



Overview of the Directorate for Education and Human Resources (EHR)

John C Cherniavsky
Senior Advisor for Research
Division of Research on Learning
in Formal and Informal Settings
National Science Foundation
San Jose, CA
March 13, 2008



Dr. Cora B. Marrett
NSF Assistant Director
Education & Human Resources



Investing in America's Future

NSF Strategic Plan

FY 2006 - 2011



NSF Strategic Goals

➤ *Discovery*

- Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity in fundamental and transformational science and engineering.

➤ *Learning*

- Cultivate a world-class, inclusive science and engineering workforce, expanding scientific literacy of all citizens.

➤ *Research infrastructure*

- Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.

➤ *Stewardship*

- Support excellence in science and engineering research and education through a capable and responsive organization.



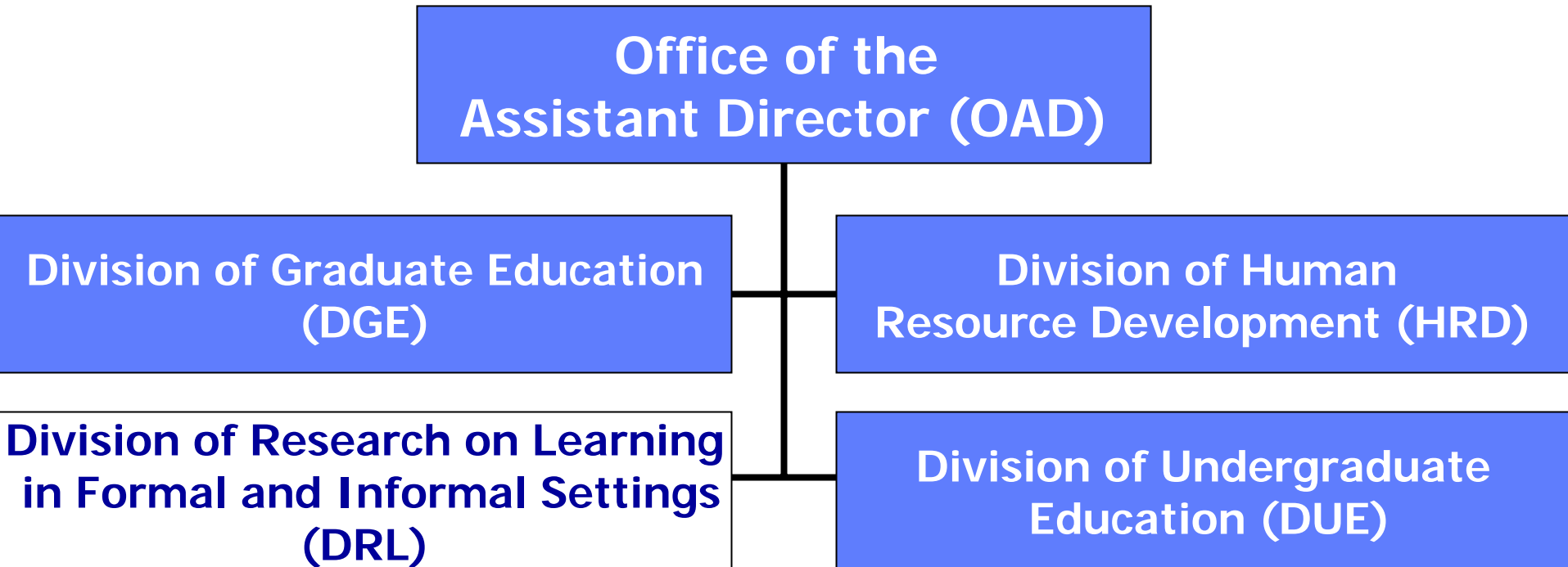
EHR's Mission

To enable ***excellence in U.S. STEM education*** at all levels and in all settings in order to support the development of ***a diverse and well-prepared workforce*** of scientists, technicians, engineers, mathematicians, and educators.

Thematic Framework for NSF's ***Education and Human Resources***

- **Broadening Participation to Improve Workforce Development**
- **Enriching the Education of STEM Teachers**
- **Promoting Learning Through Research and Evaluation**
- **Furthering Public Understanding of Science and Advancing STEM Literacy**
- **Transforming STEM Education through Cyber-enabled Learning Strategies**

EHR's Organizational Structure



FY09 Request (Millions)

Division	FY 07 Actual	FY 2008 Estimate	FY 2009 Request	Change	Percent
DRL	208.99	214.00	226.50	12.5	5.8%
DUE	204.96	211.05	219.83	8.78	4.2%
DGE	155.90	160.10	190.70	30.6	19.1%
HRD	125.80	140.45	153.38	12.93	9.2%
Total	695.65	725.60	790.41	64.81	8.9%



Division of Undergraduate Education

Mission: To promote excellence in undergraduate STEM education for all students.

Goals:

- Provide leadership
- Support curriculum development
- Prepare the workforce
- Foster connections



DUE Programs

Curriculum, Laboratory, and Instructional Development

- Course, Curriculum and Laboratory Improvement (CCLI)
- National STEM Education Digital Library (NSDL)





DUE Programs



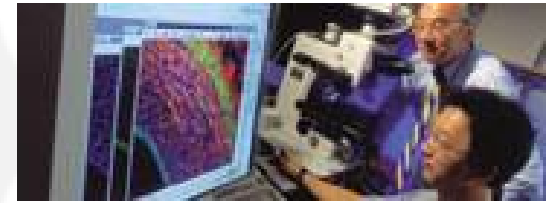
Workforce Development

- STEM Talent Expansion Program (STEP)
- Advanced Technological Education (ATE)





DUE Programs



Workforce Development – Scholarship Programs

- Federal Cyber Service: Scholarships for Service (SFS)
- Robert Noyce Scholarship Program (Noyce)
- NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)



DUE Programs

Realignment – New to DUE

- **Math and Science Partnership (MSP)**
- **Excellence Awards in Science & Engineering (EASE)**



The Distinguished Teaching Scholars (DTS) Program
The Presidential Awards for Excellence in
Mathematics and Science Teaching (PAEMST)
Program



The Presidential Awards for Excellence in Science,
Mathematics, and Engineering Mentoring
(PAESMEM)

Course, Curriculum and Laboratory Improvement (CCLI)

- **The Program was significantly revised in fiscal year 2006!**
- **3 Phases: All previous CCLI program tracks with some variations and extensions fit within the new solicitation.**
- **Dates: New solicitation [07-543](#)**
- **Phase 1 Deadline: May, 2008**
- **Phases 2 & 3 Deadline: Jan. 10, 2008**

Advanced Technological Education Program (ATE)

- The ATE program promotes **improvement in the education of science and engineering technicians** at the undergraduate and secondary school level and the educators who prepare them, focusing on technicians for high-technology fields that drive the nation's economy.
- ATE is in its 15th year of funding community colleges, having started with the Science and Advanced Technology Act of 1992 (SATA).
- FY2008-FY2010
 - **Preliminary Proposals** April 26, 24, and 23 respectively
 - **Formal Proposals** October 11, 16, and 15 respectively

STEM Talent Expansion Program (STEP)

Goal: To increase the number of students (U.S. citizens or permanent residents) RECEIVING associate or baccalaureate degrees in established or emerging fields within science, technology, engineering, and mathematics (STEM).

<http://www.nsf.gov/pubs/2007/nsf07570/nsf07570.htm>

Noyce Scholarship Program

- Funds provided to colleges and universities with strong teacher preparation programs to provide **scholarships/stipends for prospective teachers.**
- Scholarships/stipends based on academic merit, consideration of financial need, and increasing the participation of minority populations in the teaching workforce.



Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM)

- Institutional Awards and Group Awards
- Student involvement in innovative research at the forefront of the biological and mathematical sciences;
- 4 or more students in a cohort, working and learning together (at least 2 math and 2 biology majors) for group awards and eight for institutional ones;
- Long-term involvement of each student with project activities to provide immersion, intense involvement in research, and mutual reinforcement between the research and classroom activities;

Full proposal deadline: February 21, 2008



Computational Science Training for Undergraduates in Mathematical Sciences (CSUMS)

Enhance computational aspects of the education and training of undergraduate students in the mathematical sciences and to better prepare these students to pursue careers and graduate study in fields that require integrated strengths in computation and the mathematical sciences.

Full proposal deadline: October 17, 2008



DUE PIRS

Project Information Resource System

(PIRS), through which you can access updated information about DUE projects that is provided and maintained by individual principal investigators. A text search of these records will produce a "hit list" of projects that "match" your input.



QUESTIONS

Division of Research on Learning (DRL) Core Programs



- Discovery Research K-12 (DRK-12)
- Information Technology Experiences for Students and Teachers (ITEST)
- Research and Evaluation on Education in Science and Engineering (REESE)
- Informal Science Education (ISE)
- Advanced Technological Education (ATE)



Discovery Research K-12

Enables significant advances in K-12 student and teacher learning of STEM disciplines through research, development, and implementation of innovative resources, models, and technologies.

Deadline: January 28, 2008



DR-K12 Strands

➤ **Contextual Challenges**

- Assessment to improve instruction and learning
- Learning content and processes to ensure public literacy and workplace readiness

➤ **Frontier Challenges**

- Providing all students the opportunity to learn significant STEM content
- Support for STEM teachers' practice and development in an era of cyber-enabled learning
- Enhancing K-12 STEM classroom learning with local and global resources and systems

ITEST

ITEST is a initiative targeting K-12 students and teachers which focuses on the **IT and STEM workforce**. It is designed to build the knowledge base, support effective models and strategies that engage and prepare the future workforce, and foster workforce competencies. (H-1B Visa Funded)

REESE

- Advances research at the frontiers of STEM learning, education, and evaluation
- Provides foundational knowledge necessary for improving STEM teaching and learning at **all educational levels** and in all settings

Deadline: January 8, 2008

REESE Strands

➤ **Frontier Research**

- Neural basis for learning STEM
- Cognitive processes underlying STEM learning and teaching
- Measurement, modeling, and methods
- Cyber-enabled learning and teaching

➤ **Contextual Research**

- Studies of STEM teaching and learning in formal and informal settings
- Policy, evaluation, and systems studies

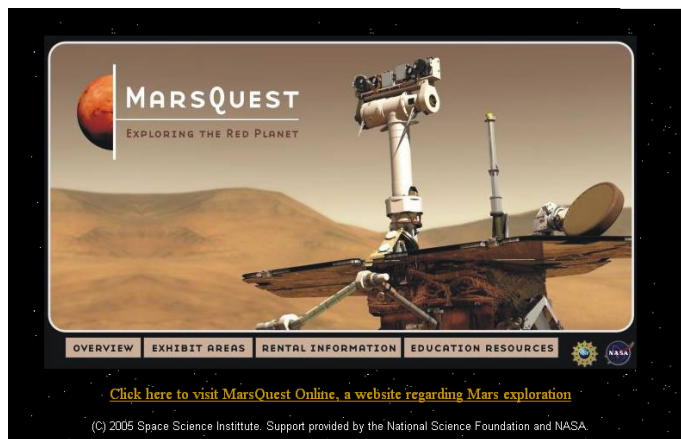


Division of Research on Learning (DRL)



Informal Education Programs

- Informal Science Education ([ISE](#))
- Communicating Research to Public Audiences ([CRPA](#))



ISE Projects

- Exhibitions at museums, science and technology centers, aquaria, botanical gardens, environmental centers, etc.
- Radio and television
- Large format films
- Community centers
- Professional development of informal science educators
- Evaluation in informal settings



QUESTIONS



Division of Graduate Education (DGE)

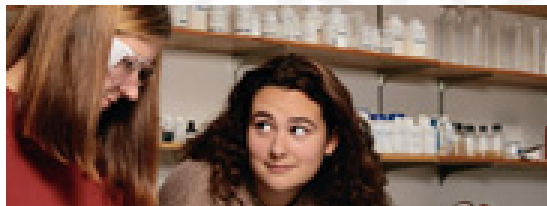
DGE programs promote the early career development of scientists and engineers by providing support at critical junctures of their careers through fellowships and traineeships.





DGE Programs

- Graduate Research Fellowship Program ([GRFP](#))
- NSF Graduate Teaching Fellows in K-12 Education ([GK-12](#))
- Integrative Graduate Education and Research Traineeship ([IGERT](#))
- Research focus on Graduate Education





Graduate Research Fellowship Program

- ▶ Purpose: To ensure the vitality of the human resource base of science and engineering in the United States and to reinforce its diversity. The program recognizes and supports outstanding graduate students in relevant science, technology, engineering, and mathematics (STEM) disciplines who are pursuing research-based master's and doctoral degrees, including women in engineering and computer and information science.
- ▶ Features
 - Portable (U.S. or foreign institution)
 - Flexible tenure options



Graduate Research Fellowship Program

➤ Eligibility Requirements

- U.S. citizen or permanent residents
- Baccalaureate degree prior to Fall
- Completion of fewer than twelve months of full-time graduate study
- Graduate study in STEM disciplines supported by NSF

➤ Fellowship Applications

- Personal profile
- Personal essay
- Previous research experience
- Proposed research plan
- Reference letters

Graduate Teaching Fellowships in K-12 Education (GK-12)

<http://www.ehr.nsf.gov/dge/programs/gk12/>



Integrative Graduate Education and Research Traineeship Program (IGERT)

<http://www.igert.org>

Purpose: To provide training opportunities for U.S. Ph.D. students that feature

- ✓ interdisciplinary cutting-edge research
- ✓ innovative educational programs
- ✓ diversity



QUESTIONS



Division of Human Resource Development (HRD)

Two-fold Mission:

To increase the participation and advancement of underrepresented minorities and minority-serving institutions, women and girls, and persons with disabilities at every level of the science and engineering enterprise.

To serve as a focal point for NSF's agency-wide commitment to enhancing the quality and excellence of science, technology, engineering, and mathematics (STEM) education and research through broadening participation by underrepresented groups and institutions.





HRD Programs



Minorities and Minority Serving Institutions

- Alliances for Broadening Participation in STEM
 - Graduate Education and the Professoriate Program (AGEP)
 - The Louis Stokes Alliance for Minority Participation Program (LSAMP) and Bridge to the Doctorate (BD) Program
- Centers for Research Excellence in Science and Technology (CREST)
- Historically Black Colleges and Universities Undergraduate Programs (HBCU-UP)
- Tribal Colleges and Universities Program (TCUP)



HRD Programs



Women and Girls

- Research on Gender in Science and Engineering (GSE)
- ADVANCE: Increasing the participation and representation of women in academic science and engineering careers (ADVANCE)



Persons with Disabilities

- Research in Disabilities Education (RDE)

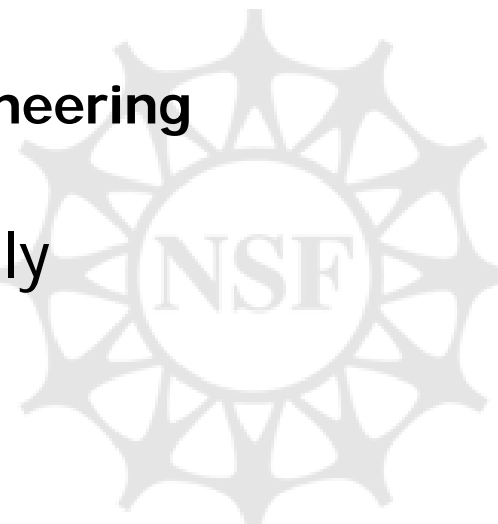
Alliances for Graduate Education and the Professoriate Program (AGEP)

- **Increase the number minority students receiving doctoral degrees in STEM**
 - develop and implement models for recruiting, mentoring, and retaining students
 - develop effective strategies for identifying and supporting students who want to pursue academic careers
- **Research on different transitions**
 - undergraduate through graduate study
 - course-taking to independent research
 - the academic environment to the workplace

Centers of Research Excellence in Science and Technology (CREST)



- **Develops outstanding centers through the integration of education and research**
 - Minority Serving Institutions are eligible
 - Promote the production of new knowledge
 - Increase the research productivity of faculty
 - Broaden student access to STEM research
 - Five-year projects, up to \$1M per year
- **Research Infrastructure for Science and Engineering (HBCU-RISE)**
 - HBCUs with STEM doctoral programs only
 - Three-year projects, \$1M total



Louis Stokes Alliance for Minority Participation Program (LSAMP)

Goal: To develop the strategies to increase the number of minority students who complete BA/BS degrees in STEM.

- Partnerships between institutions, government agencies and laboratories, industry, and professional organizations are required.
- Activities:
 - student enrichment
 - skill development and academic enrichment
 - mentoring
 - curricular and instructional improvement
 - direct student support

Tribal Colleges and Universities Program (TCUP)

Goal: To enhance the quality of STEM instructional and outreach programs at TCUs.

- Emphasis on the leveraged use of information technologies to address the digital divide
- Activities include:
 - Implementation of comprehensive institutional approaches to strengthen STEM teaching and learning
 - Improve access to, retention within and graduation from STEM programs
- Eligible institutions are Tribal Colleges and Universities, Alaskan Native and Native Hawaiian Serving Institutions

Research on Gender in Science and Engineering (GSE)

Goal: To broaden participation of girls and women in STEM.

Proposal types:

- Research informing educational practice
- Dissemination of research
- Integration of proven good practices in education

ADVANCE

Goal: To increase the participation and advancement of women in academic science and engineering careers.

- **Institutional Transformation (IT):** 5-year projects, \$2 M to \$4 M total
 - Comprehensive, institution-wide, projects to transform the organization and culture of the university or college
- **IT-Start:** 2-year planning grant projects, \$100 K to \$200 K total
 - Planning and assessment activities to prepare a competitive IT proposal.
- **Partnerships for Adaptation, Implementation and Dissemination (PAID):** One to five-year projects
 - Funding will depend on the scope of the project
 - Projects should adapt, implement and/or disseminate the exemplary programs, policies, and practices to increase the participation of women in STEM academics.

Research in Disabilities Education

Goal: To increase the participation and achievement of persons with disabilities in STEM education and careers.

Proposal types:

- Research informing educational practice
- Assistive technologies and technology for learning
- Dissemination of research
- Regional Alliances for persons with disabilities in STEM education



NSB Merit Review Criteria (NSF 04-23)

Intellectual Merit

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?

How well qualified is the nominee (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.)

To what extent does the proposed activity suggest and explore creative, original or **potentially transformative** concepts?

How well conceived and organized is the proposed activity? Is there sufficient access to resources?

Transformative Research

- ❖ The term transformative research is being used to describe a range of endeavors which promise extraordinary outcomes, such as: revolutionizing entire disciplines; creating entirely new fields; or disrupting accepted theories and perspectives—in other words, those endeavors that have the potential to change the way we address challenges in science, engineering, and innovation.



NSB Merit Review Criteria (NSF 04-23)

Broader Impacts

How well does the activity advance discovery and understanding while promoting teaching, training, and learning?

How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?

To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?

Will the results be disseminated broadly to enhance scientific and technological understanding?

What may be the benefits of the proposed activity to society?



Getting Started

- Start **EARLY**
- Get acquainted with **FASTLANE**
(www.FastLane.nsf.gov)
- **Read** the Program Solicitation and *follow the guidelines.*
- **Contact** a program officer to discuss your idea; this provides useful information and often helps you to refine your idea; it may also prevent you from applying to the wrong program (*e-mail* is best).
- Become an NSF reviewer.
- Subscribe to Custom News Services at NSF
<http://www.nsf.gov/mynsf/>



QUESTIONS