Critical Issues Facing the Physics Community

Theodore Hodapp
Director of Education and Diversity
American Physical Society
Supply of US Citizens

Physics PhDs

US Citizens

Foreign Citizens

Year


US Citizens

Foreign Citizens

www.PhysTEC.org
Percentage of Women Earning Physics Degrees

Source: IPEDS Completion Survey
Minorities in Higher Education

- College Age Population: ~1.5M
- All Bachelor Degrees: ~200k
- Physics Bachelor Degrees: ~320
- Physics Doctoral Degrees: ~35
- Physics Faculty: ~12

URM Percentage

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URM Physics PhDs
Normalized to Minority Population

100% would indicate full participation by minorities

31 PhDs awarded to URMs in 2008

URM=Under-Represented Minority
Source: IPEDS Completion Survey by Race
Bachelor and PhD STEM Degrees

- Bachelor of Science (BS)
- PhD

Percentage of Minorities

- Computer Science
- Chemistry
- Biology
- Engineering
- Math and Stats
- Physics

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Cumulative PhD Completion Rate for Math/Physical Sciences

Source: Council on Graduate Schools
Need for High School Physics Teachers

Relative Demand by Field

Fields with Considerable Shortage (5.00 - 4.21)

- Severe/Profound Disabilities (Spec. Ed.) 4.47
- Mathematics Education 4.46
- **Physics** 4.39
  - Multicategorical (Spec. Ed.) 4.39
  - Mild/Moderate Disabilities 4.37
- **Chemistry** 4.35
  - Mental Retardation (Spec. Ed.) 4.34
  - Emotional/Behavioral Disorders (Spec. Ed.) 4.31
  - Bilingual Education 4.31
  - Learning Disability (Spec. Ed.) 4.28
  - Visually Impaired 4.24
  - Dual Certificate (Gen./Spec.) 4.23
  - Hearing Impaired 4.23
  - Speech Pathology 4.21

2008 AAEE (*American Association of Employment in Education*)
Educator Supply and Demand in the United States Report

www.PhysTEC.org
Physics Teacher Education

For comparison, secondary teachers with a major in the field (2004):

- Science (all): 77%
- Math: 61%
- English: 76%
- Social Studies: 79%

Source: Schools and staffing survey, National Center for Education Statistics

AIP Statistical Research Center: 2004-05 High School Physics Survey
Demographics of High School Physics Teachers

- 27,000 Physics Teachers Nationwide
- 1,200 new physics teachers each year
- ~ 400 of these have a physics major or minor

- Number taking physics growing by 1% per year

Source: AIP Statistical Research Center
• Rising Above the Gathering Storm:

**Action A-1:** Annually recruit 10,000 science and mathematics teachers by awarding 4-year scholarships and thereby educating 10 million minds.

**Action C-1:** Increase the number and proportion of US citizens who earn physical-sciences, life-sciences, engineering, and mathematics bachelor’s degrees by providing 25,000 new 4-year competitive undergraduate scholarships each year to US citizens attending US institutions.
Increase in Physics Teachers Educated at PhysTEC Institutions

* Became a PhysTEC site 2003 or later
** Number of physics certifications averaged over 319 institutions in 15 states. Note that all PhysTEC teachers are more highly qualified than the minimum standards in most states.

www.PhysTEC.org
Arkansas Success Story

Dramatic increase in majors enabled a large increase in physics teachers

PhysTEC funding starts

PhysTEC funding ends; program sustained locally

www.PhysTEC.org

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PhysTEC Member Institutions

...committed to improving the education of physics and physical science teachers

www.PhysTEC.org
PhysTEC RFP Elements

- Site Types (Targeted, Comprehensive)
- Funding (*up to* $25k, $100k/yr for 3 years)
- National models
- Key components
- Expectations (reporting, data, meetings)
- Review process
- Timeline

- [http://www.phystec.org/solicitation](http://www.phystec.org/solicitation)
PhysTEC RFP Timeline

• RFP: October
• 2-3 page pre-proposal: 5 November
• Full (9/15 page NSF style) proposal: 14 January
• Proposal review (late January)
• Funding decision: April
• Project Start: August 2011
• PhysTEC 2011 Meeting: 23-25 May (held in tandem with UTeach Institute)

• [http://www.phystec.org/solicitation](http://www.phystec.org/solicitation)
APS Programs for Women

• Professional Skills Development workshops
• Childcare grants to attend meetings
• Gender equity meeting/conversations
• CSWP gazette
• Female-friendly website
• CSWP climate site visits
• Blewett fellowship
• Travel grants / Speakers list / Rosters
Minority Bridge Program
Project Components

- Recruiting / Relationships
- Establish Bridge Programs
- Partnership Institutions
- Advocacy / Synergy
Minority Bridge Program
Project Components

• Recruiting / Relationships
  • Visit large number of MSIs annually
  • Establish research collaborations between MSIs and DGIs
  • Informing students of opportunities and realities
  • Social media to connect students
  • Summer workshop for students and faculty

• Establish Bridge Programs
• Partnership Institutions
• Advocacy / Synergy
Minority Bridge Program
Project Components

• Recruiting / Relationships

• Establish Bridge Programs
  • Learn from existing efforts
  • Transitional Masters (2 yrs) or Post-baccalaureate year (1 yr)
  • Institutional components:
  • Mentoring
  • Progress monitoring
  • Financial support
  • Research
  • Coursework (advanced mathematics and physics)
  • Application preparation
  • Social support

• Partnership Institutions

• Advocacy / Synergy
Minority Bridge Program
Project Components

- Recruiting / Relationships
- Establish Bridge Programs
- Partnership Institutions
  - Improving graduate education for all students
  - Financial incentive
  - Institutional components:
    - Site leader / champion
    - Mentoring / advising
    - Progress monitoring
    - Social support
    - Re-examination of admissions guidelines
    - Department culture
    - COM visit
    - Common data-gathering/analysis
- Advocacy / Synergy
Minority Bridge Program
Project Components

• Recruiting / Relationships
• Establish Bridge Programs
• Partnership Institutions

• Advocacy / Synergy
  • Organize summer workshop
  • Research/publish effectiveness of interventions
  • Common recruiting/application to bridge programs
  • Disseminate information and ideas to physics community
  • Use APS name to spread program
  • Fund raising
  • Oversight
  • Project-wide activities/tasks
Admissions Bias?

Source: PhD Recipients from Oregon State University