STEM Funding Opportunities at the U.S. Department of Education

Dr. Ellen Lettvin
Robert Noyce Senior Fellow in Informal STEM Learning
U.S. Department of Education
July 27, 2016
OVERVIEW

- STEM at ED
- STEM as equity issue
- Inter-agency STEM and STEM networks
- STEM funding opportunities
- Highlights of STEM in ESSA
- CS for All
- STEM and early learning
- Q & A
STEM at the U.S. Department of Education (ED)
STEM OFFICE VISION

STEM learning is important for everyone. The relevant, real-life skills that people develop when learning STEM subjects help make everyone better problem-solvers and citizens. To achieve the vision of STEM literacy for all, the Office of STEM at the U.S. Department of Education seeks to:

- **Maximize access** to high-quality STEM education for all students, from pre-k through post-secondary school, both in and outside the classroom.
- **Inspire and prepare** students to achieve proficiency in the STEM disciplines and to consider pursuing careers in STEM fields, particularly women, minorities, and special needs populations.
- **Support educators** who teach STEM subjects to ensure they have access to the tools and resources they need to prepare students with the STEM skills needed for college, career and life.
- Identify and support the implementation of innovative and scalable approaches and research strategies that improve the effectiveness of STEM education in formal and informal learning environments.
STEM OFFICE STRATEGIES

TO IMPACT OUR PRIORITY AREAS, WE EMPLOY THE FOLLOWING STRATEGIES:

- Strengthen existing Department of Education STEM programs
- Enhance inter-agency collaboration focused on STEM
- Communications and Outreach
- External Partnerships
- Influence and Shape the Future of STEM Education
Emerging areas of opportunity:
- Early Learning
- Computer science
- Synergies between formal and informal STEM
- Coordinating with STEM Learning Ecosystems

Key focus areas:
- Equity
- STEM proficiency for all students
- STEM support for all teachers
- Evidence-based practice

Types of support:
- Formula grants (support from ED directly to states based on formula)
- Discretionary grants (support from ED directly to grantees)
STEM INVESTMENT AT ED

STEM IS A PRIORITY IN OVER 60 GRANT ANNOUNCEMENTS

- Math Science Partnerships
- Career and Technical Education: Basic Grants to States
- Education Research Grants – Effective Teachers and Teaching
- Hispanic Serving Institutions STEM and Articulation Programs
- Investing in Innovation (I3)
- 21st Century Community Learning Centers (21st CCLC)
- Teacher Incentive Fund (TIF)
- Teacher Quality Partnerships
- Magnet Schools Assistance Program
- Race to the Top
- Ready to Learn
- Supporting Effective Educator Development (SEED)
- Green Ribbon Schools
- Minority Science and Engineering Improvement Program
- Special Education Research Grants – Professional Development
- Special Programs for Migrant Students
- Teachers for a Competitive Tomorrow (TCT)
- Arts in Education
- Institute for Education Sciences
STEM as Equity Issue
WHY STEM?
IMPORTANT TO OUR ECONOMIC FUTURE

Figure 1: Sustained Growth is Projected for STEM Occupations
Employment as a Percentage of 2006 Employment, by Occupation

Source: Chairman’s staff of the Joint Economic Committee based on data from the Bureau of Labor Statistics. The BLS does not project employment for individual years from 2010-20. For the purposes of this chart, Life Sciences excludes Medical Sciences.
STEM AS EQUITY ISSUE? WAGE DIFFERENTIAL

Source: US Census Bureau, BLS, CPI, smoothed over 12-month window
WHY STEM?
IT’S MORE ABOUT THE SKILLS

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3 The MetLife Survey of THE AMERICAN TEACHER Preparing Students for College and Career
STEM AND EQUITY
LESS ACCESS TO ADVANCED COURSES

African American and American Indian students have less access to a full range* of math and science courses in their high schools.

Source: US Department of Education, Office for Civil Rights, Civil Rights Data Collection, 2011-2012
* Algebra I, Geometry, Algebra II, Calculus, Biology, Chemistry, Physics
By the time they reach 6th grade, middle class kids have likely spent 6,000 more hours learning than kids born into poverty.

**THE 6,000 HOUR LEARNING GAP**

**PARENTS**
- That’s how much more time Jack’s family members are likely to have spent reading to him, compared to Mike’s.

**PRE-SCHOOL**
- That’s the difference between having and not having Pre-K education, which kids like Mike access at significantly lower levels.

**AFTER-SCHOOL & EXTRA-CURRICULARS**
- Kids like Mike lose more ground in grade school. They’re significantly less likely to be able to enroll in enriching activities.

**SUMMER LEARNING**
- Children like Jack are eight times more likely than Mike to enjoy camp or another summer learning opportunity.

**FIELD TRIPS**
- That’s how much more time Jack has likely spent than Mike visiting zoos, museums or other such places during summers.

**6,000 HOURS DIFFERENCE BY THE 6TH GRADE.**

Learning time is a resource that is unequally distributed, and disadvantaged students suffer the consequences. While middle class children learn to read, create, persist and problem-solve at home and through after-school and summer experiences, parents stressed by poverty are far less likely to be able to ensure those opportunities for their children.

**SOURCES:**
Estimated time spent in school and informal learning environments. This diagram shows the relative percentage of waking hours that people across the lifespan spend in formal educational environments and other activities. (Stevens, R. Bransford, J. & Stevens, A., 2005 Reproduced with permission of The LIFE Center.)
Inter-agency STEM and STEM Networks
PCAST: NATIONAL GOALS FOR STEM EDUCATION

- Improve P–12 STEM Instruction
- Increase and Sustain Youth and Public Engagement in STEM
- Enhance STEM Experience of Undergraduate Students
- Better Serve Groups Historically Underrepresented in STEM
- Design Graduate Education for Tomorrow’s STEM Workforce
ADMINISTRATION-WIDE EFFORT
(COMMITTEE ON STEM EDUCATION – COSTEM)

PARTICIPATING FEDERAL PARTNERS

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Education
- Department of Energy
- Department of Health and Human Services
- Department of Homeland Security
- Department of the Interior
- Department of Transportation
- Environmental Protection Agency
- Executive Office of the President
- National Aeronautics and Space Administration
- National Science Foundation
- Smithsonian Institution
COORDINATION STRATEGIES

• **Build new models for leveraging assets and expertise**
  Implement a strategy of lead and collaborating agencies to leverage capabilities across agencies to achieve the most significant impact of federal STEM investments.

• **Build and use evidence-based approaches**
  Conduct STEM education research and evaluation to build evidence about promising practices and program effectiveness, to be used across agencies, and share with the public to improve the impact of the Federal STEM investments.
ED-NASA PARTNERSHIP

Pilot started in 2013
- 3 Engineering Design Challenges
- 3 states; virtual engagement w/NASA staff
- 20, 21st CCLC sites
- Implementation study

Program expanded in 2014-15
- 6 Engineering Design Challenges
- 10 states; virtual engagement w/NASA staff
- ~80, 21st CCLC SITES
- Implementation study; included in meta-evaluation

Program expansion underway for 2016
- 3 Engineering Design Challenges
- GLOBE Programs
- 20 states; virtual and some place-based engagement
- Site selection assessment underway
ED-NPS PARTNERSHIP

Citizen science: the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

Administration priority area.

Piloted in 7 national parks reaching students at 21\textsuperscript{st} CCLC programs in 11 schools serving BIE students in AZ, NC, SD, NM, WA, ID

In 2016, expanding to serve non-BIE students served by 21\textsuperscript{st} CCLC sites in more states adjacent to National Park units

Implementation study obtained
Contributed to meta-evaluation
Evaluation of student outcomes planned for 2016
STEM-RICH PARTNERSHIPS (21st CCLC):

INSTITUTE OF MUSEUM AND LIBRARY SERVICES

- Students experience STEM-rich Tinkering and Making, engage with high-quality STEM content and activities, interact directly with Maker experts
- Professional development and technical assistance build staff capacity, support acquisition of new content knowledge and development of new teaching strategies
  - Improvisational and creative problem solving, no one “right way”
  - Developing and building out an idea – testing, learning from feedback, re-designing, re-testing, persisting through frustrations
  - STEM as a means not an end: work with STEM tools, concepts, phenomena
  - Establish linkages between school-day learning and out-of-school applications
- Pilot collaboration (2015), reached 25 21st CCLC sites through collaboration with science centers in PA, NY, CA, TX, FL

Photographs and graphic courtesy of the Exploratorium ©
RELEVANT PLACE-BASED INITIATIVES & NETWORKS

- **Mott Network**  
  (National Network of Statewide Afterschool Networks)

- **Imagine Science**  
  (Boys & Girls Club of America, National 4-H Council, YMCA)  
  Dallas, Omaha, Orange County

- **Hive Learning Networks**  
  [https://hivelearningnetworks.org/](https://hivelearningnetworks.org/)

- **Cities of Learning**  
  Chicago, Dallas, Pittsburgh, Washington D.C.

- **STEM Learning Ecosystems**  
  [www.stemecosystems.org](http://www.stemecosystems.org)

- **Promise Neighborhoods, Promise Zones, Community Schools**

- **Learning Labs in Libraries and Museums**

- **Education Innovation Clusters**  
  [http://tech.ed.gov/innovationclusters/]
More and more young people are learning about science, technology, engineering, and mathematics (STEM) in a wide variety of afterschool, summer, and informal programs. At the same time, there has been increasing awareness of the value of such programs in sparking, sustaining, and extending interest in and understanding of STEM.
STEM funding opportunities
On 4/13 ED released a Dear Colleague Letter to states, school districts, schools and education partners on how to maximize federal funds to support and enhance innovative STEM education for all students.

References formula grant programs in ESEA, IDEA and Perkins

Letter can be found at: http://www2.ed.gov/programs/promiseneighborhoods/stemdearcolleagueacces.pdf
EXAMPLES OF FY 16 OPPORTUNITIES

Overview in the Department’s forecast for funding opportunities (for discretionary grant programs):

- Institute of Education Sciences (IES)
- Office of Elementary and Secondary Education (OESE)
- Office of Innovation and Improvement (OII)
- Office of Postsecondary Education (OPE)
- Office of Special Education and Rehabilitative Services (OSERS)
- Office of Career, Technical and Adult Education (OCTAE)
- Office of English Language Acquisition (OELA)

http://www2.ed.gov/fund/grant/find/edlite-forecast.html
EXAMPLES OF FY 16 OPPORTUNITIES

- Institute of Education Sciences NCER Grant Competitions to Increase Researcher-Practitioner Partnerships and Diversify the Research Profession (due 8/6/16) includes:
  - Research networks focused on critical problems of education policy and practice
  - Partnerships and collaborations focused on problems of practice or policy
  - Low-cost, short duration evaluation of education interventions
  - Research training programs in the education sciences

EXAMPLES OF FY 16 OPPORTUNITIES

- Institute of Education Sciences NCER Grant Competitions to Increase Researcher-Practitioner Partnerships and Diversify the Research Profession (due 8/06/16):

- Research networks focused on critical problems of education policy and practice:

  - **Exploring Science Teaching in Elementary School Classrooms Network** comprised of interdisciplinary research teams to delve deeply into early elementary school (first through third grade) science teaching to *uncover the teaching actions that are associated with improved education outcomes for students*, with a special focus on students from low-income families and underrepresented groups.
EXAMPLES OF FY 16 OPPORTUNITIES

- **Provide support to STEM or CS educators:**
  - Investing in Innovation (i3)
  - Teacher Quality Partnerships (TQP; deadline was 7/7/16)

- **Develop innovative, evidence-based, scalable STEM programs:**
  - Investing in Innovation (i3)
    (deadline for proposals 8/16/16)

- **Place-based STEM education:**
  - Promise Neighborhood program
    (deadline 9/6/16)
Highlights of STEM in the Every Student Succeeds Act
EVERY STUDENT SUCCEEDS ACT

THE BIG PICTURE

The Every Student Succeeds Act ensures opportunity for all of America’s students:

- Holds all students to high college- and career-ready academic standards
- Provides more kids access to high-quality preschool
- Guarantees steps are taken to help students, and their schools, improve
- Reduces the burden of testing while maintaining annual information for parents and students
- Promotes local innovation and invests in what works
EVERY STUDENT SUCCEEDS ACT

COMPETITIVE GRANT PROGRAMS

- Includes competitive grants similar to many of ED’s signature programs to promote local innovation and invest in what works

- These include grants to provide continued support for:
  - high-performing charter schools for high-need students
  - comprehensive, place-based wraparound interventions, similar to the Promise Neighborhoods program
  - identification, replication and scaling of local innovation and evidence-based strategies to improve outcomes for high-need students, similar to the Investing In Innovation (i3) program
  - magnet schools that eliminate racial isolation and improve academic achievement under the Magnet Schools Assistance Program
The Math and Science Partnerships program (Title II Part B under ESEA, as amended by NCLB) will not continue as a distinct funding opportunity after FY 2016. However, STEM and computer science are clearly listed throughout ESSA as allowable uses of formula funds. ESSA also contains additional funding opportunities to strengthen STEM education.

- **Title II**: The STEM Master Teacher Corps will allow for a national competition for SEAs to develop State-wide STEM master teacher corps, or for non-profits in partnership with SEAs, to support the implementation, replication or expansion of effective STEM professional development programs.

- **Title IV Part A**: STEM and computer science are mentioned multiple times under activities to support well rounded educational opportunities. Environmental education is identified as an element of a well rounded education.

- **Title IV Part B**: The 21st Century Community Learning Centers lists programs that contain STEM as an authorized local activity.
Computer science for all
COMPUTER SCIENCE FOR ALL (CS FOR ALL)

WHY COMPUTER SCIENCE?

*It’s all about computational thinking!*

“Computational methods and models give us the courage to solve problems and design systems that no one of us would be capable of tackling alone...Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child’s analytical ability.”

- Jeanette Wing, Carnegie Mellon University

https://www.cs.cmu.edu/~15110-s13/Wing06-ct.pdf
COMPUTER SCIENCE FOR ALL (CS FOR ALL)

- Announced via President’s weekly address on January 30th
- President’s FY17 Budget proposal features:
  - $4B in funding for states for CS for All efforts
  - $100M in funding for districts for CS for All efforts

  - **Dear Colleague Letter** published in April 2016 with opportunities to support STEM education
  - **CS Teacher Institute**: The Department of Education’s Office of Career, Technical, and Adult Education (OCTAE) and National Science Foundation (NSF) will participate in a joint effort to expand the field of computer science educators in Career and Technical Education (CTE) programs.
    **Creating 21st Century Learners and Coders**: The 21st CCLC program will showcase promising practices and resources within its network of State Directors, site Directors and front-line staff.

https://y4y.ed.gov/computer-science
COMPUTER SCIENCE FOR ALL (CS FOR ALL)

RESOURCES FROM OTHER AGENCIES

• The National Science Foundation has funded significant foundational research in computer science. Visit their websites for a list of resources:

• The White House has been collecting private commitments around computer science and computing. Their website summarizes organizations individuals committed to this work:
  - https://www.whitehouse.gov/blog/2016/01/30/computer-science-all
Early STEM learning
FOCUS ON EARLY STEM LEARNING

- White House Symposium on early STEM 4/21/16
  - Over 200 responses to the call to action
  - Tips Sheets located here – “Let’s talk read and sing about STEM” (available in both English and Spanish here - http://www2.ed.gov/about/inits/ed/earlylearning/talk-read-sing/index.html
  - Tips for Families with Young Children
  - Tips for Preschool Teachers & Providers
  - Tips for Infant/Toddler Teachers & Providers
  - Let's Talk about the World Poster

- Working with OET and Office of early learning on tech recommendations for Ed/HHS
- Ready to Learn has a science literacy focus in FY15 competition and will be releasing reports on their prior math focus
- In 2014 IES released a report on best practices, “Teaching Math to Young Children”
RECAP

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- Follow-up questions? Ellen.Lettvin@ed.gov