National Science Foundation (NSF)
Directorate for Education
and Human Resources (EHR)
Overview for FY 2011

Building Bridges to the Future

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Presentation Overview
NSF Directorate for Education and Human Resources (EHR) - FY 2011

- About EHR
- Connecting Learning and Education for a Knowledge Society
- The EHR Enterprise at NSF: Program Overview
- Coordination and Cooperation with other NSF Directorates
- Collaboration with other Federal Agencies

Acknowledgement:
James Colby
Office of the Assistant Director
Education Directorate
What Does EHR Seek to Achieve?

- Build a globally competitive, diverse STEM workforce
- Inspire and engage the public as science learners
- Advance understanding and anticipate the form and value of tomorrow’s learning
- Innovate to meet societal challenges.
EHR’s Organizational Structure

Office of the Assistant Director

Division of Graduate Education (DGE)

Division of Human Resource Development (HRD)

Division of Research on Learning in Formal and Informal Settings (DRL)

Division of Undergraduate Education (DUE)
<table>
<thead>
<tr>
<th>Division</th>
<th>FY 09 Actual</th>
<th>FY 10 Estimate</th>
<th>FY 11 Request</th>
<th>Change Over FY10</th>
<th>Percent Change from FY10</th>
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<tbody>
<tr>
<td>DRL</td>
<td>226.68</td>
<td>242.00</td>
<td>247.85</td>
<td>5.85</td>
<td>2.40</td>
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<tr>
<td>DUE</td>
<td>283.08</td>
<td>292.41</td>
<td>289.98</td>
<td>-2.43</td>
<td>-0.08</td>
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<td>DGE</td>
<td>181.67</td>
<td>181.44</td>
<td>185.26</td>
<td>3.82</td>
<td>2.10</td>
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<td>HRD</td>
<td>154.08</td>
<td>156.91</td>
<td>168.91</td>
<td>12.00</td>
<td>7.60</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$846.23</strong></td>
<td><strong>$872.76</strong></td>
<td><strong>$892.00</strong></td>
<td><strong>$19.24</strong></td>
<td><strong>2.20%</strong></td>
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</tbody>
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Myths About EHR

• EHR does not accept RAPID or EAGER proposals.
• EHR does not accept CAREER proposals.
• Graduate Research Fellowships do not include STEM education as a field of study.
• EHR does not fund international activity.

Anytime, Anywhere, Anybody Technology
The EHR Enterprise at NSF: Program Overview

- Investments across STEM fields to support education achievement and workforce development:
  - Education Research, Development, Evaluation
  - Teacher Development, Capacity Building and Partnerships in K-12 Education
  - Broadening Participation; Support for Minority Serving Institutions
  - STEM Career Pathways: Undergraduate Education
  - Public Engagement with Science
  - Innovation in Graduate Education
Education Research, Development, Evaluation

**Discovery Research K-12 (DR-K12)** enables advances in student and teacher learning of the STEM disciplines through research and development on innovative resources, models, and technologies.

**Research and Evaluation on Education in S&E (REESE)** advances research at the frontiers of STEM learning, education, and evaluation, and provides the foundational knowledge necessary to improve STEM teaching and learning at all educational levels and in all settings.

The **Fostering Interdisciplinary Research on Education (FIRE)** strand in the **REESE** program seeks proposals by which scholars can cross disciplinary boundaries and facilitate the development of innovative theoretical, methodological, and analytic approaches to STEM education issues of national importance.
Research on Gender in S&E (GSE) seeks to broaden the participation of girls and women in all fields of STEM education by supporting research, the diffusion of innovations, and extension services.

Research in Disabilities Education (RDE) seeks to increase the participation of persons with disabilities in STEM education and careers. Emphasis is placed on contributing to the knowledge base.

Undergraduate student teachers use SimSchool© module to learn to how to teach students with disabilities.
Promoting Research & Innovation in Methodologies for Evaluation (PRIME) supports research on evaluation; explores innovative new approaches for determining impacts and usefulness of STEM education activities.

Transforming STEM Learning (TSL) program invites interdisciplinary proposals to study prototypes for innovations like virtual schools; and design and conduct exploratory development of new, potentially transformative models for STEM learning environments.
<table>
<thead>
<tr>
<th>Research Programs</th>
<th>Research and Development Programs</th>
<th>Programs with Research Tracks</th>
<th>Programs to Support Development of Education Research Workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Evaluation on Education in Science and Engineering (REESE)</td>
<td>Cyberlearning Transforming Education (CTE) – Proposed for FY2011 with support across five EHR programs [DR-K12; ISE; TUES; CREST; NSDL]</td>
<td>Innovative Technology Experiences for Students and Teachers (ITEST)</td>
<td>Fostering Interdisciplinary Research on Education (FIRE) – a strand of the Research and Evaluation on Education in Science and Engineering (REESE) program.</td>
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<tr>
<td>PRIME</td>
<td>Discovery Research K-12 (DR-K12)</td>
<td>Informal Science Education (ISE)</td>
<td>Graduate Research Fellowships (GRF)</td>
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<tr>
<td>Research in Disabilities Education (RDE)</td>
<td>Climate Change Education Partnerships (CCEP) – with support from the BIO and GEO Directorates, and OPP</td>
<td>Historically Black Colleges and Universities, Undergraduate Program (HBCU-UP)</td>
<td>Faculty Early Career Development (CAREER) proposals to the EHR Directorate</td>
</tr>
<tr>
<td>Research on Gender in Science and Engineering (GSE)</td>
<td>Math and Science Partnership (MSP)</td>
<td>Louis Stokes Alliances for Minority Participation (LSAMP)</td>
<td></td>
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<tr>
<td>STEM Talent Expansion (STEP) – Track II</td>
<td>Transforming Undergraduate Education in STEM (TUES)</td>
<td>Advanced Technological Education (ATE)</td>
<td></td>
</tr>
<tr>
<td>Math and Science Partnership (MSP) Research, Evaluation, and Technical Assistance (RETA)</td>
<td>Transforming STEM Learning (TSL)</td>
<td></td>
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</tbody>
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Education Research Elsewhere at NSF

• Mathematics and Physical Sciences Directorate [Education and Interdisciplinary Research]

• Engineering Directorate [Innovations in Engineering Education, Curriculum, and Infrastructure program]

• Computer and Information Science and Engineering Directorates [Proposed FY2011 Program in Cyberlearning for Transforming Education (CISE/EHR/SBE/OCI); a new planning effort underway for a program on research on learning in the context of computing education]

• Social and Behavioral Sciences Directorate [Science of Learning Centers, Developmental and Learning Sciences, Social Psychology, and Linguistics]
Teacher Development, Capacity Building and Partnerships in K-12 Education

Innovative Technology Experiences for Students and Teachers (ITEST) program supports research about the growing demand for professionals and information technology workers in the U.S. and seeks solutions to help ensure the breadth and depth of the STEM workforce.

Robert Noyce Teacher Scholarship (NOYCE) program seeks to encourage talented STEM majors and professionals to become K-12 mathematics and science teachers and provides scholarships and stipends for students holding STEM degrees who earn a teaching credential and commit to teaching in high-need K-12 school districts.

Cal State, Long Beach, NOYCE Scholars
Teacher Development, Capacity Building and Partnerships in K-12 Education [cont’d]

**Math and Science Partnership (MSP)** program is a major R&D effort supporting innovative partnerships to improve K-12 student achievement in math and science. MSP projects contribute to what is known in math and science education and serve as models that have a sufficiently strong evidence/research base to improve student outcomes.

Appalachian MSP Project

**NSF Graduate STEM Fellows in K-12 (GK-12)** enhances graduate students’ teaching skills and improves STEM teaching and learning within K-12 classrooms through sustained partnerships between institutions of higher education and local school districts.

U. Arkansas GK-12 Project
Public Engagement in Science

Informal Science Education (ISE) program supports innovation in anywhere, anytime, lifelong learning, through investments in research, development, infrastructure, and capacity-building. ISE also supports PIs of NSF-funded research projects for Communicating Research to Public Audiences.

Climate Change Education (CCE) supports a broad range of efforts to enhance climate literacy and to enable individuals and communities to make informed, responsible decisions regarding actions affecting climate.
Advanced Technological Education (ATE) focuses on education of technicians for high-technology fields that drive our nation's economy. Partnerships among academia and industry are prominent features.

STEM Talent Expansion Program (STEP) supports projects leading to an increase in the number of students earning STEM degrees. Educational research projects on degree attainment in STEM are encouraged.

NSF Scholarships in STEM (S-STEM) makes grants to institutions of higher education to support scholarships for academically talented, financially needy students for an associate, baccalaureate, or graduate level degree.
**Federal Cyber Service: Scholarship for Service (SFS)** supports scholarships and capacity building activities designed to increase the number of qualified students entering the fields of information assurance and computer security.

Customized, scaled model of a city water supply system used by NSF Cyber Corps students to test operating software weaknesses.

**Transforming Undergraduate Education in STEM (TUES)** supports efforts to create, adapt, and disseminate new learning materials and teaching strategies, develop faculty expertise, implement educational innovations, assess learning and evaluate innovations, and conduct research on STEM teaching and learning.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>1</td>
<td>Important, timely topics &amp; responsive to needs</td>
<td>Sufficient detail and clear plans</td>
</tr>
<tr>
<td>2</td>
<td>PI's strong</td>
<td>Evaluation plan good</td>
</tr>
<tr>
<td>3</td>
<td>Collaboration details</td>
<td>Activities doable &amp; related to outcomes</td>
</tr>
<tr>
<td>4</td>
<td>Potential for involving women and minorities</td>
<td>Dissemination good &amp; contributes to knowledge base</td>
</tr>
<tr>
<td>5</td>
<td>Dissemination good &amp; contributes to knowledge base</td>
<td>Potential for involving women and minorities</td>
</tr>
<tr>
<td>6</td>
<td>Large impact</td>
<td>Build on prior work or products</td>
</tr>
<tr>
<td>7</td>
<td>Build on prior work or products</td>
<td>Innovative or novel</td>
</tr>
<tr>
<td>8</td>
<td>Evaluation plan good</td>
<td>Large impact</td>
</tr>
<tr>
<td>9</td>
<td>Innovative or novel</td>
<td>Collaboration details</td>
</tr>
<tr>
<td>10</td>
<td>Non-traditional pedagogy</td>
<td>Important, timely topics &amp; responsive to needs</td>
</tr>
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</table>
Innovation in Graduate Education

Integrative Graduate Education and Research Traineeship (IGERT) supports education of U.S. Ph.D. scientists and engineers with the deep interdisciplinary knowledge and technical, professional, and personal skills to become leaders and creative agents for change.

IGERT-funded researcher develops hand-held terahertz spectrometer.
Innovation in Graduate Education [cont’d]

Graduate Research Fellowships (GRF) awards support for graduate study leading to research-based masters or doctoral degrees. Provides three years of support within a five-year period, which may be used at an institution in the U.S. or abroad.

NSF Graduate STEM Fellows in K-12 (GK-12) provides funding to broadly prepare graduate students for professional careers and, through interactions with teachers in K-12 schools, improve their communication and teaching skills and enrich STEM instruction in K-12 schools.
Support to Minority-Serving Institutions

**Tribal Colleges and Universities (TCUP)** program enhances the quality of STEM instructional and outreach programs at Tribal, Alaska Native-serving, and Native Hawaiian-serving institutions.

**Centers of Research Excellence in Science and Technology (CREST)** enhances research capabilities of minority serving institutions and their faculty through effective integration of education and research, and expands the presence of students historically underrepresented in STEM disciplines.

**Historically Black Colleges and Universities—Undergraduate Program (HBCU-UP)** seeks to increase the quality of STEM education at Historically Black Colleges and Universities, addressing their STEM needs goals and mission.
CREST Program Mission

CREST makes resources available to enhance the research capabilities of minority-serving institutions through the establishment of centers that effectively integrate education and research. CREST promotes the development of new knowledge, enhancements of the research productivity of individual faculty, and an expanded diverse student presence in STEM disciplines.

(1) CREST Centers (5 years, $5M; renewable)

(2) HBCU-RISE Awards (3 years, $1M)
Examples of CREST OUTCOMES

- Tuskegee University CREST grant in structural nano-composites (1998-2008)
  - New doctoral program in materials science
  - 14+ PhD’s; 52 MS; 78 undergraduates
  - 154 archival and 198 conference papers
  - Multiple research partnerships


- NCCU CREST (2008-2013) is leading a multi-university effort to develop the world’s most intense positron source for material characterization.
Large-Scale Programs for Broadening Participation

Research in Disabilities Education (RDE) seeks to increase the participation of persons with disabilities in STEM education and careers. Emphasis is placed on research to expand the knowledge base in disabilities education.

Alliances for Graduate Education and the Professoriate (AGEP) aims to increase the number of underrepresented minorities receiving PhD degrees in STEM.

Undergraduate research fellows with disabilities work at U. Southern Main laboratory.
Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE) develops systematic approaches to increase the representation and advancement of women in academic science and engineering careers.

Louis Stokes Alliances for Minority Participation (LSAMP) seeks to increase the quality and quantity of students receiving baccalaureate degrees in STEM fields, and provides a “Bridge to the Doctorate” component.
EHR Coordination/Cooperation with other NSF Directorates

Selected Cross-Cutting Programs

EHR: Bridges to Addressing Societal Challenges

Climate Change

Energy

Cyber-security

New Emerging STEM Areas

Public Understanding
NSF Collaboration with other Federal Agencies
Glossary of Principal EHR Programs

- **AGEP**: Alliances for Graduate Education and the Professoriate

- **ATE**: Advanced Technological Education

- **CREST**: Centers of Research Excellence in Science and Technology

- **DR-K12**: Discovery Research K-12

- **Federal Cyber Service**: Scholarship for Service (SFS)

- **FIRE**: Fostering Interdisciplinary Research on Education

- **GRF**: Graduate Research Fellowships

- **GSE**: Research on Gender in Science and Engineering

- **HBCU-UP**: Historically Black Colleges and Universities, Undergraduate Program

- **ISE**: Informal Science Education

- **ITEST**: Innovative Technology Experiences for Students and Teachers

- **LSAMP**: Louis Stokes Alliances for Minority Participation
Glossary of Principal EHR Programs

- **MSP**: Math and Science Partnership
- **NSDL**: National STEM Education Distributed Learning
- **S-STEM**: NSF Scholarships in STEM
- **NOYCE**: Robert Noyce Teacher Scholarship Program
- **PRIME**: Promoting Research and Innovation in Methodologies for Evaluation
- **REESE**: Research and Evaluation on Education in Science and Engineering
- **RDE**: Research in Disabilities Education
- **STEP**: Science Technology, Engineering, and Mathematics Talent Expansion
- **TCUP**: Tribal Colleges and Universities Program
- **TSL**: Transforming STEM Learning
- **TUES**: Transforming Undergraduate Education in STEM
Visiting the EHR Website