The Critical Role of PreK-12 Learning for the Future of Science

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THANK YOU! 10 Years of DRK-12

Community for Advancing Discovery Research in Education

DR K-12 Principal Investigators, staff, participants, and evaluators

DR K-12 Program Officers and Administrative Staff
Discovery Research K-12, NSF 06-593

• Grand Challenge 1: Mathematics and Science Assessments

• Grand Challenge 2: Elementary Grades Science.

• Grand Challenge 3: Cutting-Edge STEM Content in K-12 Classrooms
Figure 1. DRL Cycle of Innovation and Learning
(Note: Programs whose primary emphases relate to particular components appear in larger type.)
Common Guidelines for Education Research and Development (IES & NSF, 2013)

• Foundational research
• Early-stage exploratory research
• Design and development research
• Efficacy, effectiveness, and scale-up research
CONTINUING CHALLENGES: DRK-12

• Planning and executing/adapting rigorous research designs with appropriate outcome variables
• Accumulation of findings to inform policy and practice, possibly in key priority areas
• Capacity building in the R&D community
• Use and adaptation of DRK-12 findings and models at scale
• Telling the story of DRK-12 impact
And new opportunities ...
SCIENCE AND ENGINEERING FOR TOMORROW

convergent, networked, data-intensive, international, diverse and multilevel teams, crowdsourced with public participation
GROWING CONVERGENT RESEARCH AT NSF

NSF INCLUDES

NSF 2050

MIDSCALE RESEARCH INFRASTRUCTURE

MRI

MREFC
Computer Science For All

• Announced in the President’s Weekly Address on January 30, 2016
• Focus is on ensuring ALL students have access to learning Computer Science
• Significant proposed funding: $4B to empower states, $100M for school districts to train CS teachers, expand access, and build effective regional partnerships
• Involving even more partners: Governors, mayors, and education leaders, CEOs, philanthropists, creative media, technology, and education professionals are deepening their CS commitments; e.g. Governors for CS, Code.org, NMSI (National Math and Science Initiative), Cartoon Network, Google, RI, KY, AR, NYC, San Francisco, Broward County, CSNYC, MassCAN, TFA (Teach for America), Microsoft, the Infosys Foundation USA, NCWIT, and the Computer Science Education Coalition.
$135M available over 5 years to **build on NSF’s research** developing instructional materials, assessments, in-service and pre-service models of teacher professional development, and approaches to ongoing support of classroom teachers.

- 2 new high school courses, currently taught in over 2,000 schools: *Exploring Computer Science* (introductory course for all students) and AP *CS Principles* (Curricular Framework with a number of different, aligned courses)
- Both are rigorous, student-centered, focused on conceptual understandings and societal impacts, accessible (w/o prior experience), project-based, and inspiring
- Professional development to support high school teachers in CS instruction
- Research to integrate CS and Computational Thinking in K-8 STEM curriculum and instruction
What is Public Participation in Science, Technology, Engineering, and Mathematics Research (PPSR)?

- Research that includes partnerships between STEM professionals and “amateurs”/volunteers to address research questions.
- Always involves the public’s participation in some aspects of STEM research, which may require training.

(Ref: NSF 2015 Strategic Review documents)
FY16-17 NSF Agency Priority Goal

• Build the capacity of the nation to solve research challenges and improve learning by investing strategically in crowdsourcing and other forms of public participation in science technology, engineering, and mathematics research (PPSR).

• By September 30, 2017, NSF will implement mechanisms to expand and deepen the engagement of the public in research.

www.performance.gov
NAEP 2014 Technology and Engineering Literacy

Select a task below to begin:

- Explore growth in Chicago
- Design a safe bike lane
- Create an ideal iguana habitat
- Promote a teen rec center
NAEP 2014 Technology and Engineering Literacy

Highlights of what we learned about eighth-grade students include the following:

**Female students scored** 3 pts higher than **male students.**

**NSLP\(^1\) not eligible students scored** 28 pts higher than **eligible students.**

87% reported **figuring out why something was not working in order to fix it** outside of their school work.

50% reported **using a computer to create, edit, or organize digital media** at least once a month in school.

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\(^1\) NSLP = National School Lunch Program.
2015 Maker Faires had over 1.1 million visitors (the HUSTLE, December 11, 2015)
Thank you

Questions and discussion