



A·P·L·U's Science & Mathematics Teacher Imperative

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June 29, 2009



Who is A·P·L·U?

- 185 member institutions – all leading public/flagship/land-grant research universities in every state
- 27 leading university systems
- Largest, best prepared undergraduate cohorts in science, engineering and mathematics
- Largest and highly accomplished science, math and engineering faculties



The problem?



RISING ABOVE THE GATHERING STORM

*Energizing and
Employing America
for a Brighter
Economic Future*

Committee on Prospering in the
Global Economy of the 21st Century:
An Agenda for American Science and Technology

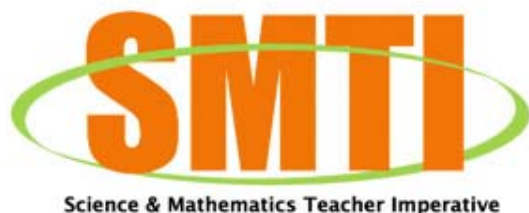
Committee on Science, Engineering, and Public Policy

NATIONAL ACADEMY OF SCIENCES,
NATIONAL ACADEMY OF ENGINEERING, AND
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

Economic studies conducted even before the information-technology revolution have shown that as much as 85% of measured growth in US income per capita was due to technological change.

...(we are) deeply concerned that the scientific and technological building blocks critical to our economic leadership are eroding at a time when many other nations are gathering strength.

Improve K–12 science and mathematics education
Recommendation #1: **Annually recruit 10,000 science and math teachers**



APLU's Science and Mathematics Teacher Imperative (SMTI)

Mission:

- Substantially increase the number and diversity of high quality mathematics and science teachers in middle and high schools

Strategic Plan:

- **Collective action from national consensus by leading universities on direction and definition of effort**
- **University leadership in concert with key faculty, particularly from science disciplines**
- **National momentum based on some common metric and framing of approaches**
- **Extensive cross pollination across existing initiatives**
- **Partnerships with education, state governments, business**



- 116 Universities have made the SMTI commitment, as have 11 university systems
- 27 institutions have been selected to participate in an NSF RETA (Research, Evaluation and Technical Assistance) grant entitled “Promoting Institutional Change to Support Science Teacher Preparation” with no direct funding to those institutions.



... Through the NSF grant we are building a set of opinion-leader research universities who not only have made the commitment to teacher preparation, but to collaboratively studying what works and why.

- Top leadership commitment
- Disciplinary society participation (APS & ACS)
- Cross-college teams
- Inter-institutional transparency



There are Several Points in the Pipeline that Faculty Impact Teachers

Undergraduate
and graduate
majors

Pre-service
Teachers

Professional
Development
for Teachers



Some of the hurdles faculty induce

- Poor undergraduate instruction discourages majors
- A chilly climate for majors interested in teaching
- Perpetuating myths regarding the profession of teaching



Reform introductory courses (Florida International University)

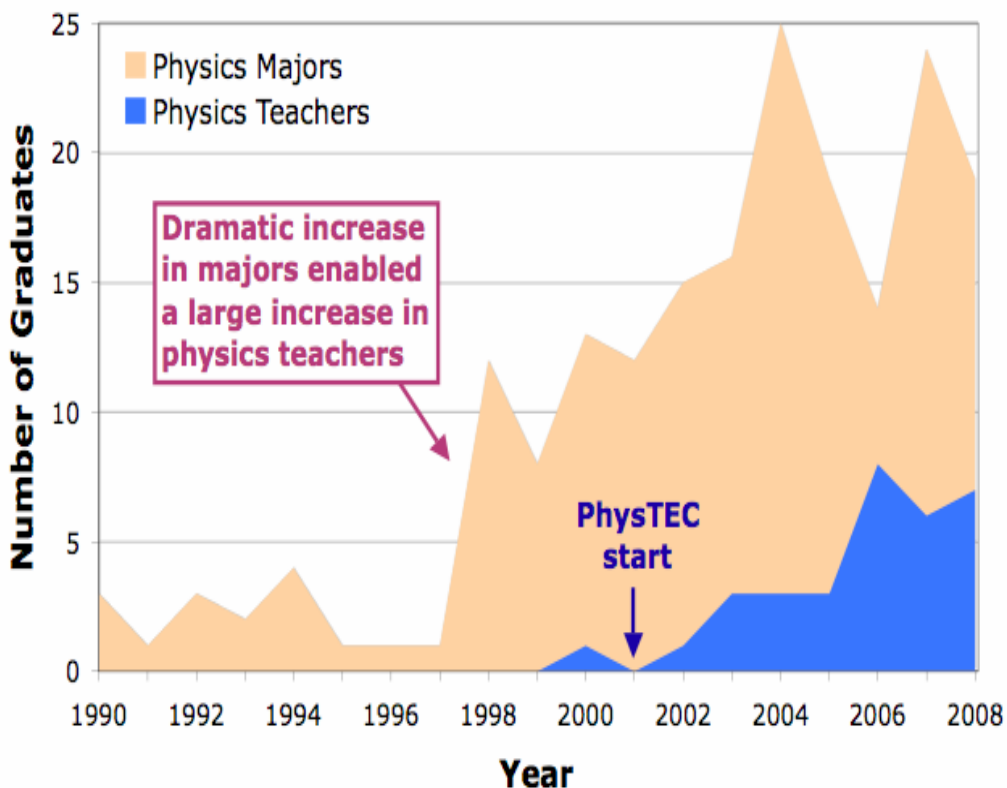
- Utilize research-based curricula to improve student learning and model best teaching practices
- Implicit message that teaching is valued
- Interactive methods more engaging for students



Laird Kramer, Physics faculty member, instructs students in introductory mechanics using the ASU Modeling curriculum



Active advising of majors produces more teachers (University of Arkansas - Fayetteville)

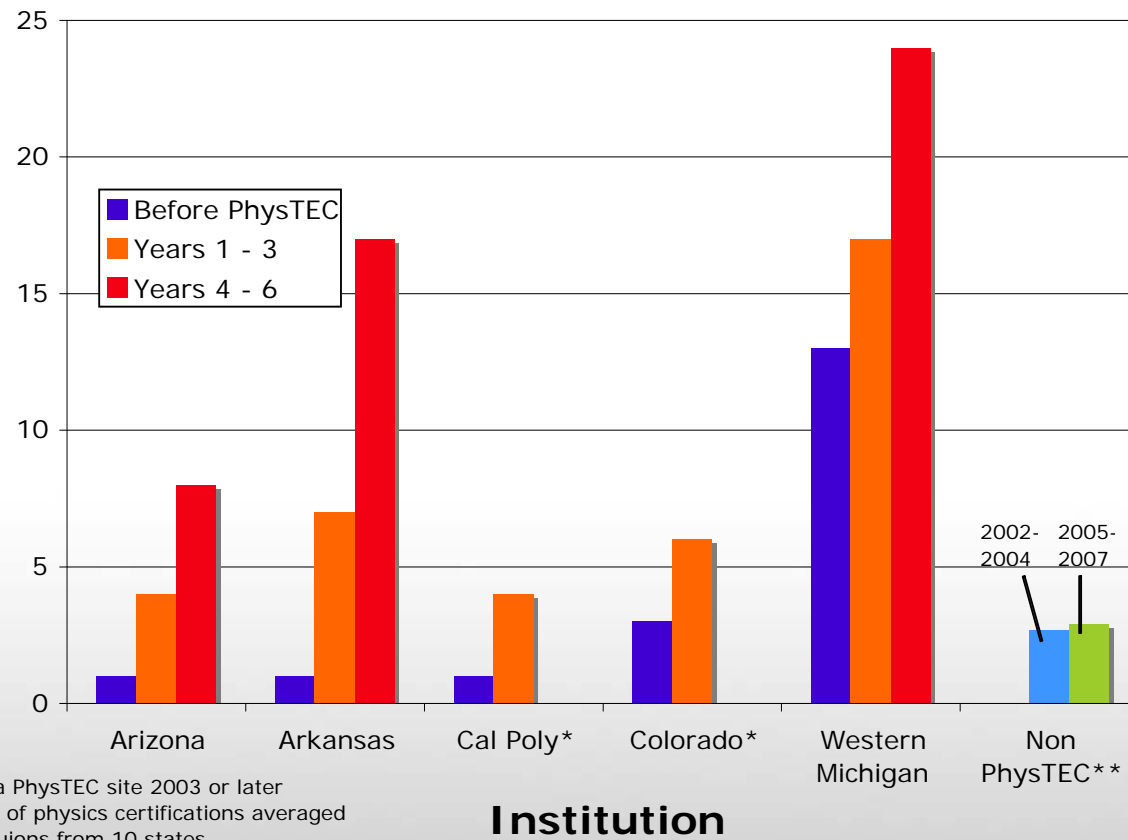


Active advising checklist

- Build relationships with students
- Present teaching as a career option
- Learn about certification programs
- Advocate for students
- Make professional connections for students



PhysTEC: Physics departments expanding the pipeline



*Became a PhysTEC site 2003 or later
 **Number of physics certifications averaged over institutions from 10 states



Reform the Chilly Climate for K-12 Teaching in Math and Science Departments

What would your professors in your major (math and science) department say if you told them you wanted to be a high school teacher?

Some of the student responses:

- Professors at our university don't value teaching
- There is a lack of respect in departments for K-12 teaching
- It is not considered a "full blown career"
- Professors would be angry
- Professors would say, "You're wasting your talent"
- Professors would say, "Don't do it"

Encouragement from faculty to consider K-12 teaching was an important factor in students' decisions to pursue certification.

Valerie K. Otero, "Recruiting Talented Mathematics and Science Majors to Careers in Teaching: A Collaborative Effort for K-16 Educational Reform." Proceedings of the NARST 2006 Annual Meeting.



Give early teaching experiences – even to those who have yet to commit to being a teacher (University of Colorado at Boulder)



Valerie Otero, Education faculty member and expert in physics education research, instructs LAs enrolled in a 1 credit pedagogy course

Learning Assistants (LAs)

- Undergraduates facilitate group learning activities
- Concurrent pedagogy course
- 6 PhysTEC institutions adopted the CU Boulder LA program

Impact

- Teacher recruitment
- Class performance improved
- LA knowledge increased



Remove Myth of High Attrition

The Fact: **More than two-thirds stay in teaching**

Attrition from teaching is **less severe than is typically believed** when return rates are included.

1987-1997 New Teacher Cohorts in Illinois

Public Schools.

Source: Leaving Schools of Leaving the Profession: Setting Illinois' Record Straight on New Teacher Attrition. (2007) Karen J. DeAngelis and Jennifer B. Presley. Illinois Education Research Council, Edwardsville, IL

Field	Return-Adjusted Attrition Rate from the Profession (%)	Percent Who Leave and Return (%)	5-Year Attrition Rate Without Returns (%)
Overall	27	13	40
English	32	14	46
Math	30	12	42
Science	31	12	43
Self-Contained Elementary	24	12	36
Social Science	28	10	38
Special Education	26	15	41
25 or younger	28	14	42
35 or older	23	12	35



And:

College graduates who go into teaching are **more likely to stay than those who enter most other professions requiring comparable education.**

Science and Engineering Indicators 2008, Arlington, VA (NSB 08-01A) January 2008. Baccalaureate and Beyond data.



...And so today, I am calling on a new generation of Americans to step forward and serve our country ... If you want to make a difference in the life of the nation...join the teaching profession. America needs you.

-- President Obama, March 10, 2009

And university science & mathematics faculty can help to making this happen by improving what they already do.