University
Wichita State University
Wright State University



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