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EHR ADVISORY COMMITTEE MEETING

Day 1: November 30, 2017

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THE WORLD'S BIGGEST EDUCATION PRIZE ANNOUNCES INAUGURAL LAUREATES



CAROL S. DWECK
YIDAN PRIZE FOR
EDUCATION RESEARCH



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Community College Innovation Challenge



2017 First Place Winner!

*Submission Deadline:
February 14, 2018*



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Big Ideas Town Hall

NSF'S BIG IDEAS



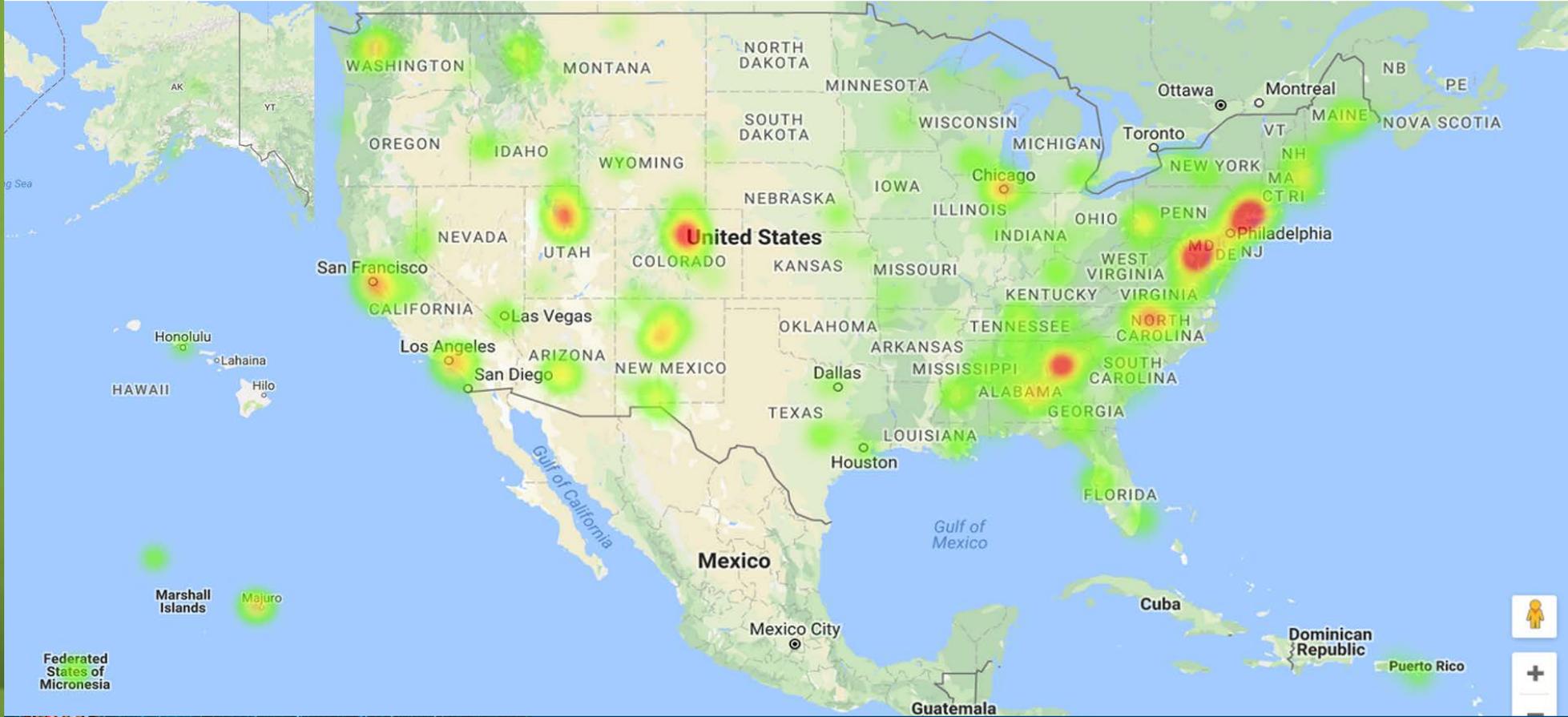
http://www.nsf.gov/news/special_reports/big_ideas

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NSF INCLUDES



67

Launch Pilots Funded

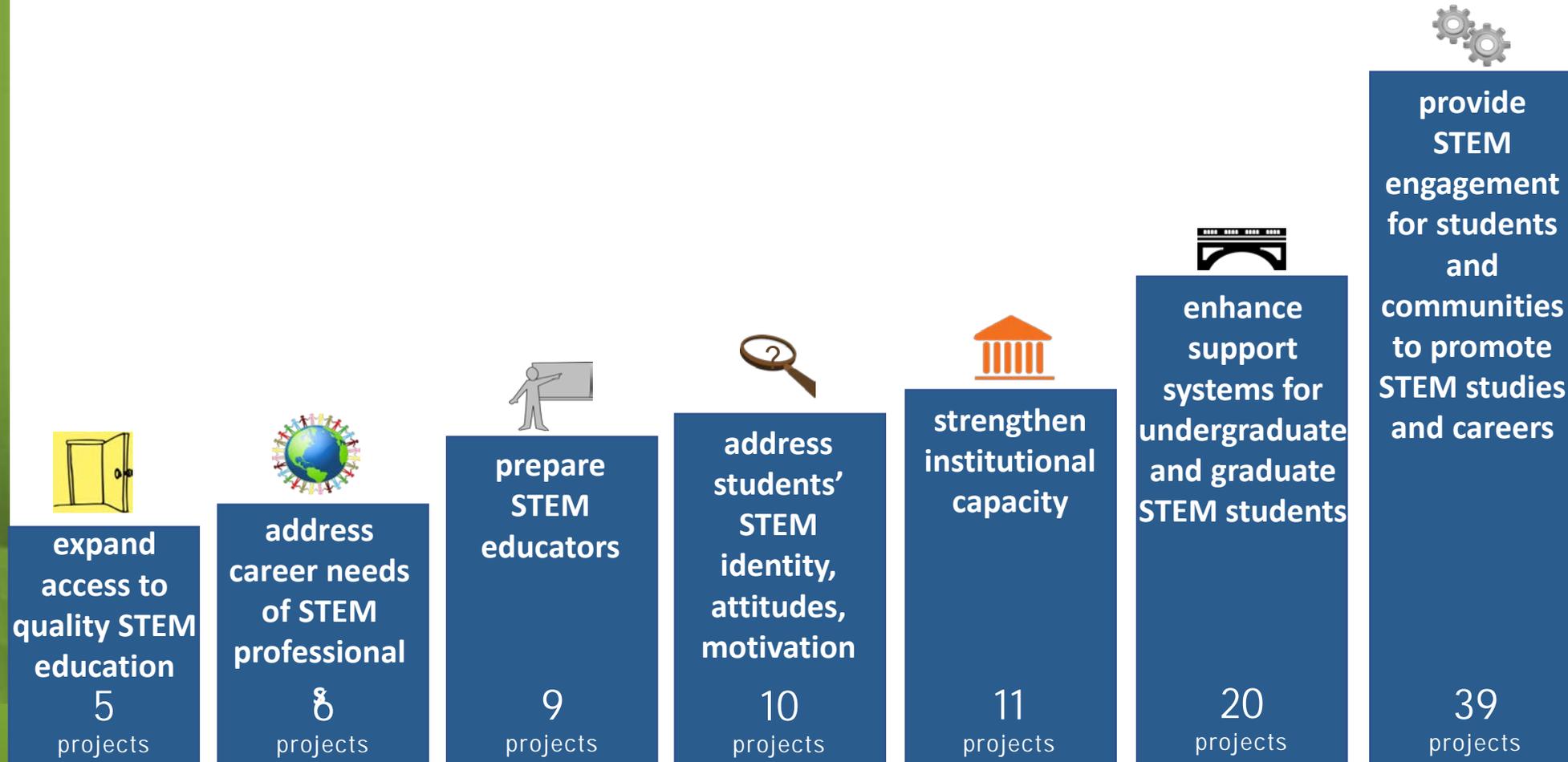
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Launch Pilot Strategies

to address a particular broadening participation challenge



Note: Some projects have goals and objectives that fall into more than one category.

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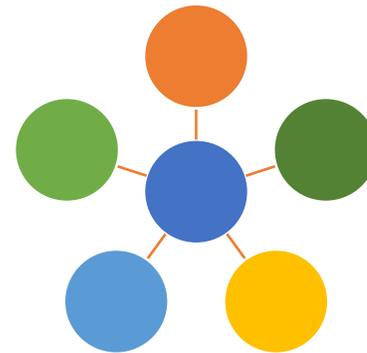
NSF INCLUDES IN FY 2018

On-Ramps

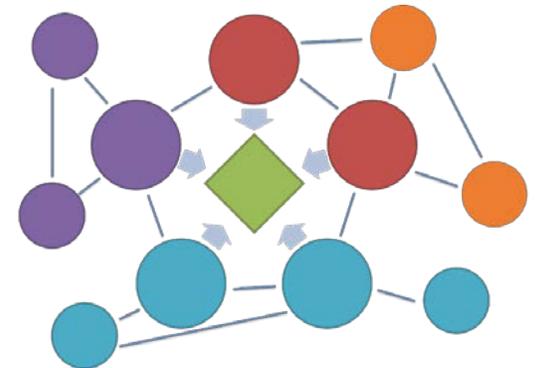
DCL NSF 17-111



Coordination Hub



Alliances (coming soon)



Launch Pilots from FY16 & FY 17

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FEDERAL REGISTER

The Daily Journal of the United States Government

Request for Recommendations for Membership on STEM Education Advisory Panel

A Notice by the National Science Foundation on 11/02/2017

- STEM Education Advisory Panel established October 18, 2017
- Currently accepting recommendations (Target date ~~November 30~~, 2017)

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Federal Employee Viewpoint

FEVS 2017

What does it tell us?

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Good News for EHR Overview

- Of the 71 questions, EHR improved on 65
- Of the other 6 questions, EHR is above 75 on 4
- The two that are not a strength and not improving are:
 - My workload is reasonable (NSF = 53%, EHR = 53%)
 - The skill level in my work unit has improved in the past year. (NSF = 58%, EHR = 52%)
- For EHR there has been a steady increase in positive attitudes each year since 2013 and the increase this year is quite significant
- On only 4 items are the positive percentages below 50%.

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Good News for EHR FEVS Indices

Index	GOV 2017	NSF 2017	EHR 2017	EHR Δ 2013- 2017	EHR Δ 2016- 2017
“New IQ”	60	68	69	21	11
Global Satisfaction	64	74	81	30	12
Employee Engagement	67	75	75	18	9
Career Development	56	65	66	23	7
Workload	53	55	57	8	0
Performance Management & Recognition	56	64	64	20	9

*Note: A score greater than or equal to 65 is viewed as a strength. An increase (or decrease) of three points or more is viewed as significant, especially a change in one year.

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Good News for EHR FEVS Sections

Section	GOV 2017	NSF 2017	EHR 2017	EHR Δ 2013- 2017	EHR Δ 2016- 2017
My Work Experience	72	78	80	13	6
My Work Unit	53	61	61	18	7
My Agency	58	68	67	17	7
My Supervisor/Team Leader	72	80	78	17	5
Leadership	58	68	68	24	16
My Satisfaction	53	64	67	31	11
Worklife	79	86	86	-4	13

*Note: A score greater than or equal to 65 is viewed as a strength. An increase (or decrease) of three points or more is viewed as significant, especially a change in one year.

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EHR Working Groups

- Abstract Review Committee
- Communications Team
- Workload Committee
- Engagement Group
- Recognition and Rewards
- HSI Programs

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Top Workload Recommendations

- Consider and evaluate a “no deadlines” approach to solicitations
- Streamline the declination process
- Standardize data requested from PIs
- Consider standardizing language on solicitations (e.g. description of research and evaluation components)

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Engagement Recommendations

- Supervisors and senior managers trained to be aware of engagement issues and of opportunities to increase staff engagement
- One EHR staff member tasked with coordinating engagement activities at the directorate level
- Scientific and administrative staff engage in more joint activities
- EHR all-hands meetings used for engagement activities

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Telling the EHR Story

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Budget Uncertainty

	FY17 Approp.	FY18 Request	FY18 House	FY18 Senate
NSF	\$7.96B	\$6.65B	\$7.33B	\$7.31B
EHR	\$880.00M	\$760.55M	\$880.00M	\$862.40M

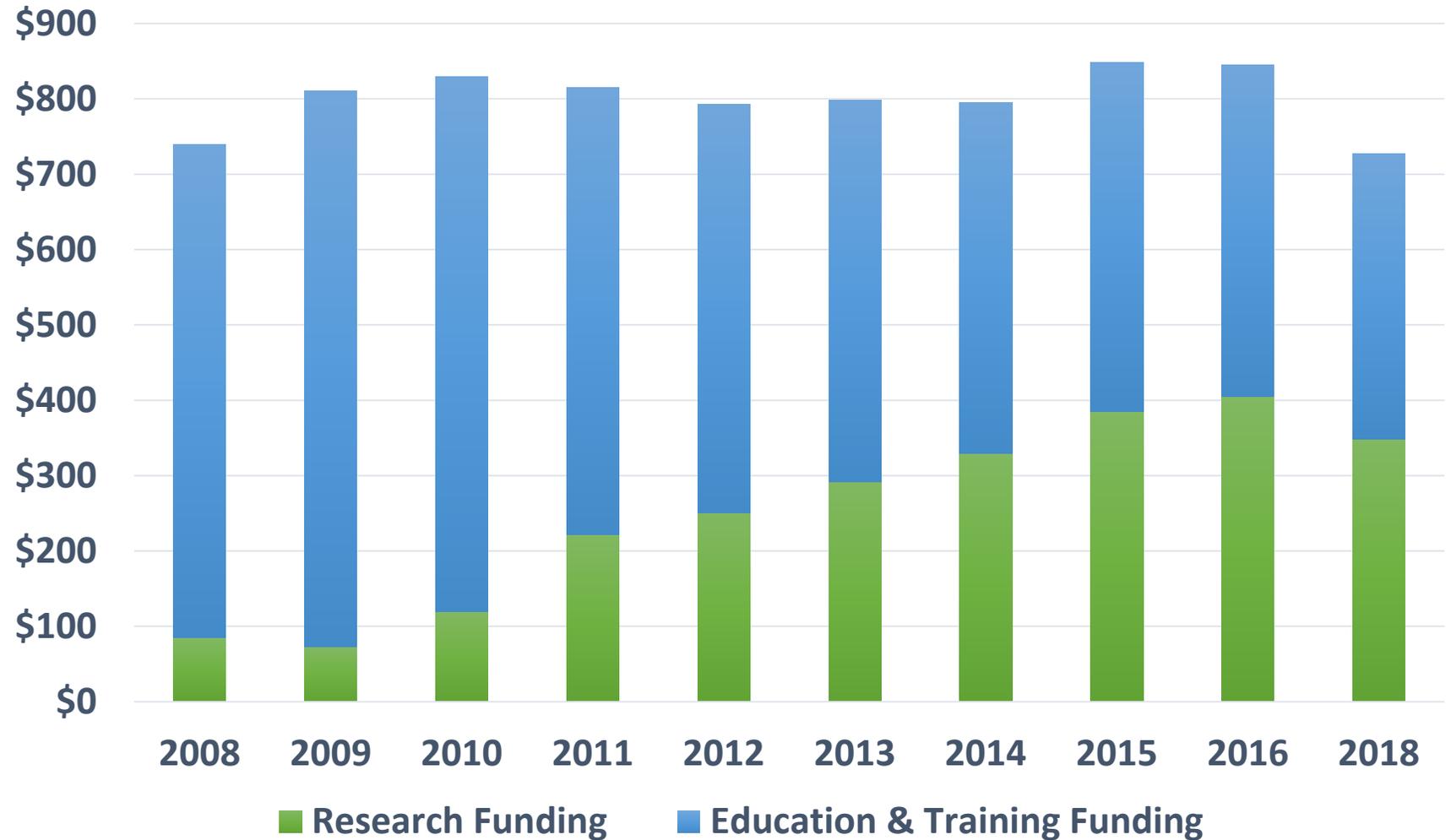
** Continuing Resolution to December 8, 2017*

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Funding in EHR Over Time



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EHR Advisory Committee Subcommittees

- Open Education Resources
- Broadening Participation Portfolio
 - Building Capacity at HSIs
 - TCUP 1994 Research Symposium
- Public Private Partnerships
- Launching a STEM Education Initiative
- Growing the Field

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National Search for Assistant Director for Education and Human Resources

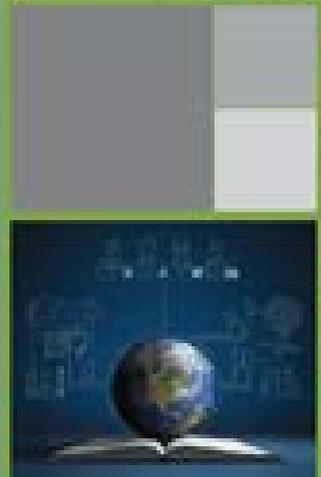
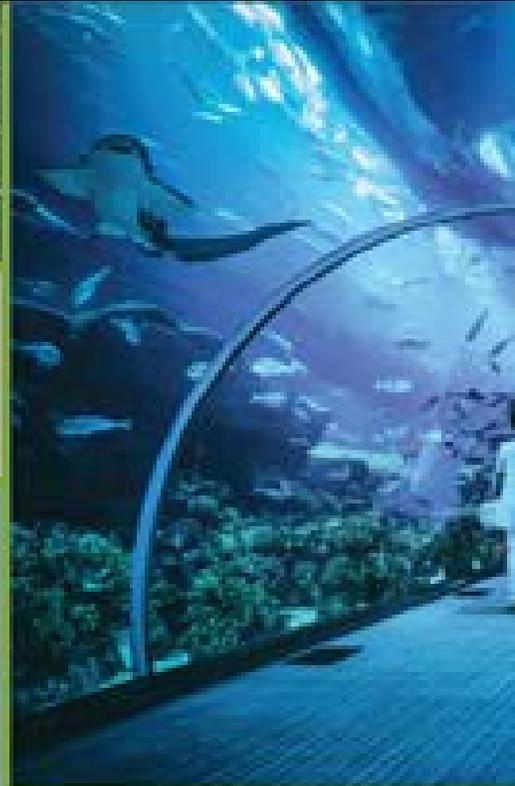
- Seeking strong list of outstanding candidates
- Notice posted November 28, 2017
- Nomination deadline January 22, 2018

<http://www.nsf.gov/od>

Launching a STEM Education Initiative

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November 30, 2017

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Because of NSF investments, STEM education is better than it was ten years ago.

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Outcome of this discussion:

Explore issues that an AC Subcommittee on the Future of STEM Education might tackle

Begin to develop a vision for STEM education in 2027

Consider the emerging landscape of STEM education

Discuss what NSF should do to support the vision

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What should you see happening in a
STEM classroom ten years from now?

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Reflections from
senior staff

Changing nature of science

- Many scientific questions can only be answered by convergent approaches.
- Science is more data intensive.
- The rate of production of new knowledge is faster than ever before.
- There is a drive for greater access to data and publications.
- New fields, including discipline-based education research, are emerging.

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How should STEM education change to reflect the changing nature of science?

Given increasing convergence and big data, what should NSF do to identify and enable the needed changes in STEM education? Will sustained support for individual projects be needed to accomplish this goal?

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Changing Demographics

- U.S. is growing more diverse.
- STEM participation for underrepresented groups at all levels is still very low.
- Socioeconomic gaps persist and hinders participation in STEM.
- Intersectional approaches to study diversity issues are gaining importance.

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How should STEM education change to reflect the changing demographics?

- Given the increasingly diverse U.S. population that still has lower STEM participation of underrepresented groups, what should NSF do to encourage parity in STEM education for all?
- Will the use of intersectional approaches help achieve equity?

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Changing workplace and careers

- Technology is driving changes in required job skills.
- Artificial intelligence is replacing many professional jobs.
- The workplace is interdisciplinary and team-oriented.
- Career paths are increasingly diverse and multi-faceted.
- International competitiveness shapes the labor market.

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How should STEM education change to reflect changing workplace and careers?

- Given the rapid changes in the workplace, how do we provide accessible opportunities for lifelong learning?
- How do we balance the value of a broad education with the demand for preparation for specific jobs?

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Changing educational institutions

- Institutions are undergoing financial stresses, with departures from traditional models and competition from disrupters.
- There is increasing demand for flexibility (place and time) and prevalence of on-line delivery.
- The lines between traditional educational stages and institutions are blurring (e.g., college credit in high school, informal vs. formal)
- The number of adjunct and part-time faculty is growing.

What should
NSF do?

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How should STEM education change to reflect changing educational institutions?

Given the changing nature of educational institutions, how can NSF:

- reflect this in the structure of EHR programs?
- promote evidence-based practices?

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Discussion: STEM Ed Subcommittee Draft Charge Statement

Thanks to our wonderful deputy division directors for their excellent work on this presentation and the draft statement:

Lura (Jody) Chase, HRD

Nirmala Kannankutty, DGE

Keith Sverdrup, DUE

Elizabeth VanderPutten, DRL

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Hispanic-Serving Institutions (HSI) Program

EHR Advisory Committee
Meeting

November 30, 2017

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Presenters

Andrea Johnson

Division of Human Resource Development

Talitha Washington

Division of Undergraduate Education

Joan Walker

Division of Research on Learning in Formal and Informal Settings

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Launching first program to ***build capacity*** at HSIs that typically do not receive high levels of NSF funding.

NSF's Task

1. Identify critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs
2. Identify potential actionable solutions that fall within NSF's mission, policies, and practices.

<https://nsf.gov/ehr/HSIProgramPlan.jsp>

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Legislative Background

Consolidated Appropriations Act, 2017

Public Law 115-31

“The agreement also directs NSF to establish an Hispanic Serving Institution (HSI) program at no less than \$15,000,000 as authorized in 42 U.S.C. 1862o-12. The agreement encourages NSF to use this program to build capacity at institutions of higher education that typically do not receive high levels of NSF grant funding.”

American Innovation and Competitiveness Act

Public Law 114-329

“SEC. 315. HISPANIC-SERVING INSTITUTIONS UNDERGRADUATE PROGRAM UPDATE.

(a) IN GENERAL.—Section 7033(a) of the America COMPETES Act (42 U.S.C. 1862o–12(a)) is amended as follows:

“(a) IN GENERAL.—The Director shall award grants on a competitive, merit-reviewed basis to Hispanic-serving institutions (as defined in section 502 of the Higher Education Act of 1965 (20 U.S.C. 1101a)) to enhance the quality of undergraduate STEM education at such institutions and to increase the retention and graduation rates of students pursuing associate’s or baccalaureate degrees in science, technology, engineering, and mathematics.”

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NSF's Current Investments in HSIs

- In FY 2016, EHR support for undergraduate STEM education at HSIs included:
 - ATE \$ 8.6M
 - IUUSE \$12.9M
 - Noyce \$ 9.8M
 - S-STEM \$26.7M

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Defining Hispanic-Serving Institutions

Title V, Part A. HISPANIC-SERVING INSTITUTIONS. – The term “Hispanic-serving Institution” means an institution of higher education that—

- (A) is an “eligible” institution
- (B) has an enrollment of undergraduate full-time equivalent students that is at least 25 percent Hispanic at the end of the award year immediately preceding the date of application.

As amended through P.L. 113-67, Enacted December 26, 2013

http://legcounsel.house.gov/Comps/HEA65_CMD.pdf

Section 502(2),p. 690-691

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Our Process: Listening to the HSI Community

1. Forming the Building Capacity at HSI Subcommittee of the EHR AC
2. Holding HSI Faculty and Staff Listening Sessions
3. Funding HSI STEM Conferences

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Guiding Questions Across Efforts

1. What does NSF need to know to build the capacity of HSIs that typically do not receive high levels of NSF funding?
i.e., Challenges and opportunities
2. What does 'building capacity' mean to you?
3. If an institution received a capacity-building grant from NSF, how would it know if its efforts had been successful?

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HSI Subcommittee: Challenges to Building Capacity

1. Faculty development
2. Curriculum redesign
3. Undergraduate research
4. Transitions
5. Metrics for success

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HSI Subcommittee's Advice

1. Be strategic and inclusive.
2. Use academic institutional partnerships.
3. Incentivize cross-sector collaboration.
4. Promote the use of cost-effective practices.
5. Building the program will be a process; initiate it soon and fine-tune it as it progresses.

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Faculty & Staff Listening Sessions

- Invited over 400 two- and four-year HSIs to participate in a three-hour listening session.
 - Opportunity to provide feedback via online form.
 - 300+ individuals from over 100 institutions participated
 - 130+ written responses submitted.
-
- Same guiding questions posed to HSI Subcommittee.

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Listening Sessions Results

Faculty Development

- Grant proposal preparation training
- Support for pedagogical innovations
- Opportunities to share and learn about best practices
- Release time

Student Support

- Paid undergraduate research opportunities at academic institutions
- Career externships with local industries
- Advisement and mentoring regarding course selection and STEM careers

Institutional Partnerships

- Support for bridge programs and other efforts that align student transitions
- Creation of consortia among HSIs and between HSIs and industry

Metrics of Success

- Longitudinal designs and qualitative measures

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Dear Colleague Letter

Improving Undergraduate STEM Education @ HSIs

Transforming STEM Education in Hispanic Serving Institutions - Regional Insights from the Southwest. University of Arizona, November 18-20, 2017. [1748526](#)

Hispanic-focused STEM Ideas for Inspiration and Innovation. Nova Southeastern University, December 10-12, 2017. [1748199](#)

Understanding and Improving Readiness and Student Transitions. University of Houston, February, 2018. [1748533](#)

Pathways for Hispanic Students in STEM. University of California-Irvine, January, 2018. [1748570](#)

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Student panel speakers

HSI Conference @ University of Arizona



Representative Raul Grijalva (front, left) and University of Arizona HSI Conference Hosts.

Track 1 – 2-year/4-year Transitions/Partnerships

Track 2 – R1/High Impact Practices

Track 3 – Innovative Pedagogies #STEMinHSI

Track 4 – Recruitment & Retention

Track 5 – Culturally Responsive STEM Education



HSI Conference attendees and NSF staff, University of Arizona

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Student Listening Session @ SACNAS 2017

4 NSF program officers and ~25 participants

Results converge with other listening efforts:

- Doing research early and often
- Hispanic role models
- Faculty development
- Transition from 2-year to 4-year institutions
- Help in balancing school with family obligations



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We Continue to Listen

1. What are the most critical challenges and opportunities regarding undergraduate STEM education at two-year and four-year HSIs?
2. How do those identified needs fit within NSF's mission, policies, and practices?
3. What are potential metrics for success of the HSI program?
4. What topic(s) need further discussion?

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EHR ADVISORY COMMITTEE MEETING
Day 2: December 1, 2017

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Telling the EHR Story

EHR has launched a major effort to document the impact of EHR funding.

GOALS

- Assess and understand the history of NSF education funding and its impact on the Nation
- Record what has been accomplished in a living document
- Develop approaches to future data collection that support dissemination of EHR-funded research, materials, and other products
- Inspire EHR staff and PI community to work toward even more impactful achievements
- Enable researchers and practitioners to find and use EHR-funded work

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Telling the EHR Story

New document(s) will enable:

- OLPA and NSF leadership to communicate the impact of EHR funding to OMB and Congress
- OLPA and EHR OAD to easily “mine” the information to effectively communicate education achievements to the general public
- EHR leadership to make informed decisions regarding the most effective use of available resources

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The documents

We will create two documents that are available both in print and electronically.

1. A collection of **one-pagers** that tell unique stories of the impact of EHR funding.

- Stories that tell the impact of a body of funding over a period of time. Each begins with an impact claim and offers a high-level defense of that claim.
- “Gems” that demonstrate a focused body of work with significant impact.

2. A collection of **white papers** and other **scholarly products** that expand on selected one-pagers to elaborate and defend the claims.

Some will be written by program directors, science assistants, or AAAS Policy Fellows, while others will be synthesis reports funded by EHR.

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Examples of stories

EHR has supported computer science education, and the use of computing in STEM education, since computers first became available in classrooms and homes. This longstanding commitment is now critical in priority areas such as K-12, undergraduate, technical education, and cybersecurity.

EHR funding has been critical to the national movement in undergraduate biology education toward more effective, evidence-driven, and inclusive instruction.

U.S. community colleges have drawn on EHR support to educate thousands of students who are now employed in advanced technology industries, often in jobs that did not exist 15 years ago.

EHR funding to Tribal colleges and universities has been crucial to a major expansion of opportunities for students to pursue STEM majors and STEM careers, as well as greater professional preparation for their faculty.

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Examples of gems

ASSISTments, an EHR-funded online math homework program, uses formative assessments and rapid feedback to help students learn. In a review of educational technology interventions, scholars at MIT praised ASSISTments for its ability to nearly double students' yearly gains on a standardized mathematics assessment.

EHR has supported Stanford professor Carol Dweck's award-winning research on mindset which is having a significant impact on K-12 education. As an example of her work, Dweck has shown that giving girls stories of scientists overcoming adversity can improve their "growth mindset" and lead to impressive learning gains in STEM classes.

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Points to consider

- Congress, OMB, and the Administration specify how 69% of EHR funds are to be used
- The EHR portfolio covers all areas of science, technology, engineering, mathematics and STEM education research
- Education, including STEM education, can be controversial and it can be risky for NSF to be viewed as endorsing curricula

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Impact anecdotes

At the October 2017 meeting of the AAU STEM Education Network, participants highlighted the critical importance of NSF funding for making the institutional changes needed to support evidence-based undergraduate STEM education.

The 88 participants included administrators, professors, leaders of campus teaching and learning centers, and government relations staff. The participants had received a total of 211 NSF awards -- totaling \$145M, $\frac{2}{3}$ from EHR -- to support their scientific and educational research and development.

In July 2017, EHR funded an AERA meeting with representatives of 15 scholarly organizations that support education research. The meeting led to a joint resolution committing to transparent reporting of research and responsible sharing of data, with the aim of establishing strong standards for open science across all education research.

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Where to find EHR-funded products

- Federal resources
 - What Works Clearinghouse
 - Education Resources Information Center (ERIC)
 - IES Practice Guides
 - Science.gov*: (Federal programs including two FC-STEM IWGs)
 - NSF Award Search
- Google, Google Scholar
- Academic collections
 - Campus digital libraries
 - Professional societies
 - Disciplinary Education Journals
- Other
 - EHR-funded Resource Centers (e.g. CAISE)
 - National Science Digital Library (NSDL)
 - e.g. *ShareMyLesson.com*



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Moving forward

- Papers that result from EHR Awards will comply with NSF's Public Access policy.
EHR will emphasize the policy in review and post-award monitoring.
- New IUSE awards require all resources that are produced with IUSE funding to be Open License.
EHR will work with the Open Education Resources Subcommittee of the EHR Advisory Committee to explore extending this requirement to other programs.
- EHR will increase the number of funded synthesis reports.
- EHR will continue to fund resource centers that maintain websites with educational resources on topics supported by that center.

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Moving forward

Question

What additional steps should we take to make NSF-funded education resources easily accessible by scholars and practitioners?

OPEN EDUCATIONAL RESOURCES

ATTITUDES, AWARENESS, AND ADOPTION IN K-12 AND
HIGHER EDUCATION

Dr. Jeff Seaman

Director

Babson Survey Research Group

BABSON SURVEY RESEARCH GROUP

- *Regional, national, and international research projects: survey design, sampling methodology, data integrity, statistical analyses and reporting.*
- Online Learning in U.S. Higher Education (foundation and commercial support)
- Sloan K-12 Online and Blended Learning Survey Reports
- Technology in Education
- International – Global Entrepreneurship Monitor, Canadian Distance Ed
- Open Educational Resources – Hewlett Foundation

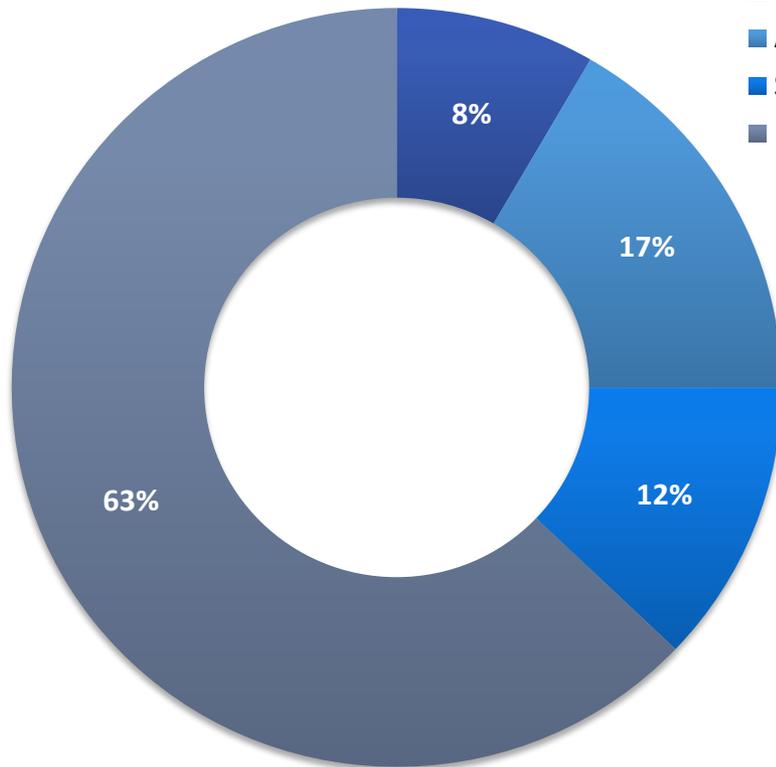
OPEN EDUCATIONAL RESOURCES

- Hewlett Foundation definition:
- *OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others.*
- Surveys – Focused on a specific recent decision
 - Higher Education: Teaching faculty who made a decision on required course materials in past 2 years
 - K-12: District that made a curriculum adoption decision in the past 3 years.

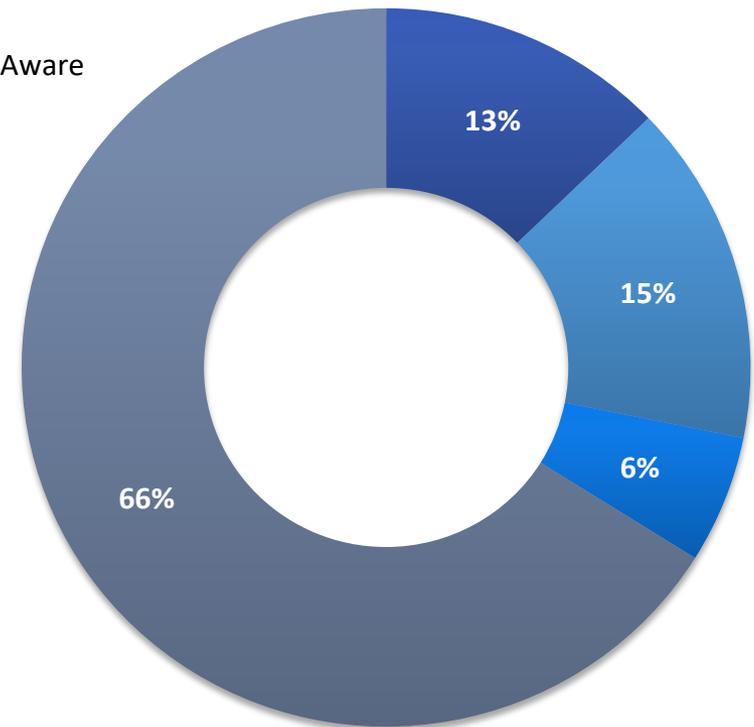
AWARENESS REMAINS LOW

Awareness of Open Educational Resources and Creative Commons

HIGHER EDUCATION TEACHING FACULTY



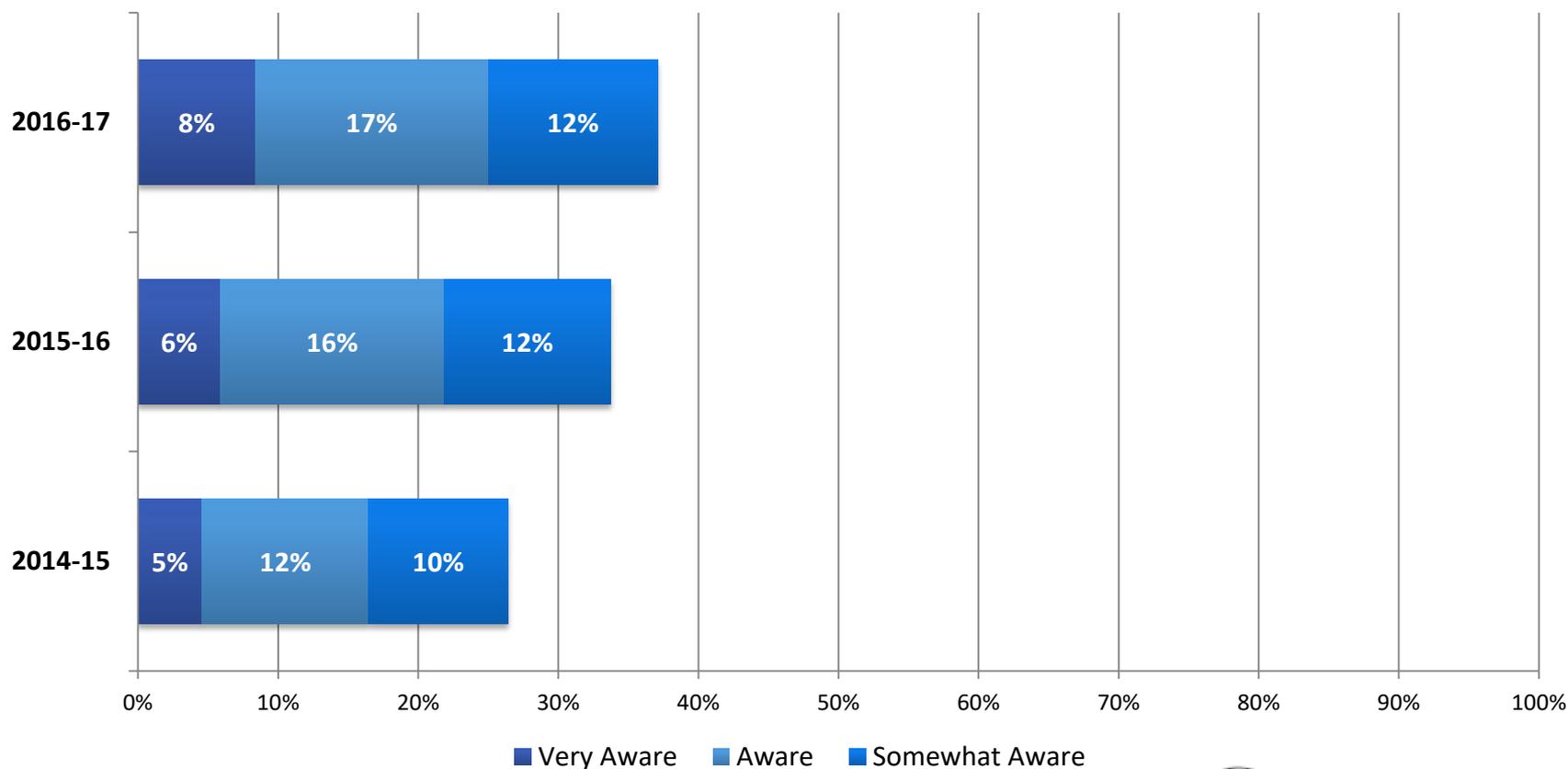
K-12 DISTRICT DECISION MAKERS



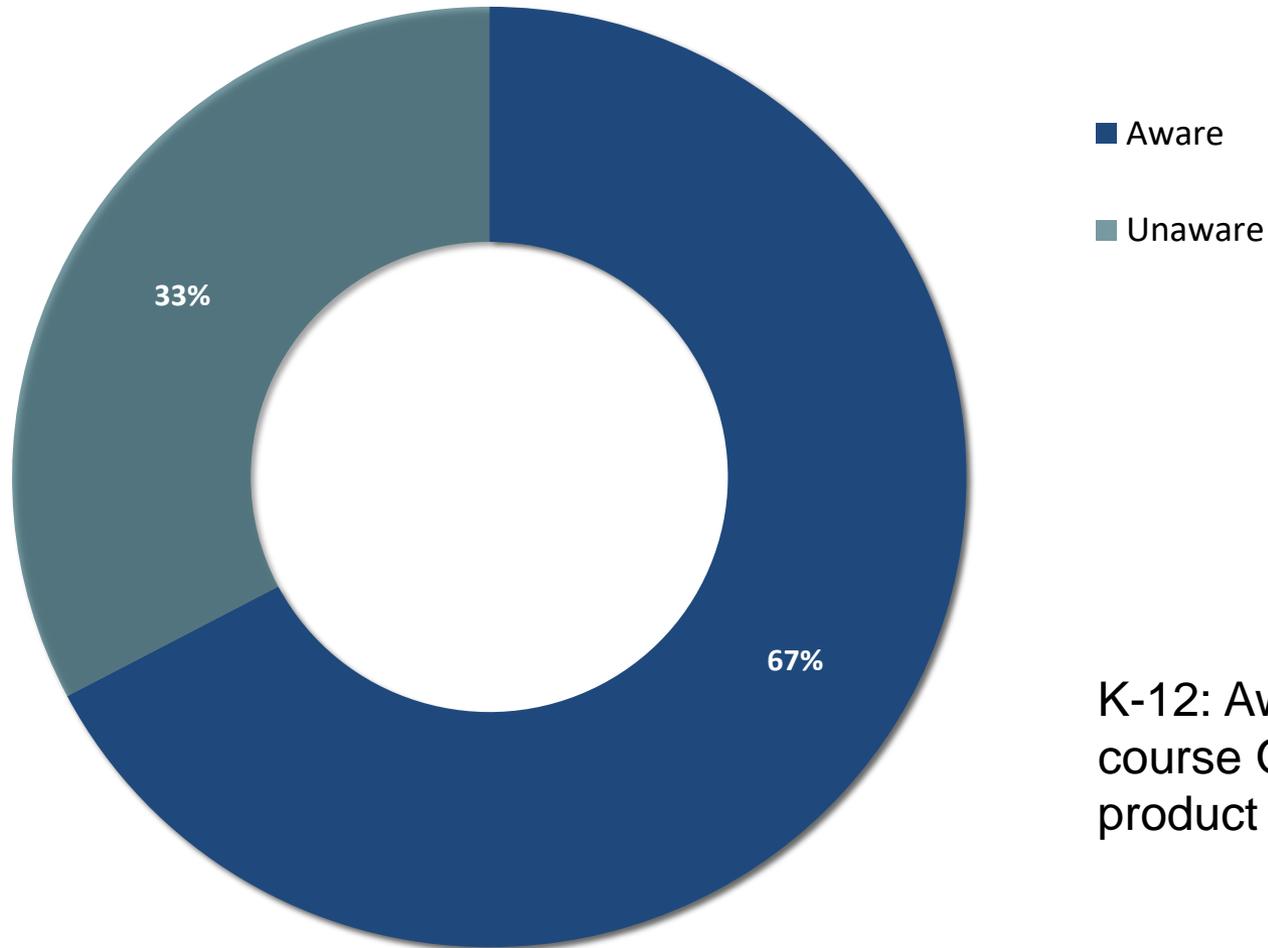
- Very Aware
- Aware
- Somewhat Aware
- Not Aware

BUT IS GROWING...

AWARENESS OF OPEN EDUCATIONAL RESOURCES AND CREATIVE COMMONS: 2014-15 TO 2016-17



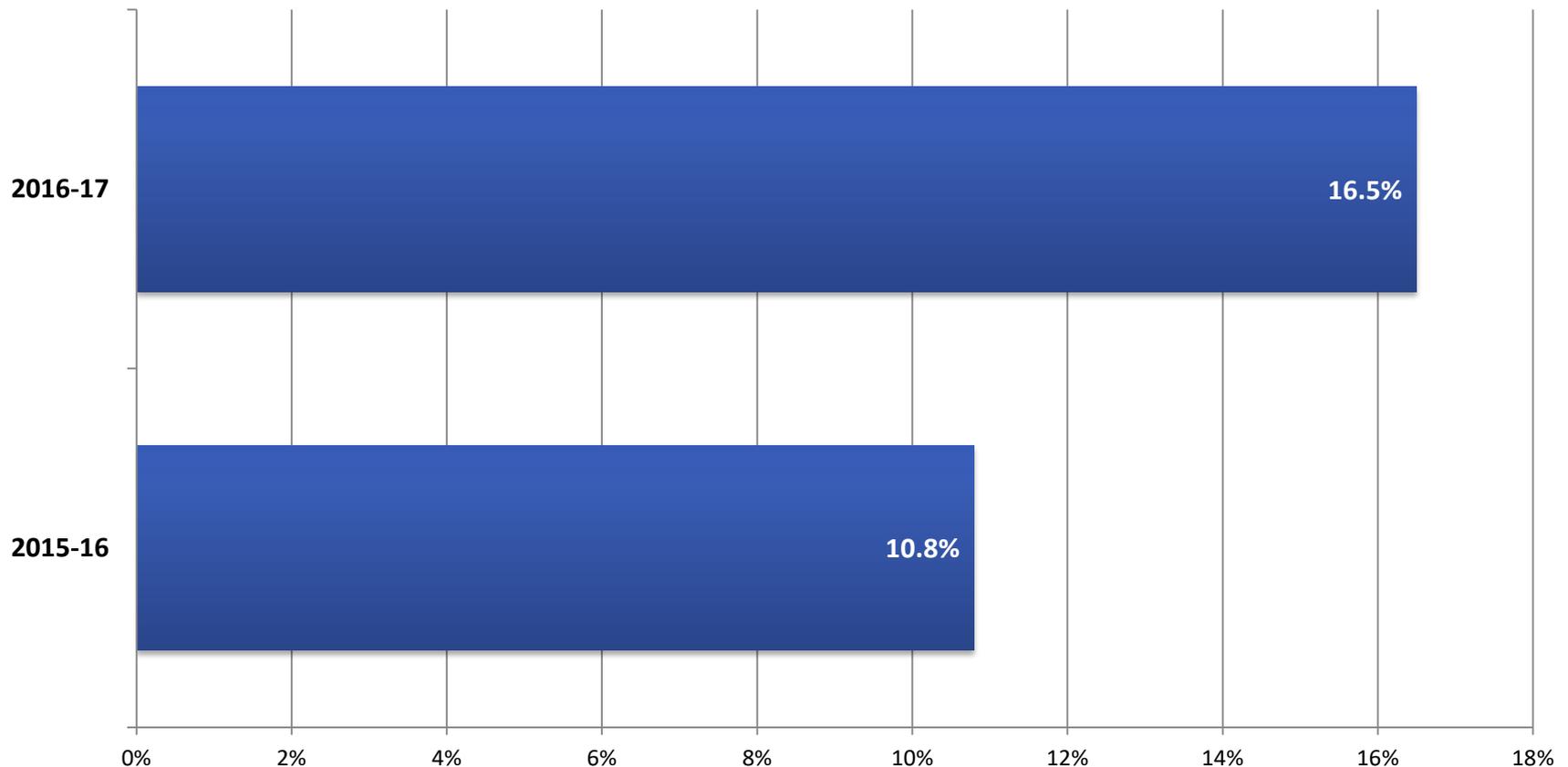
MUCH HIGHER PRODUCT AWARENESS



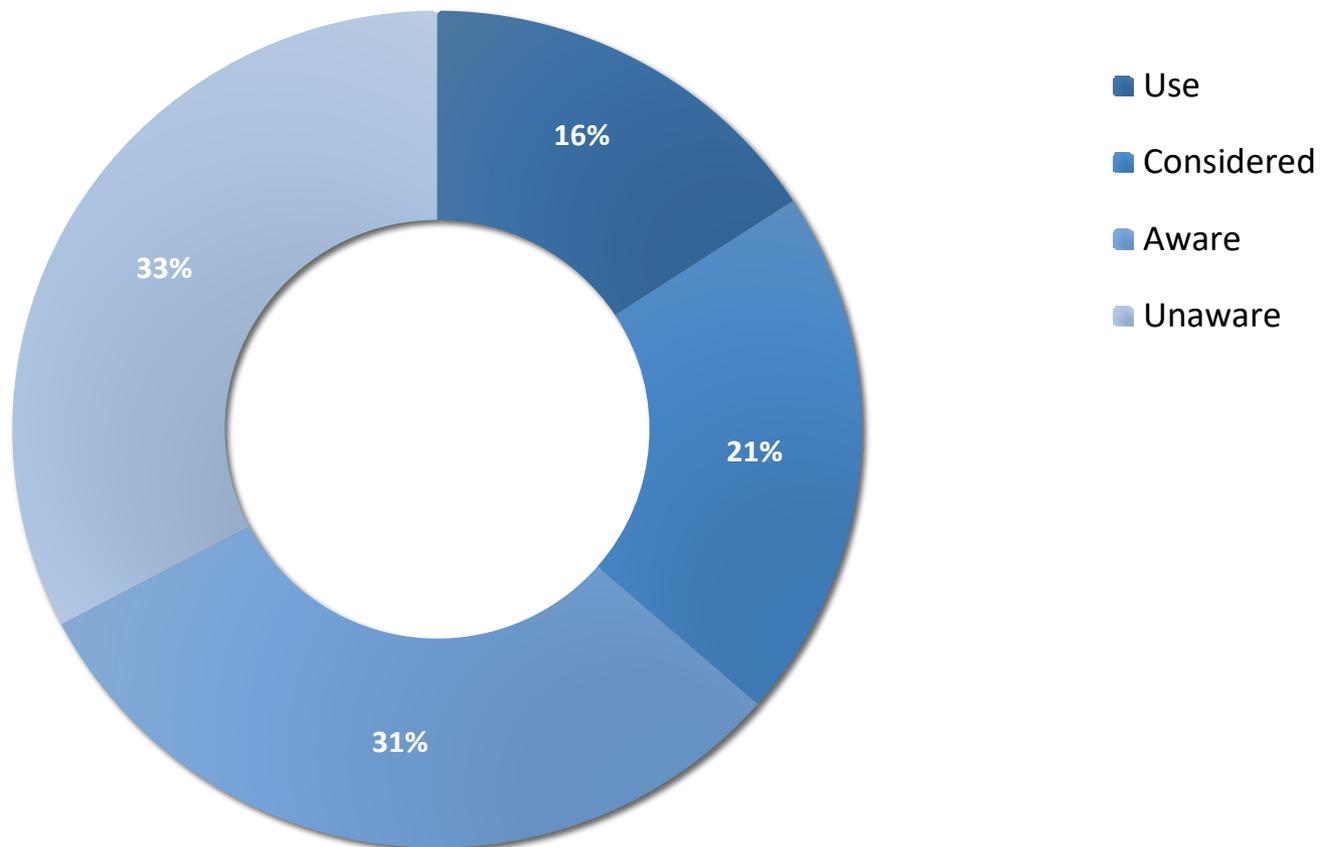
K-12: Awareness of full-course OER curriculum product

HIGHER ED OER TEXTBOOK ADOPTION

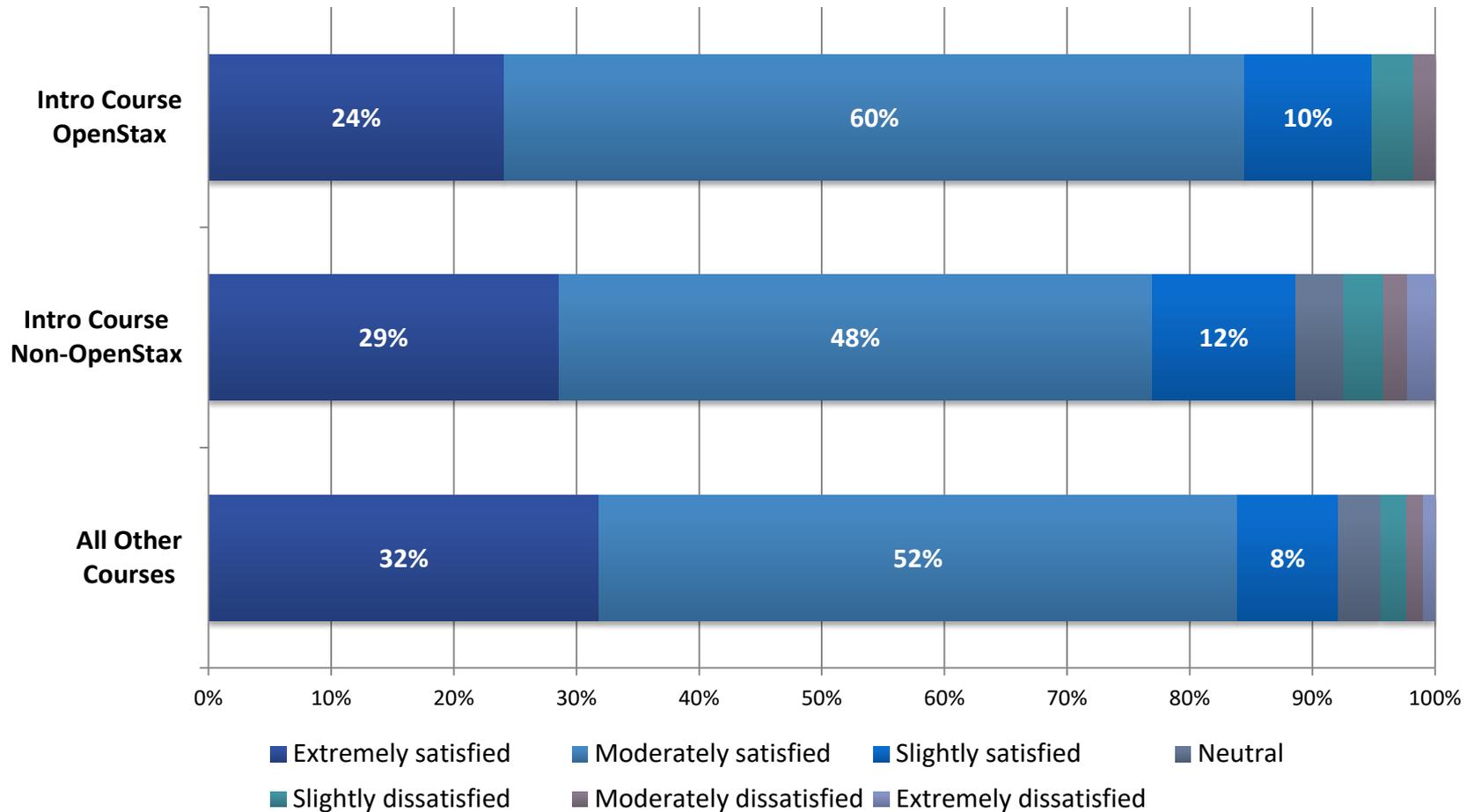
ADOPTED AN OPENSTAX TEXTBOOK FOR INTRODUCTORY LEVEL
COURSE: 2015-16 AND 2016-17



SIMILAR ADOPTION LEVELS FOR K-12



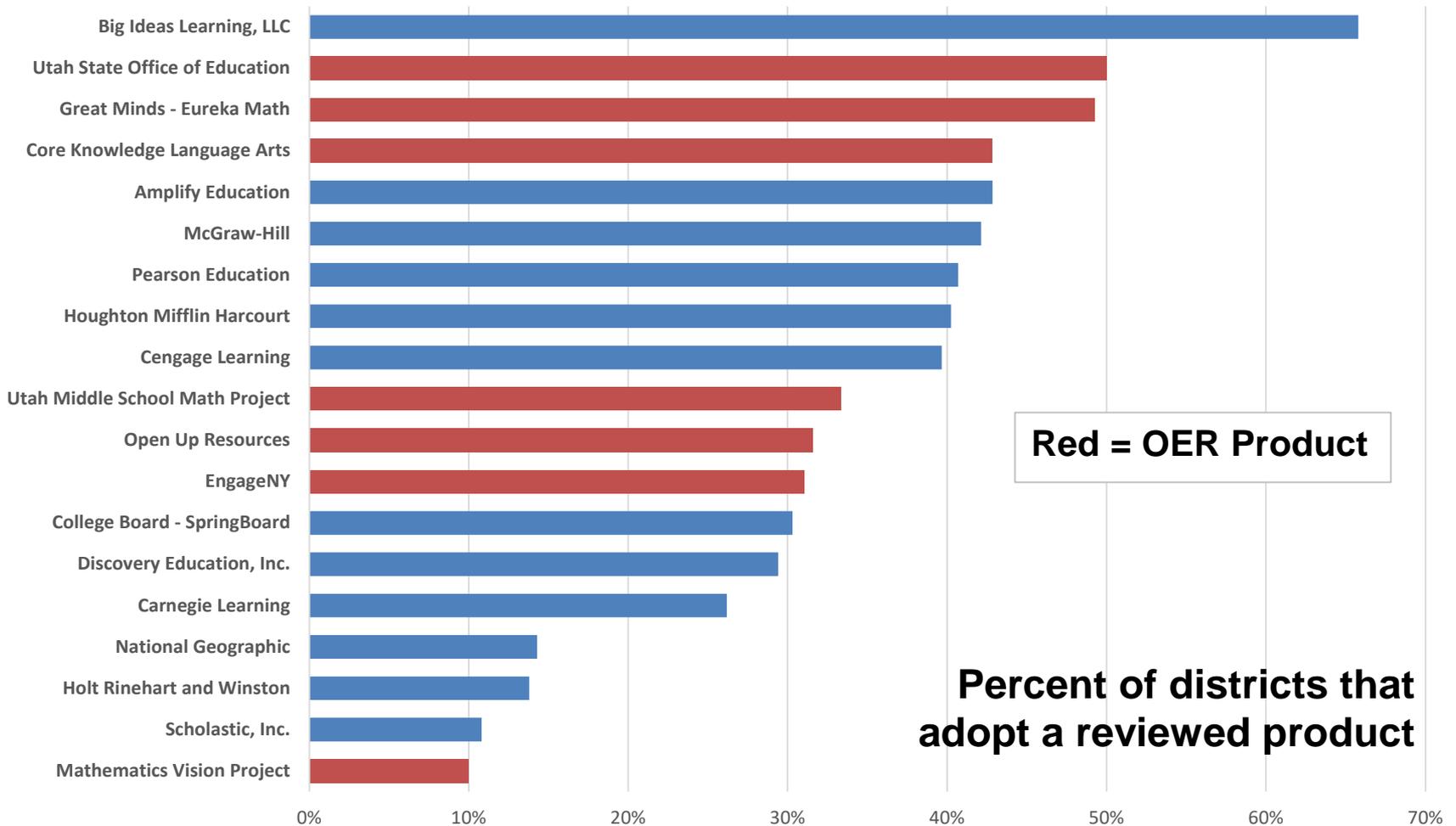
QUALITY IS THERE - FACULTY SATISFACTION



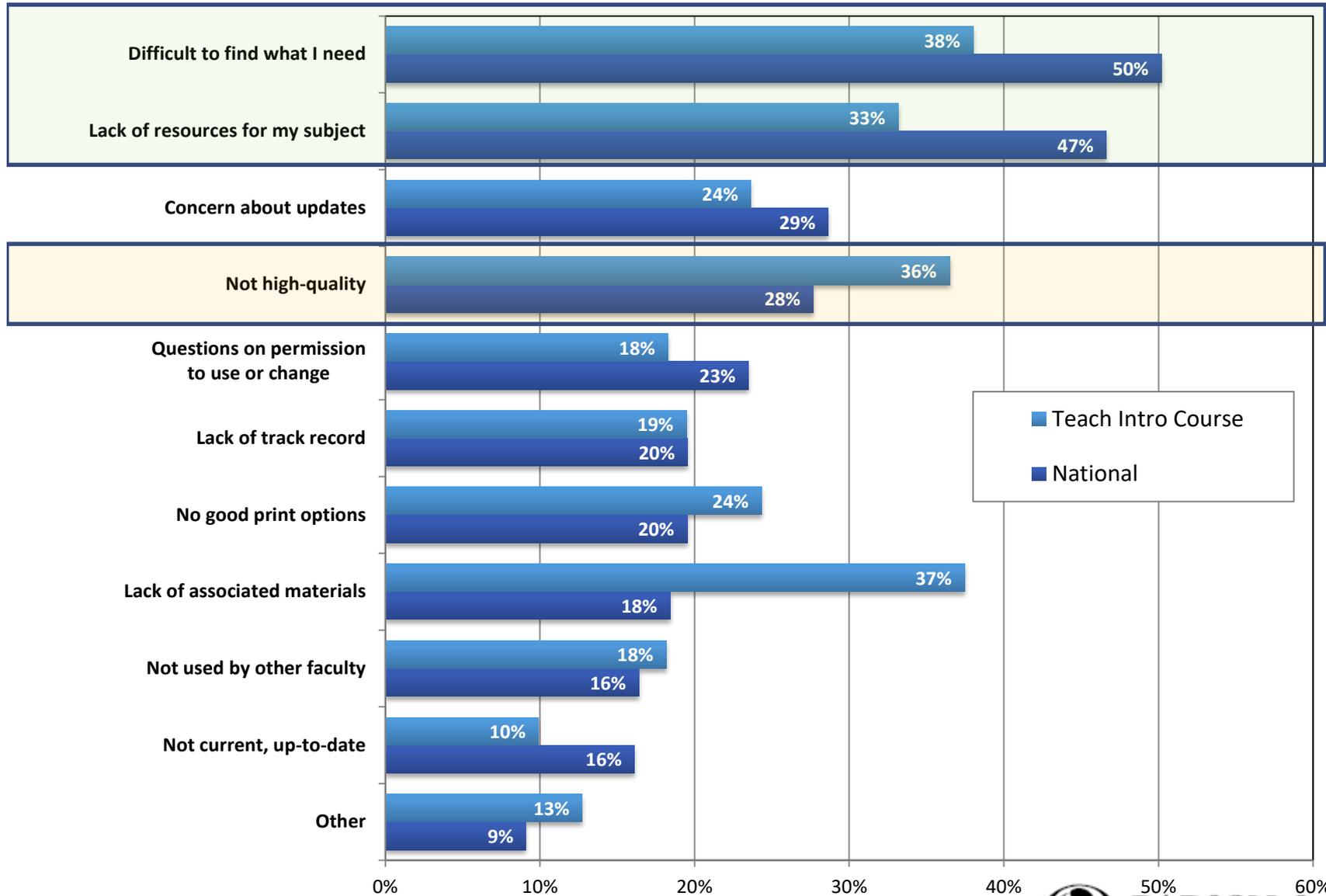
OPENSTAX ADOPTERS

- Less satisfied with supplemental material
- Extremely satisfied with cost to the student
- Similar levels of satisfaction on other dimensions
 - Easy to find
 - Works with my LMS
 - Recommended by other faculty
 - Familiarity with brand/publisher
 - Comprehensive content
 - Adaptable/editable

K-12 ADOPTION RATES



BARRIERS TO ADOPTION OF OER - 2016-17



FACULTY OER ADVANTAGES

- Its free - more students with resources
- Strong dissatisfaction with current publishing model
- Institutional pressure
- “Feel Good” response – matches academic ideals
- Digital is an advantage
- The ability to remix

CONTACT

Dr. Jeff Seaman

jseaman@seagullhaven.com

<http://www.onlinelearningsurvey.com/oer.html>



Research Roadmap Working Group

Evan Heit
Division Director, DRL

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Research roadmap working group

- Charged with developing a plan to enhance the scope, quality, and impact of EHR's research portfolio around identified and emerging program priorities.
- More than 40 EHR staff participated; more than 10 meetings.
- Developed a document with 18 specific recommendations in areas such as promoting scientific transparency, building internal and external expertise, engaging stakeholders, and evaluating progress.

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Sample recommendations

- Promote scientific transparency
 - Highlight the role of data management plans in the proposal review process.
 - Encourage/incentivize/require sharing of research plans, data, and materials, by investigators.
- Build research expertise, internally
 - Every EHR staff member is encouraged to have an Individual Development Plan, Independent Research and Development plan, or equivalent.
 - Build EHR's internal infrastructure for knowledge sharing and curation. Activities could range from brown bag events and more in-depth learning opportunities to depositories of our funded research.

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Sample recommendations

- Engage stakeholders
 - Programs should fund more synthesis proposals and forward-looking workshops.
 - Re-engage and re-target National Academies investments.
- Evaluate progress
 - Identify opportunities to integrate (where appropriate, streamlining or enhancing) data and tool development for monitoring and evaluative purposes, working collaboratively across programs
 - Charge the EHR Evaluation and Monitoring Group with developing a framework for evaluating EHR research programs.

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Build research expertise, externally

- Have deeper and more sustained outreach activities, beyond solicitations and webinars, to include PIs and potential PIs.
- Fund more professional development opportunities for PIs and potential PIs (e.g., summer schools, award supplements for professional development).
- Fund twice as many CAREER awards, while maintaining a competitive program.
- Fund other field-building awards, targeted at graduate students, post-docs, or mid-career faculty, and fund projects that develop research and evaluation methodology itself.

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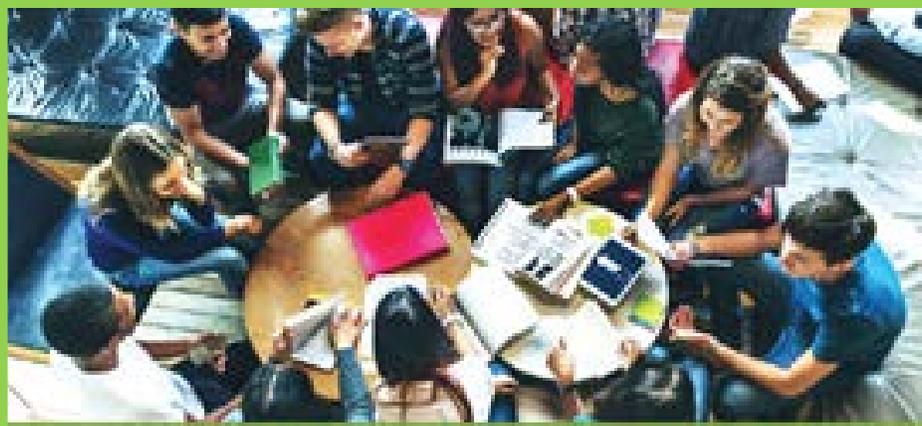


The challenge

- What can EHR do to build, support, and enhance our research communities?

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The NSF ADVANCE Program

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The NSF ADVANCE Program Goals

STEM institutions and organizations
that are structured to be inclusive



A diverse STEM academic workforce



Research-based equity practices in
STEM institutions and organizations



Systemic Strategies ADVANCE (2001-2017) Focused on Addressing gender-based inequities in institutions, policies, procedures, & practices

Professional Development

- Women who negotiate are nice too!
- Support Programs
- Expand Definition of Excellence
- Inclusive Organizations

MENTORING Circles

- Using Culture & Climate Surveys
- Mini-Grants
- Open Searches
- Dependent Care Policies
- Empowerment
- Search Data
- Address Academic Stigmas
- Intersectional Perspective
- Adaptation for Different Contexts

Eliminating Hidden Rules

- Train leaders to use policies
- Collecting, analyzing, sharing, using the right data
- Recognize & value service work
- Equitable Policies for Resource Allocation
- Monitoring workload
- Implicit Bias Training
- Accountability for Leadership
- Work Life Policies & Programs
- Mitigate Implicit Bias Vol 1 – search coms
- Mitigate Implicit Bias Vol 2 - tenure
- Mitigate Implicit Bias Vol 3 - promotion
- ALLIES
- ADVOCATES AND

Bystander Interventions

- Offices of Diversity and Inclusion - for Faculty too!
- Transparency & Consistency
- Microaggression Training
- Using Culture & Climate Surveys
- Salary Equity Surveys
- Family Advocates
- Dual Career Policies
- Chair Training
- Departmental Level Strategies
- Interactive Theater
- Diversity Goals
- Leadership Development
- Sponsorship
- Start-up checklists

Gender Strategies before ADVANCE (2001) Focused on individuals

- Different Contexts
- New Questions
- On-going SBE Research
- Learning from ADVANCE program

Professional Development

Women who negotiate are nice too!

Support Programs

Expand Definition of Excellence

Inclusive Organizations

MENTORING Circles

Using Culture & Climate Surveys

Mini-Grants

Open Searches

Dependent Care Policies

Empowerment

Search Data

Address Academic Stigmas

Intersectional Perspective

Adaptation for Different Contexts

Eliminating Hidden Rules

Train leaders to use policies

Collecting, analyzing, sharing, using the right data

Recognize & value service work

Equitable Policies for Resource Allocation

Monitoring workload

Implicit Bias Training

Accountability for Leadership

Work Life Policies & Programs

Mitigate Implicit Bias Vol 1 – search coms

Mitigate Implicit Bias Vol 2 - tenure

Mitigate Implicit Bias Vol 3 - promotion

ADVOCATES AND ALLIES

Bystander Interventions

Offices of Diversity and Inclusion - for Faculty too!

Transparency & Consistency

Microaggression Training

Using Culture & Climate Surveys

Salary Equity Surveys

Family Advocates

Dual Career Policies

Chair Training

Strategies

Departmental Level

Interactive Theater

Diversity Goals

Leadership Development

Sponsorship

Start-up checklists

ADVANCE Sustainability

University of California - Irvine Office of Diversity and Inclusion



Douglas M. Haynes
VP for Academic Equity, Diversity & Inclusion, ADVANCE Project Director, Professor Department of History
“Our mission is simple and audacious: to establish UCI as a national leader and global model of inclusive excellence.”



- University of Michigan
- University of Wisconsin
- Georgia Tech
- University of Washington

Northeastern University ADVANCE Office of Faculty Development



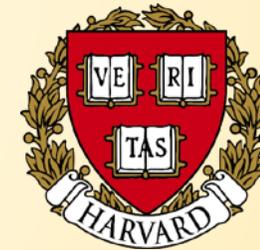
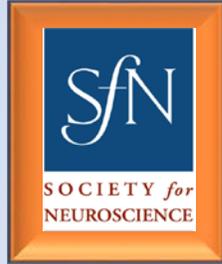
Jan Rinehart
Executive Director ADVANCE
STRIDE Committee training already being offered for dates in 2018.



- CUNY Hunter
- U of Colorado Boulder
- Case Western Reserve U
- UMBC
- VA Tech
- Kansas State U
- New Mexico St U

Diffusion of ADVANCE Innovations

Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE)



Diffusion of ADVANCE Innovations



Northeastern University ADVANCE IT - STRIDE Committee Training 2008 to now.



Luis M. Falcón co-PI on Northeastern ADVANCE, trained as a STRIDE faculty, becomes Dean at U Mass Lowell in 2012.



Joseph C. Hartman, Dean of Engineering, adopts strategies shared by Dr. Falcón when he arrives at Lowell in 2013.



U Mass Lowell awarded IT project in 2016 focused on bystander training & subtle gender bias.



ADVANCE Inspires International Action



“The US has led the way with the ADVANCE programme, funded by the National Science Foundation.”

- European Commission 2012



“Programmes such as the pioneer ADVANCE programme... by the US National Science Foundation, have successfully encouraged major universities into changing their institutional policies, procedures and practices for recruitment, retention, tenure and promotion, improving working conditions, social and gender climates and dynamics and the situation of women faculty in STEM disciplines.”

- GENDER-NET European Research Area Network, accessed Nov. 2017



“In 2009, inspired by the ADVANCE Program created by the US National Science Foundation, the European Commission launched a new set of calls for proposals as part of the Science-in-Society Work Programme of the 7th Framework Programme (FP7), which sought to directly support Universities and Research Organisations into engaging in structural change through the implementation of tailored gender equality plans.”

- The INTEGER Project, accessed Nov. 2017



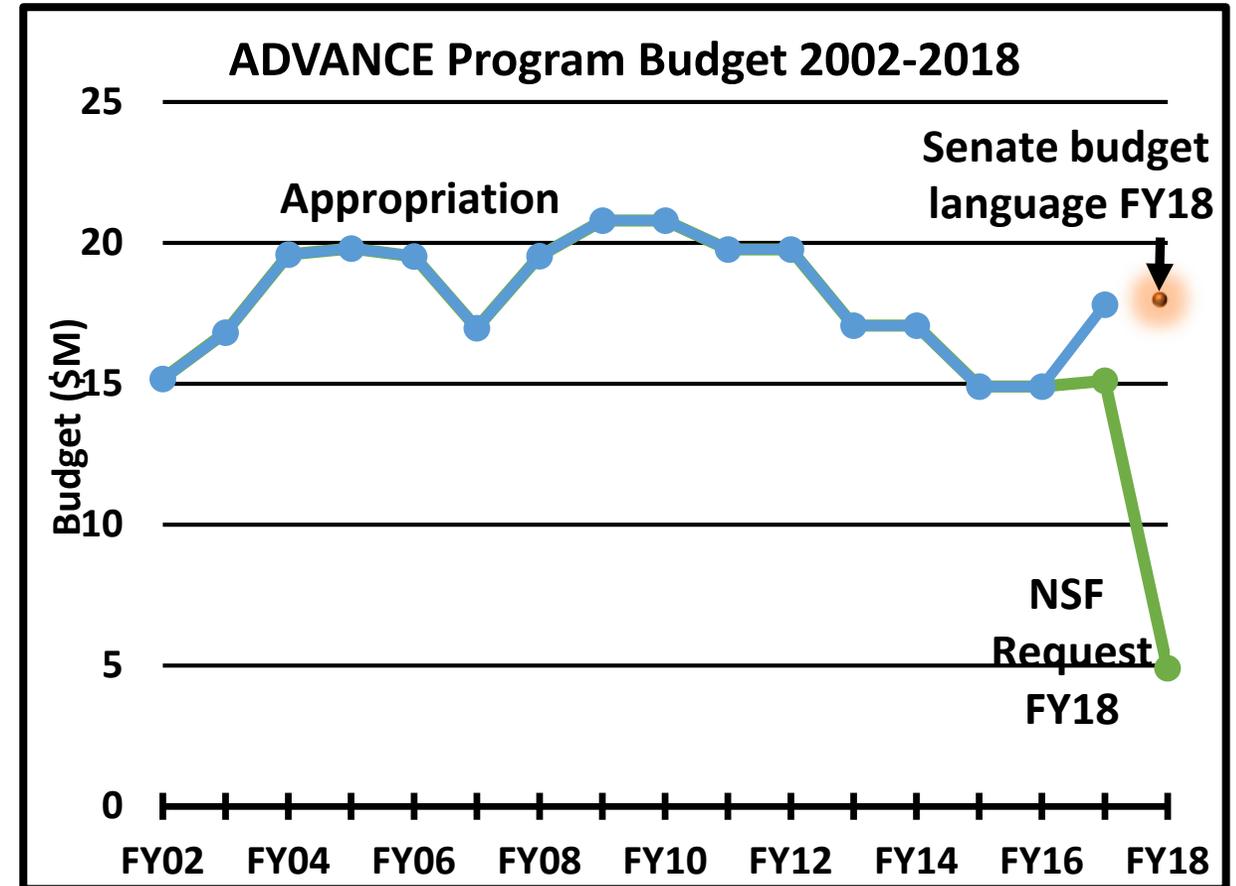
ADVANCE - Looking Forward

Program Management

- Program Evaluation 2018
- More and better sharing from ADVANCE
 - ARC Network

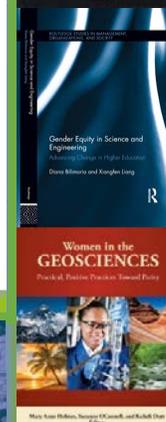
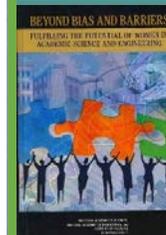
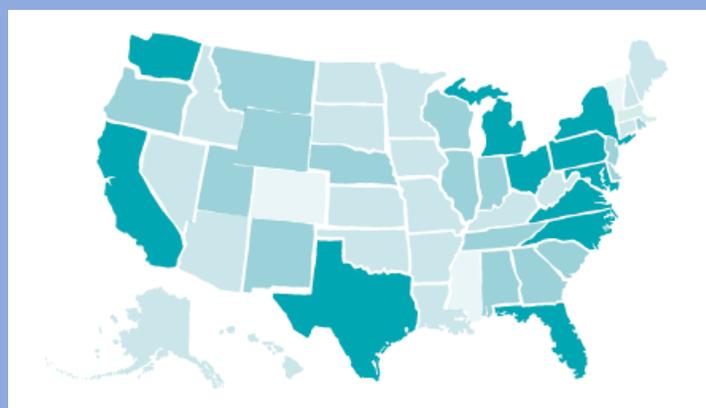
Focus on systemic change

- STEM Professional societies
- STEM Discipline Specific strategies



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ADVANCE

ADVANCE@nsf.gov

Thank You



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Discovery Research preK-12 (DRK-12) Program

Division of Research on Learning
in Formal and Informal Settings

Program Solicitation: NSF 17-584

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Goal of the DRK-12 Program

Catalyze research and development of (STEM) education innovations or approaches that can serve as models for use by the nation's formal STEM education infrastructure (e.g., schools, districts, states, teachers).

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DRK-12 Projects

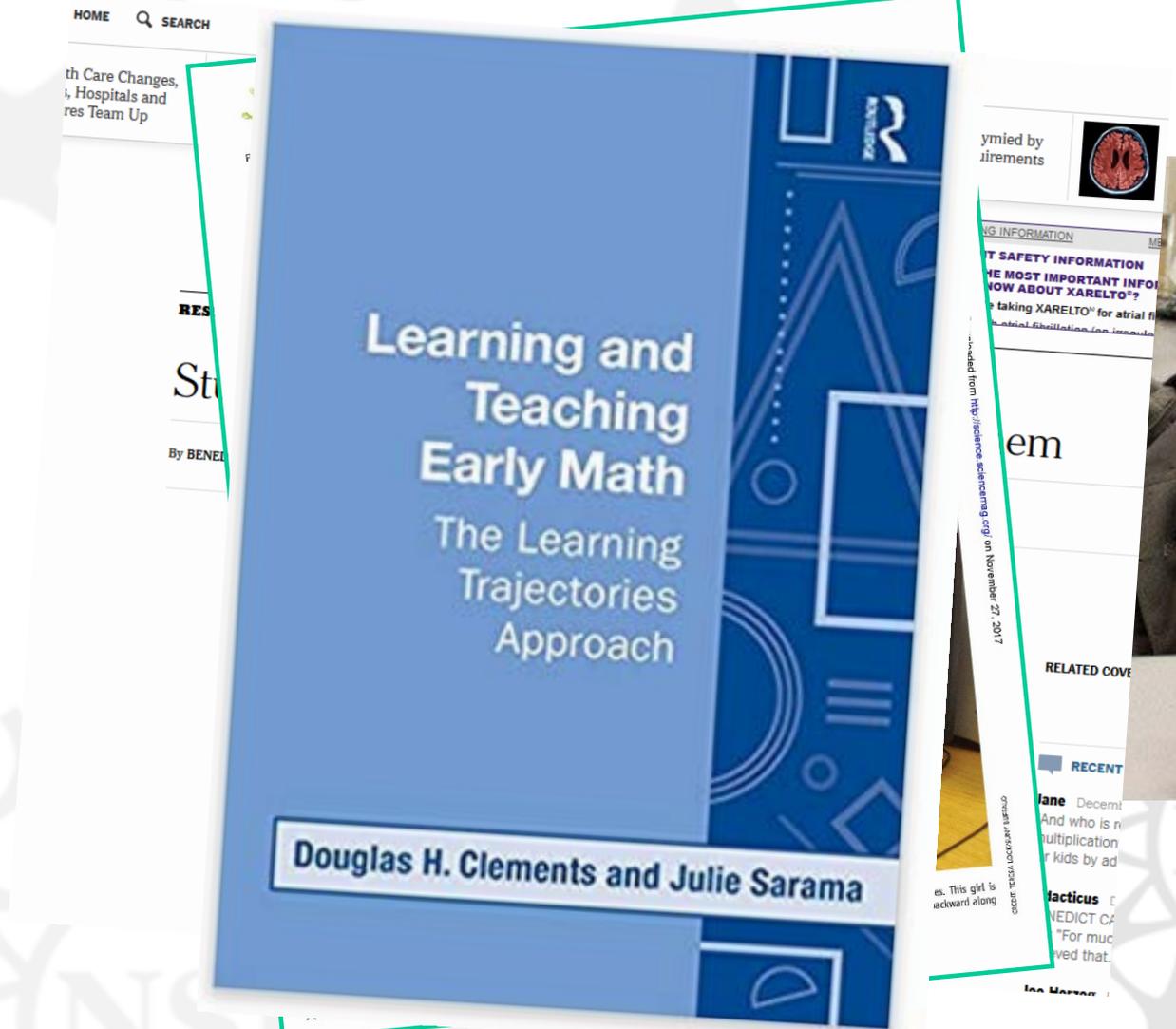
- Contribute to the research base in STEM education
 - Build on fundamental research and STEM education development literature and practice
 - Have rigorous research and development plans
- Reflect the needs of an increasingly diverse student and teacher population

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Early Math Education— Building Blocks and TRIAD



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Scratch and ScratchJr

- Scratch is a free programming language and online community intended for children aged 5 through 16.
- Used by millions of people in over 150 countries and in 40 languages.
- Early iterations of Scratch were funded by collaborations between CISE and DRK-12.

Create stories, games, and animations
Share with others around the world



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Scratch and ScratchJr

The screenshot displays the Scratch web application interface. At the top, there is a menu bar with 'Scratch', 'File', 'Edit', 'Tips', and 'About'. Below the menu bar, the main workspace is divided into several sections:

- Stage:** A large white area where the cat sprite is positioned. The coordinates 'X: 240 Y: 88' are visible at the bottom right of the stage.
- Sprites:** A panel at the bottom left showing a single sprite named 'Sprite1' with a cat icon.
- Scripts Area:** A panel on the right side containing a list of script blocks. The 'move 10 steps' block is highlighted, and a mouse cursor is pointing at it.
- Block Palette:** A vertical list of block categories on the left side of the Scripts area, including Motion, Looks, Sound, Pen, Data, Events, Control, Sensing, Operators, and More Blocks.

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PhET Simulations

- PhET provides fun, free, interactive, research-based science and mathematics simulations.
- Help students engage in science and mathematics using the following design principles: encourage inquiry, provide interactivity, make the invisible visible, show visual mental models, include multiple representations, use real-world connections, give implicit guidance, flexible use in many educational situations.

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PhET Simulations

The image displays three overlapping PhET simulation windows. The top window is titled 'Tug of War' and shows a blue figure pulling a rope. The middle window is titled 'Motion' and shows a 'Sum of Forces' checkbox. The bottom window is a chemistry simulation showing the combustion of methane. It features a yellow smiley face icon and a 'Tools: None' dropdown menu. The simulation shows a reaction between methane and oxygen, with molecular models and chemical formulas.

1 CH₄ + 2 O₂ → 1 CO₂ + 2 H₂O

At the bottom of the chemistry simulation window, there are three radio buttons: Make Ammonia, Separate Water, and Combust Methane. A green circular icon with a white 'G' is located in the bottom right corner of the window.

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DRK-12 Today

- At the September application deadline, the program received an extremely robust response from the field.
- Emphases on early childhood, computer science, and mathematics education are critically important.
- The focus on broadening participating continues to be a critical component of the DRK-12 portfolio.

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DUE Core Programming: IUSE and its predecessors

Perspectives on goals, outreach, and impacts

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An Evolving Core Program (CCLI, TUES, IUSE) growing emphasis on knowledge creation and DBER

- CCLI began in 1998, evolved into TUES in 2010, then IUSE in 2014
- **IUSE** was a EOP request to NSF for a core UG STEM Ed program for Fed Govt
- It also absorbed 2 other programs: STEP & WIDER;
 - **STEP** - an institutional awards program dating from 2002; more than 200 grants.
 - -- Designed to increase STEM enrollments and degrees.
 - -- Evaluation data show that it succeeded and demonstrated a peer “me too” effect
 - **WIDER** (EOP request for an institutional program focused on better teaching)
 - -- ran for 2 years (2013 & 2014), making 40 “Institutional Transformation” grants
 - [Note: *WIDER = Widening the Implementation & Demonstration of Evidence-based Reforms*]

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Program Design

- IUSE has two Main tracks
 1. Engaged Student Learning
 - Direct lineage from CCLI and TUES
 2. Institutional & Community Transformation
 - Primary lineage from STEP & WIDER
- IUSE has made grants for four years
 - The majority are *engaged student learning* awards
 - About 40% of the IUSE budget is supporting Institutional & Community grants

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Major CCLI/ TUES/ STEP/ WIDER/ IUUSE Themes

- GOAL is Improved quality of STEM education
 - (Better Materials & Practices -> deepening student learning)
- SCOPE AND FOCI
 - Serving all institutions, all students, and all STEM disciplines;
 - Developing the analytical tools to measure learning gains
 - Supporting faculty professional development.
 - Reinvigorating STEM courses with modern materials reflecting cutting edge STEM
- RESEARCH GOALS
 - Increasing knowledge of effective teaching & learning practices [Intellectual Merit]
 - Increasing Knowledge of effective practices for institutional & community transformation [Broader Impact]
- A PERSISTENT THEME - integration of research and education practices

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Engaged Student Learning Communities reaching large scale

Communities include

- PKAL
- Peer instruction (“concep” tests [TM] + clickers) → Eric Mazur
- JITT: Just in Time Teaching (digital homework)
- PLTL: Peer Led Team Learning (small discussion groups)
- POGIL: Process oriented Guided Inquiry Learning (small teams)
- SCALE UP: Student-Centered Active Learning Environment for Undergraduate Programs (teams around 7’ diameter round tables)
- CUR: The Council on Undergraduate research (CUR)
- SENCER: Science Ed for New Civic Engagements & Responsibilities (STEM for non-majors)

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Points of light: some examples of major successes

Curriculum Focus

(1) **Social Explorer**, GIS-based mapping system for spatial analysis

- Supported by 3 DUE grants and 2 SBE grants
- Widely used now

(2) **CATME** – Comprehensive Assessment of Team-Member Effectiveness

- Originally funded by CCLI – ASA (Assessment of Student Achievement)
- Engineering teams focus
- Two more grants (DUE & EEC)
- Current milestones – 1 million registered student users, 15,000 instructor accounts, and 2,000 institutions using it in 80 countries.

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Points of Light continued...

Research example

Discipline-Based Education Research (DBER); NAS / BOSE Study (2012)

- A broad-reaching synthesis of the evidence, led by Dr. Susan Singer
- Spawned a growing community of DBER scholars
- Helped us understand the need for replication work and better research in some areas

Disciplinary Examples

(1) Vision and Change in Undergraduate **Biology Education** (2013) -
[funded by 2 NSF Directorates, HHMI, and NIH; & supported by AAAS]

- Operational plan is being carried out by PULSE: Partnership for Undergraduate Life Sciences Education

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Disciplinary examples continued...

(2) **Geo Science Education** “**On the Cutting Edge**” developed continuously from the first 2002 onward.

- Supported through follow-on grants from DUE & GEO
- More than 100 workshops
- reached 3,000 faculty, post docs, and grad students from 900 institutions

(3) **Center for the Integration of Research, Teaching & Learning (CIRTL)** –

- Focus on **future faculty**
- Jointly funded by two challenge grants from DUE and MPS.
 - Since then funded twice again by DUE.
- There are now 43 universities participating.
- There are also two CIRTL MOOCs – basic and advanced, taken by thousands

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IUSE and Community Building Through Institutional Grants

Institutional Transformation

- 44 WIDER Grants during 2013 and 2014. 30 more awarded by IUSE.
 - Grants are evenly spread geographically.
 - Grantees are meeting and sharing findings and models
 - Some Grantees are now conducting research
- **Institutional Transformation example:** the REBUILD program at the University of Michigan funded in 2014 by IUSE grant.
 - attracted \$20 million in additional funding from other sources
 - Provided \$8 million from the Board of Regents based on big data analysis

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Community Building (Transformation)

- **FOUR EXAMPLES**

- The AAU STEM Education Initiative funded by Helmsley and subsequently by DUE to conduct research on effectiveness of 8 different models;
- The University Innovation Alliance of 11 large public universities previously funded with large DUE grants (Sharing data, methods, and ideas)
- **NSEC**: National Alliance of STEM Education Centers (N=120+)
- **ASCN**: The Accelerating Systemic Change Network (led by Linda Slakey and others); 27 experts in 6 working groups



NSF Research Traineeship (NRT) Program

Division of Graduate Education

EHR Advisory
Committee

December 1, 2017

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IGERT to NRT Transition

IGERT

FY1997-FY2012

942 Awards

~60 still active



NRT

FY2014-present

54 awards

All still active

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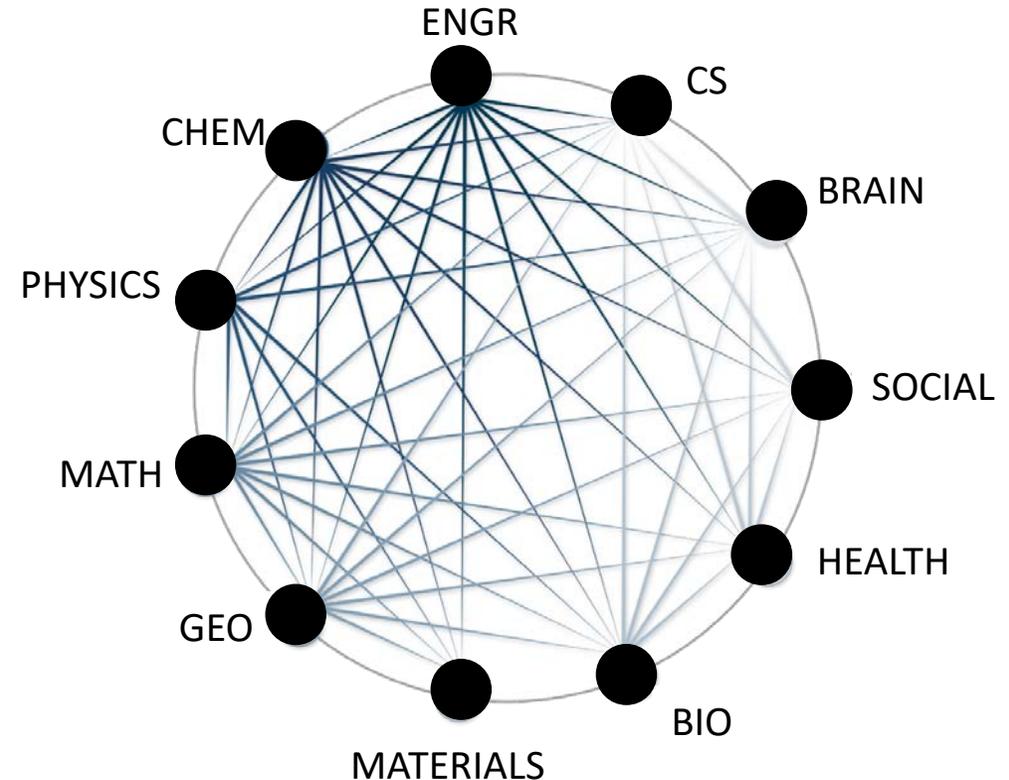


NSF Research Traineeship (NRT)

The NRT Program encourages the development of innovative models for STEM graduate training

Key Traineeship Elements

- Interdisciplinary Research & Training
- Inclusive Workforce Development

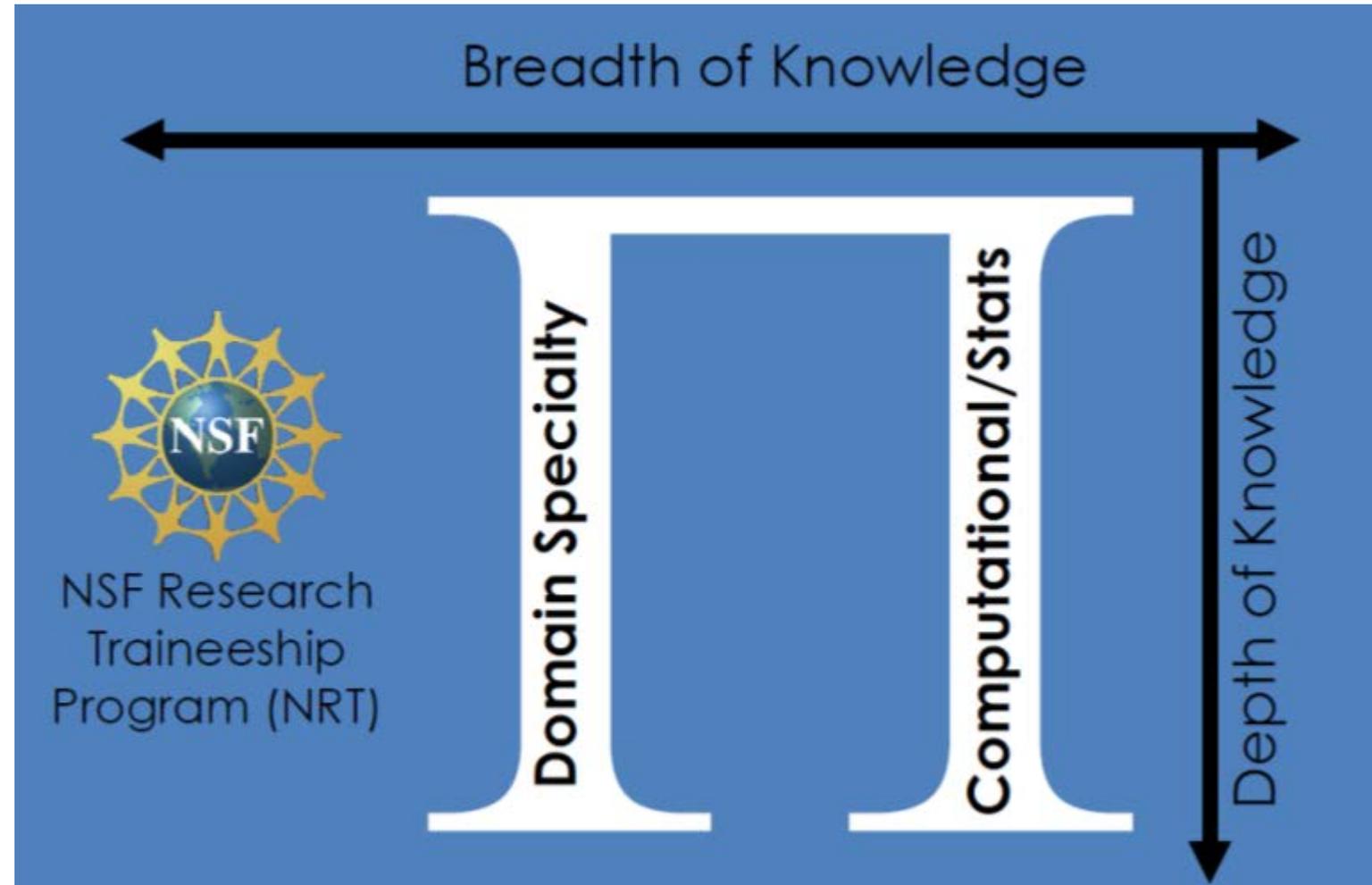


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Interdisciplinary Research & Training



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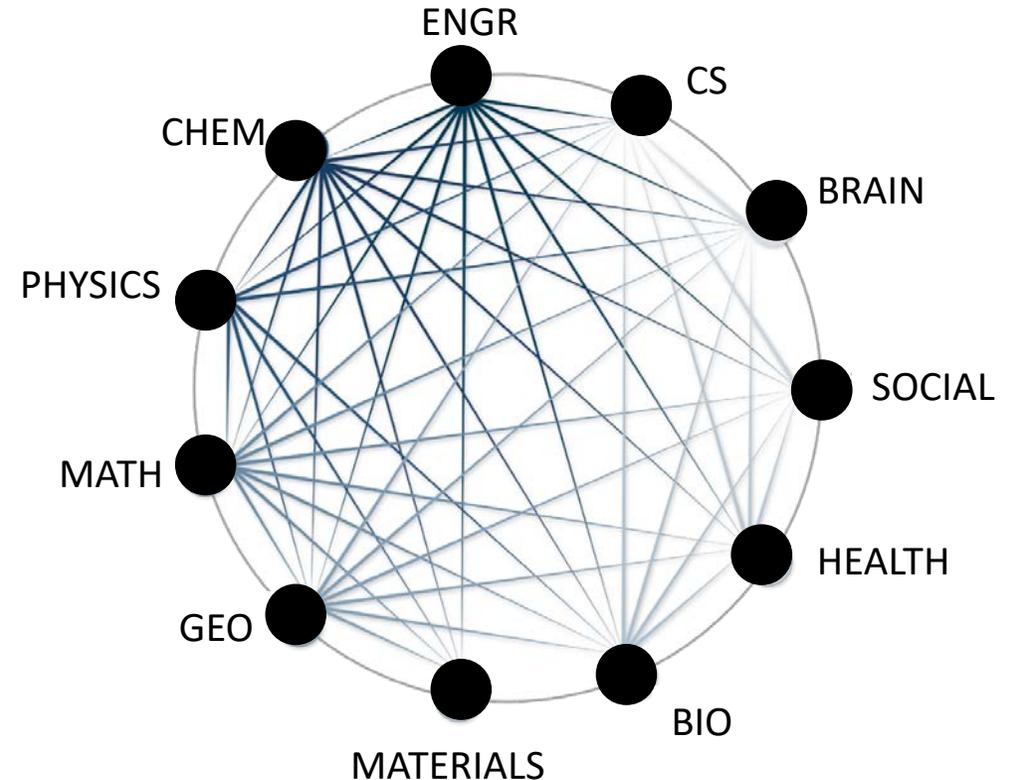


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NRT-INTERFACE

*Training Next-Generation Scientists with Experimental, Theoretical,
and Computational Competencies for Complex Interfaces*

Interdisciplinary Research

- Complex interfaces in advanced materials
- Partners in academia, industry and government labs
- Integrated curriculum

Professional Development

- Bootcamp: Interdisciplinary team skills
- Communication skills
- Career path experiences
- Professional skills workshops



University of Southern Mississippi

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NRT-EMPOWER

Education Model Program on Water-Energy Research



Interdisciplinary Research

- Water-Energy Nexus
- Domestic & International Field Experiences
- Seed Grant Program



Professional Development

- Prof Development Specialization with targeted coursework
- Career Pathway Experience
- Management, Policy, Law, Public Communication of Science



Syracuse
University



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Internships: Partnering with Industry & Others

- 10% of NRT Trainees completed an internship
- Internship Opportunities Vary by Project
 - Local, national, international
 - Private, government labs
 - Sample Partners: Boeing, Solvay Specialty Polymers, AAAS Mass Media, USGS, NOAA, Wave Energy Converter Control Scenarios for Sandia National Labs

“My internship provided me with possible career opportunities.”

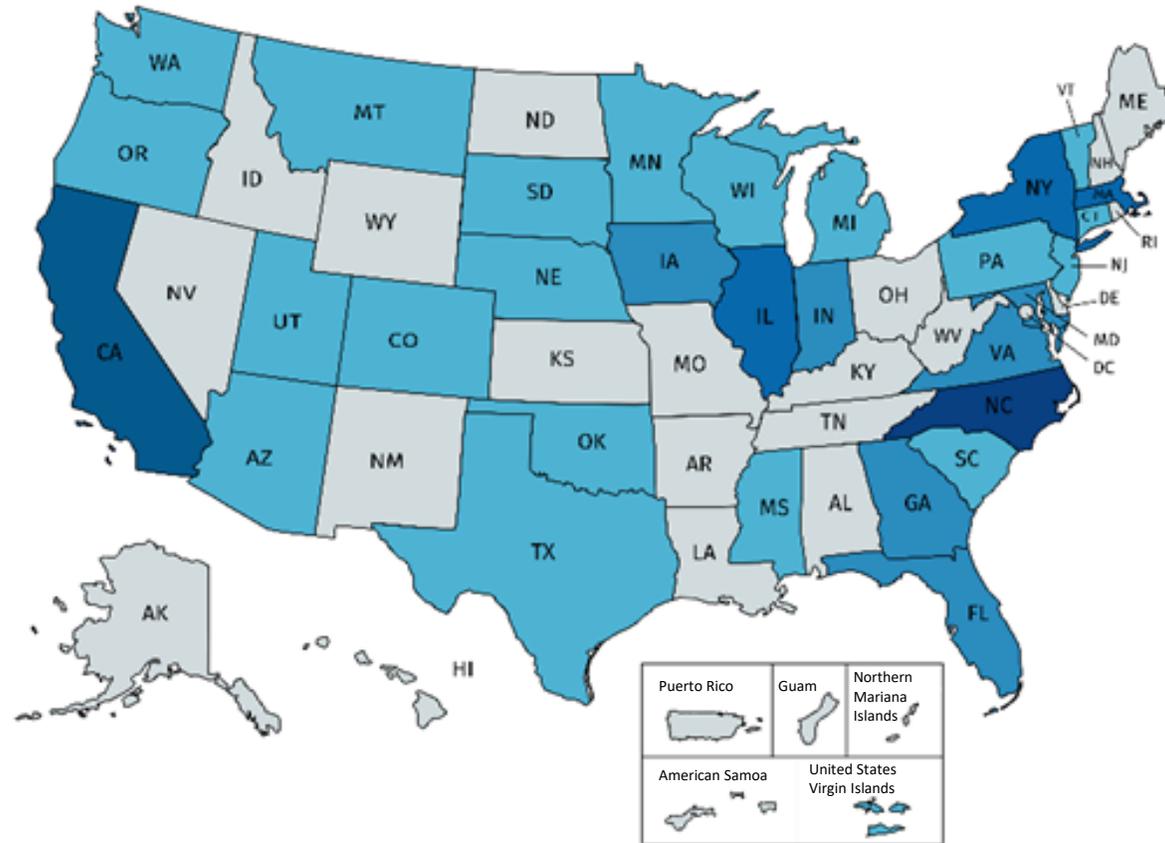
-NRT Trainee, Oregon State University

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Broadening Participation



Awards: 1 2 3 4 >5

NRT Portfolio

- 51 Projects
- 54 Awards
 - 30 States
 - 20% EPSCoR
- Institutions
 - 13% MSIs
 - 20% non-R1
- PI/co-PI Diversity
 - 36% Female
 - 12% URM