

**NSF's Division of Undergraduate
Education:
Context, Mission, and Programs**



**CSAAPT
April 23, 2016
Ashland, VA**



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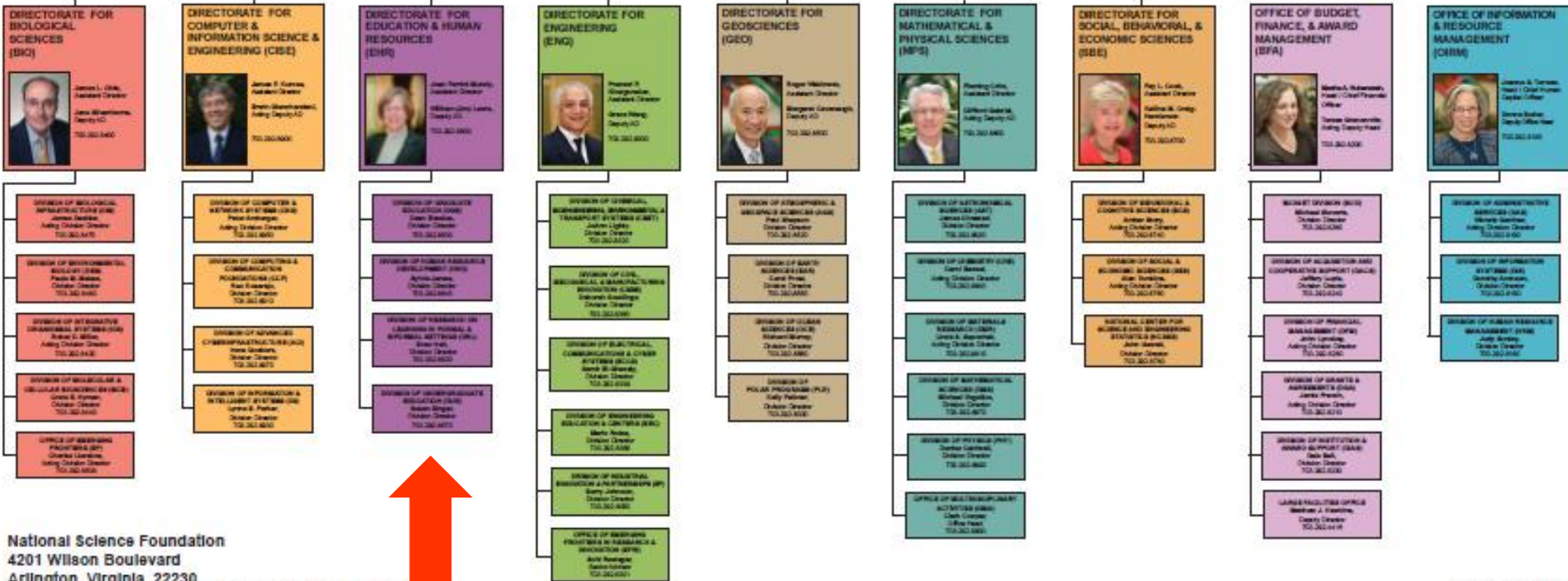
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Federal Context

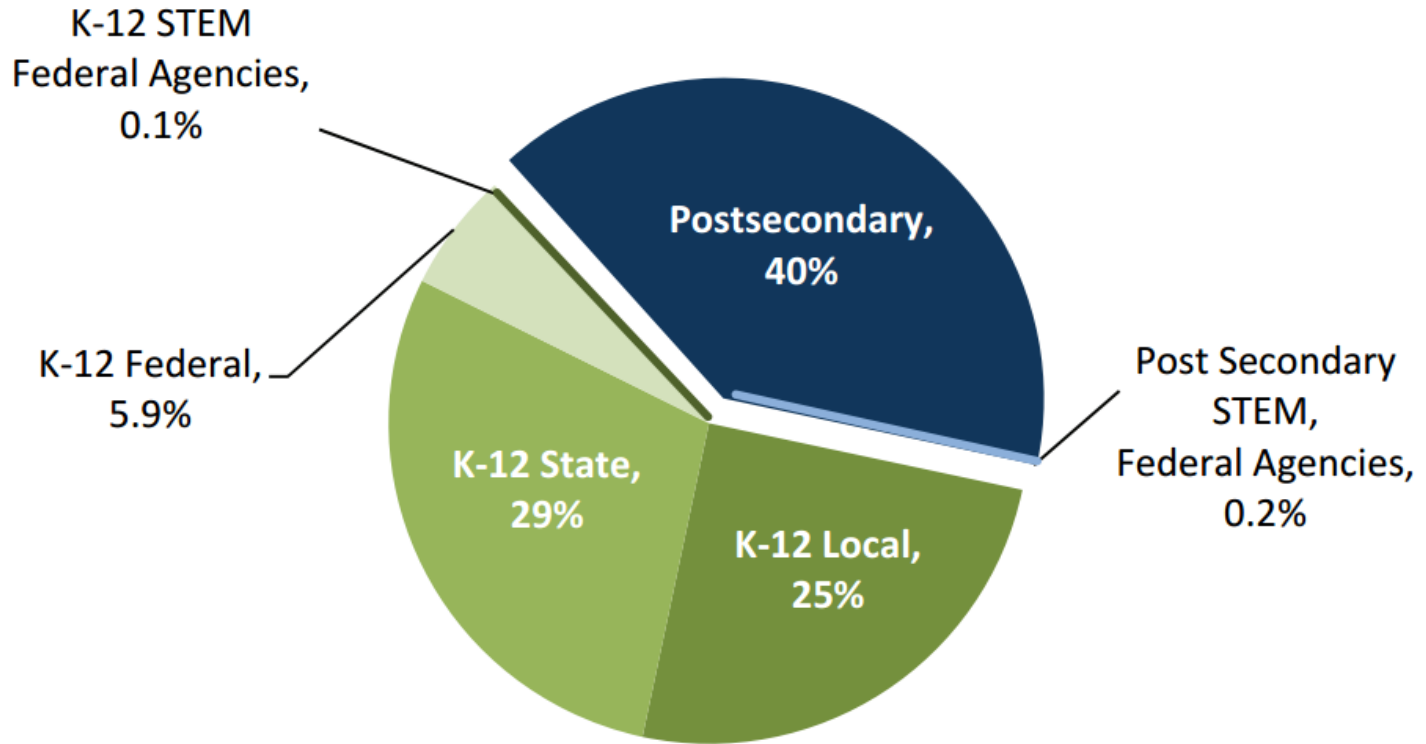
The National Science and Technology Council's Federal STEM Education 5-Year Strategic Plan:

- prepare 100,000 high-quality K-12 STEM teachers by 2020;
- strengthen the infrastructure for supporting STEM instruction and engagement;
- increase the number of undergraduates with a STEM degree by one million over the next decade; and
- broaden participation in STEM fields by underrepresented groups.



Figure 1: Total Education Spending in the United States

Total Education Spending (\$1.1 T)



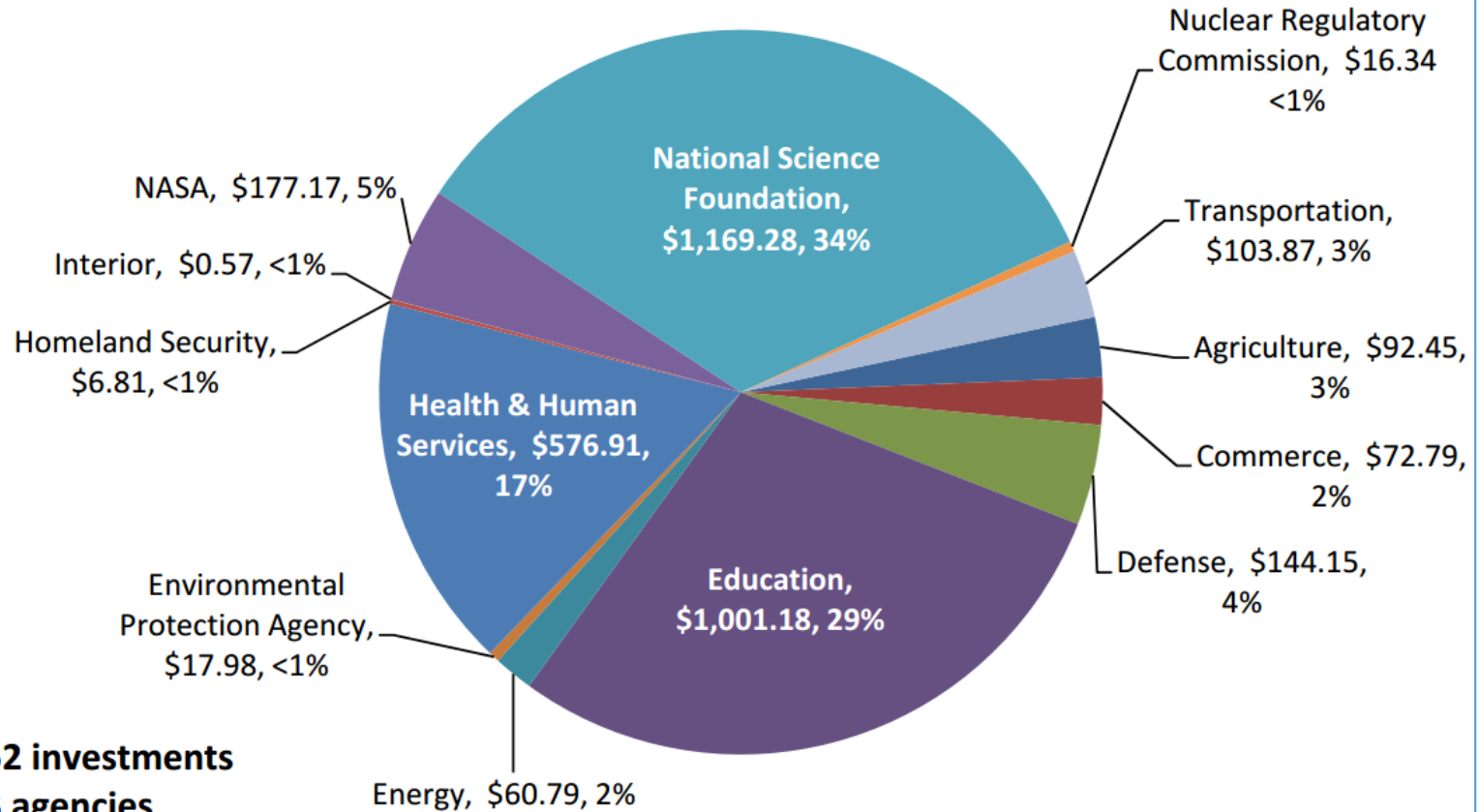
US Department of Education Digest of Educational Statistics, 2009
via CoSTEM Report (2011)



Federal Investment in STEM Education

Figure 3: Federal STEM Education Investments by Agency

Federal STEM Education Investments by Agency (\$3,440 M)



252 investments
13 agencies

Source: CoSTEM Report (2011)



Figure B10: DOEd Investments by Objective

Department of Education Investments by Objective (\$1,001 M)

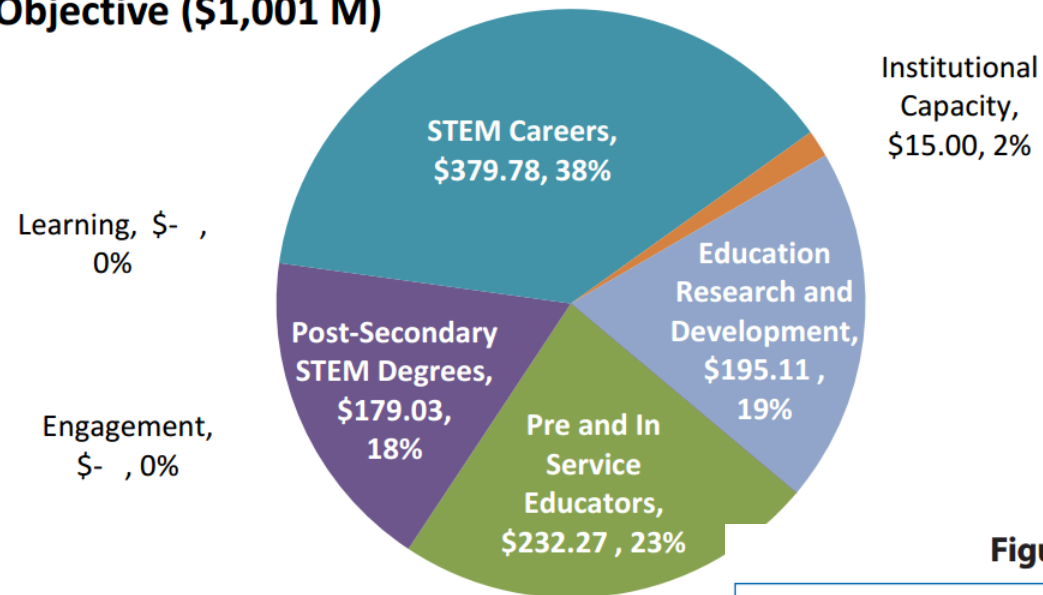
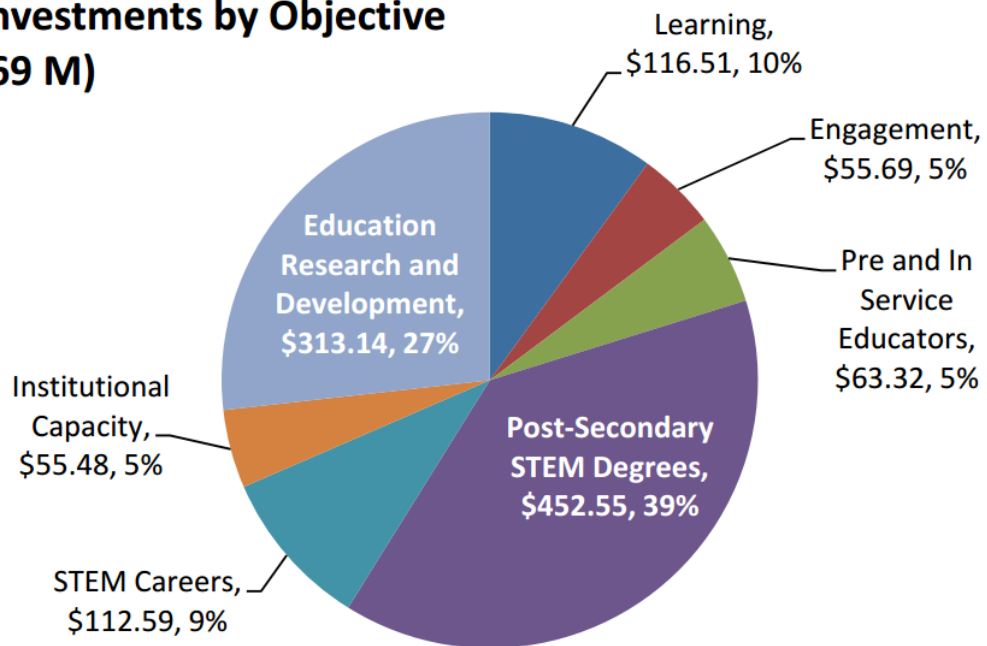


Figure B22: NSF Investments by Objective

NSF Investments by Objective (\$1,169 M)



Source: CoSTEM Report (2011)



Implications

- Act catalytically
- “Scaling” or widespread adoption and/or adaptation of models
 - Dissemination → Propagation
- There is also a research agenda regarding how to do this “optimally”
 - For whom, under what circumstances, and why?
- Collaborations/partnerships are vital



National Context

- A National Association of Educational Progress (NAEP) report, and many others, continue to raise concerns about a range of issues: testing, insufficient use of evidence-based practices in teaching, meeting individual students' needs in diverse classrooms, etc.



EHR: Goals

- Prepare the **next generation of STEM professionals** and attract/retain more Americans to STEM careers
- Develop a robust research community that can conduct **rigorous research and evaluation** to support excellence in STEM education and that **integrates research and education.**
- Increase **the technological, scientific and quantitative literacy** of all Americans so that they can exercise responsible citizenship and live productive lives in an increasingly technological society.
- Broaden participation (**individuals, geographic regions, types of institutions, STEM disciplines**) and close achievement gaps in all STEM fields.



EHR: Thematic Framework

- **Learning and Learning Environments**

Develop understanding of the foundations of STEM learning; emerging contexts and tools; building new environments for learning in a technological society

- **Broadening Participation in STEM**

Increase the scientific workforce by engaging and building capacity in all people in STEM learning and professional training

- **STEM Professional Workforce Development**

Improve the education and preparation of a STEM professional workforce



EHR: Investments

- A wide-ranging portfolio
- Evidence-based
- Evidence-generating



DUE

**Division of
Undergraduate
Education**

HRD

**Division of Human
Resource
Development**

**EHR
Divisions**

DRL

**Division of
Research on
Learning in Formal
and Informal
Settings**

DGE

**Division of
Graduate Education**



DUE
Division of
Undergraduate
Education

EHR
Divisions



ATE

Advanced
Technological
Education

S-STEM

NSF Scholarships in
STEM

DUE Programs

IUSE: EHR

Improving
Undergraduate
STEM Education

Noyce

Robert Noyce
Teacher Scholarships



ATE Program

- Education of science and engineering technicians for high-technology fields that drive the nation's economy.
- Community and Technical Colleges (2-yr institutions)
- Partnerships: Industry, Economic Development Agencies and Secondary and 4-yr institutions
- Pathways: 7-12, 2- and 4-yr institutions



ATE Program

- Supports the education of science and engineering technicians for the high-tech fields that drive the nation's economy
- Three tracks: Projects, Centers, & Targeted Research
- Education/industry partnerships are a hallmark
- Community and technical colleges must be in leadership roles
- Solicitation: NSF 14-577
- Next proposal deadline: October 6, 2016



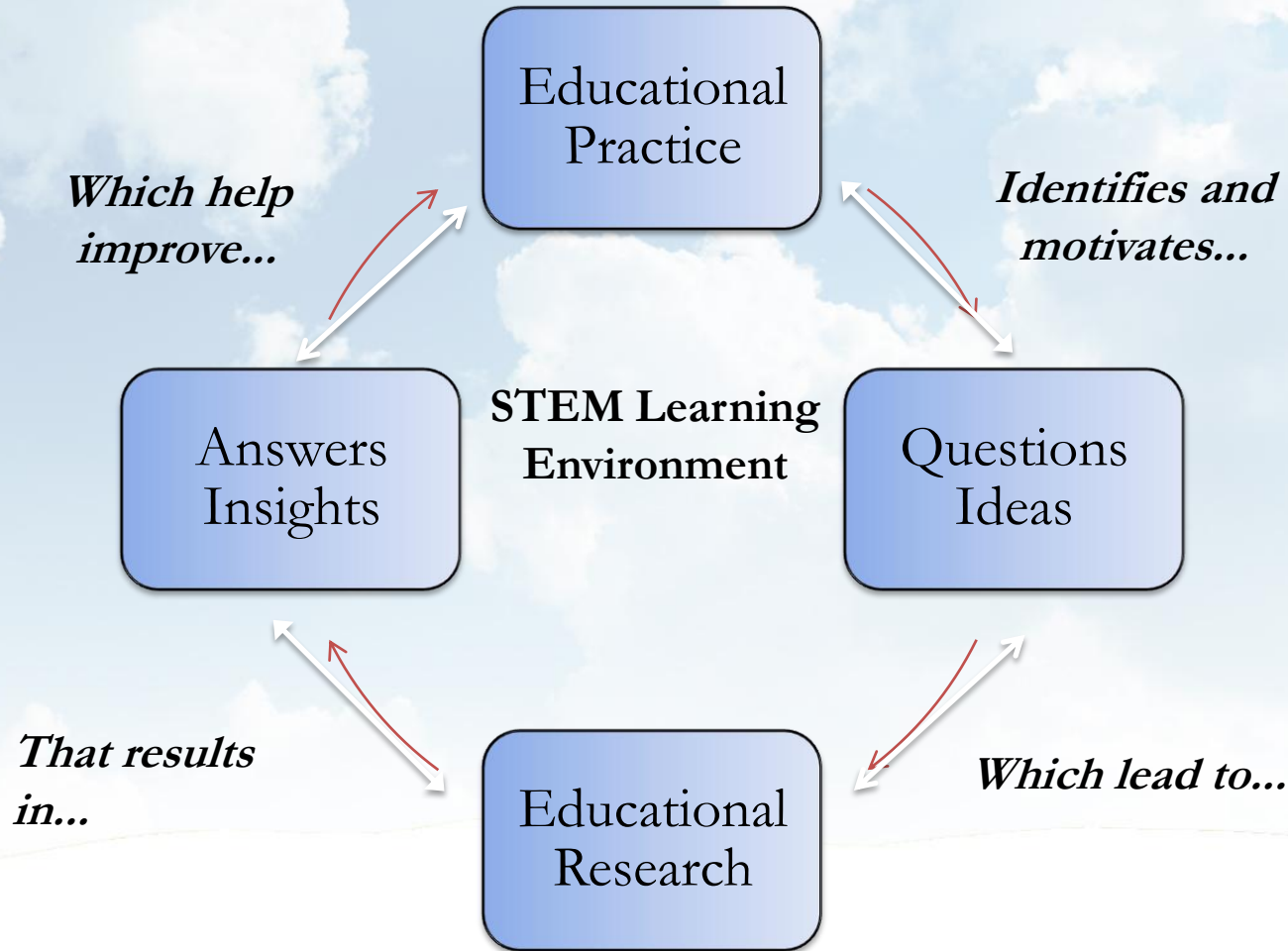
IUSE: EHR

Program Goals

- **Improve STEM Learning & Learning Environments**
 - Improve the knowledge base for defining, identifying, and innovating effective undergraduate STEM education teaching and learning
- **Broaden Participation & Institutional Capacity for STEM Learning**
 - Increase the number and diversity of undergraduate students
- **Build the Professional STEM Workforce for Tomorrow**
 - Improve the preparation of undergraduate students

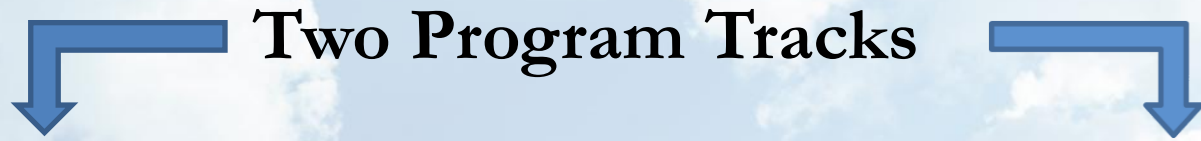


Educational Practice & Research Cycle



IUSE: EHR Program

NSF 15-585



Engaged Student Learning

Institutional and Community Transformation

Two Approaches

Two Approaches

**Exploration
& Design**
(smaller scale)

**Development
& Implementation**
(larger scale)

**Exploration
& Design**
(smaller scale)

**Development
& Implementation**
(larger scale)

Up to \$300K
Up to 3 yrs

Level I:
Up to \$600K Up to 3 yrs
Level II:
\$601K to \$2M Up to 5 yrs

Up to \$300K
Up to 3 yrs

Up to \$3M
Up to 5 yrs

Deadline
Exploration/Design:
November 2, 2016

Deadlines
Development/Implementation:
January 13, 2016 and January 11, 2017

Focuses on design, development, implementation of and research on STEM learning models, approaches, and tools

Focus on approaches to increase the propagation of highly effective methods of STEM teaching and learning





Two Program Tracks

Engaged Student Learning

Institutional and Community Transformation



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Exploration & Design
(smaller scale)

Development & Implementation
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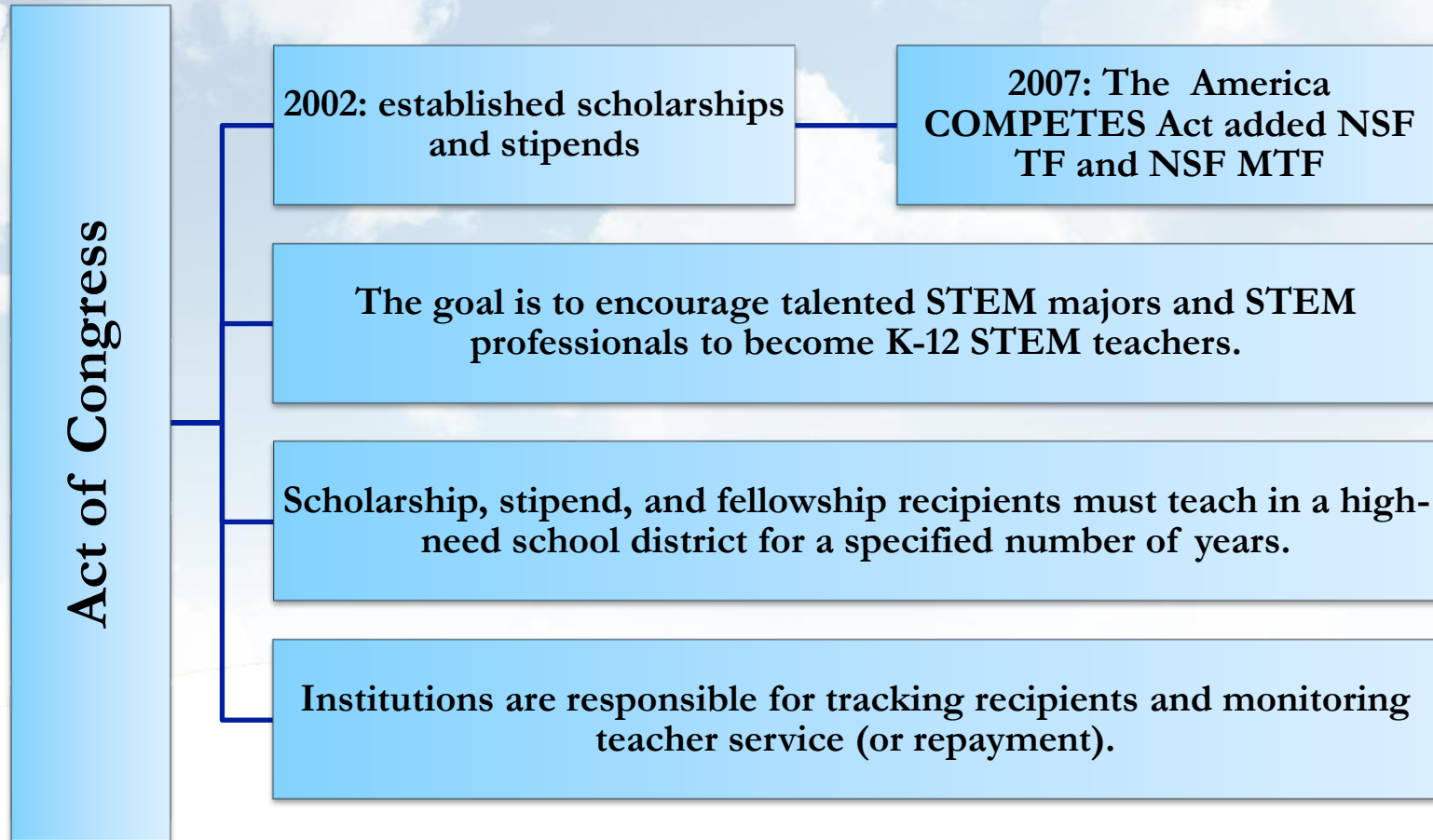
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Robert Noyce Teacher Scholarship Program



Robert Noyce

Teacher Scholarship Program

- **Noyce Scholarship Track:**
 - supports institutional scholarships and programs for STEM majors or in-service K-12 teachers who commit to teach in high-needs school districts, or
 - research on best practices for STEM teacher development
- **Capacity-Building Track:**
 - supports the establishment of infrastructure and partnerships for a future Noyce project
- **Solicitation:** NSF 16-559
- **Next Proposal Deadline:** September 6, 2016



Track 1 (S&S)
Scholarships & Stipends

undergraduate STEM majors and/or
STEM career changers

Track 2 (TF)
NSF Teaching Fellowships

STEM career changers

**Robert Noyce
Teacher
Scholarship
Program**

Track 3 (MTF)
**NSF Master Teaching
Fellowships**

exemplary, experienced STEM teachers

Track 4 (Noyce Research)

Research on the Preparation,
Recruitment, and Retention of K-12
STEM Teachers



EHR
Divisions

DRL
Division of
Research on
Learning in Formal
and Informal
Settings



DRL Mission

To promote innovative research, development, and evaluation of learning and teaching across all STEM disciplines by advancing cutting-edge knowledge and practices in both formal and informal learning settings.



HRD

**Division of Human
Resource
Development**

**EHR
Divisions**



HRD Mission

To grow the innovative and competitive U.S. science, technology, engineering and mathematics (STEM) workforce that is vital for sustaining and advancing the Nation's prosperity by supporting the **broader participation and success** of individuals currently **underrepresented in STEM** and the institutions that serve them.



EHR
Divisions

DGE
Division of
Graduate Education



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.



EHR-wide programs



ECR: EHR Core Research

- NSF 15-509, due date September 28, 2016
- Introduced in 2013 to support *fundamental research to generate foundational knowledge* in the following focal areas:
 - STEM learning and STEM learning environments
 - STEM professional workforce development
 - Broadening participation in STEM
- From the onset, encouraging integration across the focal areas and collaboration among researchers in related disciplines, including social and behavioral sciences.
- Funding and management is shared across all four divisions in EHR.



Goals of ECR

- Investing in fundamental research in STEM education about critical areas that are essential, broad, and enduring.
- Seeking proposals that help synthesize, build, and/or expand research foundations in the focal areas.
- Contributing to the accumulation of robust evidence to inform efforts to understand, build theory to explain, and suggest interventions and innovations.
- Addressing persistent challenges in STEM interest, education, learning, participation and workforce development.
- Developing foundational knowledge in STEM learning and learning contexts, both formal and informal, from childhood through adulthood, for all groups, and from the earliest developmental stages of life through participation in the workforce.



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- Broaden participation (**individuals, geographic regions, types of institutions, STEM disciplines**) and close achievement gaps in all STEM fields.



Questions?

