Diversity, Innovation & Competitiveness

EPSCoR Project Director’s & Project Administrator’s Meeting

The Sheraton National Hotel
Arlington, VA

Wanda E. Ward, Ph.D.
Directorate for Education and Human Resources (EHR)
May 20, 2009
Innovation Ecosystems

- Creativity
- Inventiveness
- Innovation
Innovation Ecosystems

Intellectual Capacity Building
- STEM talent development for *all* Americans
- Scientists/technologists/engineers; technicians; instructional workforce, literate citizenry

Research
- Creation of knowledge environments
- Diversity as innovative ability

Research Infrastructure

Collaborations
Capacity Building: NSF Strategies to Broaden Participation

**Focused Programs Examples**

**BIO:** Research Initiation Grants and Career Advancement Awards to Broaden Participation in the Biological Sciences (RIG CAA BP)

**CISE:** Broadening Participation in Computing (BPC)

**EHR:** Centers for Research Excellence in Science and Technology (CREST)

**GEO:** Opportunities for Enhancement of Diversity in the Geosciences (OEDG)

**MPS:** Partnerships in Astronomy and Astrophysics Research and Education (PAARE)

**Emphasis Programs examples**

**ALL:** Research Experiences for Undergraduates (REU) Sites

**CISE:** CISE Pathways to Revitalized Undergraduate Computing Education (C-PATH)

**EHR:** Informal Science Education (ISE)

**MPS:** Enhancing the Mathematical Sciences Workforce in the 21st Century (EMSW21)

**OD:** Science and Technology Centers (STC)
EHR Manages 31 of NSF’s 60 Programmatic Efforts to Broaden Participation

**Examples**

- **MSP**
- **ATE**
- **LSAMP**
- **IGERT**
- **CREST**
Newer Directions

A More Integrated Approach: I³

International Engagement
Innovation through Institutional Integration (I³)

- Challenges faculty and administrators in institutions of higher education to think strategically about the creative integration of NSF-funded awards towards a whole that exceeds the sum of its parts.

- Focus can be:
  - Intra-Institutional
  - Inter-Institutional
Innovation Through Institutional Integration (I³)

- Globally Engaged Workforce
- Critical Educational Junctures
- Broadening Participation
- Research & Evaluation
- Integration of Research & Education

International Cyber-enabled
2008 I³ Examples

Six awards were made in 2008

University of Colorado at Boulder
CCLI, Noyce, TPC, Reese, REU, other NSF awards from ENG, EEC

University of Florida
AGEP, GK-12, IGERT, REUs, other NSF awards from ENG, SBE, etc.

University of Washington
STEP, CCLI, RDE, ADVANCE

Kapiolani Community College of the University of Hawaii
TCUP, STEP, LSAMP subaward, EPSCOR subaward

Louisiana State University
GK-12, LSAMP, S-STEM, AGEP, Noyce, other awards from MPS

Georgia Institute of Technology
GK-12, AGEP, IGERT, RET, Noyce, ADVANCE, REU
2008 I^3 Examples: University of Florida

Builds on:
- AGEP
- GK-12
- IGERT
- REUs
- Other NSF awards from ENG, SBE, etc.

- Brings together existing NSF projects for underrepresented groups and engages more students from those groups to broaden participation and foster atmosphere of collaboration and peer support among students
- Encourages youth and incoming college students to consider STEM disciplines and careers
Builds on:

- STEP
- CCLI
- RDE
- ADVANCE (created Center for Institutional Change)

- PEERS (Promoting Equity in Engineering Relationships) undertakes both student-centered and engineering transformation interventions and creates new tools and resources.

- Addresses issues relevant to students who identify with more than one underrepresented group
2008 I³ Examples:
Kapiolani Community College of the University of Hawaii

Builds on:
• TCUP
• STEP
• LSAMP Subaward
• EPSCoR Subaward

• Develops new Associate of Science in Natural Science degree and engages in faculty development needed to increase quantity and quality of STEM faculty
• Supports a pipeline for more Native Hawaiian and other students to complete STEM degrees
2008 $I^3$ Examples:
Louisiana State University

Builds on:
- GK-12
- LSAMP
- S-STEM
- AGEP
- Noyce
- Other NSF awards from MPS

- Assists students in their professional development towards advanced degrees
- Creates an interdisciplinary curriculum in materials engineering and science
- Develops Hierarchical Mentoring Ladder system involving faculty members, graduate/undergraduate students, and high school teachers/students
2008 I³ Examples:
Georgia Institute of Technology

Builds on:
- GK-12
- AGEP
- IGERT
- RET
- Noyce
- ADVANCE
- REU

- *Tech to Teaching* includes pathways towards state teacher certification through cooperation with Kennesaw State University’s Master of Arts in Teaching program.

- Increases collaboration with partners Spelman College and Georgia Perimeter College through engagement of Tech’s graduate students as instructors in partner classrooms.
International Activity by Type

• **Collaborative Work**
  - Draws on international resources, and supports international activity and research with a high global impact.
  - Exemplary programs: *IGERT, GRF, GSE*

• **Conference, Seminar & Workshop**
  - Supports international conferences participation and fosters international dialogue through workshops and scholarly meetings.
  - Exemplary programs: *ITEST, LSAMP*

• **Internship & Study Abroad**
  - Prepares a vibrant, engaged workforce by offering academic and industrial experiences abroad.
  - Exemplary programs: *IGERT, LSAMP*
International Activity by Type

- **Outreach & Dissemination**
  - Promotes high-impact projects and facilitates informal science learning in international settings.
  - Exemplary programs: *IGERT, RDE*

- **International Exchange**
  - Promotes academic exchange and collaboration, and provides cross-cultural learning experiences.
  - Exemplary programs: *CREST, IGERT, LSAMP*

- **Other Support Activity**
  - Provides a range of support in the areas of human resources, facilities, and instrumentation to facilitate international endeavors and help students gain international perspective in learning and research.
  - Exemplary programs: *IGERT, ATE*
Future Directions

- Broadening Participation across Seamless Transitions (BPast), including the engagement of professional associations, private sector

- A more expanded NSF-wide emphasis on broadening participation across critical transitions, including explicit attention to HSIs & Community Colleges
Broadening Participation Through Partnering, Leveraging and Integrating

- Partnerships for vertical connections
- Partnerships for horizontal connection
- Greater roles for community colleges
- Minority-serving institutions, including Hispanic-serving institutions
Cyber-enabled resources to promote networking among individuals and institutions and connectivity to outside resources

Scholarship on BP

Sustained assessment/continuous feedback
Potential for Vertical Connections in an EPSCoR State: Alabama

Source: Program information attained from the NSF Fastlane database in 2007
EHR/MPS Broadening Participation Programs in Virginia

Source: Program information attained from the NSF Fastlane database on March 9, 2009
EHR/ENG Broadening Participation Programs in New York

Source: Project information attained from the NSF Fastlane database on October 8, 2008
Why Community Colleges?

Largest single sector of higher education

- 1200 accredited two-year colleges
- Enroll 6.5 million students annually for credit courses (another 5 million for noncredit)

Enroll 46% of all U.S. undergraduates

- 46% of African American Students
- 46% of Asian or Pacific Islander Students
- 55% of Hispanic Students
- 55% of Native American Students
- 39% of First Generation to attend college

Award 800,000 Associate Degrees and Certificates annually

Report of The National Commission on Community Colleges, College Board, January 2008
44% of all Science & Engineering Graduates in 1999 & 2000 attended a community college (more than 50% of bachelor’s and 35% of master’s degrees)

- 42% of computer science & math degrees
- 46% of life & related sciences
- 37% of physical & related sciences
- 45% of social & related sciences
- 40% of engineers

42% of the four year college graduates who had a GPA between 3.75 and 4.00 attended a community college

## Promoting a Diverse Scientific Workforce: Hispanic Serving Institutions (HSIs)

<table>
<thead>
<tr>
<th>Career</th>
<th>High School</th>
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| ADVANCE Institutional Transformation Award  
*New Mexico State University* | Computer Science, Engineering, and Mathematics Scholarships  
*Florida International University* |
| Graduate Engineering Education To Serve the Aerospace Industry in Urban Los Angeles and the Antelope Valley  
*California State LA University Auxiliary Services, Inc.* | TAMUK STEP: A Model for Student Success and Persistence  
*Texas Engineering Experiment Station* |

### Undergraduate

- [Career High School](#)
Critical Transition Examples Led by Hispanic Serving Institutions (HSIs)

- Alliances Among Higher Education Institutions

**LSAMP Project:** Texas LSAMP Phase IV

**Institution:** Texas Engineering Experiment Station with Texas A&M University-Corpus Christi, other 4-year institutions, and HSI Community Colleges

- Pre-College/Post-Secondary Partnerships

**ATE Project:** Chemistry: A Pipeline to 21st Century Careers

**Institution:** San Mateo County Community College District
Critical Transition Examples Led by Hispanic Serving Institutions (HSIs)

- Community College Articulation with Feeder High Schools and 4-year Transfer Institutions

  **ATE Project:** Biotechnology Education and Training Sequence Investment
  **Institution:** Southwestern College

- Bridging to Doctoral Programs

  **S-STEM Project:** A Mathematics and Physical Sciences (MaPS) Cohort of Scholars Program
  **Institution:** Northeastern Illinois University
The Global Context

....Collaboration for a Competitive and Healthy Nation....