

*The National Academies of*  
**SCIENCES • ENGINEERING • MEDICINE**  
**National Academies of Sciences, Engineering, and Medicine Symposium on Assessing  
Hard-to-Measure Cognitive, Intrapersonal and Interpersonal Competencies**

**December 16, 2015**  
**National Academy of Sciences Building, Room 120**  
**2101 Constitution Avenue, NW,**  
**Washington, DC, 20418**  
**DRAFT Agenda 12-3-15**

**Tuesday, December 15**

**4:30-6:30 pm Reception at NAS Building West Court**  
(for arriving participants and members of the committee on assessing competencies)

**Wednesday, December 16**

**NAS 120 (main room)**

**NAS Members Room (overflow room)**

**8:30-9:15 Welcome and Introductions**

- *Heidi Schweingruber, Director, Board on Science Education*
- *Joan Ferrini-Mundy, Assistant Director for Education and Human Resources, National Science Foundation (NSF)*

**9:15-10:30 Session 1: Exploring the Relationships of Cognitive, Intrapersonal and Interpersonal Competencies to STEM Learning and Persistence**

**Moderator:** *Susan Singer, NSF Division of Undergraduate Education*

- *Christine Massey, University of Pennsylvania*  
-Reflections on *Education for Life and Work*
- *Gale Sinatra, University of Southern California*  
-The role of motivation and emotion in teaching and learning about controversial topics
- *Joan Herman, CRESST, UCLA*  
-Reflections on *Assessing 21<sup>st</sup> Century Skills: A Workshop Summary*  
-Overview of Study on Assessing Intrapersonal and Interpersonal Competencies
- Questions, Discussion

**10:30-10:45 Break**

**10:45-12:00 Session 2: Defining and Assessing Competencies**

**Moderator:** *Gregg Solomon, NSF Division of Research on Learning*

Developing Definitions and Assessment Methods

- **Patrick Kyllonen, ETS**  
-Preliminary taxonomy of competencies from *Education for Life and Work*  
-Aligning Competency Types with Measurement Methods

A Research and Development Agenda and a Repository of Instruments

- **Brian Stecher and Laura Hamilton, RAND**

**12:00-1:00 Lunch**

**1:00-2:30 Session 3: Funder Interest and Activity in Assessing Competencies**

**Moderator: Joan Herman, CRESST, UCLA**

NSF Research Support: Findings from the NSF Portfolio Review

- **Susan Singer, NSF Division of Undergraduate Education**
- **Evan Heit, NSF Division of Research on Learning**

Other Funders' Research Support: Findings from the Funder Landscape survey.

- **Marc Chun, The William and Flora Hewlett Foundation**

Institute of Educational Sciences Research Support: Portfolio Overview

- **Thomas Brock, Institute of Education Sciences, U.S. Department of Education**

National Institute of Child Health and Development Research Support

- **James Griffin, Child Development and Behavior Branch, National Institute for Child Health and Human Development**

**2:30-2:45 Break** (move to parallel sessions at end of break)

**2:45-4:45 Session 4: A Sampling of NSF Projects** (audience attends parallel sessions)

**2:45-3:45 Parallel Panel Sessions**

**Panel 1: Gender, Diversity, and Competencies in STEM Pathways, Board Room**

**Moderator: Margaret Hilton, Board on Science Education**

<b>Speaker</b>	<b>NSF Award Title and Abstract</b>
<b>Jennifer Cromley, University of Illinois</b>	A multimethod approach to understanding dropout from STEM gateway courses <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=0814901&amp;HistoricalAwards=false">http://www.nsf.gov/awardsearch/showAward?AWD_ID=0814901&amp;HistoricalAwards=false</a>
<b>Tabbye Chavous, University of Michigan</b>	Race and gender in context: A multi-method of study of risk and resilience in african american college students' pathways in STEM areas <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1008327">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1008327</a>
<b>Nicole Else-Quest,</b>	Gender-ethnic identification and the development of STEM

<i>U. of MD Baltimore County</i>	achievement behaviors <a href="https://www.nsf.gov/awardsearch/showAward?AWD_ID=1153678&amp;HistoricalAwards=false">https://www.nsf.gov/awardsearch/showAward?AWD_ID=1153678&amp;HistoricalAwards=false</a>
<i>Elsa Villa, University of Texas, El Paso</i>	Latinas in computer science and engineering: A qualitative study examining identity and agency for resilience and persistence <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1232447">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1232447</a>
<i>Joanna Wolfe, Carnegie Mellon University</i>	Uncovering tacit knowledge about gender, communication and interpersonal interactions in engineering <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1262274&amp;HistoricalAwards=false">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1262274&amp;HistoricalAwards=false</a>
<i>Eric Deemer, Purdue University</i>	The mediating role of stereotype threat and achievement goals in the regulation of scientific motivation <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331962">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1331962</a>
<i>Bianca Bernstein, Arizona State University</i>	Enhanced resilience training for STEM women in an interactive, multimodal, web-based environment <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=0910384">http://www.nsf.gov/awardsearch/showAward?AWD_ID=0910384</a>

**Panel 2: Measuring Key Competencies, Room 120**

**Moderator:** *Gül E. Kremer, NSF Division of Undergraduate Education*

<b>Speaker</b>	<b>NSF Award Title and Abstract</b>
<i>Shihong Huang, Florida Atlantic University</i>	Transforming the understanding, assessment and prediction of teamwork effectiveness in software engineering education using machine learning <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1140191">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1140191</a>
<i>Amy Grack Nelson, Science Museum of Minnesota</i>	Collaboration in the 21 <sup>st</sup> century: Measuring essential skills for the STEM workforce <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1335883">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1335883</a>
<i>Kenn Barron, James Madison University</i>	Validating a rapid measure of student motivation: Using the expectancy-value theory of motivation to understand student achievement and interest in STEM classrooms <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1228661&amp;HistoricalAwards=false">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1228661&amp;HistoricalAwards=false</a>
<i>Andrew Krumm, SRI</i>	Developing community and capacity to measure noncognitive factors in digital learning environments <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1338487">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1338487</a>
<i>Ana Luz Porzecanski, American Museum of Natural History</i>	Developing and assessing process skills in conservation biology and other integrative fields <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=0942789">http://www.nsf.gov/awardsearch/showAward?AWD_ID=0942789</a>
<i>Barry Stein, Tennessee Technological University</i>	Expanding use of the CAT: Assessing and Improving Critical Thinking <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1022789">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1022789</a>

**Panel 3: Collaboration and Communication Competencies, Members' Room**  
**Moderator: Brian Stecher, RAND**

<b>Speaker</b>	<b>NSF Award Title and Abstract</b>
<i>Julie Cwikla, University of Southern Mississippi</i>	Early fraction learning: Links with prosociality and self and other perspective taking <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1262281&amp;HistoricalAwards=false">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1262281&amp;HistoricalAwards=false</a>
<i>Danielle McNamara, Arizona State University</i>	Modeling social interaction and STEM learning <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1418378">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1418378</a>
<i>Bradley Barker, University of Nebraska-Lincoln</i>	National robotics in 4-H: Workforce skills for the 21 <sup>st</sup> century <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=0833403">http://www.nsf.gov/awardsearch/showAward?AWD_ID=0833403</a>
<i>Paul Horwitz, Concord Consortium</i>	Teaching teamwork: Electronics instruction in a collaborative environment <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1400545">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1400545</a>
<i>Matthew Ohland, Purdue University</i>	Optimizing student team skill development using evidence-based strategies <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1431694">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1431694</a>
<i>Charles Wallace, Michigan Technological University</i>	Agile communicators: Preparing students for communication-intensive software development through inquiry, critique and reflection <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1504860">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1504860</a>

**Panel 4: Key Intrapersonal Competencies (e.g., motivation, mindsets) , Room 250**  
**Moderator: Heidi Schweingruber, Board on Science Education**

<b>Speaker</b>	<b>NSF Award Title and Abstract</b>
<i>Sheri Berkeley, George Mason University</i>	Self-regulation of science learning in the context of educational game creation: A study of middle school students with learning disabilities <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1420448">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1420448</a>
<i>Xueli Wang, University of Wisconsin</i>	Expanding STEM talent through upward transfer: Factors influencing transfer in STEM fields of study from two-year to four-year institutions (including motivational beliefs) <a href="http://nsf.gov/awardsearch/showAward?AWD_ID=1430642">http://nsf.gov/awardsearch/showAward?AWD_ID=1430642</a>
<i>Xaiodong Lin, Teachers College, Columbia University</i>	Developing students' growth mindsets to promote science learning (K-12) <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=124">http://www.nsf.gov/awardsearch/showAward?AWD_ID=124</a>

	<a href="#">7283&amp;HistoricalAwards=false</a>
<b>Lee Shumow</b> , Northern Illinois University	Incremental mindset and utility for science learning and engagement (I-MUScLE): A quasi-experimental study of the impacts of targeted classroom treatments (K-12)
<b>Barbara Schneider</b> , Michigan State University	An international study of student engagement: An EAGER grant <a href="http://www.nsf.gov/awardsearch/showAward?AWD_ID=1450756">http://www.nsf.gov/awardsearch/showAward?AWD_ID=1450756</a>
<b>Ming-Te Wang</b> , University of Pittsburgh	Assessing Student Engagement in Math and Science in Middle School: Classroom, Family, and Peer Effects on Engagement <a href="http://nsf.gov/awardsearch/showAward?AWD_ID=1315943">http://nsf.gov/awardsearch/showAward?AWD_ID=1315943</a>

**3:45-4:30**     **Small Group Discussions, Same 4 Rooms** —3 to 4 small groups in each room led by pairs of panel speakers

**4:30**     **Break** (return to plenary room at end of break)

**4:45-5:30**     **Session 5: Next Steps, Room 120** (main room) **Members Room** (overflow)  
**Moderator: Christine Massey**, University of Pennsylvania

-Reflections on the Day: Key themes and unanswered questions

*Fred Oswald, Rice University*

*Tabbye Chavous, University of Michigan*

-Questions and reflections from the audience

-Plans for Moving Forward

**5:30**     **Adjourn Symposium**