
NIH
SciEd
2014

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# Overview

NIH SciEd 2014, held May 4 – 6 in Bethesda, MD, was the third NIH-wide conference for science education projects funded by the National Institutes of Health. The 76 projects represented at the conference were funded by the following programs:

- Science Education Partnership Award (SEPA), Office of Research Infrastructure Programs (ORIP), Division of Program Coordination, Planning and Strategic Initiatives (DPCPSI), Office of the Director
- Science Education Drug Abuse Partnership Award (SEDAPA), National Institute on Drug Abuse (NIDA)
- NIH Blueprint for Neuroscience Research Science Education Award
- Science Education Awards, National Institute of Allergy and Infectious Diseases (NIAID)
- National Institute of Minority Health and Health Disparities (NIMHD)
- IDeA Networks of Biomedical Research Excellence (INBRE)
- Small Business Innovation Research (SBIR)

The 205 conference participants included 73 project PIs, 23 Co-PIs, 58 project managers and other staff, 10 evaluators, 7 teachers, 18 other individuals and 16 federal government employees, including NIH staff and representatives from other federal agencies involved in science, technology, engineering and mathematics (STEM) education at the pre-kindergarten – grade 12 (P-12) levels also participated. These included the US Department of Education (DoE), the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA).

The theme of the conference was “Enhancing P-12 STEM Partnerships Through Communication and Collaboration.” A major focus was on identifying opportunities for synergistic interactions among P-12 STEM projects and programs supported by the five federal agencies—DoE, NIH, NSF, NASA and NOAA. Camsie McAdams (DoE) first gave an overview of the Committee on Science, Technology, Engineering and Math Education (CoSTEM) 5-Year Strategic Federal STEM Education Plan. Next, a representative from each agency presented a synopsis of their programs. This was followed by breakout sessions in which NIH grantees presented examples of synergistic interactions among projects funded by NIH and each of the other agencies. A second set of breakout sessions aimed to identify best practices and appropriate evaluation methods for projects that address key goals of the CoSTEM Plan. Additional sets of breakout sessions addressed research and evaluation, collaborating with diverse groups, collaborating with teachers, engaging graduate students and PhD scientists in P-12 science education, sharing educational materials developed by projects, and project administration. Established working groups focused on specific topics or on regional collaborations also had time to meet. Each project presented a poster about their work. Participants reported that they returned home energized by gaining new ideas for evaluation and other project components, learning about funding opportunities, networking and forming new collaborations

# SciEd 2014 Conference Organizing Committee

Judy Brown, Patricia and Phillip Frost Museum of Science

Shannon Colton, Milwaukee School of Engineering

Rebecca Daugherty, Northwestern University

Janet Dubinsky, University of Minnesota Twin Cities

Susan Kane, City of Hope/Beckman Research Institute

Neil Lamb, HudsonAlpha Institute for Biotechnology

Laura Martin, Arizona Science Center

Nancy Moreno, Baylor College of Medicine

Virginia Shepherd,Vanderbilt University

Louisa Stark, University of Utah

# Conference Supported By

Funding for this conference was made possible in part by:Cooperative Agreement U13OD012222 from the Office of Research Infrastructure (ORIP), Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), Office of the Director, the National Institutes of Heath.The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.

# **NIH SciEd 2014:** Annual Conference for NIH Science Education Projects
## Enhancing P-12 STEM Partnerships Through Communication and Collaboration

**Bethesda Hyatt, Bethesda, MD**
**May 4-6, 2014**

*All sessions will be held in the Haverford/Baccarat Suites of the Crystal Ballroom, unless otherwise noted*

## Sunday, May 4

5:00-7:30pm **Conference Check-in**
*Crystal Ballroom Foyer*

6:00-7:00 **Networking Reception**
*Crystal Ballroom area*

7:00-7:10 **Welcome**

Louisa A. Stark, PhD, NIH SciEd 2014 Conference Organizing Committee Chair, University of Utah

L. Tony Beck, PhD, Director of the Office of Science Education (OSE) & the Science Education Partnership Award (SEPA) Program, Office of Science Education, Office of Research Infrastructure Programs (ORIP), Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), Office of the Director (OD), National Institutes of Health (NIH)

7:10-7:20 **Break**

7:20-8:35 **Breakout Sessions (5)**

**Graduate Student Volunteers – An Untapped University Resource**
Strand: Engaging Graduate Students & PhD Scientists in P-12 Education
*Cartier/Tiffany Salons (Ballroom Level)*

**Implementing Your SciEd Activity with Educators: Models and Methods**
Strand: Collaborating with Teachers
*Diplomat/Ambassador Rooms (Conference Level)*

**Sustaining Projects Beyond the Life of the Grant**
Strand: Project Administration
*Susquehanna/Severn Suites (Conference Level)*

**Using Common Assessment Tools Across Projects**
Strand: Research and Evaluation
*Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

**Visualizing Citizen Science in Ambler, PA**

Strand: Collaborating with Diverse Groups
*Congressional Room (Conference Level)*

## Monday, May 5

7:00-8:00am **Networking Breakfast**
Conference check-in

**Breakfast Breakout Session (1):**

**Regional Collaboration: Finding a Way Forward**
Strand: NIH SciEd Working Groups
*Cartier/Tiffany Salons (Ballroom Level)*

8:00-8:30 **Welcome from NIH, SEPA Update, and Messages from Senators**

James Anderson, MD, PhD, Director, Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), Office of the Director, NIH

Franziska Grieder, DVM, PhD, Director, Office of Research Infrastructure Programs (ORIP), Office of the Director, NIH

Update on the NIH Science Education Partnership Award Program (SEPA)
L. Tony Beck, PhD, Director of OSE/SEPA, ORIP, DPCPSI, OD

Video message from Senator Richard Shelby (R-AL)

Video message from Senator Tom Harkin (D-IA)

8:30-9:00 **The CoSTEM 5-Year Strategic Federal STEM Education Plan**
Camsie McAdams, MS, Acting Director, Office of STEM, US Department of Education

9:00-9:15 **Break**

9:15-10:45 **Panel of STEM-focused Agencies Involved in K-12 and Public Education**

**Panelists:**
Shelley Canright, PhD, Senior Advisor, Education Integration
NASA Office of Education

Pat O'Connell Johnson, PhD, Team Leader, Mathematics and Science Partnership
US Department of Education

Louisa Koch, MS, Education Director
National Oceanic and Atmospheric Administration (NOAA)

Joan T. Prival, PhD, Program Director, Directorate for Education & Human Resources, Division of Undergraduate Education, National Science Foundation (NSF)

Ellen McCallie, PhD, Program Director, Division of Research on Learning, Directorate for Education & Human Resources, National Science Foundation (NSF)

10:45-11:00 **Break**

11:00-12:15 **Breakout Sessions (4)**
*Goal: Discuss, brainstorm and identify ways in which NIH P-12 STEM projects and programs/ projects at each Agency can interact synergistically*

**NIH P-12 STEM and US Department of Education**
*Cartier/Tiffany Salons (Ballroom Level)*

**NIH P-12 STEM and National Science Foundation (formal programs)**
*Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

**NIH P-12 STEM and National Science Foundation (informal programs)**
*Susquehanna/Severn Suites (Conference Level)*

**NIH P-12 STEM, NASA, and NOAA**
*Diplomat/Ambassador Rooms (Conference Level)*

12:15-1:30 **Networking Lunch** *(Plenary Room)*
SEPA Mentor-Mentee groups - *Waterford Suite (Ballroom Level)*

1:30-2:45 **Breakout sessions (6)**
*Goal: Identify best practices for each type of project and appropriate evaluation methods*

**Authentic Research Experiences for Students and Teachers**
*Cartier/Tiffany Salons (Ballroom Level)*

**Curriculum Development**
*Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

**Early STEM** (pre-K through early elementary)
*Congressional Room (Conference Level)*

**Informal Science Education**
*Diplomat/Ambassador Rooms (Conference Level)*

**STEM Education for Rural Students and Teachers**
*Susquehanna/Severn Suites (Conference Level)*

**Teacher Professional Development**
*Waterford Suite (Ballroom Level)*

2:45-3:00 **Break**
Set up all posters; 3 posters/round table
Poster numbers and binder clips for attaching posters will be on the tables.

3:00-4:15 **Poster Session I** (odd numbered posters)

4:15-5:30 **Poster Session II** (even numbered posters)

5:30-6:45 **Networking Reception**
**Demonstrations of Games, Apps and Technology- Based Educational Materials**
*Crystal Ballroom area*

6:45-8:15 **Networking Dinner**

8:15-9:15 **Breakout Session (1)**
**Challenges and Opportunities in Games and Apps for STEM Learning: An Informal Group Discussion**
Strand: NIH SciEd Working Groups
*Cartier/Tiffany Salons (Ballroom Level)*

## Tuesday, May 6

7:00-8:30am **Networking breakfast**

**Breakfast Breakout Sessions (2):**

**SEPA New PI meeting**
Strand: Project Administration
*Diplomat/Ambassador Rooms (Conference Level)*
Breakfast service for this meeting will be outside these rooms

**Publish a Paper About Your Project in Curator: The Museum Journal**
Strand: Project Administration
*Cartier/Tiffany Salons (Ballroom Level)*

8:30-9:45 **Breakout Sessions (5)**

**Conducting Curriculum Evaluation Studies**
Strand: Research & Evaluation
*Diplomat/Ambassador Rooms (Conference Level)*

**Exploring the Measurement Properties of the Draw a Scientist Test**
Strand: Research & Evaluation
*Congressional Room (Conference Level)*

**Human Microbiome Share-A-Thon**

Strand: Sharing Educational Materials
*Susquehanna/Severn Suites (Conference Level)*

**Partnerships to Enhance Student Opportunities within STEM Career Pathways: What Works**
Strands: Collaborating with Diverse Groups
*Cartier/Tiffany Salons (Ballroom Level)*

**SEPA DOC (Diabetes, Obesity, and Cardiovascular Disease) Working Group: Development of a Strategic Plan**
Strand: NIH SciEd Working Groups
*Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

9:45-10:00 **Break**

10:00-11:15 **Breakout Sessions (4)**

**Bringing Social Scientists In: Extending Science Education Partnerships**
Strands: Research & Evaluation
*Diplomat/Ambassador Rooms (Conference Level)*

**Models for Creating, Maintaining, and Supporting a Teacher Network**
Strand: Collaborating with Teachers
*Congressional Room (Conference Level)*

**Overview of STEM Priorities, Funding Opportunities and Resources from the NSF**
Strand: Project Administration
*Susquehanna/Severn Suites (Conference Level)*

**Sharing the Practice of Science: PhDs in K-12**
Strand: Engaging Graduate Students & PhD Scientists in P-12 Science Education
*Cartier/Tiffany Salons (Ballroom Level)*

11:15-11:45 **Conference Wrap-up and Next Steps**
L. Tony Beck, PhD, Director of OSE/SEPA, ORIP, DPCPSI, OD
Louisa A. Stark, PhD, NIH SciEd 2014 Conference Organizing Chair, University of Utah

11:45-12:45 **Networking Lunch**

Conference Evaluation: www.research.net/s/SciEd2014

## **NIH SciEd 2014** Breakout Session Descriptions

Breakout sessions are listed alphabetically by title in nine strands:

- Monday: Cross-Agency Synergies
- Monday: Best Practices
- Collaborating with Diverse Groups
- Collaborating with Teachers
- Engaging Graduate Students and PhD Scientists in P-12 Science Education
- NIH SciEd Working Groups
- Project Administration
- Research & Evaluation
- Sharing Educational Materials

## Monday: Cross-Agency Synergies –11:00-12:15

**NIH P-12 STEM and US Department of Education**
**Facilitator:** Carla Romney, DSc, MBA, CityLab, Boston University School of Medicine
**Panelists:**
Judy Brown, EdD, Frost Science Museum (formerly Miami Science Museum)
Maureen Munn, PhD, University of Washington
Michael Wyss, PhD, University of Alabama Birmingham
Pat O'Connell Johnson, PhD, Team Leader, Mathematics and Science Partnership, US Dept of ED
***Location:*** *Cartier/Tiffany Salons (Ballroom Level)*

**NIH P-12 STEM and National Science Foundation (formal programs)**
**Facilitator:** Wendy Huebner, PhD, Montclair State University
**Panelists:**
Tim Herman, PhD, Milwaukee School of Engineering
David Micklos, DSc, Cold Spring Harbor Laboratory
Louisa Stark, PhD, University of Utah
Joan T. Prival, PhD, Program Director, Directorate for Education & Human Resources, Division of Undergraduate Education, National Science Foundation
***Location:*** *Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

**NIH P-12 STEM and National Science Foundation (informal programs)**
**Facilitator:** Judy Diamond, PhD, University of Nebraska Lincoln
**Panelists:**
Leslie Miller, PhD, Rice University
Meena Selvakumar, PhD, Pacific Science Center
Rebecca Smith, PhD, University of California San Francisco
Ellen McCallie, PhD, Program Director, Division of Research on Learning, Directorate of Education & Human Resources, National Science Foundation
***Location:*** *Susquehanna/Severn Suites (Conference Level)*

**NIH P-12 STEM, NASA, and NOAA**
**Facilitator:** Darrell Porcello, PhD, Lawrence Hall of Science, University of California Berkeley
**Panelists:**
Greg DeFrancis, MA, Montshire Museum of Science
Nancy Moreno, PhD, Baylor College of Medicine

Neil Lamb, PhD, HudsonAlpha Institute for Biotechnology
Shelley Canright, PhD, Senior Advisor, Education Integration, NASA Office of Education
Louisa Koch, MS, Education Director, National Oceanic and Atmospheric Administration
***Location:*** *Diplomat/Ambassador Rooms (Conference Level)*

## Monday: Best Practices – 1:30-2:45

**Authentic Research Experiences for Students and Teachers**
**Facilitator:** Susan Kane, PhD, City of Hope/Beckman Research Institute
**Panelists:**
Lisa Abrams, PhD, and Patty Slattum, PhD, Virginia Commonwealth University
Jennifer Hammond, Director, Teacher at Sea Program, NOAA
Mary Jo Koroly, PhD, University of Florida
Virginia Shepherd, PhD, Vanderbilt University
***Location:*** *Cartier/Tiffany Salons (Ballroom Level)*

**Curriculum Development**
**Facilitator:** Dina Markowitz, PhD, University of Rochester
**NIH SciEd Panelists:**
Cathy Ennis, PhD, University of North Carolina Greensboro
Marco Molinaro, PhD, University of California Davis
Rochelle Swartz-Bloom, PhD, Duke University
***Location:*** *Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

**Early STEM** (pre-K through early elementary)
**Facilitator:** Naomi Luban, MD, Children's Research Institute
**NIH SciEd Panelists:**
Barbara Baumstark, PhD, Georgia State University
Ginger Cross, PhD, Mississippi State University
Laura Romo, PhD, University of California Santa Barbara
***Location:*** *Congressional Room (Conference Level)*

**Informal Science Education**
**Facilitator:** Rebecca Daugherty, PhD, Northwestern University
**NIH SciEd Panelists:**
Laura Martin, PhD, Arizona Science Center
Lisa Marriott, PhD, Oregon Health and Science University
Vicki Coats, Oregon Museum of Science and Industry
***Location:*** *Diplomat/Ambassador Rooms (Conference Level)*

**STEM Education for Rural Students and Teachers**
**Facilitators:** Andrij Holian, PhD, and Tony Ward, PhD, University of Montana
**NIH SciEd Panelists:**
Ann Chester, PhD, West Virginia University
Kimberly Obbink, PhD, Montana State University
Virginia Carraway-Stage, PhD, East Carolina University
***Location:*** *Susquehanna/Severn Suites (Conference Level)*

**Teacher Professional Development**
**Facilitator:** Adam Hott, EdD, HudsonAlpha Institute for Biotechnology
**NIH SciEd Panelists:**
Barbara Hug, PhD, University of Illinois at Urbana-Champaign
Susan Hershberger, PhD, Miami University
Susanna Cunningham, PhD, University of Washington
***Location:*** *Waterford Suite (Ballroom Level)*

## Collaborating with Diverse Groups

**Partnerships to Enhance Student Opportunities within STEM Career Pathways: What Works**
Not all students have opportunities to learn about and pursue careers in STEM fields, including biomedicine. Learn how different communities have enhanced student interest, preparedness and success in health-related STEM disciplines, and discuss strategies to enhance your own programs.

As a result of participating in this session, participants will:
- Learn about programmatic elements that contribute to students' success
- Hear examples of programs that have increased the preparedness of students for STEM careers

Level: Beginning, Intermediate

**Presenters:**
Nancy Moreno, PhD, Professor & Senior Associate Director, Center for Educational Outreach, Baylor College of Medicine
Ann Chester, PhD, Assistant Vice President for Education Partnerships, West Virginia University, Robert C. Byrd Health Sciences Center

*Location: Cartier/Tiffany Salons (Ballroom Level)*

**Visualizing Citizen Science in Ambler, Pennsylvania**
Ambler Pennsylvania is a small community outside of Philadelphia. From 1880 to 1970, a series of companies manufactured asbestos containing products such as roof tiles and brake linings in Ambler. The asbestos industry formed a critical part of the community's identity and economic trajectory. As a legacy of asbestos manufacturing, Ambler has experienced environmental blight, heightened levels of mesothelioma and other asbestos-related diseases, and was first designated as a Superfund community in the 1980s.

REACH Ambler, a multi-disciplinary research project in its second year, is utilizing citizen scientists to understand the meaning of environmental health risks in Ambler. During this session, REACH Ambler researchers—citizen scientists, film-makers, and academicians—will describe the benefits and challenges of diverse collaborations, the role of citizen science in community-based public health research, and how film and audio recordings can be leveraged in service of participatory science.

As a result of participating in this session, participants will:
- Learn how community stakeholders' diverse perspectives can be used to address public health threats in post-industrial settings
- Be able to articulate the role that media play in transmitting stakeholders' voices

Level: Beginning, Intermediate, Advanced

**Facilitators:**
Lisa Jacobs, MSW, Senior Research Coordinator, Mixed Methods Research Lab, University of Pennsylvania
Fran Barg, PhD, Co-Director, Mixed Methods Research Lab & Associate Professor, University of Pennsylvania

**Presenter:**
Jabari Zuberi, MA, Filmmaker & Photographer, JZ Images; University of Pennsylvania

*Location: Congressional Room (Conference Level)*

## Collaborating with Teachers

**Implementing Your SciEd Activity with Educators: Models and Methods**
Once a curriculum is created, the process of working with educators about how to use that asset can be a daunting task. How do you get your materials out to those that can use it? How do you make sure educators are using it the way you intended? This session aims to share best practices for preparing teachers to implement classroom projects and activities. Two models will be presented to begin the discussion. The remaining time will be dedicated to sharing among the participants regarding how groups plan and implement curriculum training locally, regionally and nationally. Those with successful distribution models and those that are entering the distribution phase of the project are encouraged to attend and share.

As a result of participating in this session, participants will:
- Gain insight into various approaches for implementing P-12 STEM activities with educators

Level: Beginning, Intermediate, Advanced

**Facilitator:**
Neil E. Lamb, PhD, Vice President for Educational Outreach, HudsonAlpha Institute for Biotechnology

**Presenters:**
Adam M. Hott, EdD, Coordinator of Educational Outreach, HudsonAlpha Institute for Biotechnology
Tim Herman, PhD, Director, Center for Biomolecular Modeling, Milwaukee School of Engineering

*Location: Diplomat/Ambassador Rooms (Conference Level)*

**Models for Creating, Maintaining, and Supporting a Teacher Network**
Many SEPA projects work with a cohort of teachers, specifically in curriculum development and support. This session will allow project PIs and staff to share the different models they use to develop and maintain strong teacher networks. Particular focus will be on investigating how projects use social media, video conferencing, and distance learning technologies to stay connected with their teacher partners.

As a result of participating in this session, participants will:
- Learn and share models and methods to use in their own projects to develop and maintain strong teacher networks

Level: Intermediate, Advanced

**Facilitator:**
Greg DeFrancis, MA, Associate Director, Montshire Museum of Science

*Location: Congressional Room (Conference Level)*

## Engaging Graduate Students and PhD Scientists in P-12 Science Education

**Graduate Student Volunteers – An Untapped University Resource**
Science graduate students are an often overlooked volunteer pool but they have the capacity to mentor, engage, and lead in the community. Relying almost exclusively on graduate student volunteers, Science Club is an after school mentorship program at the Pedersen-McCormick Boys & Girls Club in Chicago, IL. Volunteers commit an afternoon a week to mentor a small group of middle school students and on average, Science Club mentors stay in the program for 1.5 years. This breakout session will explore strategies to recruit, train, and retain graduate students volunteers.

As a result of participating in this session, participants will be able to describe:
- Barriers to graduate student participation
- Strategies to build and maintain a graduate student volunteer base

Level: Beginning

**Facilitator & Presenter:**
Rebecca Daughtery, PhD, Assistant Director-Science in Society, Northwestern University

*Location: Cartier/Tiffany Salons (Ballroom Level)*

**Sharing the Practice of Science: PhDs in K-12**
As representatives of NIH P-12 STEM programs, we are all actively pursuing partnerships to improve the understanding of the health sciences in K-12. In this session, scientists from the University of Alabama at Birmingham and Vanderbilt University will present various models for involvement of PhD scientists in K-12 education. These models will include both formal (scientists as instructors or co-teaching with certified teachers) and informal (after-school programs or summer camps) education settings. This session will also include a discussion concerning the role of scientists in K-12 and strategies to promote scientist participation in K-12 education programs.

As a result of participating in this session, participants will:
- Have an understanding of the different roles for scientists in K-12 education

Level: Beginning, Intermediate, Advanced

**Presenters:**
Virginia Shepherd, PhD, Director, Center for Science Outreach; Senior Research Career Scientist, Department of Veterans Affairs; Professor of Pathology, Microbiology and Immunology, Vanderbilt University
Michael Wyss, PhD, Director, Center for Community Outreach Development; Professor of Cell, Developmental and Integative Biology, University of Alabama at Birmingham
Tiffany Ellis Farmer, PhD, Director, Interdisciplinary Science & Research, Vanderbilt University

*Location: Cartier/Tiffany Salons (Ballroom Level)*

## NIH SciEd Working Groups

**Challenges and Opportunities in Games and Apps for STEM Learning: An Informal Group Discussion**
Those who are actively developing games and apps for STEM learning, or considering such an effort will meet to discuss what they are doing and explore challenges and opportunities in this area.

As a result of participating in this session, participants will:
- Meet others interested in game and app development
- Game/app developers will have an opportunity to informally discuss their efforts at developing computer and mobile media games and apps for STEM, and explore opportunities to share knowledge or collaborate

Level: Intermediate, Advanced

**Facilitator:**
Eve Wurtele, PhD, Professor, Iowa State University

*Location: Cartier/Tiffany Salons (Ballroom Level)*

**Regional Collaboration: Finding a Way Forward**
Join us to explore regional collaboration among NIH-funded STEM programs. With recent changes in Federal funding streams, our programs (and other former or prospective STEM education programs) need to pursue collaboration as a means to attract significant non-Federal (i.e, foundation and private) support. While our target audiences and content may differ, our commitment to improving STEM education is a common thread that runs through all of our programs. What can we share? How can we share? What new funding sources can we target as a collaborative group rather than as independent programs? Let's develop a strategy for 2014 and beyond.

As a result of participating in this session, participants will:
- Learn about benefits of collaborations among programs

Level: Beginning, Intermediate, Advanced

**Presenters:**
Carla Romney, DSc, MBA, Director of Research, CityLab, Boston University School of Medicine
Michael Chorney, PhD, Professor, Penn State University College of Medicine/Hershey Medical Center
Carl Franzblau, PhD, Professor, Boston University School of Medicine
Donald DeRosa, EdD, Director, CityLab, Boston University Schools of Education and Medicine

*Location: Cartier/Tiffany Salons (Ballroom Level)*

**SEPA DOC (Diabetes, Obesity, and Cardiovascular Disease) Working Group: Development of a Strategic Plan**
The vision of the DOC is to leverage the resources of the NIH SEPA, in partnership with funded formal and informal science PIs, their institutes and partners, as well as science education stakeholders, to promote mathematics and scientific literacy for all United States citizens. The purpose of the proposed

session is to provide DOC (Diabetes, Obesity, and Cardiovascular Disease) SEPAs an opportunity to meet face-to-face to discuss the working group's mission and develop of a strategic plan for future initiatives. DOC WG members, new and old, will be encouraged to recharge their enthusiasm for working together and make concrete action plans to continue to work together throughout the coming year.

As a result of participating in this session, participants will develop:
- An understanding of the DOC Working Group (WG) mission.
- Partnership with other DOC SEPAs.
- An understanding of the DOC WG future initiatives as it relates to the discussed strategic plan.

Level: Beginning, Intermediate, Advanced

**Facilitators:**
Melani Duffrin, PhD, Professor, East Carolina University
Virginia Carraway-Stage, PhD, RD, LDN, Director, FoodMASTER; Assistant Professor, East Carolina University

*Location: Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

## Project Administration

**Overview of STEM Education Priorities, Funding Opportunities and Resources from the National Science Foundation**
The session will provide an introduction to NSF grant programs, including Advances in Informal STEM Learning (AISL), Discovery Research K-12, Innovative Technology Experiences for Students and Teachers (ITEST), PRIME (Promoting Research and Innovation in Methodologies for Evaluation), and EHR Core Research (ECR). The session will include an overview of project planning priorities, NSF grant submission requirements, and practical guidelines for developing competitive proposals.

**Presenters:**
Robert L. Russell, PhD, Program Director, Directorate for Education and Human Resources, National Science Foundation
David B. Campbell, PhD, Program Director, Directorate for Education and Human Resources, and Division of Research on Learning in Formal and Informal Settings, National Science Foundation

*Location: Susquehanna/Severn Suites (Conference Level)*

**Publish a Paper About Your Project in Curator: The Museum Journal**
The Curator is planning a special issue on how museums and other informal science education programs can serve the public good through a focus on health. Come learn how to focus and write a paper for this journal. Follow-up mentoring will be available to help authors frame and write their papers.

**Facilitators:**
John Fraser, PhD, AIA, Associate Editor
Judy Diamond, PhD, Editorial Board
Louisa A. Stark, PhD, Guest Co-Editor Special Issue

*Location: Cartier/Tiffany Salons (Ballroom Level)*

**SEPA New PI Meeting**
This session provides important information about the SEPA program. The PIs/Co-PIs of all newly-funded SEPA grants are strongly encouraged to attend; other project members are also welcome to attend.

**Presenter:**
L. Tony Beck, PhD, NIH SEPA Program Officer, OSE, ORIP, DPCPSI, OD

*Location: Diplomat/Ambassador Rooms (Conference Level)*
Note: Breakfast for those attending this meeting will be located outside the room

## Research & Evaluation

**Bringing Social Scientists In: Extending Science Education Partnerships**
Sociological theories about implicit attitudes, social inequality, and social influences can inform and be informed by NIH P-12 STEM projects. Our team has focused on the potential of friendship Social Networks for measuring the development of implicit and explicit science identities in middle-school youth as they engage in science activities. We will describe how we have used sociological theories in designing and evaluating our program. We also will present theories and methods that may be helpful to other NIH P-12 STEM projects and invite participants to share their theories, program designs and evaluation methods. Our goal is to explore ways in which partnering with social scientists can advance learning research and evaluation research conducted as part of NIH P-12 STEM projects.

As a result of participating in this session, participants will:
- Know social science theories useful for NIH P-12 STEM projects
- Know social science methods for learning research elements of NIH P-12 STEM projects
- Have an increased interest in partnering with sociologists to further their project.

Level: Beginning

**Facilitator:**
Julia McQuillan, PhD, Professor & Chair, Department of Sociology, University of Nebraska

**Panelists:**
Amy Spiegel, PhD, Research Associate Professor, Center for Instructional Innovation, University of Nebraska
Trish Hill, PhD, Research Assistant Professor, Department of Sociology, University of Nebraska

*Location: Diplomat/Ambassador Rooms (Conference Level)*

**Conducting Curriculum Evaluation Studies**
In this breakout session we will discuss studies that involve rigorous curriculum evaluation, which is critical to determining efficacy. Four investigators will highlight issues in the design and implementation of science education programs that are important in curriculum evaluation, at both the local and national levels. Marco Molinaro (University of California, Davis) will present his online national field test approach and evaluation results for the Science Biostatistics and Cancer Education modules aimed at engaging 9-12th grade biology, math and/or statistics students in evidence-based health-related decision making. Rochelle Schwartz-Bloom (Duke University) will discuss how to conduct large-scale randomized controlled, and non-randomized controlled studies, both state and nationwide, and some of the statistical

approaches for analyzing large datasets. Camellia Sanford (Rockman et al) will discuss fidelity of implementation via Touching Triton, an online educational game that teaches genetics curriculum. She will describe how a set of complementary qualitative evaluation activities can provide insights into the challenges to implementation, and help to identify scaffolds that support teachers' effective use of a given curriculum. Finally, Kristin Bass (Rockman et al) will talk about how to determine an appropriate sample size for an efficacy study by balancing statistical power against practical considerations. A general discussion with participants will address each of the issues highlighted by the panelists.

As a result of participating in this session, participants will gain an understanding of:
- Different approaches to curriculum evaluation
- How to conduct and evaluate large scale studies
- How to maintain fidelity of implementation
- How to choose appropriate sample sizes for statistical analysis

Level: Intermediate, Advanced

**Panelists:**
Rochelle Schwartz-Bloom, PhD, Director, Duke Center for Science Education; Professor of Pharmacology, Duke University Medical Center
Marco Molinaro, PhD, Assistant Vice Provost, Undergraduate Education, University of California - Davis
Camellia Sandford, PhD, Rockman et al
Kristin Bass, PhD, Senior Researcher, Rockman et al

*Location: Diplomat/Ambassador Rooms (Conference Level)*

**Exploring the Measurement Properties of the Draw a Scientist Test**
The use of the Draw a Scientist Test (DAST) is widespread in science education research examining the development of student stereotypes about scientists and those studying intervention methods aimed at countering such stereotypes. However, the measurement properties of this instrument have not been reported in the literature. Specifically, no studies have reported on the validity of this for measuring constructs related to stereotypical images of scientists. This session will use categorical principal components analysis to examine and report on the measurement validity of DAST data collected from a SEPA project.

As a result of participating in this session, participants will:
- Understand the basic terms and concepts of reliability and validity as related to a psychometric instrument development
- Understand why validity and reliability of instruments are important when measuring the impact of an educational intervention
- Understand how reliability and validity concepts apply to the DAST
- Discuss the implication of validity testing results for the use of the DAST in their SEPA projects
- Discuss possibilities for testing the validity and reliability of the DAST in the future

Level: Intermediate

**Presenters:**
Loran Parker, PhD, Assessment Specialist, Purdue University
Sandy San Miguel, PhD, Associate Dean for Engagement, Purdue College of Veterinary Medicine

*Location: Congressional Room (Conference Level)*

**Using common assessment tools across projects**
Instrumentation can be one of the most important yet challenging elements of a program's evaluation. This session will address the pros, cons and procedures for using published, reliable, previously-validated instruments in a new project. How do you determine if an instrument is a good fit for your project? Should you adapt an instrument for your project, and if so, how? How do you balance the tradeoffs of using existing instruments or developing your own measures? Participants will start to tackle these questions while also learning about online instrument databases and new measures that could be relevant to their work. Bring instruments that you'd recommend and join the conversation!

As a result of participating in this session, participants will:
- Be able to identify the benefits and tradeoffs to using published, previously-validated instruments in program evaluations
- Learn about online instrument databases
- Have a chance to examine measures of various program outcomes (e.g., science literacy) and talk with the instrument developers
- Share instruments across projects

Level: Beginning, Intermediate

**Facilitator:**
Kristin Bass, PhD, Senior Researcher, Rockman et al

**Panelist:** Wendy Huebner, PhD, Epidemiology Consultant, Montclair State University

*Location: Haverford/Baccarat Suites of the Crystal Ballroom (plenary room)*

## Sharing Educational Materials

**Human Microbiome Share-A-Thon**
Research on the Human Microbiome (the sum total of all the microbes living on and in the human body) is breaking new scientific ground and capturing the attention of the health world. How are science educators capturing the excitement of this new field and communicating these somewhat abstract concepts around the complex interplay of microbes and human health to the public? This panel discussion will spotlight specific examples of how panelists are incorporating information on the microbiome into projects as diverse as high school curriculum, museum exhibits, video games, comics, and iPad apps. Presenters and session participants will be invited to share what educational resources they already rely on and what new resources they are developing related to health education around the topics of human/microbe interactions.

As a result of participating in this session, participants will:
- Identify educational resources related to human microbiome research
- Strategize ways to incorporate the topic into both formal and informal education projects

Level: Beginning, Intermediate, Advanced

**Facilitator:**
Katura Reynolds, BA, Exhibit Developer, Oregon Museum of Science and Industry

**Panelists:**
Judy Diamond, PhD, Professor and Curator of Informal Science Education, University of Nebraska State Museum
Karina Meiri, PhD, Director, Center for Translational Science Education, Professor of Developmental, Molecular and Chemical Biology, Tufts University School of Medicine
Martin Weiss, PhD, Senior Scientist, New York Hall of Science
Louisa A. Stark, PhD, Director, Genetic Science Learning Center; Research Associate Professor of Human Genetics, University of Utah

*Location: Susquehanna/Severn Suites (Conference Level)*

# Breakout Sessions: Sunday, May 4, 7:20pm - 8:35pm

## Graduate Student Volunteers-An Untapped University Resource

**Presenter**: Rebecca Daugherty, Northwestern University
**Reporter**: Bob Bruttomesso, Middletown Springs Elementary School

Science Club-A mentorship in Chicago, middle school ms youth, 5-8th grade
Made up of mostly African American and Vietnamese students.
The clubs meet every week.
The practice design has a health focus with 6 modules.
They attempt to pull graduate student in from biology, chemistry and physics.
These graduates are not teaching content but adapting to each kid…meeting them where they are.
Small groups, 4 kids and 2 scientists/mentors.
Longer commitment of at least a year.
There isn't just one way-20 different groups working potentially 20 different ways.
In the beginning there were only 4 volunteers (Rebecca being one of them) and 12 students.

**Goals for Science Clubs:**
1. Science Skills
2. Engagement
3. Awareness – especially healthier life styles

**Graduate Interns:**
1. Reliability was a key factor
    - a. Kids talk to them, bummed when they don't show
    - b. They know /make up their own schedule
2. Maturity
    - a. Working with at-risk population.
    - b. Maturity helps-don't assume they have it!
3. Desire to learn new skills
    - a. Not all are tenured track
    - b. Practice teaching
    - c. Administrative skills

**Program Statistics**
1. 81 mentors
2. 88% weekly attendance
3. 95% if you took out reasonable absences, marriage, conferences, etc.
4. 79% of participants

**CHALLENGES**
**Recruitment**
1. E-mail
2. Open houses
3. Word of mouth
4. Individual meetings
a. Confirms a good fit
5. PI approval
6. Time commitment

**Transportation**
Many lack cars
Public transportation options unreliable
Provide cabs/rides. Everyone talks on rides / debriefs…builds community.

**Training**
Working w/urban MS populations
Quarterly orientations @ curriculum, try activities, teaching best practices, updates
Brown bag seminars-grant writing
Evaluation
Meet other science outreach professionals

**SUCCESSES**

pair experienced w/new mentors

Regular support-leadership attend club meetings

Support increased retention

- See prev page
- Sense of purpose compared to previous volunteer experiences
- See change in students over time

Spreading impact

- Mentors want to find leadership opportunities – ran own programs
- 4 programs

Influence on Careers

- 3 AAAS policy Fellows
- Education/outreach careers
- Incorporate. outreach in careers

**EVALUATION**

- Compared to past volunteer experiences
- have control group
- Greater confidence
- communication skills compared to control population

**QUESTIONS:**

How do you convince PI's & administration?

- Administration less-career training for grad students
- PI's ongoing issue-some supportive; others need more work

Want to show

- Better communication skills
- No impact on graduation rates

True volunteers or stipend?

- True volunteers

Do you ever intervene with PI?

- Very little
- WE trust them to have that conversation
- Will reach out to resistant PI's to understand why

**Participants**:

Gerrie Cole-City of Hope
Susan Kane-City of Hope
Stephanie Tammen-Tufts University
Tiffany Ellis Farmer-Vanderbilt University
Bob Bruttomesso-Middletown Springs Elementary School
Barbara Baumstark-Georgia State University
Ralph Imondi-Coastal Marine Biolabs
Nancy Moreno-Baylor College of Medicine
Rebecca Smith-University of San Francisco
Nicola Barber-University of Utah
Maurice Godfrey-University of Nebraska
Ann Chester-West Virginia University
Toby Citrin-University of Michigan
Julia Parker-Mississippi State University
Monroe Duboise-University of Southern Maine
Karen Moulton-University of Southern Maine

# Implementing Your SciEd Activity with Educators: Models and Methods

**Facilitator**: Neil Lamb, Hudson Alpha Institute of Biotechnology
**Presenters**: Adam Hott, Hudson Alpha Institute for Biotechnology
Tim Herman, Milwaukee School of Engineering
**Reporter**: Michèle Shuster, New Mexico State University

Adam Hott presented an online program that requires students to consider risk and treatment for complex disease. The challenges include complex content and concepts for teachers, and tech and IT issues related to delivery of online content in classrooms. In terms of teacher professional development, they plan to maximize the numbers of teachers reached by bringing the PD to teachers statewide (5 sites).

Tim Herman's program involves the dissemination of materials (3-D models). They have been able to address the challenge of distribution (through workshops; lending library; collaboration with a company to produce the models), but are still working on the challenge of "quality control" in terms of how teachers use the models in the classroom, and assessment of the impact.

The Q&A session highlighted the following issues:
1. IT issues (firewalls, restrictive bandwidth) in schools. Possible solutions included
    - microservers (e.g. raspberry pi; beagle bones; Cubox)
    - PD for IT and school administrators (so they know what is going on in the school at the classroom level)
2. Assessing classroom/student impact. The focus was on fostering teacher relationships to encourage them to value assessment of the activities. Tips included having multiple interactions with teachers during the academic year and encouraging them to be reflective and scientific teachers.
3. Teacher recruitment. Depending on the nature of the project, suggestions included:
    - Stipends and/or "free" materials (funds to purchase classroom materials of their choice)
    - Developing long-term relationships
    - Paying for substitute teachers
    - Becoming integrated into the district PD schedule

What other projects are doing/facing (audience participation):
1. Bringing college students/post-bacs into classrooms
2. One-on-one teacher mentoring throughout a year-long curriculum (significant time commitment; potential barrier to expanding number of teacher participants)
3. Expanding reach beyond initial teacher early adopters can be challenging. Suggestions included using peer-to-peer mentoring (teachers) on social networks and working with administrators to emphasize that curriculum is not "in addition" to what is already happening, but is reinforcing current standards and benchmarks.

**Participants**:
Neil Lamb-Hudson Alpha Institute for Biotechnology
Adam Hott-Hudson Alpha Institute for Biotechnology
Cathy Ennis-University of North Carolina
Liz Godin-Duke University
Virginia Carraway-Stage-East Carolina University
Donna Loden-Mississippi State University
Peter Crown-University of Arizona
Michael Lichtenstein-University of Texas Health Science Center at San Antonio
Kim Soper-University of Nebraska Medical Center
Joan Griswold-University of Washington
Michele Shusler-New Mexico State University
Jeff Radsick-City of Hope
Mary Jo Koroly-University of Florida
Lisa Marriott-Oregon Health and Science University
John Daniel-Seattle Children's Hospital
William Roden-Seattle Children's Hospital
Rachel Smilow-Children's National Medical Center
Michelle Ventura-Georgia State University
Angie Millan-National Association of Hispanic Nurses
Michael Fenzel-Montshire Museum of Science
Kristi Straus-University of Washington
Susan Hershberger-Miami University
Debra Yourick-Walter Reed Army Institute of Research
Rayelynn Connole-Montana Tech
Kathryn Peters-University of New Mexico
Gail Fletcher-University of Southern Maine
Katie Malauson-Tufts University
Desislaua Raycheua-Tufts University
Marisa Pedulla-Montana Tech

# Sustaining Projects Beyond the Life of the Grant

**Presenters**: Laura Martin, Arizona Science Center
Janet Dubinsky, University of Minnesota Twin Cities
**Reporter**: Carla Romney, Boston University Medical Campus

The attendees brainstormed in small groups to make a list of ways to sustain projects. The list was prioritized by the group, and then each small group delved into one of the listed ideas to further examine it. A representative of each small group then presented the ideas that emanated from the group using a SWOT (strengths, weaknesses, opportunities, threats) approach.
The ideas were:
1. Create partnerships (corporate, private, public)
2. Commercialization- bring product to market/ need to understand licensing with university
3. Pursue funding from non-NIH federal sources or state/local sources
4. Partner with colleagues who have other grants (particularly NSF) that include an outreach/ broader impacts component

5. Develop an app or game and sell via iTunes/Google Play etc.
6. Leverage STEM initiatives at state and local levels (i.e, teacher professional development grants)
7. Embrace STEAM (science, technology, engineering, arts, and mathematics) and pursue funding via the arts channels
8. Turn service activities into research projects
9. Solicit high level institutional support/commitment through established annual budgeting cycle
10. Pursue social media-based funding via crowdsourcing

**Participants**:
Carla Romeny-Boston University
Don Derosa-Boston University
Carl Franzblau-Boston University
Patricia Slattum-Virginia Commonwealth University
Marcia Johnson Witter-University of Washington
Mary Olson-Pacific Science Center
Dina Markowitz-University of Rochester
Renee Hesselbach-University of Wisconsin-Milwaukee
Judy Brown-Frost Science Museum
Merrily Sterns-American Museum of Natures History
Jackie Shia-Wheeling Jesuit University
Darrell Porcello-University of California Berkeley
Victoria Coats-Oregon Museum of Science & Industry
Kelley Withy-University of Hawaii at Monoa
Sandy San Miguel-Purdue University
Leonard Munstermann-Yale University
Paula Gregory-LSU Health Science Center
Jawed Alam-Ochsner Clinic Foundation
Allison Sharai-Ochsner Clinic Foundation
Linda Sprague Martinez-Tufts University
Karina Meiri-Tufts University
Melani Duffrin-East Carolina University
Andrij Holian-University of Montana
Julie Ho-Seattle Children's Research Institute

# Using Common Assessment Tools across Projects

**Presenter**: Kristin Bass, University of Utah
**Panelist:** Wendy Huebner, Montclair State University
**Reporter**: Tracy Meilander, Great Lakes Science Center
The session discussed advantages and limitations of common assessment tools, shared assessment resources, and presented some common assessment tools with potential applicable to other SEPA projects. Advantages of using a common assessment tool include validation of the tool, ability to add to a growing pool of data and build collaborations, opportunity to compare results between projects, and reduction in costs. Limitations can include a mismatch of content, processes, etc., lack of generalizability and/or specificity, and misalignment with program implementation and/or outcomes. Evaluation databases such as Assessment Tools in Informal Science (ATIS), at www.pearweb.org/atis/, and common measures such as Children, Youth and Families at Risk (CYFAR), at http://cyfernetsearch.org/cyfar_common_measures, can serve as a resource for identifying common assessment tools. The Science Literacy Assessment, developed by the Montclair State University's epidemiology-focused SEPA, assesses scientific literacy amongst middle school students. The assessment tool includes items that demonstrate students' general science literacy and items that assess motivation and beliefs. Members of the SEPA community contributed to expert review of the assessment tool. There are two versions of the assessment with different length forms. The project team is exploring applicability to high school and undergraduate populations. Research and findings related to this assessment will be published soon for broader dissemination beyond the SEPA community. A common assessment tool, such as the Science Literacy Assessment, may be helpful in comparing outcomes across SEPA projects and across other science education projects. Session handout available at http://www.scied.info/

**Participants**:
Ginger Cross-Mississippi State University
Sydney Harper-Mississippi State University
Patrice Saab-University of Miami
Virginia Carraway-Stage-East Carolina University
Rebecca Howsman-Seattle Children's Research Institute
Amanda Jones-Seattle Children's Research Institute
Jane Larson-University of Nebraska Medical Center
Berri Jacque-Tufts University Boston
Karen O'Hagen-Tufts University Medford
Georgia Wood Hodges-University of Georgia
Loran Parker-Purdue University
Craig Berg-University of Wisconsin-Milwaukee
Chandan Morris Robbins-Georgia State University
Maureen Munn-University of Washington
Barbara Hug-University of Illinois Urbana-Champaign
Louisa Stark-University of Utah
Michael Bernas-University of Arizona
Julia McQuillan-University of Nebraska
Eve Wurtele-Iowa State University
Dave Jones-University of Montana
Lisa Blank-University of Montana
Ruth Cohen-American Museum of Natural History
Tracey Meilander-Great Lakes Science Center
Greg Defrancis-Montshire Museum of Science
Kristen Morio-Miami University Oxford

# Visualizing Citizen Science in Ambler, Pennsylvania

**Presenters**: Lisa Jacobs, University of Pennsylvania
Fran Barg, University of Pennsylvania
**Reporter**: Lisa Jacobs, University of Pennsylvania

Introducing Ambler, Pa

- local environmental history of Ambler
- history of asbestos manufacturing
- superfund/remediation process
- University of Pennsylvania collaboration w/local community

Introducing REACH Ambler

- goals of research project
- unique collaboration w/ citizen leaders, visual ethnographers/researchers, and oral historians

“Camra”(camrapenn.org) and the Role of Audio Visual Methods in REACH

- Camra- media pedagogy lab @ UPenn
- challenges and affordances and ethical questions of multimedia research

Chemical Heritage Foundation

- use of oral history methodology
- story-telling as a means for planning a shared future in Ambler, Pa
- Recording voices of many different constituents including government agencies, local residents, local environmental activists, environmental justice communities, etc.

# Breakout Session: Monday, May 5, 7:00am - 8:00am

## Regional Collaboration: Finding a Way Forward

**Presenters**: Carla Romney, Boston University of Medical Campus
Michael Chorney, Pennsylvania State University
Carl Franzblau, Boston University Medical Campus
Donald DeRosa, CityLab Boston University
**Reporter**: Carla Romney, Boston University of Medical Campus

A lively discussion about collaboration in the New England Region and throughout the I-95 corridor ensued. There continues to be significant interest in trying to figure out how all groups can work together on projects of regional (or even national) interest.
The major concern is how to fund the groundwork to build such a collaboration. Several attendees mentioned that regional/national foundations or corporations with an interest in STEM might be interested in providing some seed funding or support. Due to limited funds at NIH, there will not be a grant for regional collaboration this year, although NIH remains interested in building networks among SEPA projects.
Mike Chorney (Penn State Hershey) was awarded a supplement to the PSU SEPA award in order to building a regional collaboration for the Mid-Atlantic Region. The Mid-Atlantic SEPA groups have met several times at SciEd meetings and at SEPA institutions. Mike has some residual funds that can be used for a meeting or other activities during 2014-15.

**Participants**:
Greg DeFrancis-Montshire Museum of Science
Mike Fenzel-Montshire Museum of Science
Berri Jacques-Tufts University School of Medicine
Karen O'Hagan-Tufts University Arts & Sciences
Jennie Aizenman-Bridgewater State University
Carl Franzblau-Boston University Medical Campus
Donald DeRosa-CityLab Boston University
Carla Romney-Boston University
Tony Beck-National Institutes of Health
Raui Subramanan-Tufts University
Monique Scott-American Museum of Native History
Chuck Wood-Wheeling Jesuit University
Katura Reynolds-Oregon Museum of Science & Industry
John Fraser-Children's Research Institute
Bette Schmit-Science Museum of Minnesota
Renee Bayer-Michigan State University

# Plenary Session: Monday, May 5, 8:00am - 8:30am

## Welcome, SEPA update, Messages from Senators

**Reporter**: Rebecca Daugherty, Northwestern University

**Franziska Grieder** (ORIP at NIH)- introduced James Anderson and thanked SEPA community

**Tony Beck**- SEPA Program Update

- "Enhancing P12 STEM partnerships through communication and synergistic interactions"
- Moving forward with SEPA
- Welcome for new PIs, P12 CoSTEM
- Five Year Strategic Plan- areas of emphasis
  - Teacher PD
  - Authentic Research Experiences (teachers and students)
  - Early STEM
  - Rural STEM (IDEA states, less than 7% of NIH funding)
- State of SEPA
  - Office of Science Education has merged with SEPA
  - $18.5 million budget
  - New RFP in next month
- Upgrading SEPA website
- Putting together SEPA database- everyone fill out simple information on form
- NIH Curriculum supplements
  - Less money to market supplements
  - Can order online the 19 supplements (8 high school, 10 middle school, 1 elementary)

**Michael Wyss**- introduced video messages, both senators getting awards

Video message from Tom Harkin (D- IA)

- Young people need an inspiring teacher or mentor
- SEPA inspired a new generation of leaders
- Thanked SEPA community for leading biomed education

Video message from Richard Shelby (R- AL)

- Promotes SEPA- American competitiveness in biomed education
- Biomed is one of most important areas of workforce development
- Taxpayer money spent wisely
- Will continue to fight for SEPA

# Plenary Sessions: Monday, May 5, 8:30am - 9:00am

## The CoSTEM 5-Year Strategic Federal STEM Education Plan

**Presenter**: Camsie McAdams, US Department of Education
**Reporter**: Virginia Shepherd, Vanderbilt University

McAdams discussed the 14 federal organizations involved in the Committee on STEM Education (CoSTEM), from the Dept of Ag to the Smithsonian. The committee set five goals:

1. Improve STEM instruction: Prepare 100,000 excellent new K-12 STEM teachers by 2020, and support the existing STEM teacher workforce. The emphasis in this goal is on EXCELLENT, not just satisfactory.
2. Increase and sustain youth and public engagement in STEM: Support a 50% increase in the number of US youth who have an authentic STEM experience each year prior to completing high school. One emphasis here was to include K-8 in this goal, not just high school.
3. Enhance STEM experiences of undergrads: Graduate 1 million additional students with degrees in STEM fields over the next 10 years.
4. Better serve groups historically underrepresented in the STEM field.
5. Design graduate education for tomorrow's STEM workforce.

McAdams next discussed the coordination approaches – i.e. building new models to leverage assets and expertise, and build evidence-based approaches. For example, much of the professional development that we do is not effective. There is not enough evidence of what works and what has impacted STEM teaching and learning.

The P-12 strategic outcomes that were discussed included:

1. Identify, develop, test, and support effective teacher preparation efforts that provide students with rich STEM opportunities.
2. Increase the number and quality of authentic STEM experiences for pre- and in-service P-12 teachers. The underlying theory is that authentic research training for teachers will change how students learn.

The P-12 near-term actions include:

1. Identify and assess Federal investments that incentivize the recruitment, training and retention of excellent K-12 STEM teachers.
2. Identify and assess Federal STEM investments in teacher IFS, including size, scope, structure, methods, status of assessment and evaluation activities and characteristics of STEM experiences.
3. Link existing resources with new infrastructures for reaching wide audiences.

The P-12 near-term outcomes:

1. Better understanding of Federal investments that incentivize excellent teachers.
2. Collect information about Federal investments. A baseline of relevant programs will provide the basis upon which assessment criteria can be developed.

# Plenary Panel: Monday, May 5, 9:15am - 10:45am

## Panel of Science-focused Agencies Involved in K-12 and Public Education

**Panelists:** Shelley Canright, NASA Office of Education
Pat O'Connell Johnson, US Department of Education
Louisa Koch, National Oceanic and Atmospheric Administration
Joan Prival, National Science Foundation
Ellen McCallie, National Science Foundation
**Reporter**: Susan Kane, City of Hope/Beckman Research Institute
The presenters' slides and handouts are available for download on the NIH SciEd 2014 conference website - http://www.scied.info/

**Shelley Canright, PhD, Senior Advisor, Education Integration, NASA Office of Education**

The vision for NASA NASA's Office of Education is to advance high quality STEM education using NASA's unique resources, which include people, mission and facilities. To develop the most talented STEM workforce, NASA focuses on building interest in STEM careers as early as possible through both formal and informal education outreach. NASA is focusing its education efforts on supporting the CoSTEM strategic priorities.

Each of the 10 NASA Centers across the US has a K-12 service region that encompasses multiple states. During the past year, NASA's K-12 education projects reached more than 1 million students through STEM programs and initiatives. Its Summer of Innovation Program engaged over 45,000 students and over 5,500 educators through camps and activities in 46 states, DC, and Puerto Rico.

NASA's unique assets include: rocket and balloon platforms, the International Space Station, the aircraft platform, ground-based platforms/challenges, NASA ambassadors and alliances, and over 18,000 employees nationwide, of which nearly 11,500 are scientists and engineers. These professionals work in all STEM fields. NASA has a long-standing practice of ensuring equal access to education opportunities and inclusiveness of all, regardless of race, ethnicity, gender, disability, or other demographic.

Research to solve NASA challenges has led to spinoff technologies such as mammogram imaging, CAT scanners, ultrasound, MRI machines, and memory foam.

NASA provides (1) internships for educators, high school, undergraduate and graduate students, (2) fellowships for faculty and graduate students, and (3) scholarships for undergraduate and graduate students pursuing STEM degrees. The agency also delivers professional development (PD) for K-20 educators through several delivery mechanisms, including both face-to-face and online.

NASA's STEM Engagement programs are designed to increase learner's involvement and interest in STEM, educate them about the value of STEM in their lives, and positively influence their perception of their ability to participate in STEM. These programs include public education activities, experiential learning opportunities, and STEM challenges.

NASA's institutional engagement programs support efforts that build and develop capacity of formal and informal institutions and organizations for sustained STEM capabilities in topical areas of interest to NASA.

The Museum Alliance includes informal education institutions/organizations and professionals from across the US who regularly use NASA materials in their programs and exhibits.

Key ways to obtain NASA materials include:

- View and download from the NASA website – www.nasa.gov/education
- Visit a NASA Educator Resource Center - www.nasa.gov/education/ercn
- Subscribe to NASA Education EXPRESS for weekly updates – www.nasa.gov/education/express
- NASA Wavelength digital library of lessons and activities – nasawavelength.org
- Additional resources for educators – www.nasa.gov/audience/foreducators/

**Pat O'Connell Johnson, PhD, Team Leader, Mathematics and Science Partnership, US Department of Education**

The Mathematics and Science Partnership (MSP) program is a formula grant program to states. States make competitive awards for PD programs that are partnerships between STEM faculty at institutions of higher education (IHEs) and high-need local education agencies (LEAs). The program supports intensive, sustained, content-based PD with an emphasis on evaluation of impacts on teachers. $150 million went to states in FY14.

MSP data from Performance Period 2011 (PP11):

- 43,000 educators participated nationwide (mostly elementary and middle school teachers), with each educator receiving an average of 80 hours of PD
- ~2900 IHE faculty participated in ED MSP projects in PP11 (average of 6 IHE faculty/project)
- Over 6200 organizations participated in 499 projects
- 2.4 million students were impacted in PP11
- Most projects were funded at $100K-500K/year with a median of $220K/year
- 45% of projects were led by LEAs, 40% led by IHEs, 15% led by non-profits
- The median number of educators served per project = 45 (range of 7-1781)
- MSP grants support enhancement of teacher knowledge and skills
    - 73% of projects had a main goal of improving teacher content knowledge
    - 2% of projects had a main goal of training teacher leaders
    - 22% of projects had both of these goals as equally important

Evaluation is a key component of MSP projects. The goal is to measure the impact of the PD on teacher content knowledge, not on measuring teaching quality or subsequent STEM teaching. The Department of Education has used a carrot approach to induce the use of experimental or quasi-experimental designs for project assessments. About 30% of MSP projects in PP11 conducted an evaluation that met all criteria for successful implementation of a quasi-experimental study design that included appropriate comparison groups and utilized reliable, valid assessment instruments.

Best practices:

- Include School of Education faculty, science faculty and master teachers on projects
- Provide 80-100 hours of PD hours and sustained support; the greatest success has been with a summer followed by additional support during the school year
- Evaluation data must be obtained from two points in time to measure the impact of PD on teacher knowledge
- Use an experimental or quasi-experimental design for data collection using valid assessment tools and appropriate comparison groups

Challenges:

- Low science knowledge among elementary and middle school teachers. Solution = time and intensity of training
- Quality of evaluation. Solution is to use a carrot (monetary incentive) to use experimental or quasi-experimental design in conducting assessments

**Louisa Koch, MS, Education Director, NOAA**

NOAA works around the clock and around the world to: (1) monitor the earth's ocean and atmosphere, (2) understand and predict the earth's environment, and (3) communicate this information in meaningful ways. NOAA's ability to predict, observe and monitor severe events has improved significantly improved over the last several decades. NOAA and EPA also provide air quality forecasts that allow people to prevent or limit the harmful effects of poor air quality on health; air pollution illness cost $150 billion/year.

Climate change threatens human health in a number of ways. NOAA's Climate.gov website provides news and feature articles, maps and data, resources for teaching about climate and energy, and resources for managing climate-related risks and opportunities, including peer-reviewed reports and publications on climate issues and impacts.

NOAA's educational partnership program funds four Cooperative Science Centers that include 23 institutions in 10 states, Puerto Rico and DC. In 2014, they received $14.4 million. The Centers have a strong focus on supporting students from underrepresented groups. Over 100 students/year are selected to receive Ernest F. Hollings Undergraduate Scholarships which provide academic assistance and a 10-week NOAA internship.

NOAA funds environmental education grants in 7 regions: California, Chesapeake Bay, Gulf of Mexico, Hawai'i, New England, the Pacific Northwest, and the Great Lakes. These grants totaled $7.2 million in FY2014. It also funds environmental Literacy Grants. These competitive awards fund regional to national-scale K-12 and informal education projects that leverage high quality partners and incorporate NOAA's scientific assets to promote stewardship and increase informed decision-making. These grants totaled $3.6 million in FY2014.

NOAA is supporting the CoSTEM Strategic Plan in multiple ways, expanding its collaborations with other federal agencies.

**Joan T. Prival, PhD, Program Director, Directorate for Education & Human Resources, Division of Undergraduate Education, NSF**

The NSF mission is to promote the progress of science; to advance the national health prosperity, and welfare; and to secure the national defense. It's vision is a nation that creates and exploits new concepts in science and engineering and provides global leadership in research and education. NSF has several programs that support K-12 STEM education.

The Robert Noyce Teacher Scholarship program encourages talented mathematics, science and engineering undergraduate majors to pursue teaching careers. It also encourages STEM professionals to become teachers and prepares teachers to become Master Teachers. The Program supports 3 types of projects: scholarships, fellowships to support post-baccalaureate career changers and development of Master Teachers, and capacity-building projects.

The STEM-C Partnerships program focuses on improving STEM learning by K-12 students. They involve mutually beneficial partnerships that involve at least one K-12 school district and at least one institution that is engaged in teacher education and which brings STEM disciplinary expertise to the partnership. The projects must have an explicit research agenda that will contribute to the literature on STEM teaching and learning.

The Discovery Research K-12 (DRK-12) program seeks to significantly enhance STEM learning and teaching by P-12 students, teachers, administrators and parents. The emphasis in DRK-12 is on research projects that study the development, testing, deployment, effectiveness, and/or scale/up of innovative resources, models and tools. Projects may be funded in any of 4 strands: assessment, learning, teaching, and implementation.

The Research Experiences for Teachers (RET) program involves teachers in research and helps them translate their research experiences and new knowledge into classroom activities. Teachers are funded through RET supplements to ongoing NSF-supported scientific research grants or via RET Site awards.

The Presidential Awards for Excellence in Mathematics and Science Teaching are the nation's highest honor for K-12 teachers of math and science. The award recognizes teachers who develop and implement a high-quality instructional program that is informed by content knowledge and enhances student learning.

Recommended resources:

- Common Guidelines for Educational Research - http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126
- NSF Resources for STEM Education website provides resources and findings generated through educational research and development projects funded by NSF - http://www.nsfresources.org/home.cfm
- The Successful K-12 STEM Education website provides information, events and resources that highlight promising practices and tools in support of effective K-12 STEM education in schools and programs - http://successfulstemeducation.org/
- Recommended National Research Council publications and resources:
- Successful K-12 STEM Education http://books.nap.edu/catalog/13158/successful-k12-stem-education-identifying-effective-approaches-in-science-technology
- Monitoring Progress Toward Successful K-12 STEM Education - http://www.nap.edu/catalog/13509/monitoring-progress-toward-successful-k12-stem-education-a-nation-advancing
- A Framework for K-12 Science Education - http://www.nap.edu/catalog/13165/a-framework-for-k12-science-education-practices-crosscutting-concepts-and

**Ellen McCallie, PhD, Program Director, Division on Research on Learning, Directorate for Education & Human Resosources, NSF**

NSF funds several programs that support informal science education. All EHR/DRL programs fund innovative projects and require knowledge generation, i.e., research. To determine which program is the best fit, ask "Where is the 'intellectual center of gravity' of your project?"

EHR core research areas are: (1) learning and learning environments, (2) workforce development, and (3) broadening participation. Projects can focus on one or more of these areas.

The Advancing Informal STEM Learning (AISL) program focuses on developing, implementing and understanding innovative research, models, resources and tools in informal learning environments. It includes afterschool programs, citizen science, cyberlearning, exhibitions, television, radio, film and many other platforms. It has a strong focus on broadening participation.

The Innovative Technology Experiences for Students and Teachers (ITEST) program ensures a high-quality STEM workforce by supporting projects that increase student awareness of career opportunities in STEM and cognate fields, motivate students to pursue appropriate educational pathways to STEM-related careers, and provide technology-rich experiences that develop disciplinary knowledge, practices, and non-cognitive skills needed in STEM fields.

The Education Core Research (ECR/REAL) program supports projects that synthesize, build, and/or expand research foundations (theory-building) and/or build a coherent foundation of theory and research to guide and improve STEM education.

The Promoting Research and Innovation in Methodologies for Evaluation (PRIME) program supports research on evaluation. Projects (1) explore innovative approaches for determining the impacts and usefulness of STEM education projects, (2) build on and expand theoretical foundations for evaluating STEM education and workforce development initiatives, and (3) grow the capacity and infrastructure of the evaluation field.

Grant writers are encouraged to read the solicitation carefully, read about current NSF awards from the program, and talk to a NSF Program Officer about your ideas, preparing a 1-2 page summary of your proposed project. The InformalScience website may be a useful resource - http://informalscience.org/

# Breakout Sessions: Monday, May 5, 11:00am - 12:15pm

## NIH P-12 STEM and Department of Education

**Facilitator**: Carla Romney, Boston University Medical Campus
**Reporter**: Casandra Gabriele, Rutgers University

Judy Brown, Frost Science Museum

- Synergistic interactions to influence Middle School girls' health education to inform development of healthy lifestyle, eating well and exercise via an online activity electronic world
- 3 week summer intensive between NYC & Miami
- Cyber interactions (food truck) vs. hands on activities
- Girls collaboration and competition supported them to continue their participation
- Dept of Ed worked with Upward Bound Math and Science Center
- IES funding 2006 preschool teacher development
- Marketing project w/out funding
- GROOVE – recruitment of grad students and scientists
- Created a mentor for students with the SAME background
- ECHOS-IRB clarified evaluators not controlled research environment
- IRB needed for evaluation to do research (program evaluator did formative evaluation)

Maureen Munn, University of Washington

- Rural school districts, not direct DOE funding, but partnered with someone who does (synergy)
- Genome Science Education Outreach program
- Partnered with GEAR-UP in DOE Washington
- Cohort MS-HS following Yakima Valley partner to connect to teachers and districts
- UWGSEO provided the scientist and teachers' curriculum development and biomedical
- UW Gear-UP connected to schools and supported developing in under served communities
- Used both informal and formal program measurements
- Co-present in annual science festivals
- Make connection to create partnerships
- Near peer effect
- Shared the vision, cost and resources, brought different skills that complimented each other project partners

Michael Wyss, University of Alabama at Birmingham

- CORD program
- Problem: careers vs STEM learning
- Parents have more diverse careers
- Integrated K-12 STEM and faculty with hands on discovery based
- Increased reading levels by 7yrs with inquiry based science lessons
- Professors from career to train teachers
- Allowed teachers an understanding
- Prevent loss of STEM in middle school
- Learn how to do inquiry in classroom (industry and labs as research approach)
- Make authentic teaching
- Parental engagement-inform parents of jobs in STEM that are essential and applicable

Mathematics and Science Partnership program

Pat O'Connell, US Department of Education

- Ed-msp.net
- Alabama is model for stretching guidelines to meet criteria to fund MSP
- Showing flexibility for funds
- Money goes to states July 1 ($150 million)
- All states have different cycles on when to apply
- Go to state website to find state coordinator and programs funded in state (to view what state chose to invest in)
- Reevaluate
- Ask the questions: what is the strength of your program and be clear on WHAT you want to ACCOMPLISH
- Building on tools
- Even if evaluations are not as strong as they should be for project, people would say continued work is beneficial to fund

**II.Questions**

Q1: What types of evaluation evidence are DOE grant reviewers looking for?

A: (DOE) different grants require different evidence; some are less rigorous

2-step process peer review

1. Content experts
    a. Field; subject
2. Evaluation experts
    a. Results
    b. References
    c. Published issues with reports

Refer to IES website for criteria on ALL grants

Look at what they are asking for

Make sure grant is meeting a need

Relate to what standards are needed

What Works Clearing House is useful reference

Q2: UAB mentioned elementary improvements in reading/math how was this measured? Are there established assessments already designed?

A2a: PARCC state tests; have a good control group
Allied tests have it's own database
A2b: consult with methodologist at your university; can match assessments already developed and describe what existing assessments might work
A2c: NSP more liberal when looking at grants
Less quantitative more qualitative

Q3: Michael, has involved under privileged parents exposure to science how did you get parents out?

A3a: Take home real life assessments: Have students working on activities in school that have real life accountability that they are willing to take home and share with parents
Provide weekend academy that, students must bring a parent in order to attend
Finance education (explore their needs)
A3b: Tells parents their kids are great
Give out rewards to celebrate
Family capstone event to improve STEM

A3c: Entire community engagement
FEED them to GET THEM IN

Q4: Opinion on virtual badges for teachers
-affirming good workers acknowledge time invested

Partnership state dept superintendent and NEXT generation
Lots of pots of funds people are unaware of
Influence them to help them do their job better
Partner with church/community to get family out and comfortable
Reach out to science museum for partnerships

**Participants**:
Mike Wyss-University of Alabama Birmingham
Paul Dusenbery-Space Science Institute
Nicola Barber-University of Utah
Jennifer Williamson-University of Washington
Katherine Williams-Edventure Children's Museum
Julie Parker-Mississippi State University
Patricia Slattum-Virginia Commonwealth University
Julia Mundy-Department of Education
Michelle Venture-Georgia State University
Carla Romney-Boston University Medical Campus
Berri Jacque-Tufts University
Karina Meiri-Tufts University Boston
Katie Malanson-Tufts University
Sandy San Miguel-Purdue University
Casandra Gabriele-Rutgers University
Susan Hershberger-Miami University
Krishan Arora-National Institution of Health
Amanda Jones-Seattle Children's Research
Terry Clark-National Institution of Health
John Fraser-Children's Research Institute
Liz Godin-Duke University
Rebecca Howsman-Seattle Children's Research Institute
Maurice Godfrey-University of Nebraska
Allison Sharai-Ochsner Clinic Foundation
Susan Kane-City of Hope
Don DeRosa-Boston University CityLab
Renee Bayer-Michigan State University
Debra Yourick-Walter Reed Army Institution of Research
Joan Griswold-University of Washington
AL Byers-National Science Teachers Association
Dave Vannier-National Institutes of Health
Judy Brown-Frost Science Museum

# NIH P-12 STEM and National Science Foundation (formal programs)

**Facilitator**: Wendy Huebner, Montclair State University
**Reporter**: Lisa Marriott, Oregon Health and Science University

Tim Herman, Milwaukee School of Engineering

- Explained his model for connecting molecular modeling with NSF CREST (which connects researchers, educators and students). Important for them to leverage engineering school expertise with SBIR grant and his small company. Center for Molecular Design and 3D Molecular Designs; both run in parallel.
- These collaborative projects ultimately led to molecular model challenge for Science Olympiad, which features 3000 teams who'll learn about molecular models. Students will access website which will teach students about background of the protein. Tim's company will send students kit to do pre-build model of protein. Took a lot of collaborative grants to enable this. SBIR grant initially. Other partners are Protein Databank. U Wisconsin Madison to collaborate on developing an HHMI grant. Invitrogen became Life Technologies, who also sponsor.

David Miklos, Cold Spring Harbor Laboratory

- Working with teachers and students since 1987. He showed the evolution of who is funding his grants. Currently, he's developing tools to do genome analysis. Used to be all NSF grants, then other agencies, now NSF grants from the research directorate of NSF, rather than the education directorate (which is what it used to be).
- Lots of genome sequencing and epigenetics for iPlants. Cost of genome sequencing has dropped 10,000-fold in the past 7-8 years. For the first time, students and researchers can work with the same data and at the same time. For example, RNA sequencing tool is currently being developed. Teachers can analyze it with their students using the Texas Advanced Computing Center. Makes it more accessible for all groups.

Louisa Stark, University of Utah

- Has had NIH grants since 2001, recently awarded an NSF, which is a DRK-12 grant. NSF grant is developing 5 lessons on national selection, which will become part of curriculum unit on evolution.
- Overall goal: How do you integrate science theory, practice, core ideas, etc. Aligning with NGSS.
- In NIH, developed virtual labs; For the natural selection lessons, students engage in a virtual lab where they visit a lake in Alaska to count and collect stickleback fish. Each student gets their own sample. They build graphs about the fish they collect, then there's a whole teacher back-end piece to consolidate the data from the class.
- For evaluation, they're doing assessment item development as part of NIH. NSF project partners with AAAS 2061 to do online assessment. Online has some challenges compared to paper/pencil that they've found.
- In light of NIH funding issues they did their teacher professional development as an online course this past year, preparing teachers to conduct classroom testing of materials Utah had developed.

Joan Prival, NSF

- Integrating research and education is fundamental to NSF. Broadening participation.
- Robert Noyce Scholarship program – goal is to encourage undergrads (STEM majors) to become teachers. Scholarship track. Summer camps, nature centers, and bringing undergrads in as assistants. Looking for ways to improve STEM instruction for undergrads. Master teacher fellowship (TF/MTF) supports post-baccalaureate pre-service teachers and STEM folks interested in career changes. Develops master teachers. Fellowships and salary supplements. Teaching commitment in high need school districts is needed. Capacity building grants (infrastructure). Projects include collaboration between STEM and education faculty. Strong partnership with a school district. Recruitment and selection strategies. Evidence-based and evidence-producing is important.
- STEM-C partnerships (where C stands for computing). At least one K-12 school district and one institution must partner. Community enterprise for STEM teaching and learning. Current issues related to STEM content and computer science. Identifying and cultivating exceptional talent. K-12 STEM teacher preparation. Improving STEM learning by K-12 students. Work needs to contribute to literature. Address a national priority is important (rather than small local issue)

DRK-12 – framed around a research question. 4 strands: assessment, learning, teaching, etc.
RET (Research Experiences for Teachers) – via a lot of NSF directorates.
Other: talk about what's already going on at your institution. They love to see leveraging of other federal funding. Connection to other programs. If it's a research grant, connect with SEPA for broader impacts.

Synergistic collaboration ideas from table discussions:

- Institutional support is important for bringing different projects together, in case it didn't get funded. Matching support (no matching funds allowed per NSF), but rather describe how two projects are integrated together. Very few programs allow matching funds. However, when we talk about institutional support (put in facilities and other resources), you can write about that other part.
- Talk about how to involve pre-service teachers in College of Education. Use SEPA best practices. Is there funding through NSF for health-related programs. Joan Prival said they support biology, but not health. Important to distinguish. How to teach anatomy, physiology. ATE program (technician education). K-12 is a broad biology. Getting them interested in biology is important. Really interesting way in teaching biology/physiology, especially for physiology.

**Participants**:
Michele Shuster-New Mexico State University
Karen O'Hagan-Tufts University
Jennie Aizenman-Bridgewater State University
Angie Millan-National Association of Hispanic Nurses
Chanda Reburiano-University of New Mexico
Delia Leonida-University of New Mexico
Kristen Morio-University Miami, Ohio
Brenda Armstrong-University of Duke
Marco Molinaro-University of California Davis
Virginia Shepherd-Vanderbilt University
Susan Deriemer-Meharry Medical College
Megan Moore-Louisiana State University
Barbara Hug-University of Illinois
Mike Kennedy-Northwestern University
Dave Jones-Missoula Country Public School
Sydney Harper-Mississippi State University
Patrice Saab-University of Miami
Michael Bernas-University of Arizona
Renee Hesselbach-University of Wisconsin-Milwaukee
Virginia Carraway-Stage-East Carolina University
Janet Dubinsky-University of Minnesota Twin Cities
Rochelle Schwartz-Bloom-Duke University
Lisa Marriott-Oregon Health and Science University
Jane Larson-University of Nebraska Medical Center
Kelley Withy-University of Hawaii
Shelley Stern-New Knowledge Organization
Mary Jo Koroly-University of Florida
Tony Ward-University of Montana
Paula Gregory-LSU Health Science Center
Georgia Hodges-University of Georgia
Stephanie Tammen-Tufts University
Ravi Subramanian-Tufts University
Gisle Ragusa-University of Southern California

# NIH P-12 STEM and National Science Foundation (Informal Science Education programs)

**Presenter**: Judy Diamond, University of Nebraska
**Reporter**: Trish Wonch Hill, University of Nebraska

**Panelists**: Leslie Miller, Rice University, Meena Selvakumar, Pacific Science Center, Rebecca Smith, University of California San Francisco, Ellen McCallie, Program Director, Division of Research on Learning, EHR, NSF

Goal: Explore how PIs with NIH SEPA grants can leverage their experiences to inform potential projects at NSF, particularly with informal programs, and vice versa.
Key Points:

1. Persistence of Partners – Build, grow, mentor, go further, and leverage into broader impacts.
2. Refinement of measures – Measures that do not undermine why we do informal education, what can we learn from one project can contribute to our understanding of other projects.
3. Leveraging Synergy – Collaborations beget collaborations, informal collaborations across programs are just as important as formal collaborations.
4. Leverage Dissemination – Creative sustained dissemination leads to broader impacts, NIH ->NSF

Examples of NIH-NSF Synergistic Activities from Panel:
Meena Selvakumar – Pacific Science Center – NSF AISL – Seattle – fostering communication between scientists and the public. Discussed "face to face" program featuring scientists – audience is informal science educators; teach them how to bring in scientists and train them to interact with the public. "Portal to the Public" - change-ready hybrid exhibit/program space – supplemented with 'face to face' learning with scientists (changes every 6 months)

Leslie Miller – Rice University – Synergy of NSF Informal Science and NIDA – CSI Web Adventures; five 'cases' to solve, cases 1-3 developed through NSF, 4,5 – NIDA. Learning Research - Theory of Possible Selves –Randomized controlled trial, each classroom played two of the three cases. Major findings – Role plays influence on STEM career motivation + learning gains (moderate to large affects). Plan to add more STEM virtual apprenticeships – teach prescription drug abuse through forensic science. Design a BLUEPRINT grant w/similar types of role-play 'virtual clinical trial'.

Rebecca Smith – NIH SEPA -UCSF-SEP– Science Festivals — Large inspiring celebrations of science, Bay Area, 10 days, over 2 weekends, events geographically distributed, 50 events; hallmark is access. AISL grants are collaborative with multiple institutions, four festivals, second grant, early festivals mentor other sites. Mentoring has resulted in opportunities for other ways to collaborate by furthering connections with other groups across the country.

Ellen McCallie

1. As I see it, this discussion isn't about program collaborations; it's about leveraging synergies between people and projects funded by one or both NIH and NSF.
2. NSF funds education research and development in line with the STEM topics it funds through its other directorates; NSF doesn't focus directly on health. Health is NIH's area. There are a lot of synergies in learning about health and STEM, however. For example, our three speakers have illustrated some of these.
3. Look beyond a single program to support your work over time. Concepts that may have begun as appropriate for AISL may have moved to ECR, cyberlearning, or other programs, depending on what your learning research questions are and develop into.

**Participants**:
Trish Wonch Hill-University of Nebraska
Amy Spiegel-University of Nebraska
Julia McQuillan-University of Nebraska
Andrij Holian-University of Montana
Kristi Straus-University of Washington
Michael Lichtenstein-University of Texas Health Science Center San Antonio
Lisa McDonald-J.Craig Venter Institute
Eve Wurtele-Iowa State University
Toby Citrin-University of Michigan
Dedee Ludwig-Museum of Science and Industry
Loran Parker-Purdue University
Linda Sprague Martinez-Tufts University
Melani Duffrin-East Carolina University
Karen Moulton-University of Southern Maine
Gail Fletcher-University of Southern Maine
Laura Martin-Arizona Science Center
Chase Norris-Arizona Science Center
Ralph Imondi-Coastal Marine Biolabs
Linda Santschi-Coastal Marine Biolabs
Ann Chester-West Virginia University
Michael Fenzel-Montshire Museum of Science
Kim Soper-University of Nebraska
Ian Herriott-University of Alaska
Donna Loden-Mississippi State University
Bob Russell-National Science Foundation
Valentine Kass-National Science Foundation
Brittani Lane-Edventure Children's Museum
Adam Hott-HundsonAlpha Institute for Biotechnology
Cathy Ennis-University of North Caroluna
Victoria Coats-Oregon Museum of Science & Industry
Marlys Hearst Witte-University of Arizona
Lisa Blank-University of Montana
Peter Crown-University of Arizona
Marcia Johnson Witter-University of Washington
Ruth Cohen-American Museum of Natural History
Kristin Bass-Rockman Et Al
Monroe Duboise-University of Southern Maine
Monique Scott-American Museum of Natural History
Kim Obbink-Montana State University
Camellia Sanford-Rockman Et Al
Martin Weiss-New York Hall of Science

# NIH P-12 STEM, NASA, and NOAA

**Facilitator**: Darrell Porcello, University of California Berkeley
**Panelists**: Greg DeFrancis, MA, Montshire Museum of Science
Nancy Moreno, PhD, Baylor College of Medicine
Neil Lamb, PhD, HudsonAlpha Institute for Biotechnology
Shelley Canright, PhD, Senior Advisor, Education Integration, NASA Office of Education
Louisa Koch, MS, Education Director, National Oceanic and Atmospheric Administration
**Reporter**: Katie Wallace, NASA
How can SEPA expertise be applied to NASA:

Greg – SEPA project has more evaluation than NASA project
Can apply evaluation to NASA Project
Evaluation not publicly available now; will eventually be in CAISE
Shelley – Look in "Performance Assessment" on www.nasa.gov/education
NASA Health Clusters: JSC, GRC, ARC (Origins of Life)
Shelley – Check out NASA Specific website
Carol Merchant – Possibility for "consecutive funding"

Advice for PIs

- Ecosystem model – Put all the parts together for one, important whole
- Efforts are not duplicative, but additive
- How to tell the story
- Larger sense than just funding – think exposure, added value, how to communicate to congress

**Participants**:
Billy Roden-Seattle Children's Research Institute
Julie Ho-Seattle Children's Research Institute
Dina Markowitz-University of Rochester
Terry Clark-National Institution of Health
Vai Davillier-Great Lakes Science Center
Nancy Moreno-Bayler College of Medicine
Neil Lamb-Hudson Alpha Institute for Biotechnology
Katie Wallace-NASA
Jeff Radsick-City of Hope
Bob Bruttomesso-Middletown Springs Elementary School
Rayelynn Connole-Montana Tech
Chuck Wood-Wheeling Jesuit University
Mary Olson-Pacific Science Center
Marisa Pedulla-Montana Tech
Susanna Cunningham-University of Washington
Louisa Koch-NOAA
Laura Fawcett-Yale Peabody Museum of Natural History
Alejandro Ortega-University of New Mexico
Kathryn Peters-University of New Mexico
Leonard Munstermann-Yale University
Shelley Canright-NASA
Adrian Zongrone-Edventure Children's Museum
Katura Reynolds-Oregon Museum of Science & Industry

# Breakout Sessions: Monday, May 5, 1:30pm - 2:45pm

## Authentic Research Experiences for Students and Teachers

**Facilitator**: Susan Kane, City of Hope
**Reporter**: Rayelynn Connole, Montana Tech

Four panelists discussed models for delivering authentic research experiences for students and teachers. The models shared commonality in that each program engaged participants in long-term, rigorous research experiences through campus programs or field-based programs (NOAA). Each panelist discussed their current models and methodology for studying the efficacy of their program. The following is a brief breakdown of each model and evaluation methods utilized.

**Vanderbilt University (SSMV)—Virginia Shepherd**

Program Model

- Program for highly talented high school students (9-12 grade).
- 26 students attend sessions at Vanderbilt every week for 4 years
- Students attend 3-6 week summer academy
- Local school district provides operational funds for the program
- Students move through a rigorous curriculum that begins with how to ask a question through to designing a research study

Evaluation Methods

- Quasi-experimental design with 100 matched control students, compared standardized test scores
- In every category, the program students outperformed the control
- 34 Siemens and Intel semifinalists

Future Directions

- Would like to replicate in other universities
- Expanding partnerships
- Expanding SSMV program for implementation in traditional schools

**Virginia Commonwealth (CRESST)—Patty Slattum**

Program Model

- Program targeting childhood obesity, health and wellness
- One-week summer academy for 53 teachers with 4 themes: Inquiry process; research/ health literacy; measurement and statistics; and ethical issues in clinical research

Evaluation Methods

- Logic model and framework
- Mixed methods design
- Horizon teacher observation protocol (TSES, 2001)
- Students are highly engaged and communities are beginning to embrace health fairs presented by students which leads to sustainability of program

Future Directions

- Program directors would like to investigate how sustained the changes with teachers' pedagogical approach are
- Continue working with communities to take on the topics

**University of Florida—Mary Jo Koroly**

Program Model

- Connect research faculty with teachers and students
- 2,538 students and 1,602 teachers served to date
- Two-week summer program
- In-class action research projects
- Tuition-free graduate credits offered for teachers

Evaluation Methods

- 28 teachers have come back for another three-week experience in a research lab
- Teachers report high satisfaction with the program and rate the following as important for their PD:
  - Being treated as a professional
  - Rapport with University staff
  - Relationship of trust with colleagues

**NOAA—Jennifer Hammond**

Program Model

- Teacher at Sea program (K-12 teachers, any subject area discipline)
- Currently has reached every state in the U.S.
- Teachers spend 10-30 days at sea and are part of a research team
- Teachers select trips based on their research interests and geographic preferences
- Create 2-3 blogs per week, scientists review the posts
- Teachers have access to real-time data

Evaluation Methods

- Teacher surveys and interviews (6 mo and 1 year follow-up)
- Teachers report high satisfaction with the program and wish to re-live the experience

Future Directions

- How to quantify this experience as transformative for the teachers?
- Creating alumni groups so that teachers can stay connected

**Participants**:

Julie Ho-Seattle Children's Research Institute
Amanda Jones-Seattle Children's Research Institute
Monroe Duboise-University of Southern Maine
Karen Moulton-University of Southern Maine
Gisele Ragusa-University of Southern California
Lisa McDonald-J.Craig Venter Institute
Karen O'Hagan-Tufts University
Marlys Hearsy Witte-University of Arizona
Linda Santshi-Coastal Marine Biolabs
Desislaua Raytckeva-Tufts University
Ralph Imondi-Coastal Marine Biolabs
Julia Mundy-Department of Education
Renee Hesselback-University of Wisconsin-Milwaukee
Katie Wallace-NASA
Kenneth McMartin-LSU Health Sciences Center
Tracy Meilanders-Great Lakes Science Center
Rayelynn Connole-Montana Tech
Marisa Pedulla-Montana Tech
Brenda Armstrong-Duke University
Louisa Koch-NOAA
Adrian Zongrone-Edventure Children's Museum

# Curriculum Development and Evaluation

**Facilitator**: Dina Markowitz, University of Rochester
**Panelists**: Cathy Ennis, PhD, University of North Carolina Greensboro
Marco Molinaro, PhD, University of California Davis
Rochelle Swartz-Bloom, PhD, Duke University
**Reporter**: Joan Griswold, University of Washington

In this session, three investigators highlighted issues in the design and implementation of science educational materials, and discussed their studies that involved rigorous curriculum evaluation. The speakers were Rochelle Swartz-Bloom (Duke), Marco Molinaro (UC Davis) and Cathy Ennis (UNC – Greensboro).
Rochelle Swartz-Bloom described aspects of the RISE program at Duke. She detailed:

- Curriculum Design Best Practices: the topic should be relevant to the high school student; content-rich and correlated to NGSS; constructivist in nature (which includes addressing student misconceptions); inquiry-based; utilizing student self-assessments in addition to program assessments.
- Methodology and Implementation Best Practices: Randomized controlled trials are the gold standard and, although challenging in an educational stetting, these studies can be accomplished.
- Assessment and Evaluation Best Practices: Collaborate with experts, validate instruments, and apply statistics.

In research evaluating teacher professional development for the Pharmacology Education Partnership (the PEPproject.net), a two-year cycle allowed some teachers to be put on a wait list so that they could serve as their own controls before receiving PD. After taking part in teacher PD the following year, the same teachers would be part of the experimental group.

Marco Molinaro described his project, which provides on-line teacher professional development, case studies, a curriculum in which students make complex health decisions using data sets and statistics, and a data visualization and analysis tool SeeIt (sbcesepa.org) that students use to help in decision-making. Marco detailed some points about curriculum development and evaluation, including the importance of:

- Community effort: Their curriculum development is done by a team of researchers, teachers from biology, math and health backgrounds, and a professional curriculum developer
- Flexibility for teachers: Teachers preferred not having a rigid order to the curriculum
- Fitting the content into traditional classes: This has been a challenge, in that biology teachers may be willing to bring statistics into the class, but statistics teachers have been less willing to bring in biology. That this content is not traditionally covered in any one class presents a challenge to running a controlled research study.
- Maintaining on-line materials long-term. Their group uses Google sites.
- Promoting the cross-use of materials and tools
- Continued dissemination and testing

Cathy Ennis described the curriculum developed by her project at UNC which provides science-enriched content in a Physical Education environment for middle school students. The curriculum uses a constructivist approach. Master teachers design the base lessons, and the SEPA team finalizes the materials. The resulting curriculum is very detailed (scripted) and includes extensive teacher training. The curricular materials include a teacher's manual, student science journals, teacher resource cards, materials for family science activity night events, and knowledge tests. The research project:

- Used a pre/post stratified, randomized control group design, and structural equation modeling to understand impact of the curriculum on the school, the teachers and the student.
- Involved 7 school districts (16 middle schools) for a total of over 10,000 participants.
- Resulted in significant gains for student knowledge concepts.
- Challenges included maintaining school sample size over 3 years, providing school and teacher incentives, and recruiting a nationally representative sample of middle schools to test dissemination in Phase II.

**Participants**:
Nancy Moreno-Bayler College of Medicine
Catherine Sasek-NIDA/NIH
Billy Roden-Seattle Children's Research Institute
Nicola Barber-University of Utah
Ravi Subramanian-Tufts University
Dina Markowitz-University of Rochester
Drittani Lane-Edventure Children's Museum
Patrice Saab-University of Miami
Maria Leeder-P & P Museum of Science
Jeff Radsick-City of Hope
Liz Godin-Duke University

# Early STEM

**Facilitator**: Naomi Luban, Children's Research Institute
**Panelist:** Barbara Baumstark, PhD, Georgia State University
Ginger Cross, PhD, MIssissippi State University
Laura Romo, PhD, University of California Santa Barbara
**Reporter**: Leslie Miller, Rice university

**Presentation 1: Barbara Baumstark, Ph.D. Georgia State University**
BioBus utilizes graduate students to teach genetics to children in grade 1-3. The underlying thinking is that since children are best at learning a language early in life, the "language of genetics" could also be easily absorbed at an early age. Through SEPA funding, eight modules were created and evaluated. The modules consist of hands-on activities using craft supplies so that they are easily related to young children. Research demonstrated that not only do children learn the concepts, but they retained them over time. The next research questions relate to whether this phenomenon of teaching the language of DNA transcends grade and age levels.

**Presentation 2: Ginger Cross, Ph.D. Mississipi State University**
The goal of this project is to teach 4-6 year olds about healthy foods and the importance of physical activity as a way to address health issues in northern Mississippi. Partners include Healthworks and MSU. The project designed its objectives and methods based on front-end research with families, teachers, and community. The curriculum involves science, math and creative expression. The project is now working through implementation issues. One of the challenges in dealing with this age range is ensuring the curriculum and testing are developmentally appropriate. Lessons learned include that the testing needs to last no more than 15 minutes and be easy to administer. The features that support success in this project are using a bottom-up approach, offering repeated exposure to the content, and using storybook characters to convey concepts.

**Presentation 3: Laura Romo, Ph.D. University of California Santa Barbara**
Even at a young age, children can comprehend the biological processes behind germ contamination and disease spread, therefore this project created seven unit that teach why and how this happens. The materials were created at developmentally appropriate levels by finding ways to describe the biological processes in ways the children could comprehend (e.g., germs have babies) The target audience is bilingual students in at-risk schools. For half of the students in the project, Spanish is their dominant language. Not only can we teach biological processes to this young age, we can teach them questioning skills, part of the inquiry tools they will need. Too many people underestimate what young children can learn.

Discussion questions included why should we begin teaching science at such an early age, and where can one find other resources for early childhood science education. Mentioned were materials created by children's museums, Purdue University ( "The Day I Become a Scientist" materials), and the howtosmile.org web site.

Further discussion noted the pressures of the Common Core and the heavy emphasis on reading and math to the exclusion of science in the early years. Others offered ideas as to how science could be taught with the integration of reading and math. Children will learn science from a variety of resources—so there is concern that what they learn is accurate.

**Participants**:
Yukari Okamoto-University of California Santa Barbara
Judy Brown-Frost Science Center Miami
Sandy San Miguel-Purdue University
Rebecca Howsman-Seattle Children's Research Institute
Alejandro Orfega-University of New Mexico
Tiffany Ellis Farmer-Vanderbilt University
Bob Bruttomesso-Middletown Springs Elementary School
Trish Hill-University of Nebraska
Sydney Harper-Mississippi State University
Julie Parker-Mississippi State University
Donna Loden-Mississippi State University
Kathie Williams-Edventure Children's Museum
Terry Clark-National Institution of Health
Janet Dubinsky-University of Minnesota
Kim Soper-University of Minnesota
Darrell Porcello-University of California Berkeley
Leslie Miller-Rice University
John Daniel-Seattle Children's Research Institute
Michelle Ventura-Georgia State University
Chandan Morris Robbin-Georgia State University

# Informal Science Education

**Facilitator**: Rebecca Daughtery, Northwestern University
**Panelists**: Laura Martin, PhD, Arizona Science Center
Lisa Marriott, PhD, Oregon Health and Science University
Vicki Coats, Oregon Museum of Science and Industry
**Reporter**: Loran Parker, Purdue University

The panel discussed best practices in and out of school settings.
Lauren Martin, Arizona Science Center
Described her secret grant at Arizona Science Center. The project combines teacher, school materials and family activities. Laura presented results of their summative evaluation which found gains in knowledge about first attack after participation. Her project also developed an observation rubric to assist in determining if outreach activities aligned with strands of informal learning.
She noted that they did not always intend to align with all six strands. Aspects of the project that supported success were strong team and networks, forward to feedback, institutionalization of activities, and partnerships. Challenges faced: marketing, turnover in museum staff, access to teachers, R.O.I Questions and discussions with Laura focused on development & sequentially appropriate times and context in which to introduce essential concepts like DNA

Lisa Marriott described Oregon Health & Science University's community health research project. The project collects health information and educates based on participant health information. She discussed the audience evaluation framework and how the project linked anonymous data. The project uses participant's generated code to link data. They plan to create pre-post evaluations rather than evaluation stations. Teacher rewards (drawings) work to keep teacher response rates round 40%.

Vicki Coats from OMSI described the development and formative evaluation of "The Zoo in You" a bilingual exhibit focusing on the human microbiome. Front end evaluation found a lack of knowledge and misconceptions, but a lot of curiosity. Differentiation between audience groups included different levels of attention to negative aspects of microbes. Formative evaluation was quite positive, however visitors did not feel that the relationship between the microbiome and DNA were well communicated. Lessons learned: bilingual evaluators are important, reciprocation to focus communities is important.

**Question/discussion:** How to preserve "test free zone" for informal contacts?

- Observation instruments adapted from classroom, meaning maps and drawings protocols, other symbols (smiley faces, etc) based instruments, group interviews.
- 21st-century community centers were promoted as a new/good after school STEM funding opportunity.
- STELAR is ITEST's bank of instrument for evaluation.

**Participants**:

Bob Russell-NSF
Val Davillier-Great Lakes Science Center
Martin Weiss-New York Hall of Science
Dedee Ludwig-Museum of Science & Industry
Kristi Bowling-Rice University
Loran Parker-Purdue University
Meena Selvakumar-Pacific Science Center
Chase Norris-Arizona Science Center
Julia McQuillan-University of Nebraska
Katura Reynolds-Oregon Museum of Science & Industry
Kristi Straus-University of Washington
Mary Olson-Pacific Science Center
Ted Emmett-University of Pennsylvania
Mike Kavanaugh-University of Montana
Toby Citrin-University of Michigan
Lisa Jones-University of Pennsylvania

# STEM Education for Rural Students and Teachers

**Facilitators**:Tony Ward, University of Montana
Andrij Holian, University of Montana
**Reporter**: Lisa Blank, University of Montana

**Panelists**: Ann Chester, West Virginia University
Kimberly Obbink, Montana State University
Virginia Carraway- Stage, East Carolina University

**Session Goals:**
1. Identify best practices in STEM education for rural teachers and students

**List of Practices:**
1. what works
2. appropriate evaluation methods
3. challenge and ways to meet them

**Virginia Carroway-Stage**
The FoodMaster Initiative (K-12)
1. uses food as a tool to teach math and science
2. creates programs to supplement standard curriculum.

**Why food?**
1. preexisting experiences w/food
2. engage multiple senses
3. natural integration
Created grade 3-5 curriculum

**"FoodMaster"**
Working on grade 6-8 now
1. science curriculum/ text
2. math
Curriculum Development (1year)
- pilot-test
- tool development
- quasi-experimental evol. Design

Pre-Implementation

**Teacher Training**
1)comparison groups
equal benefits @ post
2)baseline survey instruments

**Process Evaluation**
1. Teacher Interviews
2. formative feedback
Post-implementation
1. written summary
2. post survey

**Evaluation:**
1. demographics
2. nutrition teaching efficacy
science/math content knowledge and attitudes
3. dietary behaviors

**Findings: (grade 4)**
1. teaching efficacy
2. science/math/nutrition knowledge

**Challenges:**
1. well-matched classrooms
2. mortality
3. location/distance- time
4. tool development- distance

**Successes:**
1. multiple forms of evaluation
2. Formative/summative feedback
3. Process evaluation
4. Knowledge exams linked to national assessments
5. Validated tools

**Ann Chester, WV University**

- 20 yr. old project, funded by SEPA since 1996.
- Original goal to get underrepresented kids to finish high school, go to college and go back and work in their communities. Now we have community research and STEM reform.

**Informal Education**

1. 1 teacher to 10 students
2. trained to do their own research (community based) select
3. universities (concord) gave college scholarships to mining candidates

tuiton/fee waiver through medical school/dental school

powerful incentives

**Expectations**

1. 70 hours of community service
2. 2 research projects
3. college immersion in summer

**Knowledge brokers**

1. individuals who live in community and partner scientists w/ students

Kidney study example

- fast food lowers albumin

was a relationship researched by students to understand why kidney disease is so high in WV

**Next steps:**

1. need to evaluate

*individual/psychological factors

are we changing/increasing:
academic identity, goal orientation participating citizenship, intellectual risk taking, cultural literacy, coping skills

**Community/social factors**

1. sense of community
2. social support
3. lifetime health outcomes

**Challenges**:

1. sustainability/ funding
2. community across cultures
3. control group

**Kimberly Obbink, MSU**

- Bioscience Montana
- 4th year of SEPA grant

- Extended University
- 4-H
- Senior research faculty

1. Sustained inquiry-based experiences of children

**Science Modules:**
1. neuro-science>Dr. John Miller
2. infectious disease>Dr. Voyich
3. metabolomics>Dr. Dratz

1) one week summer institute
2) monthly google hang-outs
3) first half year
   - complete curriculum
4) second half year
   - independent research project

**Impacts**:
1. knowledge of bioscience concepts and research methodology
2. awareness/ interest in bioscience careers
3. research, critical thinking, problem solving skills
4. undergraduate/science mentors resources and activities
5. science fair winners

Used Inverness Research for project evaluation

**Questions:**
1) What works/ doesn't work in evaluation?
   - longevity of program
   - social media to families to track students
   - modeled after 4-H so each region has a HSTA representative
   - 4-H doesn't work w/ tribal and African American families

2) How has the requirement for a control affected your work?

**Participants**:
Dave Jones-Missoula County Public School
Maurice Godfrey-University of Nebraska
Kelley Withy-University of Hawaii
Amy Spiegel-University of Nebraska
Michael Bernas-University of Arizona
Paula Greogory-LSU Health Science Center
Ian Herriott-University of Alaska Fairbanks
Melani Duffrin-East Carolina University
Maureen Munn-University of Washington
Marcia Johnson Witter-University of Washington
Delia Leonida-University of New Mexico
Chanda Reburiano-University of New Mexico
Diane Adger-Johnson-NIH
Chuck Wood-Wheeling Jesuit University
Sally Davis-University of New Mexico
Shelly Stern-New Knowledge Organization
Georgia Hodges-University of Georgia
Lisa Blank-University of Montana

# Teacher Professional Development

**Facilitator**: Adam Hott, Hudson Alpha Institute for Biotechnology
**Panelists**: Barbara Hug, PhD, University of Illinois at Urbana-Champaign
Susan Hershberger, PhD, Miami University
Susanna Cunningham, PhD, University of Washington
**Reporter**: Katie Malanson, Tufts University

In this session we heard about various approaches to professional development for teachers with the overarching goal of improving implementation of science education initiatives.

Barbara Hug and Tania Jones presented an overview of Project Neuron. Project Neuron develops curriculum materials for middle and high school classrooms. Its lessons aim to teach core biological principles using neuroscience examples. Project Neuron provides teacher PD both in the summer and during the school year. The impact of Project Neuron's PD was evaluated through pre/post-content tests, attitudinal surveys, interviews, and classroom observations. The main challenges faced by Project Neuron include developing appropriate assessment tools, communication with their teachers, and how to best document curriculum use in the classroom.

Susan Hershberger presented the project Fighting with Food. Fighting with Food develops educational materials for K-12 classrooms that explore the role of nutrition in reducing the risk of everyday environmental contaminants such as lead. Fighting with Food evaluates the effectiveness of their PD through assessing teacher content knowledge and attitudes. The main challenges Fighting with Food faces include: the more data they request from their teachers, the less the teachers are willing to participate, maybe partly because the less time they have for actually teaching. Fighting with Food also is facing a plateau effect with their attitudinal assessment, as teachers begin the program at a very high level and have little to no room left for improvement. Additionally, the content knowledge test for the students can be quite challenging being at a higher reading level than they are performing at.

Susanna Cunningham presented the project ONE-DA (Online Neuroscience Education about Drug Addiction). ONE-DA is an online college level biology course about drug addiction for high school students. Teachers must already have at least a master's degree, and attend a four day summer course, and two Saturday sessions in professional learning communities (PLC). ONE-DA evaluates the effectiveness of their PD both quantitatively and qualitatively with pre/post content tests, attitudinal surveys and in daily PD sessions with a "got" vs "need" exercise in which teachers outline that day's activities.

Once opened for discussion the group had the following questions:
**Are audio recordings good enough to replace in-person classroom observations to assess fidelity of implementation?**
With other measures, yes, audio recording can be powerful, but it is timely to transcribe.

**What does a successful teacher look like after our PD?**
Become critical thinkers, both themselves and instill critical thinking in their students
Stay up-to-date on content knowledge
Students pass exams
Use 2-4 activities in appropriate way
Empowered to teach science education

**How best to evaluate the PD?**
What is happening in this classroom? (Australia) 56 item survey
Really, we want shorter more robust surveys
Teacher reports of what they did
Classroom observation

**Participants**:
Gail Fletcher-University of Southern Maine
Rebecca Smith-University of California San Francisco
Louisa Stark-University of Utah
Megan Moore-Louisiana State University
Michele Shuster-New Mexico State University
Karina Meiri-Tufts University
Micaehl Myss-University of Alabama at Birmingham
Stephanie Tammen-Tufts University
Katie Malanson-Tufts University
Jennifer Williamson-University of Washington
Gerri Cole-City of Hope
Jane Larson-City of Hope
Jawed Alam-Ochsner Clinic Foundation
Kathryn Peters-University of New Mexico
Jeenie Aizenman-Bridgewater State University
Susan DeRiemer-Meharry Medical College
Casandra Gabriele-Rutgers University
Michael Lichtenstein-University of Texas Health Science Center

# Breakout Sessions: Tuesday, May 6, 7:00am - 8:30am

## Publish a Paper about Your Project in Curator: The Museum Journal

**Facilitators**: John Fraser, Children's Research Institute
Judy Diamond, University of Nebraska
Louisa Stark, University of Utah
**Reporter:** Laura Martin, Arizona Science Center

John Fraser, from New Knowledge Organization and Associate Editor, Operations of Curator, gave background on the journal which focuses on the museum field in general. Other journals, like Museums and Social Issues and the Journal of Museum Education, focus on more specific aspects of museums. Curator publishes pieces on how museums can be and can act, on how we engage in practices related to collections, exhibits, programs, audiences, and so on. It looks at how museum practices might change. It is published by the California Academy of Sciences through Wiley and has an electronic submission process.
Different kinds of pieces are accepted: reflective forum pieces which are about 2500 words long that discuss propositions or ideas; articles which are about 5-8000 words and discuss empirical data; and, philosophical pieces of about 8000 words. In the transition to publishing by Wiley there have been delays in the review process. They have about a 75%-80% rejection rate; many submissions come from abroad. Reviewers have strict criteria that expect articles to be grounded in proven scientific methods or discourse traditions, drawing on evidence and prior work to establish a case. Judy Diamond, on the editorial board, stressed this as well: what does the evidence say?
Louisa Stark and John had issued a call for a Special Issue on museum-based health projects. Unfortunately, many submissions did not meet the review criteria, so the journal's editorial team has suggested that a new call for papers be issued.
Q: what methods are acceptable; the journal seems to be moving towards a more traditional science article format. A: The journal expects rigorous methods in any article, but empirical research is not the only type of article accepted.
Q: What about articles on activities outside the museum, like outreach programs? A: If it relates to learning research more broadly and the role of museums that would work. Curator is a critical voice so as long as the paper challenges the museum framework or how the public experiences museums that's ok.
Johnny then asked everyone to briefly describe their projects and issues they thought they might write about [we didn't get to everyone because time ran out].

Topics raised were:

- Exhibits supporting formal school health curricula
- Universities and museums
- Partnerships and authority
- Multi-faceted projects: media partners/programs/inservice
- Range of programs – coordinating a focus on a topic, science community
- Intern or interpreter as learner – museum as an identity catalyst
- Collaborative papers from multiple projects would be welcome - You can co-author
- What we can learn from festivals – purposes and goals
- How developmental psychology informs learning experiences
- Community co-created stuff; social catalyst
- Exhibit as a research project; randomized trials at museums

- Evaluating outcomes
- Young minds – different topics, parent experience; co-learning
- Fun-up expertise as adding to community service
- The rural experience of museums; thinking about rural voices, museums as a "sector"

Judy then reviewed the deficits of previous submissions:

- The project isn't unique; needs to be set in a context of the previous literature and activities which are the foundation for the next step (your project)
- Wasn't grounded in new evidence and data
- Didn't extract what the lessons are for the field
- Didn't include a critique of the project relative to the field

Johnny described other sections of the journal: media, exhibit reviews, book reviews. He said it would be really interesting to have a piece on the history of how museums have addressed health. He said that good articles would be accepted even if they weren't part of the special issue and they are launching an on-line virtual issue from the archive of Curator to accompany a special issue.

Some copies of the Call for Papers were available; it will be available on line. Their editorial calendar next year isn't set so the group recommended a November submission deadline. It takes about a year for the whole process of review to be completed before publication.

**Participants**:

Carla Easter-National Human Genome Research Institute
Ginger Cross-Mississippi State University
Julie Paricer-Mississippi State University
Mary Olson-Pacific Science Center
Val Davillier-Great Lakes Science Center
Laura Martin-Arizona Science Center
Rebecca Smith-University of California San Francisco
Tracey Meilander-Great Lakes Science Center
Patricia Slahum-Virginia Commonwealth University
Louisa Stark-University of Utah
Judy Diamond-University of Nebraska
Kathie Williams-Edventure Children's Museum
Adrian Zongrone-Edventure Children's Museum
Victoria Coats-Oregon Museum of Science & Industry
Laura Fawcett-Yale Peabody Mseum of Natural History
Bette Schmit-Science Museum of Minnesota
Darrell Porcello-University of California Berkeley
Julia McQuillan-University of Nebraska
Brittani Lane-Edventure Children's Museum

# Breakout Sessions: Tuesday, May 6, 8:30am - 9:45am

## Conducting Curriculum Evaluation Studies

**Presenter**: Rochelle Schwartz-Bloom, Duke University
**Panelists**: Rochelle Schwartz-Bloom, Duke University
Marco Molinaro, University of California - Davis
Camellia Sanford, Rockman et al
Kristin Bass, Rockman et al
**Reporter**: Susan Hershberger, Miami University Oxford

This session presented four perspectives on this topic: two presentations from the evaluator's perspective and two from the principal investigator's perspective. How evaluation supports a project as well as case studies of different successful SEPA projects was presented.

Camellia Sanford addressed the group first on the evaluator's perspective of fidelity of implementation. Fidelity includes: meeting targeted goals, audience, and dosage in real classrooms and considers factors such as grade level, aptitude, content area and curricular context. Evaluation measures both the impact and the nature of the impact. "Touching Triton" served as a case study. The human planetary exploration game for 9th through 12th grade biology, biotechnology, anatomy, and genetics students was tested first with teachers in professional development and subsequently their students. Implementation varied from as little as one class period to several class periods. Teacher interaction with the game and classroom observations were collected along with student pre and post content and interest surveys. The evaluation identified early challenges including varying teacher technology abilities, student absences, varying science classes, and varying student experiences (individuals, pairs or groups of students) as well as school technology issues which informed the ongoing project.

Rochelle Schwartz-Bloom presented evidence-based science education design and analyses in different pharmacology education partnership projects beginning in 1998 based on drug curriculum modules for chemistry and biology. A randomized control trial where teachers either participated or served as a control with participation in a subsequent year was described. This face to face teacher professional development model of a pharmacological student was extended and explored with greater dissemination to teacher professional development at NSTA conferences, and distance learning models. In some versions, the design was not randomized, but teachers served as their own control, or teachers and students were randomized by school. The importance of how a curriculum study is designed and evaluated with respect to numbers and statistical relevance was stressed for publication as well as future funding.

Marco Molinaro described The Science, Biostatistics and Cancer Education project with online modules for the SeeIt web-based graphical analysis tool. This national online testing of the curriculum connected with this statistical tool project involved teacher professional development designed to introduce biostatistics into the classroom since currently there is little biology taught in math classes and little math taught in biology classes. Teachers were recruited at NSTA/NARST. The first phase of national testing started with encouraging teacher interest, but ended with significantly fewer teachers completing the pre-post assessment/questionnaires. While the advantages of national testing through an online resource such as Google may be more informative than local testing, there are connecting to teacher participant challenges that need to be addressed. Issues of long term testing and sustainability were also discussed.

Kristin Bass addressed the significant issues of sample size and measured effects for relatively large studies, issues important in the design of the evaluation. The required sample size is dependent on the size of the effect to be observed. While a large effect might be seen even with a small sample a more modest effect requires a larger sample. The importance of the difference one is measuring is also important. Finally, while one may want to begin with a large sample to allow for attrition, additional variables such as demographic data, or pre-test information may allow for a smaller sample to show a specific effect. Questions discussed that effect size is important for publishing as well as future funding.
Slides available at http://www.scied.info/

**Participants**:
Lisa Blank-University of Montana
Tiffany Ellis Farmer-Vanderbilt University
Kelley Withy-University of Hawaii at Manoa
Marlys Hearst Witte-University of Arizona
Mary Jo Koroly-University of Florida
Leonard Munstermann-Yale University
Casandra Gabriele-Rutgers School of Public health
Don DeRosa-Boston University
Tim Herman-Milwaukee School of Engineering
Kristen Morio-Miami University
Chardan Morris Robbins-Georgia State University
Chuck Wood-Wheeling Jesuit University
Laura Fawcett-Yale University
Barbara Hug-University of Illinois
Marco Molinaro-University of California Davis
Carol Merchant-NIH
Lisa Abkams-Virginia Commonwealth University
Susan Hershberger-Miami University
Marissa Pedalla-Montana Tech
Rayelynn Comole-Montana Tech

# Exploring the Measurement Properties of the Draw a Scientist Test

**Presenters**: Loran Parker, Purdue University
Sandy San Miguel, Purdue University
**Reporter**: Sandy San Miguel, Purdue University

This was an interactive session discussing the validity of the draw a scientist test through exploring the measurement properties of the test. The Test: Students are asked to draw-a-scientist and write what the scientist is doing.

Drawings are assessed through going down a checklist of stereotypes (i.e. glasses, Einstein hair, male, white, “Eureka!”, symbols) stereotypes are both negative and positive. Participants used the DAST to see how common distribution variables were. Hard to determine race and drawings were not repeatable. Test repeatability was reported as 0.4 in one case. Total scores had a normal distribution in this case. Another participant found low reliability even from children of scientists, added “do you know any scientists?”. Considred a dated test. Science is more of a team effort now. Data are binary and scales are ordinal, individual item analysis is more useful than summing + and – items, threats to validity and reliability include teacher’s instructions, scoring, experience level, it’s fun to draw mad scientists, etc. No underlying theoretical framework that informs the framework, consequences are we cannot adequately or accurately describe impact.

Exploratory/confirmatory analysis of test of how factors group to examine construct validity if factors group your data can become more robust, participants sorted stereotypes into groups
* opposites
* person vs. environment. vs. work
Explored sampling adequacy, variance in checklist items, tetrachoic correlations and factor analysis. Examine factor loadings to see the number of factors that make sense to data interpretation. Went through process as a group and discussed interpretation.

**Participants**:
Bob Bruttamesso-Middletown Springs Elementary School
Michael Lichtenstein-University of Texas Health Science
Denise Young-University of North Carolina
Jay Heinz-University of North Carolina
Ginger Cross-Mississippi State University
Jane Larson-BSCS
Eve Wurtele-Iowa State University
Greg Defrancis-Montshire Museum of Science
Michelle Ventura-Georgia State University
Rebecca Smith-University of California, San Francisco
Amy Spiegel-University of Nebraska
Trish Wonch Hill-University of Nebraska

# Human Microbiome Share-a-thon

**Facilitator**: Judy Diamond, University of Nebraska
**Panelists**: Judy Diamond, University of Nebraska State Museum
Karina Meiri, Tufts University School of Medicine
Martin Weiss, New York Hall of Science
Louisa Stark, University of Utah
**Reporter**: Katura Reynolds, Oregon Museum of Science and Industry

Judy Diamond shared information on the Biology of Human project, whose goal is to change people's perspectives on their interactions with microbes. They have a gut microbiome research group on University of Nebraska campus. The team spent first two years focusing on community learning centers, museum outreach, and researching how science identity changes in kids, including the role of social networks. Their previous SEPA project, World of Viruses, produced a book called Planet of Viruses by Carl Zimmer, plus comic books and iPad apps. The current work on bacteria is producing a sticker book of SEMs (with a new version coming out that will be bilingual) and a new comic book featuring a skateboarding theme. Focus is on mouth microbes partly because the gut research is a field that is changing so very rapidly! Next phase will focus on vaccines. Goal is not to tell folks what is right or wrong, but rather to stimulate people to be interested in the underlying biology, which should lead them to be able to make better choices.

Martin Weiss talked about the Evolution/Health connection project at the New York Hall of Science. Visitors have a high interest in their own health could this become a way to transition into the challenging topic of evolution? Bacterial evolution can be easier to "accept" than human evolution. Their programs have looked at skeletal changes in humans and how that affects our health now. Consider the developed world versus the developing world, and theories about how lack of parasites (which are known to modulate our immune responses) might be leading to sudden surge in hay fever, peanut allergies, etc in the developed world. Could we consider using parasites as intentional methods of therapy? (Whipworm, etc) As we sanitize our world, which is not in itself a bad thing, a "pound of dirt" might still be needed to keep us healthy.

Berri Jaque, an immunologist at Tufts, spoke about the Great Diseases project. They work in an elective high school biology setting (11-12 grade), which had no set curriculum. The team has built four disease models, including infectious diseases. Students love learning about themselves, but not necessarily on a biological level? Over 5 years, they have expanded beyond just the host defense system. New expansions will include adding C. diff infections and fecal transplants to the curriculum. Aiming for curriculum to be ready around July 1.

Louisa Stark shared microbiome curriculum supplement materials that can be found at Learn.Genetics.utah.edu. Tailored to work for high school but can be adapted for middle school and museums as well. The Ecology and Evolution section has the human microbiome content, including a microbiome simulator, “Your Microbial Friends,” and the Agent Antibiotic video game. Teacher resources are included as downloadable PDFs, and the team is happy to work with folks to adapt website content for displays at museums and so on.

Katura Reynolds presented on the Zoo in You traveling exhibit that the Oregon Museum of Science and Industry is building with the expertise of the microbiome researchers at the J. Craig Venter Institute. The mid-sized exhibit, which is bilingual in English and Spanish, will kick-off at the OMSI floor in October 2014 and then travel the country for 6-8 years. The team is taking a playfully interactive approach (green-screen weather reports on the climate inside your nose!) and framing things in terms of building awareness of body as ecosystem and drumming up curiosity about the research—but not giving a lot of research results, since that will all be changing so fast during the years the exhibit is on tour. Katura recommended some resources on this topic: teaming up with researchers; NIH Human Microbiome Website; MicrobeWorld.org (including bilingual podcasts); Human Oral Microbiome Database (homd.org); blogs by science writers Carl Zimmer and Ed Yong; and checking out the Genome exhibit currently at the NMNH.

**Participants**:
Karen O’Hagan-Tufts University
Desislava Raytimeua-Tufts University
Jawed Alam-Ochsmer Clinic Foundation
Gail Fletcher-University of Southern Maine
Victoria Coats-Oregon Museum of Science Industry
Mary Olson-Pacific Science Center
Ian Herriott-University of Alaska Fairbanks
Monroe Duboise-University of Southern Maine
Monique Scott-American Museum of Natural History
Susanna Cunningham-University of Washington
Julia McQuillan-University of Nebraska
Karen Moulton-University of Southern Maine
Kristi Bowling-Rice University

# Partnerships to Enahnce Student Opportunities within STEM Career Pathways

**Presenters**: Nancy Moreno, Baylor college of Medicine
Ann Chester, West Virginia University
**Reporter**: Rebecca Daugherty, Northwestern University

STEM Careers data from Change the Equation

- 3:1 applicant:job opening ratio (overall employment)
- 1:2 applicant:job opening ratio (STEM)
- 1:3 applicant:job opening ratio (Healthcare)
- A clear need to prepare more STEM and healthcare workers
- Underrepresented youth are not prepared, aware, and exposed enough

Problems start in elementary school- poor reading and math skills, lack of guidance
Middle and high school offer little opportunity to catch up
Baylor College of Medicine – Nancy Moreno

- Curriculum offered through BioEd online
- Middle school after school program
- Teacher PD works (80-100 hours per year over multiple years)- raises student scores on TX standardized tests
- Grow your own- STEM-focused schools to increase and broaden applicant pool for medical school
  - Elementary through high school
  - Up to 12 students enroll in BS/MD program
  - 39% of MD graduates come from magnet schools

Health Science and Technology Academy- Ann Chester

- Program serves 97% white, rural high school students in West Virginia
- 800 students per year, 75 teachers
- Partnership across the state
- Four year program- after school community based project with summer session at area colleges and universities
- What made it successful?
  - Powerful incentives- full-ride scholarship to college and graduate schools
  - Clear expectations- 3.0+ GPA, 70% attendance, 75 hours of community service, attend two summer sessions, must participate in and present a community project
  - Communities of support- teachers, local volunteer governing boards
  - Knowledge brokers- Program staff (4) that help coordinate resources and connections for community health projects
  - Diverse positive role models
  - STEM-related immersion experiences
  - College immersion experiences
  - Community-based project
  - Reinforce skills
  - Recognition- students profiled in newspapers, receive awards
  - Have fun and celebrate

Biggest Challenges

- HSTA
  - Sustained funding- $2.5-3 million per year
  - Maintaining diversity in the program (30% African American)
- Baylor
  - Scale- how to serve the whole district

**Participants**:
Jeff Radsick-City of Hope
Susan Kane-City of Hope
Toby Citrin-University of Michigan
Julie Ho-Seattle Children's Research Institute
Amanda Jones-Seattle Children's Research Institute
Becky Howsmon-Seattle Children's Research Institute
Dave Jones-Missoule County Public Schools
Val Davillier-Great Lakes Science Center
Laura Martin-Arizona Science Center
Jennie Aizenman-Bridgewater State University
Tony Ward-University of Montana
Brittani Lane-Edventure Children's Museum
Kathie Williams-Edventure Children's Museum
Adrian Zongrone-Edventure Children's Museum
Kenneth McMartin-LSU Health Science Center
Dedee Ludwig-Museum of Science & Industry
Terry Clark-NIH
Peter Crown-University of Arizona
Rebecca Daugherty-Northwestern University
Ted Emmett-University of Pennsylvania
Bette Schmit-Science Museum of Minnesota
Maurice Godfrey-University of Nebraska
Susan DeRiemer-Meharry Medical College
Virginia Shepherd-Vanderbilt University
Nicola Barber-University of Utah
Judy Cameron-University of Pittsburgh

# SEPA DOC (Diabetes, Obestity, and Cardiovascular Disease) Working Group: Development of a Strategic Plan

**Facilitator**: Virginia Carraway-Stage, East Carolina University
**Reporter**: Melani Duffrin, East Carolina University

The SEPA DOC working group (WG) session began with a historical overview of the past six years of activities. The SEPA DOC WG typically focuses efforts on a specific activity over a 3 year time frame. The last 3 years have focused on the development of a science attitude scale. Group participants were provided a handout of the proposed 24 item scale that was collapsed from an original 50 item scale. A scale validity paper is currently in progress. Discussion then focused on "Next steps" for SEPA DOC WG. The group established new leadership that will focus on unifying messages across SEPA DOC WG programs and possibly developing a SEPA DOC WG website. New SEPA DOC WG leadership will include Darrell Porcello (SEPA DOC WG Chair) of University of California Berkeley, Stephanie Tammen of Tufts University School of Medicine, Joan Griswold and Maureen Munn of University of Washington, and Tracey Meilander of Great Lakes Science Center.

**Participants**:
Cathy Ennis-University of North Carolina
Sally Davis-University of New Mexico
Stephanie Tammen-Tufts University
Donna Loden-Mississippi State University
Joan Griswold-University of Washington
Darrell Porcello-University of California Berkeley
Patrice Saab-University of Miami
Tracey Meilander-Great Lakes Science Center
Maureen Munn-University of Washington
Paul Dusenbery-Space Science Institute
Dina Markowitz-University of Rochester
Virginia Carraway-Stage-East Carolina University
Wendy Huebner-Montclair State University
Paula Gregory-LSU Health Science Center
John Fraser-New Knowledge

# Breakout Sessions: Tuesday, May 6, 10:00am -11:15am

## Bringing Social Scientists In: Extending Science Education Partnerships

**Facilitator**: Julia McQuillan, University of Nebraska
**Panelists**: Amy Spiegel, University of Nebraska
Trish Hill, University of Nebraska
**Reporter**: Amy Spiegel, University of Nebraska

Judy Diamond began by describing how, as PI on various projects, she has moved from traditional evaluation toward more learning research, and understanding how her projects can contribute to a greater understanding of the field. This involves including social scientists (sociologists, cognitive psychologists, etc.) who are using established methodologies in their field, but studying the same phenomena as we are, and so bringing in their discipline expertise to frame studies with more generalizable results.

Julia McQuillan, co-PI and sociologist conducting learning research as part of the Biology of Human SEPA project, began by introducing panelists Trish Wonch Hill (sociologist/ learning researcher) and Amy Spiegel (educational psychologist/ evaluator), both BioHuman project team members. Dr. McQuillan said, "Let's explore when it might be useful to have a social scientist on your project." She asked session participants to describe their NIH SciEd projects and to articulate what (often implicit) theories underlie their projects and why they think change will occur for their participants. Participants shared a variety of concepts, including authentic experiences, virtual world experiences, role models, experiences with real scientists, making things personal to connect participants to the content, constructivism, letting students try on different possible selves, experiential learning, immersion, and community-based research. Intuitively, project creators know why their projects are working, but understanding the norms and language of sociologists can get results published and out to a greater audience. As participants shared their ideas, Dr. McQuillan identified how these can be mapped onto different sociological theories, including Identity, Multilevel Gender, Schemas/ Implicit Attitudes, Social Cognitive, Social Construction, Fundamental Attribution, and Lewinian Field theories.

Dr. McQuillan briefly described the Biology of Human project learning research, which includes a network map around science identity, investigating how science identity may be social in nature. Do kids cluster around science identity? Are changes in friends associated with changes in science identity? The project started with the idea of implicit science identity, that all children start out with tendencies that could develop into science interest, literacy, and for some, careers. Why then do only some explicitly claim a science identity, maintain interests in science, develop higher science literacy, and for a few, become scientists? Guided by four Sociological theories around social influence and identities, the Biology of Human project seeks to answer these questions. The panelists also emphasized the difference between logic models that focus on evaluation of specific project goals and theoretical concept maps that focus on generalizability for a larger audience.

Handouts:

- Biology of Human Systems Approach Graphic
- Engaging Teenagers with Science Through Comics article abstract and figure
- Survey codebook (DRAFT!) listing survey items and associated working constructs, sociology theories, item categories, and original sources with an abbreviated list of cited, published instruments

**Participants**:
Julia McQuillan-University of Nebraska
Amy Spiegel-University of Nebraska
Trish Wonch Hill-University of Nebraska
Lisa McDonald-J. Craig Venter Institute
Leonard Munstermann-Yale University
Alberto Guzman-Alanes-U C Davis
Matthew Steiwachs-UC Davis
Rachel Smilow-Children's National Medical Center
Ginger Cross-Mississippi State University
Shelley Stern-New Knowledge
Mary Olson-Pacific Science Center
Martin Weiss-New York Hall of Science
Louisa Stark-University of Utah
Rebecca Smith-University of California San Francisco
Lisa Blank-University of Montana

# Models for Creating, Maintaining, and Supporting a Teacher Network

**Facilitator:** Greg DeFrancis, Montshire Museum of Science

**Participants**:
Lisa Abrams-Virginia Commonwealth University
Jackie Shia-Wheeling Jesuit
Ian Herriott-University of Alaska Fairbanks
Sydney Harper-Mississippi State University
Rebecca Howsmon-Seattle Children's Research Institute
Michele Shuster-New Mexico State University
Michael Lichtenstein-University of Texas Health Science Center of San Antonio
Kathryn Peters-University of New Mexico
Renee Bayer-Michigan State University
Susan Hershberger-Miami University
Cathy Ennis-University of North Carolina
Joan Griswold-University of Washington
Liza Godin-Duke University
Dave Vamner-NIH
Susan DeRiemer-Meharry Medical College
Gail Fletcher-University of Southern Maine
Susanne Cunningham-University of Washington
Bob Bruttomesso-Middletown Springs Elementary School
Berri Jacque-Tufts University
Desislava Rayleneva-Tufts University
Ravi Subramanion-Tufts University
Nicola Barber-University of Utah

# Overview of STEM Education Priorities, Funding Opportunities and Resources from the National Science Foundation

**Facilitator:** Robert Russell, NSF
**Reporter:** Gisele Ragusa, University of Southern California

Introduction

- When in doubt, call a program officer!
- Most are in DRL that are applicable
- Does it do Pre K- call program officer
- Funding Level ~10% (discouraging but encourage resubmission)
- Program officers provide targeted feedback
- Do you address reviewers concerns? Your call but you do not have to
  - NSF does not have standing review panels
  - No limit on resubmission (2-3 re-submissions ok; 1-2 re-submissions typical)
- Generally 1 call per program per year, occasionally 2 rounds
- EHR Core Program (ECR): foundational funding to study learning (higher % than some other programs)
  - Proposal based on strong theory, strong research design and strong review of literature
  - Basic STEM learning within different environments
  - Workforce development (career development theory)
  - Broadening participation (variables of URMS and women)
  - Two types
    - Capacity building ($300 K) to lay the ground work for your research, max 3 years
    - Core research project maximum 5 years, $1.5 million max
  - What makes a research question foundational?
    - Are the question/results generalizable?
    - Are they theory building?
- Research in Engineering Education (REAL) may merge with EHR Core
- CAREER Awards
  - Start your research
  - Launch a research agenda
  - Post docs not eligible
  - Must be tenure track faculty member
- PRIME: Research on evaluation
  - Research on evaluation
  - Development of new theory building instrumentation
  - Developing techniques
  - Growing evaluation capacity
  - Exploratory: Lay ground work for projects max $250 K for 2 years
    - Planning grant
  - Capacity building: Max $800 K, 3 years

- DR K-12
  - Built around a hypothesis
  - Program should be the context for the research
  - For health related interventions, must be solid science
    - Ask program officer before applying
  - Requires resource, models and tools (RMTs) in the context of asking research questions
  - 4 strands of DR K-12
    - Assessment
    - Curriculum in STEM
    - Teaching strands (pre/inservice program for teachers)
    - Implementation-variables that affect quality and effectiveness of implementation of the program
  - Two types
  - Exploratory types
  - Research and development types
  - Also conference ($250-300K) must include series of activities and workshop grants available (up to $50 K)-w/outside review
    - Contact program office with one page concept paper
  - Can jump into full, no advantage review-wise to start with exploratory
  - But if you aren't ready should do exploratory
  - Must always talk about any prior NSF work in NSF proposals
    - Can also do NIH but be creative about talk about what you have done and how it lays foundation of what you are proposing to do
  - Must form an intellectual foundation for what you are doing
    - Integrate with your literature review
  - See PPT for various max awards and durations
- ITEST- Youth learning STEM incorporating technology- career focus a must
  - NOTE: last round few were rated highly competitive
  - Funding from H1B VISA
  - Aim to improve workforce development focus
  - Position evaluation in research to some degree, finding should be of interest to the nation (generalizable)
  - Information and Computing Technology (ICT, traditional STEM careers, range of STEM professions
  - All must provide direct service to students but can have some teacher professional development
  - Two types
    - Strategies project: creation and innovation workforce related activities
      - Max $1. 2 Million
    - SPrEaD Project:  Dissemination of projects in workforce
      - Max 2 million

- AISL: knowledge building
  - Ask research questions about how programs work and why
  - Major thrust should be outside of the classrooms
  - May have some resources for schools, (online for example)
  - Audience- Anybody, anytime, anywhere
  - Helpful to relate to NGSS, common core math etc.
  - Types of Projects
    - Pathways – exploratory
    - Research service to practices- research advance knowledge and provide evidence base
    - New learning resource to be done in a new way – developing exhibits
    - Broad implementation- dissemination and research based rationale for approach (how does it work under different circumstances, what are most effective
    - Conferences and workshops inform science, workshop can be submitted at any time
    - New component- Science Learning Plus (+) - US researchers collaborate with UK
      - Contact Dennis Schatz (PO), Rick Duschel (PO)
      - First deadline is July 10th
- Putting Your Proposal Together
  - Goals and Purposes
  - Choose appropriate program
    - There are some overlaps
    - When in doubt, call program officer
  - Budget should be consistent with level of work
    - Higher budgets will not penalize submission- people do look at the budget however
    - Two months salary max on all NSF proposals (can ask for more % effort with rationale)
    - Indirect costs set by institution and auditors- not factors in review process (only direct costs budgets reviewed by reviewers)
    - No cost sharing (can leverage existing resources however)
  - Project description
    - 15 page max
    - Overview- intro to project
    - Goals and objectives of project/research
    - Summary of effectiveness and impact of prior support
    - Explanations of principles guiding project design informed by literature
    - Detailed work plan with a timeline
    - Qualification of key personnel
    - Anticipated results
    - Research plan (if applicable/appropriate)- must be strong, discuss validation and reliability of instrumentation, statistical approaches of analyses etc.
      - IMPORTANT- Questions, data, analytical plan, expertise of investigators
    - External review or evaluation process
      - External review process
      - Advisory board (critique research design and implementation)
      - Third party evaluation (independent)
      - Choose what is effective for project

- Dissemination plan
  - Be creative beyond the typical publishing and conference presentation (do this but include other ideas)
    - E.g. community of practice and network for dissemination
- Fatal flaws
  - Return without review
    - Font size, margins, required elements
  - Points to remember
    - Must be STEM relevant
    - Must have good lit review including reference to other funded projects
    - Must have strong research design
    - Don't ignore what is required
    - Have clear plan for implementation
    - Intellectual Merit- Why is it an interesting research problem? Research design tied to literature and intellectual foundations
    - Broader Impacts- why is it relevant nationally?
    - See PPT for process diagram for NSF submission process
    - Go to NSF.gov for questions

**Participants:**
Laura Romo-University of California, Santa Barbara
Yukari Okamoto-University of California, Santa Barbara
Jennie Aizenman-Bridgewater State University
Karen O'Hagan-Tufts University
Jane Larson-BSCS
Kim Soper-University of Nebraska
Brittani Lane-Edventure Children's Museum
Carla Romney-Boston University
Mary Jo Koroly-University of Florida
Val Davillier-Great Lakes Science Center
Victoria Coats-Oregon Museum of Science & Industry
Monroe Duboise-University of Southern Maine
Dave Jones-Missoule County Public School
Tony Ward-University of Montana
Chuck Wood-Wheeling Jesuit University
Don Derosa-Boston University
Kelley Witty-University of Hawaii
Melani Duffrin-East Carolina University
Barbara Hug-University of Illinois
Gisele Ragusa-University of Southern California
Karina Meiri-Tufts University
Kristi Straus-University of Washington
Eve Wurtele-Iowa State University
Marco Molinaro-University of California Davis
Dedee Ludwig-Museum of Science & Industry
Andrij Holian-University of Montana
Laura Martin-Arizona Science Center
John Daniel-Seattle Children's Research Institute
Julie Ho-Seattle Children's Research Institute
Billy Roden-Seattle Children's Research Institute
Amanda Jones-Seattle Children's Research Institute
Kristen Morio-Miami University
Lisa Marriott-Oregon Health and Science University

# Sharing the Practice of Science: PhDs in K-12

**Presenters:** Virginia Shepherd, Vanderbilt University
Michael Wyss, University of Alabama
Tiffany Ellis Farmer, Vanderbilt University
**Reporter:** Rebecca Daugherty, Northwestern University

How are PhDs getting involved in K12?

Vanderbilt- Center for Science Outreach Programs
Tiffany Ellis Farmer and Virginia Shepherd

- School for Science and Math
  - PhD scientists as instructors 4 days per week
  - Weekly enrichment for 25 high school students on the Vanderbilt campus
  - Pulls resources from the campus
- Interdisciplinary Science and Research Program
  - Takes place at the high school
  - PhD scientists co-teach with science teachers, help develop curricula
  - Four year program for the high school students
- K8 Resident Scientist
  - PhD scientists embedded at elementary and middle schools
  - Support teachers and co-teach some activities
- Scientist in the Classroom
  - Graduate student and postdocs visit classroom one day per week
  - Receive $7,000 stipend
  - Work two weeks in the summer to develop plan with teachers
  - Many transition to full-time positions with other Vanderbilt programs
- Working to develop alternative certification for scientists through iTeach
- NIH-BEST grants as funding source for alternative graduate training programs
- Challenge- there's no clear path for PhD scientists in education

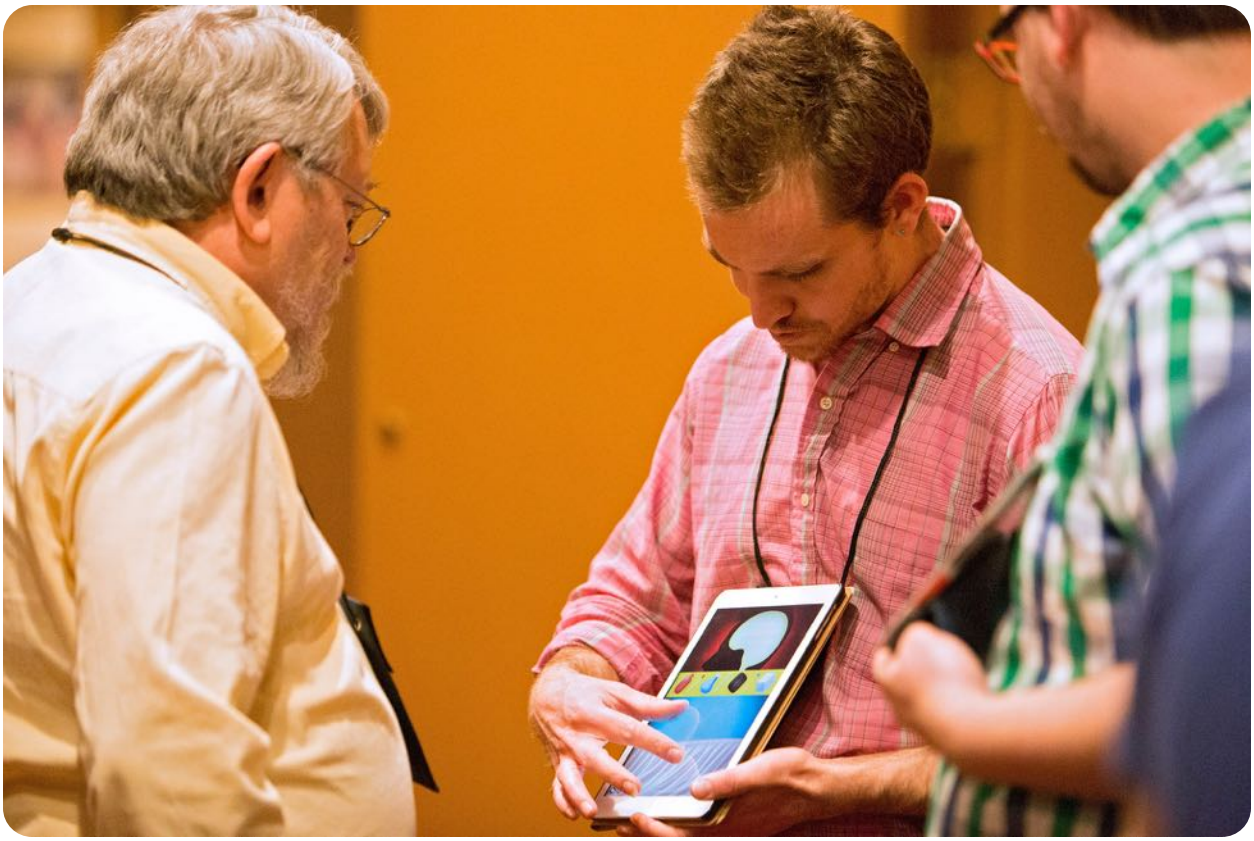
McWane Science Center
Michael Wyss

- Harder to get university scientists to take students and teachers in the lab since funding is tight
- Supporting NSF CAREER grants
- PhD teaching fellows through Robert Noyce funding

**Q&A session**

- PhD students going on to earn Masters in Teaching
- PhD scientists need training in pedagogy to be prepared for the classroom and need continued support once they go to the classroom
- Need exposure to alternative careers

**Participants:**
Terry Clark-NIH
Scott Rawls-Temple University
Tracey Meilander-Great Lakes Science Center
Marissa Pedulla-Montana Tech
Rayelynn Connole-Montana Tech
Susan Kane-City of Hope
Ralph Imondi-Coastal Marine Biolabs
Linola Santschi-Coastal Marine Biolabs
Denisa Young-University of North Carolina
Jay Heinz-University of North Carolina
Edward Emmett-University of Pennsylvania
Rochelle Schwartz-Bloom-Duke University
Chanda Reburiano-University of New Mexico
Delia Leonida-University of New Mexico
Tony Beck - NIH
Kathie Williams - Edventure Children's Museum
Jennifer Williamson - University of Washington
Tiffany Ellis Farmer - Vanderbilt University
Virginia Shepherd - Vanderbilt University



## **NIH SciEd 2014** Poster Presentations

Posters are listed alphabetically by Institution within the following topic areas:

- Authentic Research Experiences for Students and Teachers
- Curriculum Development
- Early STEM
- Informal Science Education
- Student Science Enrichment
- Teacher Professional Development

### Authentic Research Experiences for Students and Teachers

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 1 | City of Hope and the San Gabriel Valley SEPA Collaborative | City of Hope/ Beckman Research Institute | Susan E Kane | SEPA |
| 2 | NeuroLab: Discovery-based Explorations of Scientific Models, Model Organisms, and Model Systems in Developmental Neuroscience | Coastal Marine Biolabs | Ralph Imondi, Linda Santschi | SEPA |
| 3 | Barcode Long Island | DNA Learning Center, Cold Spring Harbor Laboratory | David Micklos | SEPA |
| 4 | BioStart: Clinical Research and Education Experiences for Students, Teachers, Parents and Community | Louisiana State University Health Science Center Shreveport | Kenneth E McMartin | SEPA |
| 5 | Epidemiology and the Energy Balance Equation | Montclair State University | Mark Kaelin, Wendy Huebner | SEPA |
| 6 | Bringing Research into the Classroom | Montana Tech | Marisa Pedulla, Rayelynn Connole | SEPA |
| 7 | CHIDR Chatter: Translating Community-level Data for School Use (Let's Get Healthy!) | Oregon Health & Science University | Lisa Marriott, Jackilen Shannon | SEPA |
| 8 | Planarians and the Pharmacology of Addiction: An in vivo Model for Science Education | Temple University | Scott Rawls | NIDA |
| 9 | Bioinformatics Inquiry through Sequencing | Tufts University | David Walt, Donna Slonim | SEPA |

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| 10 | Science Education Enabling Careers | University of Alabama | J. Michael Wyss | SEPA |
| 11 | Translating Translation and Scientific Questioning in the Global K-12 Community | University of Arizona | Marlys Witte, Francisco Garcia | SEPA |
| 12 | Biology-Environmental Health Science Nexus: Inquiry, Content and Communication | University of Milwaukee | David Petering, Craig Berg | SEPA |
| 13 | Clean Air and Healthy Homes Programs (CAHHP) | University of Montana | Tony Ward, Andrij Holian | SEPA |
| 14 | WV-HSTA Students Take CBPR to Their Communities | West Virginia University | Ann Chester | SEPA |

## Curriculum Development

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 15 | Gene U: Inquiry-based Genomics Learning Experiences for Teachers and Students | Baylor College of Medicine | Nancy Moreno | SEPA |
| 16 | The Learning Brain – Interactive Inquiry for Teachers and Students | Baylor College of Medicine | Nancy Moreno | NEURO |
| 17 | Foundations for Student Success | Baylor College of Medicine | Nancy Moreno | NIAID |
| 18 | Being Me | Children's National Medical Center | Naomi L Luban | SEPA |
| 19 | Science Education in the Health Ed Class: Tobacco and Addiction | Duke University Medical Center | Rochelle Schwartz-Bloom | SEDAPA |
| 20 | FoodMASTER: Impacting Middle (Grades 6-8) Science and Mathematics Learning Environments | East Carolina University | Melani W Duffrin, Virginia Carraway-Stage | SEPA |
| 21 | Connecting Classrooms and Community with the Health Sciences | Montshire Museum of Science | Gregory DeFrancis | SEPA |
| 22 | Fat Dogs and Coughing Horses: Animal Contributions Towards a Healthier Citizenry | Purdue University West Lafayette | Sandra San Miguel, Tim Ratliff | SEPA |

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| 23 | A Collaborative Approach to Real-World Science in the Classroom | Tufts University | Karina F Meiri | SEPA |
| 24 | The Great Diseases: Bringing Health Science and Health literacy to the High School Biology Classroom | Tufts University | Karina F Meiri | SEPA |
| 25 | Modeling for Fidelity, Mentored Dissemination of an Innovative Curriculum about Infectious Disease | Tufts University | Berri Jacque, Karina Meiri | NIAID |
| 26 | SYSTEMS: Stimulating Young Scientist to Engage, Motivate, and Synthesize | University of Georgia | Georgia Wood Hodges | SEPA |
| 27 | The Science of Healthful Living | University of North Carolina | Catherine Ennis, Ang Chen | SEPA |
| 28 | Neuroscience Activities for Hands-on Learning | University of Rochester | Dina Markowitz | NEURO |
| 29 | NIH-Funded Projects at the University of Utah:<br>The Neuroscience of Our Senses;<br>Your Body's Microbial Ecosystem: Web-based Curriculum for Secondary Science;<br>Inside Your Body: Web-based Curricula for Secondary Science | University of Utah | Louisa A Stark, Kevin Pompei | NEURO<br>NIAID<br><br>SEPA |
| 30 | Sowing the Seeds of Neuroscience | University of Washington | Eric Chudler | NEURO |
| 31 | Genes, the Environment, and Me | University of Washington | Munn, Maureen | SEPA |
| 32 | In-school Internships for Students and Teachers in Underserved Schools | Walter Reed Army Institute of Research | Debra L Yourick | SEPA |

## Early STEM

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 33 | DNA is Elementary | Georgia State University | Barbara Baumstark, Michelle Ventura, Chandan Robbins | SEPA |

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| 34 | Integrating Health and Germ Biology in a Science Curriculum for Latino Preschoolers | University of California | Laura Romo, Yukari Okamoto, Terry Au | SEPA |
| 35 | Integrating Nutrition Concepts and Biology in a Science Curriculum for Latino Preschoolers | University of California | Laura Romo, Yukari Okamoto, Terry Au | SEPA |

## Informal Science Education

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 36 | Framing New Pathways to Medical Discoveries for Families, Students and Teachers | Arizona Science Center | Laura W Martin | SEPA |
| 37 | Scientastic! & Partnership in Neuroscience Education | Duquesne University | John A Pollock | SEPA<br>NSF SBIR<br>Foundation |
| 38 | Unlocking the Mysteries of Chronic disease: Bioinvestigations for Family, School and Youth Audiences | Edventure Children's Museum | Kathie Williams | SEPA |
| 39 | BioMedTech: Students Translating and Exploring Medicine (BMT: STEM) | Great Lakes Science Center | Valence Daviller, Sarah Ann MacLeish | SEPA |
| 40 | Meta!Blast: An Immersive Interactive Learning Module for Cell Biology | Iowa State University | Eve S Wurtele | SEPA |
| 41 | Partnerships to Promote Healthy Lifestyles for Children and Communities | Mississippi State University | Ginger Cross | SEPA |
| 42 | SIMLAB: Using Patient Simulation for Student Exploration of Community Health Issues | Museum of Science and Industry | Rabiah Mayas, Patricia Ward | SEPA |
| 43 | Discover Health/Descubre la Salud | Space Science Institute | Paul B Dusenbery | SEPA |
| 44 | Evolution Health Connection | New York Hall of Science | Martin Weiss | SEPA |
| 45 | Science Club: Building a Science Community Partnership with the Boys & Girls Club | Northwestern University | Michael Kennedy | SEPA |

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| 46 | The Zoo in You: Exploring the Human Microbiome | Oregon Museum of Sciences and Industry | Victoria J Coats, Lisa McDonald | SEPA |
| 47 | Out of the Lab and Into the Spotlight: Bringing Current Health Research to the Public | Pacific Science Center | Meena Selvakumar | SEPA |
| 48 | Weighing the Evidence | Science Museum of Minnesota | Laurie A K Fink | SEPA |
| 49 | PlayPads: Mobile Educational Health Science Activities for Children in Hospitals | University of California Berkeley | Darrell Porcello, Sherry Hsi | SEPA |
| 50 | GROOVE (Girls Realizing Options through Open-Sim Virtual Experiences) | University of Miami | Patrice Saab, Judy Brown | SEPA |
| 51 | Biology of Human: Understanding Ourselves Through the Lens of Current Biomedical Research | University of Nebraska Lincoln | Judy Diamond, Julia McQuillan, Charles Wood | SEPA |
| 52 | SEPA in New Mexico | University of New Mexico Health Science Center | Shiraz Mishra, Sally Davis | SEPA |
| 53 | Grossology and You | University of North Carolina Chapel Hill | Denise Young, Rich Superfine | SEPA |
| 54 | Resources for Education and Action for Community Health in Ambler – "REACH Ambler" | University of Pennsylvania | Fran Barg, Ted Emmett, Jody Robert | SEPA |

## Student Science Enrichment

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 55 | It's Complex! Engaging Student Discussions around Complex Genetics and Individualized Medicine | HudsonAlpha Institute for Biotechnology | Neil Lamb | SEPA |
| 56 | Virtual Clinical Trials: Advances in Neuroscience | Rice University | Leslie Miller, Kristi Bowling | NEURO |
| 57 | Engaging Families to Enhance Science Learning and Interest in STEM Careers | Seattle Children's Hospital | Amanda L Jones | SEPA |

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| 58 | Nuestro Futuro: Advancing Science Education (NFASE) | Tufts University | Linda Sprague Martinez<br>Flavia Perea | NIMHD |
| 59 | Building Bridges: Health Science Education in Native American Communities | University of Nebraska Medical Center | Maurice Godfrey | SEPA |
| 60 | Virtual Sprouts: Web-based Gardening Games to Teach Nutrition and Combat Obesity | University of Southern California and California Science Center | Donna Spruit-Metz | SEPA |
| 61 | Transforming STEM Learning in Urban Schools Using the SSMV Model | Vanderbilt University | Virginia L Shepherd,<br>Tiffany Ellis Farmer | SEPA |

## Teacher Professional Development

| Poster # | Project Name | Institution | PI(s) | Funder |
|---|---|---|---|---|
| 62 | Meharry Health Sciences Leadership Academy | Meharry Medical College | Susan A DeRiemer | SEPA |
| 63 | Fighting With Food Battling Chemical Toxicity With Good Nutrition | Miami University | Susan Hershberger | SEPA |
| 64 | Teachers FIRST: From Interesting Research to Scientific Teaching | Milwaukee School of Engineering | Tim Herman | SEPA |
| 65 | STC: Science Tools in the Classroom | New Mexico State University | Michele Shuster | SEPA<br>NM-INBRE |
| 66 | BEST Science! - Bioscience Enrichment for Students and Teachers | Ochsner Clinic Foundation | Jawed Alam,<br>Paula Gregory | SEPA |
| 67 | Pathways: Promoting Access to the Health Sciences Through Partnership | University of California San Francisco | Rebecca Smith | SEPA |
| 68 | Biomedical Explorations: Bench to Bedside Phase II | University of Florida | Mary Jo Koroly,<br>W McCormack,<br>K Crippen | SEPA |
| 69 | Project NEURON | University of Illinois | Barbara Hug,<br>Donna Korol,<br>George Reese | SEPA |

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|---|---|---|---|---|
| 70 | BRAIN to High School | University of Minnesota | Janet M Dubinsky | SEPA |
| 71 | Micro- and Nanospace Explorations of Health and Disease | University of Southern Maine | Monroe Duboise | SEPA |
| 72 | Postively Aging: Maximizing the Healthspan | University of Texas Health Science Center San Antonio | Michael J Lichtenstein | SEPA |
| 73 | Project CRESST: Enhancing Clinical Research Education for Science Students and Teachers | Virginia Commonwealth University | Lisa Abrams | SEPA |
| 74 | Climate Change and Patterns of Vector-Borne Disease: Development of Translational Science Curricula | Yale Peabody Museum | Leonard E Munstermann | SEPA |

# **NIH SciEd 2014** Participants

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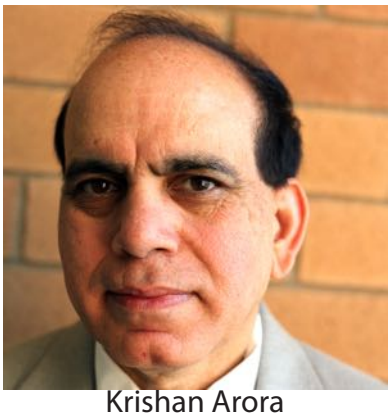

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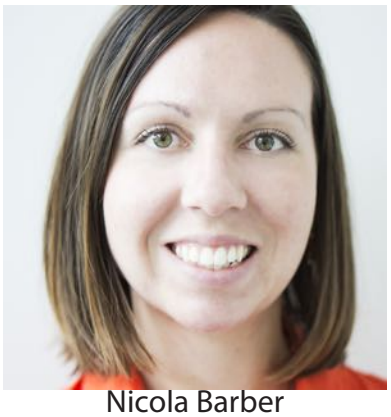

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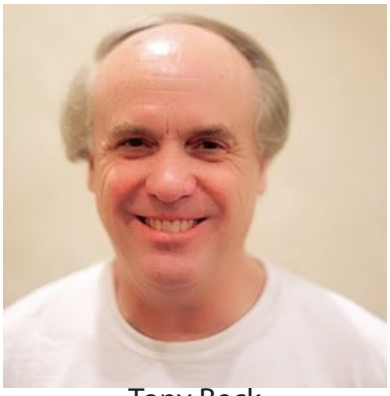

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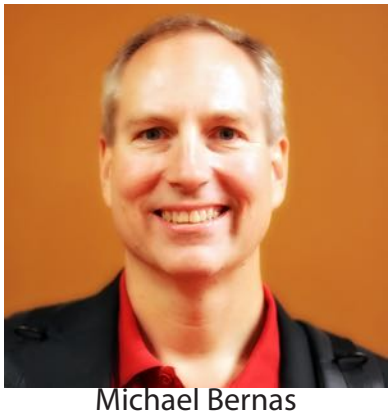

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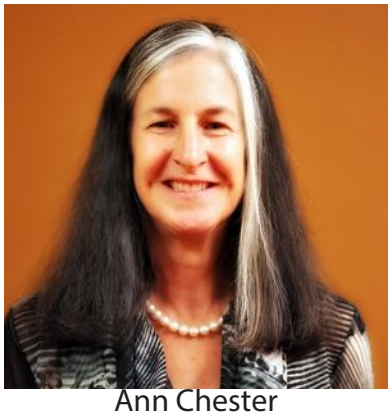

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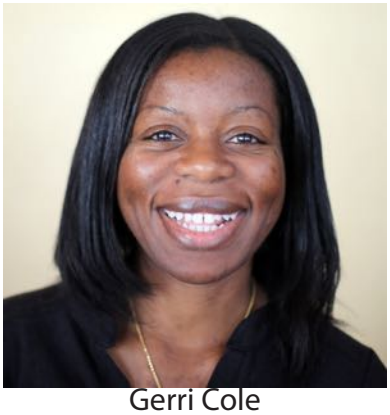
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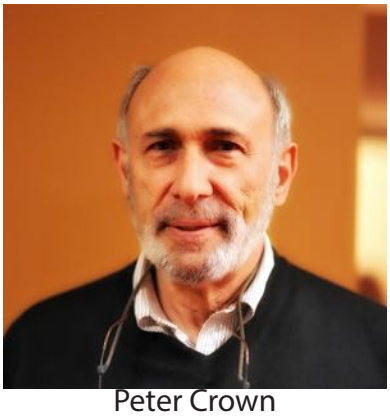
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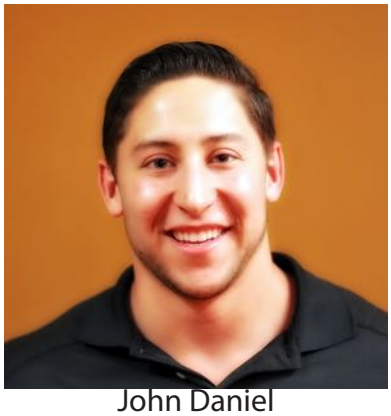
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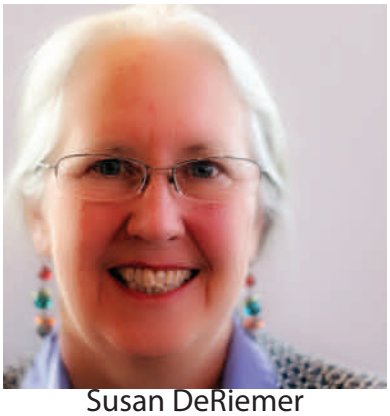

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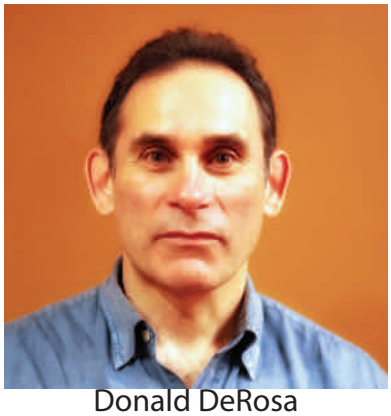

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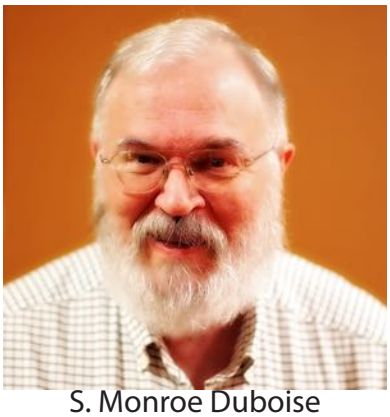

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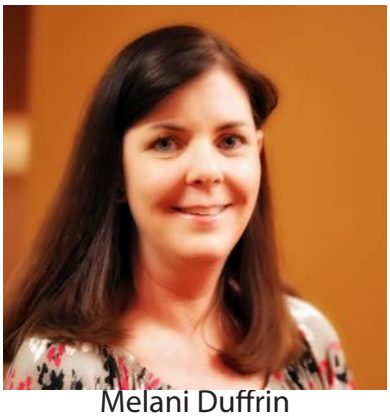

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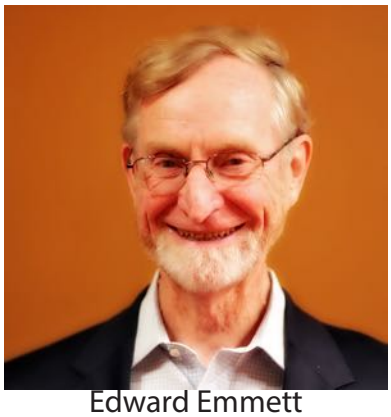

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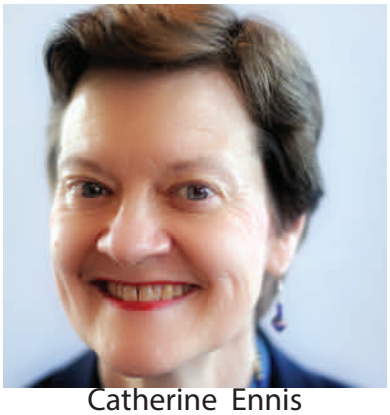

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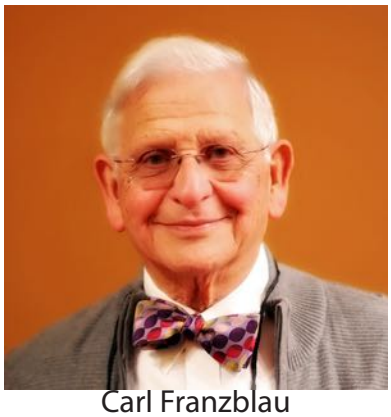

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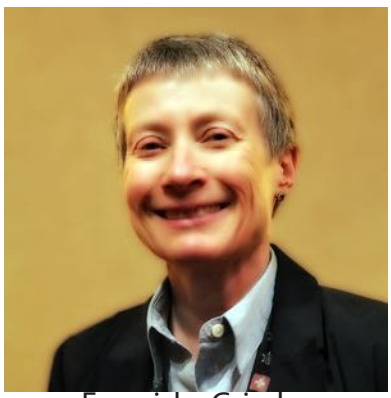

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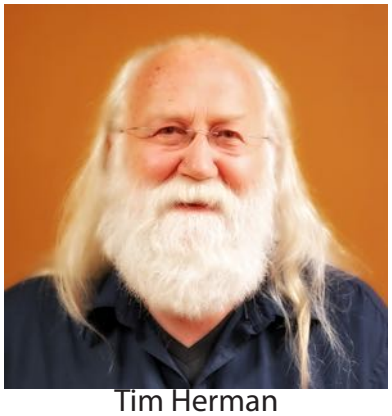

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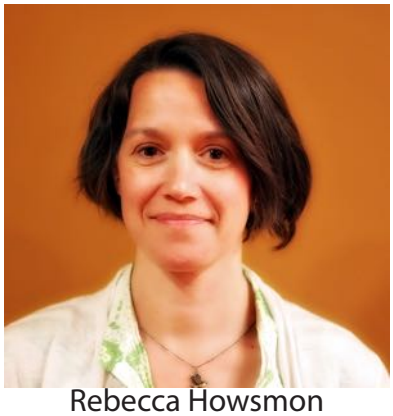

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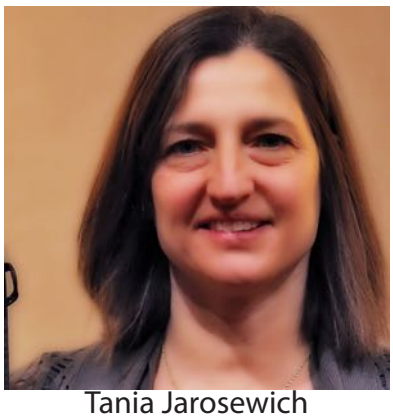

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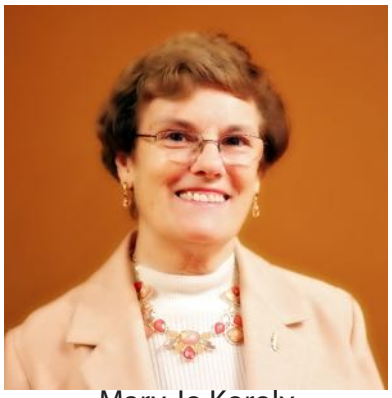
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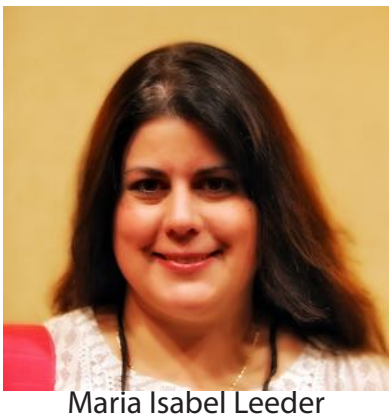
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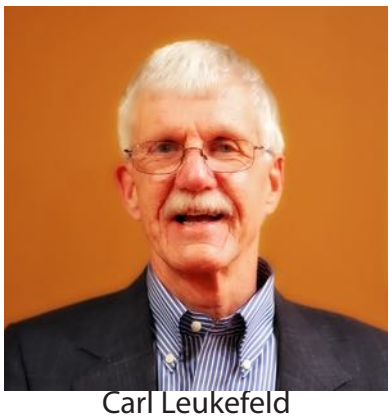
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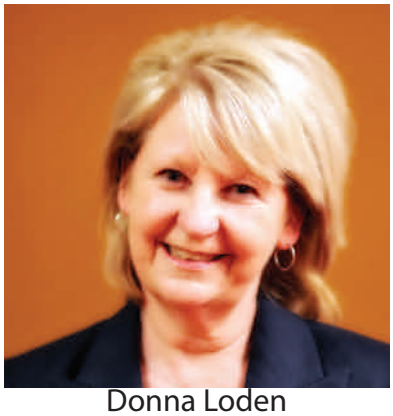

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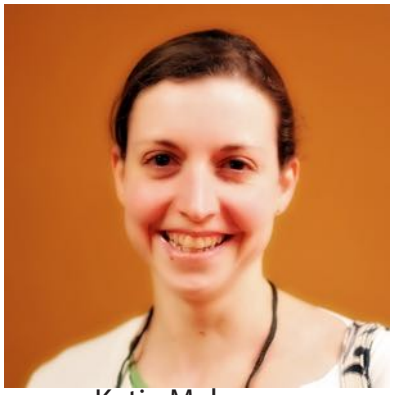
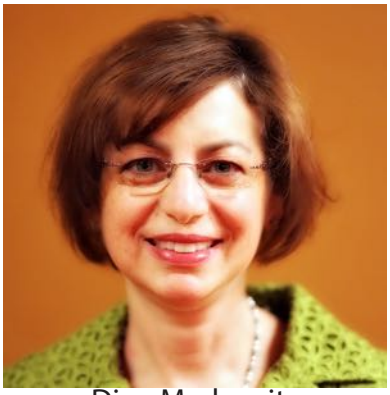


Katie Malanson
Tufts University School of Medicine



Dina Markowitz
University of Rochester

Lisa Marriott
Oregon Health & Science University

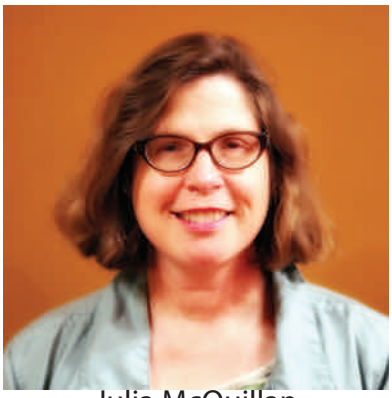
Laura Martin
Arizona Science Center

Camsie McAdams
US Department of Education

Ellen McCallie
National Science Foundation

Lisa McDonald

Kenneth McMartin
Louisiana State University Health Sciences Center Shreveport

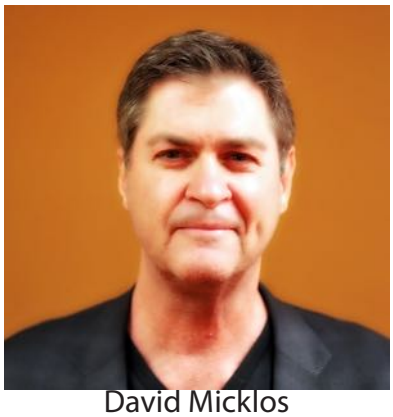


Julia McQuillan
University of Nebraska

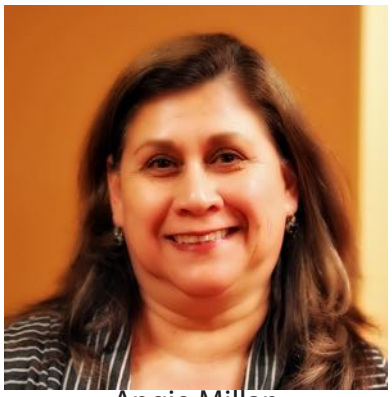
Tracey Meilander
Great Lakes Science Center

Karina Meiri
Tufts University School of Medicine

Carol Merchant
NIH/NCATS



David Micklos
Cold Spring Harbor Laboratory

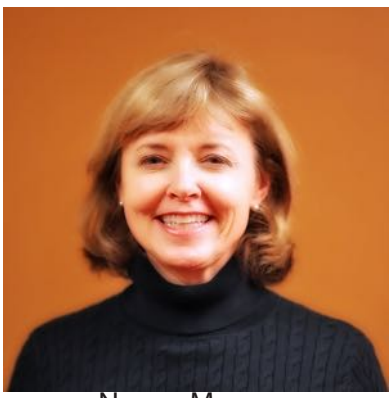


Angie Millan
National Association of Hispanic Nurses

Leslie Miller
Rice University

Marco Molinaro
University of California Davis

Megan Moor
Louisiana State University Health Sciences Center Shreveporte



Nancy Moreno
Baylor College of Medicine

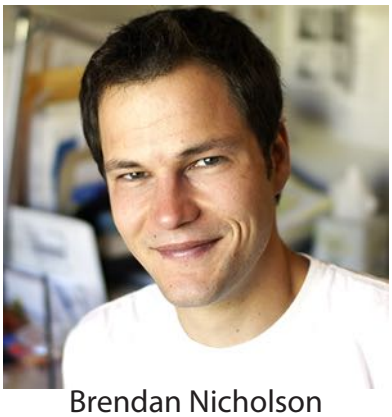
Kristen Morio
Ohio's Evaluation & Assessment Center

Karen Moulton
University of Southern Maine

Julia Mundy
Department of Education

Maureen Munn
University of Washington

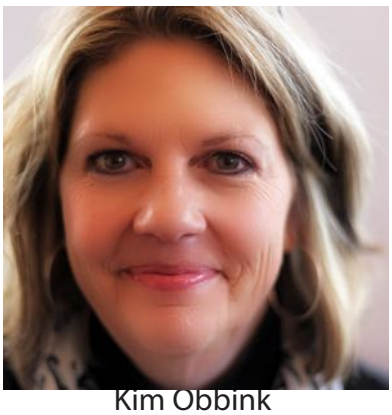
Leonard Munstermann
Yale University



Brendan Nicholson
University of Utah

Chase Norris
Arizona Science Center

Karen O'Hagan
Tufts University



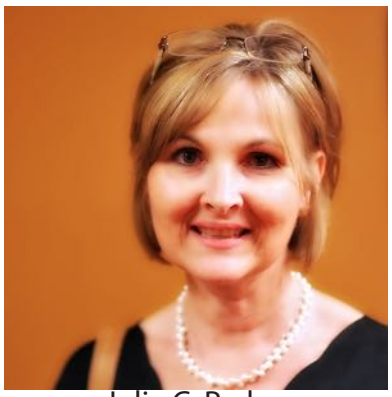
Kim Obbink
Montana State University

Yukari Okamoto
University of California, Santa Barbara

Mary Olson
Pacific Science Center

Alejandro Ortega
University of New Mexico

Patricia O'Connell Johnson

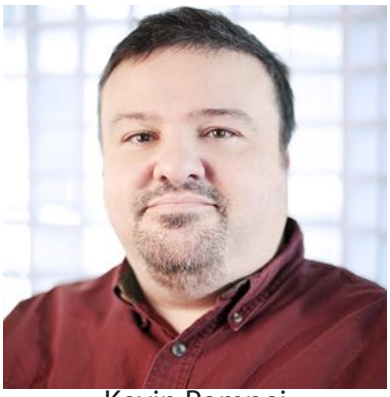


Julie C. Parker
Mississippi State University

Loran Parker
Purdue University

Marisa Pedulla
Montana Tech

Flavia Perea
Tufts University School of Medicine



Kathryn Peters
University of New Mexico

John Pollock
Duquesne University

Kevin Pompei
University of Utah

Darrell Porcello
University of California Berkeley

Joan Prival
National Science Foundation

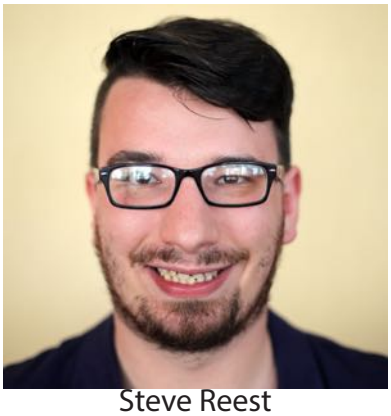
Jeffery Radsick
Duarte HIgh School

Gisele Ragusa
University of Southern California

Scott Rawl
Temple Universitys

Desislava Raytcheva
Tufts University School of Medicine

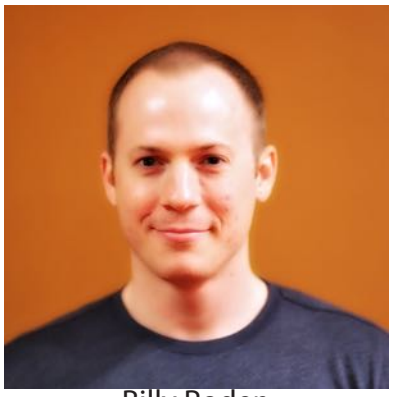
Chanda Reburiano
University of New Mexico/Jemez Mountain Schools



Steve Reest
University of Utah

Katura Reynolds
Oregon Museum of Science & Industry (OMSI)

Sally Roberts
Wayne State University



Billy Roden
Seattle Children's Research Institute

Chandan Morris Robbins
Georgia State University

Carla Romney
Boston University School of Medicine

Laura Romo
University of California, Santa Barbara

Robert Russell
National Science Foundation

Patrice Saab
University of Miami

Camellia Sanford
Rockman et al

Sandy SanMiguel
Purdue Veterinary Medicine

Linda Santschi
Coastal Marine Biolabs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Rochelle Schwartz-Bloom
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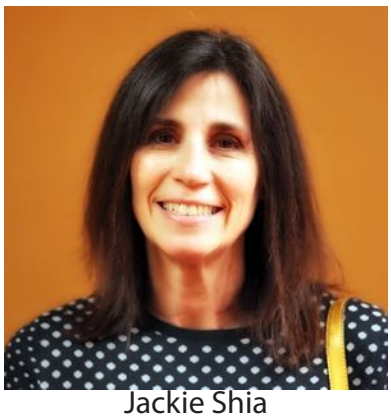
Monique Scott
American Museum of Natural History

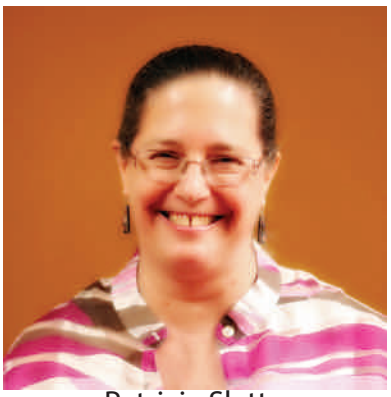

Meena Selvakumar
Pacific Science Center


Allison Sharai
Ochsner Clinic Foundation

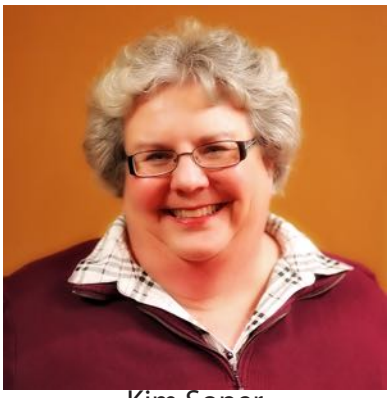

Virginia Shepherd
Vanderbilt University


Jackie Shia
Challenger Learning Center


Michele Shuster
New Mexico State University

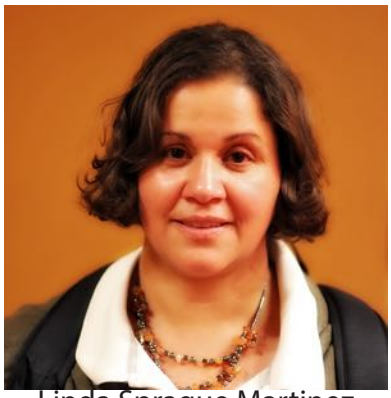

Patricia Slattu
Virginia Commonwealth University


Rebecca Smith
University of California San Francisco



Kim Soper
University of Nebraska Medical Center

Amy Spiegel
University of Nebraska-Lincoln



Linda Sprague Martinez
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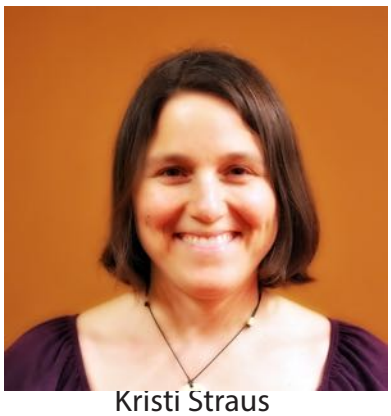
Louisa Stark
University of Utah

Matthew Steinwachs
University of California Davis

Shelley Stern
New Knowledge Organization

Merrily Sterns
American Museum of Natural History



Kristi Straus
University of Washington

Ravi Subramanian
Tufts University School of Medicine

Stephanie Tammen
Tufts University School of Medicine

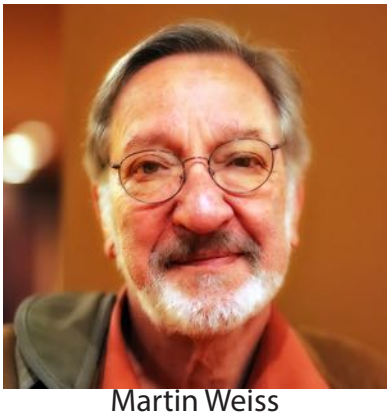
Dave Vannier
NIH

Michelle Ventura
Georgia State University

Katie Wallace
NASA

Tony Ward
University of Montana

Mathew Weaver
University of Utah



Martin Weiss
New York Hall of Science

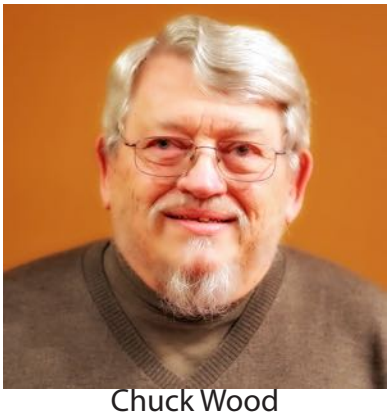
Kathie Williams
EdVenture Children's Museum

Jenny L. Williamson
University of Washington

Kelley Withy
University of Hawaii

Marlys Hearst Witte
University of Arizona

Trish Wonch Hill
University of Nebraska-Lincoln



Chuck Wood
Wheeling Jesuit

Eve Wurtele
Iowa State University

J. Michael Wyss
University of Alabama Birmingham

Denise Young
UNC Morehead Planetarium and Science Center

Debra Yourick
Walter Reed Army Institute of Research

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