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Overview

NIH SciEd 2013, held May 13-16, 2013 in Omaha, Nebraska, was the second 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)

The 194 conference participants included project PIs, staff and evaluators, teachers who participate in projects, NIH staff, and individuals interested in science education.

The theme of the conference was "Implementing the Framework for K-12 Science Education & the Next Generation Science Standards," which was addressed in plenary and breakout sessions. The Conference also provided opportunities for updates by NIH, NSF and US Department of Education staff, plenary presentations on topics of interest to science education partnership programs, discussions of evaluation methods and tools, regional meetings, networking, and an exchange of information among participating projects.

2013 Conference Organizing Committee:

Susanna Cunningham, University of Washington Judy Diamond, University of Nebraska Lincoln Maurice Godfrey, University of Nebraska Medical Center Susan Hills, University of Alaska Fairbanks Rabiah Mayas, Museum of Science and Industry Linda Pruski, University of Texas Health Science Center at San Antonio Louisa Stark, University of Utah Diane Adger-Johnson, NIH NIAID Science Education Program Officer Krishan Arora, NIH NIMHD Health Scientist Administrator L. Tony Beck, NIH SEPA Program Officer

Cathrine Sasek, NIH NIDA SEDAPA & NIH Blueprint for Neuroscience Program Officer

Conference Supported By

NIH OD ORIP SEPA Cooperative Agreement 8U13OD012222 Louisa A. Stark, PhD Principal Investigator

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.

The University of Nebraska Medical Center

The Munroe Meyer Institute of the University of Nebraska Medical Center

NIH SciEd 2013: Annual Conference for NIH Science Education Projects		
Implemen	the Next Generation Science Standards Hilton Omaha, Omaha, NE May 13-16, 2013	
All session	Schedule as meet in Grand Central Ballroom A-C (2nd level) unless otherwise noted	
Monday, May 13		
5:00 - 7:00pm	Conference Check-in - Registration Desk (near escalator on 2nd level) Reception - Prefunction Area, 2nd level Poster-Set-up	
Tuesday, May 14		
7:00-8:00am	Breakfast Poster set-up Late conference check-in – Registration Desk (near escalator on 2nd level)	
8:00-8:20am	Welcome Louisa A. Stark, PhD, Conference Organizing Committee Chair Director, Genetic Science Learning Center, University of Utah	
	Maurice Godfrey, PhD, Local Host Professor, Munroe-Meyer Institute, University of Nebraska Medical Center	
	H. Dele Davies, MD Vice Chancellor for Academic Affairs and Dean for Graduate Studies University of Nebraska Medical Center	
8:20-9:20am	Keynote Address: Considering Students' Interest and Engagement through a Framework for Examining Students' Learning Activity Preferences Robert H. Tai, EdD, Associate Professor, Curry School of Education, University of Virginia	
9:20-9:40am	Break	
9:40-10:00am	Proposed K-12 STEM Education Consolidation: National Institutes of Health Bruce Fuchs, PhD, Director, NIH Office of Science Education L.Tony Beck, PhD, NIH SEPA Program Officer	
10:00-10:20am	Proposed K-12 STEM Education Consolidation: Smithsonian Institution Claudine K. Brown, JD, Assistant Secretary for Education and Access, Smithsonian Institution (via conference call)	
10:20-10:40am	Proposed K-12 STEM Education Consolidation: National Science Foundation	

James H. Lightbourne, PhD, Director, Division of Graduate Education, National Science Foundation (via conference call)

10:40-11:00am Break

| |:00-| 2:00pm Keynote Address: Culturally Appropriate Science and Health Education Programs and Materials for Native American and Alaskan Native Students and Families

Cynthia A. Lindquist, PhD—also known as Ta'sunka Wicahpi Win (Star Horse Woman)—President, Cankdeska Cikana (Little Hoop) Community College

12:00-1:15pm Lunch

1:15-2:30pm Concurrent Breakout Sessions

Considering Students' Interest and Engagement through a Framework for Examining Students' Learning Activity Preferences: Follow-up Discussion

Strand: Curricula, Teachers and Students Washington City

Culturally Appropriate Science and Health Education Programs and Materials for Native American and Alaskan Native Students and Families: Follow-up Discussion

Strand: Underrepresented Populations *Hendon*

Evaluation Designs: When Is It Appropriate to Use Randomized Controlled Trials, Quasi-Experimental Designs, and Non-Comparison Designs?

Strand: Evaluation Ballroom D

Health Wise: Different Approaches to Presenting Health in Museum Settings

Strand: Informal Science Education St. Nicholas B

Legislative Education: Advice and Resources

Strand: Technology St. Nicholas A

Issues Specific to Digital Education Projects

Strand: Project Resources Ballroom E

2:30-2:45pm Break

- 2:45-3:00pm Update on the NIH Science Education Drug Abuse Partnership Award Program (SEDAPA) Cathrine Sasek, PhD, SEDAPA Program Officer (via conference call)
- 3:00-3:15pm Update on the NIH Science Education Partnership Award Program (SEPA) L. Tony Beck, PhD, NIH SEPA Program Officer

3:15-3:30pm	Break
3:30-4:45pm	Poster Session I – even-numbered posters
4:45-5:30pm	Break
5:30-10:30pm	Networking Reception, Dinner and American Indian Cultural Event Omaha's Henry Doorly Zoo & Aquarium, 3701 S. 10 th Street Co-hosted by the University of Nebraska Medical Center
5:30 –	First bus from Hilton Omaha to Zoo (continuous loop)
6:00-8:	30 – Reception and dinner in the Durham TreeTops Restaurant
6:00-8:	00 – Lied Jungle open
7:00-10	0:30 – Aquarium open
7:30-8:	30 – Pow-wow ceremony by the WO-XETE-HIRE (Ho Chunk word meaning "Loved by All") Dancers from the Winnebago Public School and St. Augustine School in Winnebago, NE
10:30 -	- Last bus from Zoo to Hilton Omaha
Wednesday, M	ay 15
7:00-8:00am	Breakfast
	New England Regional Science Education Partnership Strand: SciEd Working Groups and Regional Consortia Ballroom D
	The Mid-Atlantic Regional SEPA Consortium Strand: SciEd Working Groups and Regional Consortia <i>Ballroom E</i>
8:00-8:20am	Proposed K-12 STEM Education Consolidation: US Department of Education Camsie McAdams, MEd, Senior Advisor on STEM Education, US Department of Education, Office of Planning, Evaluation and Policy Development (via conference call)
8:20-9:20am	Keynote Address: The Next Generation Science Standards Stephen L. Pruitt, PhD, Vice President, Content, Research & Development, Achieve, Inc.
9:20-9:35am	Break
9:35-10:50am	Keynote Address: The NRC Framework: Implications for Instruction, Instructional Materials, and Professional Development Brett D. Moulding, Utah Partnership for Effective Science Teaching and Learning; National Academy of Sciences Board on Science Education; National Research Council

Committee on the Framework

10:50-11:00am Break

1:00-12:15pmConcurrent Breakout Sessions

Creation of a National Science Corps – a Nationwide STEM Partnership

Strand: Project Resources St. Nicholas A

Cross-Cutting Concepts in the Framework for K-12 Science Education and the NGSS

Strand: Curricula, Teachers & Students Ballroom D

Planning and Developing a Project Website: Tips and Lessons Learned

Strand: Technology Ballroom E

SEPA Programs in Informal Settings

Strand: Informal Science Education *Hendon*

Teaching Science to English Language Learner Populations

Strand: Underrepresented Populations Washington City

The Title I Phenomenon: Experimental Education Program Evaluation in the Face of Radical Disruptive Change

Strand: Evaluation St. Nicholas B

12:15-1:30am Lunch

1:30-2:45pm Concurrent Breakout Sessions

Assessment in Informal Summer Science Programs Strand: Evaluation St. Nicholas B

Diabetes, Obesity & Cardiovascular (DOC) Group: A Focused Group Discussion on Data-Driven Educational Programming

Strand: SciEd Working Groups & Regional Consortia *Hendon*

Program Management 101

Strand: Project Resources St. Nicholas A

1:30-2:45pm Concurrent Breakout Sessions Cont.

Scientific and Engineering Practices in the *Framework* and NGSS: Implications for Curricula, Teacher Professional Development, and Classroom Instruction

Strand: Curricula, Teachers & Students Ballroom D

Students Partnering with Scientists to Conduct Meaningful Community Research Education

Strand: Curricula, Teachers & Students Ballroom E

Using Twitter for Science Education

Strand: Technology Washington City

2:45-3:00pm Break

3:00-4:15pm Poster Session II – odd-numbered posters

4:15-5:45pm **Reception**

Projects share hands-on activities they have developed

Dinner on your own

Thursday, May 16

7:00-8:00am Breakfast

8:00-9:15am Concurrent Breakout Sessions

A Guide to an Inter-SEPA Collaboration: The Illinois-Nebraska Model

Strand: Project Resources St. Nicholas A

High School Public Health Advocacy Curriculum

Strand: Curricula, Teachers & Students Hendon

Linking Data from Multiple Sources to Assess the Impact of P-12 Curricula and Classroom Visits on Student Perceptions of Scientists, Attitudes Towards Science, and Content Knowledge Strand: Evaluation Ballroom D

Move it Online AND Keep the Quality: Replacing In-Person Workshops with Effective Online Professional Development Strand: Curricula, Teachers & Students Ballroom E

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

Strand: Project Resources Grand Central Ballroom A-C

Science Education Outreach and Native Communities: Winning Partnerships Strand: Underrepresented Populations St. Nicholas B

9:15-9:30am Break

9:30-10:45am Concurrent Breakout Sessions

Challenges and Opportunities in Evaluating Program Implementation Strand: Evaluation

Ballroom E

Inquiry-Based Learning Using Interactive Technology to Improve STEM Education

Strand:Technology Ballroom D

9:30-10:45am Concurrent Breakout Sessions Cont.

Health Academies: Bringing Health Education and Career Opportunities into the Secondary Classroom and Out Into the World

Strand: Curricula, Teachers & Students St. Nicholas A

Practice Makes Perfect: Modeling as an Authentic Practice of Science

Strand: Curricula, Teachers & Students St. Nicholas B

Teacher Bias and Expectations of ELL Populations

Strand: Underrepresented Populations *Hendon*

11:00-12:15pmLunch

NIH SciEd 2013 Breakout Session Descriptions

Breakout sessions are listed alphabetically by title in seven strands:

- Evaluation
- Curricula, Teachers & Students
- Informal Science Education
- Project Resources
- SciEd Working Groups & Regional Consortia
- Technology
- Underrepresented Populations

Evaluation

Assessment in Informal Summer Science Programs

Assessment is always controversial and never more so than in informal summer science programs. How is fun assessed? Is it important to know what the children have learned in one week? What kind of assessment can be used? These and your questions will discussed and modeled. Participants should bring assessments that have worked or other information to help others develop useful tools for their programs.

Presenter: Constance O'Brien, MS, University of Nebraska Omaha

Challenges and Opportunities in Evaluating Program Implementation

In this interactive session, we'll describe our experiences evaluating the implementation of the Genetic Science Learning Center's curriculum supplement modules, and give participants the chance to reflect on how they might study implementation in their own projects. The GSLC has ample web traffic evidence for the popularity of its activities. Once educators have visited Learn.Genetics and Teach.Genetics, however, which lessons do they choose to use in their classrooms and why? How do they adapt the activities for their particular students and settings? To answer these questions, external evaluator Rockman et al collaborated with the GSLC to administer online surveys about educators' implementation of materials from three content modules. Our session will first present what we did and learned along the way, then allow participants to define implementation for themselves (e.g., as quantities and/or qualities of program delivery) and consider how and why they might measure it using mixed methods.

Facilitators: Kristin M. Bass, PhD, Rockman et al Dina Drits-Esser, PhD, University of Utah

Evaluation Designs: When Is It Appropriate to Use Randomized Controlled Trials, Quasi-Experimental Designs, and Non-Comparison Designs?

In this interactive session, we will address issues commonly discussed among SciEd conference participants: When is it appropriate to use randomized controlled trials (RCTs) and quasi experimental designs (QEDs) versus other evaluation designs? What are the affordances of the different types of designs? We will discuss the many factors that come into play when deciding on the right evaluation design for your project. This session will include activities to: I) explore definitions of RCT and QED

studies, 2) determine the types of research and evaluation study goals and questions that meet the criteria for different types of rigorous designs, and 3) discuss your project's goals and appropriate design. This session will include presentations and opportunities for hands-on work.

Facilitators: Dina Drits-Esser, PhD, University of Utah Kristin M. Bass, PhD, Rockman et al

Linking Data from Multiple Sources to Assess the Impact of P-12 Curricula and Classroom Visits on Student Perceptions of Scientists, Attitudes Towards Science, and Content Knowledge

The Fat Dogs and Coughing Horses Team will share their approach to outcome and process evaluation of the impact of the implementation of P-12 curricula and classroom visits. The session will describe the program, logic model, assessment instruments and strategies, statistical tests for linking and analyzing data from multiple evaluation instruments, and how the evaluation results could inform program improvement. The assessment tools, aimed at assessing perceptions, attitudes, and knowledge of audiences from early elementary school students to high school students will be shared along with strengths and lessons learned. The session will include an activity where participants will work in groups to devise plans for examining the relationships among expected outcomes of their projects, and how the result might be useful in enhancing their understanding of their program's effectiveness. Participants are encouraged to bring their project's logic models and assessment tools to share and discuss among the group.

Facilitator: Sandra San Miguel, DVM, PhD, Purdue University College of Veterinary Medicine **Presenter:** Omolola Adedokun, PhD, Purdue University

The Title I Phenomenon: Experimental Education Program Evaluation in the Face of Radical Disruptive Change

Title I Schools present a unique set of challenges for health education research. Beyond home challenges, the high staff turn-over and overlapping short-term programs reduce the ability to attribute change to any specific experimental intervention. This session will present the external evaluation strategy for Being Me, a health curriculum aimed to support youth science learning in upper elementary Title I schools around Washington DC. The session will examine how assessment of long-term impacts of an NIH-SEPA project created by the Children's National Medical Center and National Children's Museum employed a culturally responsive evaluation frame to develop useful data to describe project outcomes. This interactive session will describe the use of informed observers, qualitative long-term comparison data in the face of nearly complete change within the schools, and the attempts made to structure flexible and internally referential assessment strategies in the face of radical and unanticipated change.

Facilitator and Presenter: John Fraser, PhD, New Knowledge Organization, Ltd.

See also:

- Diabetes, Obesity & Cardiovascular (DOC) Group: A Focused Group Discussion on Data-Driven Educational Programming [SciEd Working Groups & Regional Consortia]
- Health Academies: Bringing Health Education and Career Opportunities Into the Secondary Classroom and Out Into the World [Curricula, Teachers & Students]
- Move it Online AND Keep the Quality: Replacing In-Person Workshops with Effective Online Professional Development [Curricula, Teachers & Students]

Curricula, Teachers & Students

Considering Students' Interest and Engagement through a Framework for Examining Students' Learning Activity Preferences

This session will be a follow-up discussion with Robert Tai on topics related to his keynote address (presented before this session).

Discussant: Robert H. Tai, EdD, University of Virginia (plenary speaker)

Cross-Cutting Concepts in the Framework for K-12 Science Education and the NGSS

The performance expectations in the highly anticipated Next Generation Science Standards provide a clear and meaningful use of crosscutting concepts to develop meaning across all science disciplines. The NRC *Framework for K-12 Science Education* provides a clear and compelling argument for crosscutting science concepts and their role in the classroom. Understanding the nature of these concepts is an important tool for effective science instruction, curriculum development and teacher professional development.

Presenter: Brett D. Moulding, Utah Partnership for Effective Science Teaching and Learning; National Academy of Sciences Board on Science Education; National Research Council Committee on the *Framework* (plenary speaker)

Health Academies: Bringing Health Education and Career Opportunities Into the Secondary Classroom and Out Into the World

This session will describe the individualized model of Health Career Academies that Educational Service Unit 4 is currently carrying out in secondary, rural schools in Nebraska. Methods of introducing health/ science careers into the traditional secondary classroom curriculum will be highlighted. Evaluation methods will also be presented.

(Note: This breakout session will meet for the first half of the session.)

Presenter: Holly Carr, BS, Educational Service Unit 4, Nebraska

High School Public Health Advocacy Curriculum

Traditional health education focuses on individual behavior choices. In contrast, this innovative, 10-lesson Public Health Advocacy Curriculum utilizes classroom-based activities and community-based projects to 1) teach students how their surroundings affect their health, and 2) engage students in efforts to address the goods, services, resources, and policies that impact their health. In this session we will review Curriculum content, describe how lessons have been implemented, discuss current dissemination strategies, and brainstorm how SMYSP and attendees can promote public health in K-12 education.

Presenter: Nell Curran, MPH, Stanford University

Move it Online AND Keep the Quality: Replacing In-Person Workshops with Effective Online Professional Development

Online platforms (e.g., Googledocs, Blackboard) promote discussions and collaboration. Using them allows 1) participation by many teachers at a fraction of the cost of in-person workshops and 2) asynchronous discussions that fit busy professionals' schedules. But can they provide rich and engaging discussion like live workshops? Can online collaborations produce work that meets the standards of in-person professional development (PD) programs? The American Physiological Society (APS) Frontiers in Physiology Program is a nationwide summer research experience and PD program, engaging MS/HS teachers from 15-25 states annually. APS used a quasi-experimental design with matched samples of Frontiers teachers to determine the effectiveness of structuring online conversations and whether online collaborations could produce materials of similar quality to those generated at in-person workshops. Results indicate that, with appropriate structuring, online discussions and collaborations can be fully effective and can be used to engage teachers who are geographically dispersed in productive PD.

Presenters: Margaret E. Shain, MS, American Physiological Society Tonya F. Smith, MS, Richland School District One, Columbia, SC Robert Manriquez, MS, Stanley High School, Logansport, LA

Practice Makes Perfect: Modeling as an Authentic Practice of Science

The 2012 Framework for the new K-12 Science Standards emphasize "models and modeling" as an important practice of science. Join us in this hands-on exploration of how students can be introduced to the invisible molecular world through modeling. We will explore a Mystery Tube, understand Why Ice Floats and learn How to Fold a Protein – all while using hands-on models of molecular structures.

Presenters: Tim Herman, PhD, Milwaukee School of Engineering Shannon Colton, Milwaukee School of Engineering

Scientific and Engineering Practices in the *Framework* and NGSS: Implications for Curricula, Teacher Professional Development, and Classroom Instruction

The scientific and engineering practices described in the NRC Framework for K-12 Science Education provide a clear picture of how students use science to make sense of novel phenomena. These practices and their role in the classroom are an important dimension of the vision described in the Framework and NGSS. This session will engage participants in a hands-on example, using this as a springboard for a discussion of ways professional development and instructional resources can support classroom instruction consistent with the Framework and NGSS.

Presenter: Brett D. Moulding (plenary speaker), Utah Partnership for Effective Science Teaching and Learning; National Academy of Sciences Board on Science Education; National Research Council Committee on the *Framework*

Students Partnering with Scientists to Conduct Meaningful Community Research Learn how to Educate, Engage, Empower Students, Communities and Scientists to conduct community research. Leave with a blueprint of how to initiate your own project. See also:

- Challenges and Opportunities in Evaluating Program Implementation [Evaluation]
- Inquiry-Based Learning Using Interactive Technology to Improve STEM Education [Technology]
- Teacher Bias and Expectations of ELL Populations [Underrepresented Populations]
- **Teaching Science to English Language Learner Populations** [Underrepresented Populations]

Informal Science Education

Health Wise: Different Approaches to Presenting Health in Museum Settings

Health care is expensive and complex, and there are many competing interests requiring all of us to make challenging decisions and take an active role in advocating for ourselves. Making effective health care choices requires that we have the science literacy and critical thinking skills necessary to understand and evaluate evidence and choices presented. Exhibitions on health can play a role in increasing "health literacy". The presenters will discuss the questions they attempted to answer with their approaches to engaging visitors to science museums in understanding health. The questions and the program solutions will form the basis of a vigorous discussion with the audience about different approaches to engaging visitors about health issues. We will present on: the human body as an ecosystem especially how our bacterial symbionts have major effects on our health; how an understanding of evolution can bring new insights into our health by focusing on proximal and ultimate causation; conversation induces, via a collection of Questionable Medical Devices, a conversation about making informed health decisions: exploring in a lab setting the chemistry and biology of medicines which are ever increasing a major component of health care. In addition, we will describe exploring health, in a lab setting.

Facilitator/Presenter: Martin Weiss, PhD, New York Hall of Science Presenters: Laurie A. K. Fink, PhD, Science Museum of Minnesota Victoria Coats, Oregon Museum of Science and Industry Nicole Cartwright Kwiek, PhD, Center of Science and Industry

SEPA Programs in Informal Settings

A discussion of issues of common interest among science museums and other non-academic environments. Examples may include: collaborative activity, training, sharing materials, and how to relate to the discussion of standards.

Facilitator: Laura Martin, PhD, Arizona Science Center

See also:

Assessment in Informal Summer Science Programs [Evaluation]

Project Resources

A Guide to an Inter-SEPA Collaboration: The Illinois-Nebraska Model

In this session, presenters will share their experiences in planning, developing, and implementing programs through a partnership between two SEPA programs. They will describe how both programs can expand their impact by using synergistic activities. In addition, practical and logistical issues will be discussed. Successes and challenges will be shared with the wider SEPA community.

Presenters: Chandana Jasti, MS, University of Illinois Liliana Bronner, MHSA, University of Nebraska Medical Center

Creation of a National Science Corps – a Nationwide STEM Partnership

This session will explore the creation of a national Science Corps as a nationwide STEM partnership.We envision organizing the Science Corps as similar to the Peace Corps, but dedicated to science education throughout the United States. This session will explore interest in launching a Science Corps and attendant issues such as funding sources, shared expertise, focus on students and teachers, and recruitment of staff. The session will also include a discussion of the need for a national Science Corps, the use of mobile and lending labs, universities, museums, industry partners as collaborators, and evaluation of the impact/effectiveness of such a program. This will be a brainstorming session to assess feasibility of this idea.

We will propose one possible scenario. We would urge others to bring forth their ideas at the session. If there is interest we would organize into a virtual committee

- Exploring organizational structure
- Funding and Support Opportunities
- Create a Lobbying Force

 Facilitators: Carla Romney, DSc, Boston University School of Medicine Don DeRosa, EdD, Boston University School of Medicine
 Presenter: Carl Franzblau, PhD, Boston University School of Medicine

Legislative Education: Advice and Resources

Do you want to reach out to your legislators to educate them about the importance of science and health education for ensuring a trained workforce and science- and health-literate citizenry? For addressing health disparities and encouraging healthful behavior? This session will offer advice and resources for getting to know your legislator and his/her staff, planning and carrying out a meeting, and following up.

Presenter: Erin Dolan, PhD, University of Georgia

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, and Innovative Technology Experiences for Students and

Teachers (ITEST). The session will include an overview of project planning priorities, NSF grant submission requirements, and practical guidelines for developing competitive proposals.

Presenter: Robert L. Russell, PhD, National Science Foundation

Program Management 101

This session will be a chance for program managers of various projects to discuss successful and not-so successful efforts to keep a project moving forward. Particular attention will be given to first and second year projects to ensure that those project managers get off to a good start. A significant amount of time will be dedicated to questions/answers from participants.

Facilitator: Adam Hott, EdD, HudsonAlpha Institute for Biotechnology

See also:

- Planning and Developing a Project Website: Tips and Lessons Learned [Technology]
- Using Twitter for Science Education [Technology]

SciEd Working Groups and Regional Consortia

Diabetes, Obesity & Cardiovascular (DOC) Group: A Focused Group Discussion on Data-Driven Educational Programming

DOC Group members will engage in facilitated group discussion on the importance of data-driven educational programming. Members will explore how methods and measures currently being utilized in or considered for individual projects can be optimized. Information from DOC Group members will be synthesized to inform the possibility of a coordinated data collection and analysis among multiple programs.

Facilitators: Melani Duffrin, PhD, East Carolina University Sebastian Diaz, PhD, Diaz Consulting Virginia Carraway-Stage, PhD, East Carolina University

New England Regional Science Education Partnership

This session will bring together representatives from projects that serve the 6 New England states to explore collaborations that may lead to future grant submission.

Facilitator: Carla Romney, DSc, Boston University School of Medicine

The Mid-Atlantic Regional SEPA Consortium

MAR-SEPA has been in existence for over two years, and has made steady progress in building its collaborations and partnerships. The group is embarking upon new funding opportunities, and a discussion of how to continue to develop and attract extramural funds is the theme of the breakout session (see http://marsepa.org/). A recent draft proposal, related to the development of a regional

teacher professional development thrust, will also be broached in order to determine its leveraging merit. The current status of CTSAs and SEPAs will round out the discussion.

Facilitator: Michael Chorney, PhD, Pennsylvania State College of Medicine

Technology

Inquiry-Based Learning Using Interactive Technology to Improve STEM Education

This breakout session will allow collaborators to discuss STEM applications and science pedagogy both in the classroom and during after school time activities targeting students from K-12 and beyond into an undergraduate and graduate settings. The facilitators for this session are UNO faculty mentoring undergraduate and graduate students. Furthermore, the facilitators of this session have studied the affects of this teaching style on student understanding and long-term retention. We will touch on the use of nascent technologies and modeling to simulate biological and other STEM concepts (E.g. the life cycle of malaria, infection by influenza, and movement of bacteria).

Facilitators and Presenters:

Christine E. Cutucache, PhD, University of Nebraska at Omaha (Biology) Tomas Helikar, PhD, University of Nebraska at Omaha (Mathematics)

Presenters:

Mark A. Pauley, PhD, University of Nebraska at Omaha (Interdisciplinary Informatics) Neal Grandgenett, PhD, University of Nebraska at Omaha (STEM and Math Education) Elliott Ostler, EdD, University of Nebraska at Omaha (Teacher Education)

Issues Specific to Digital Education Projects

This session will focus on the variety of unique issues those creating digital education products face. From finding the right programmer to finding pilot educators, digital education projects face a specific set of challenges to successfully implement. We will share as a group issues we have faced, how we have or are currently addressing those issues and work together to build a cohort of NIH SciEd grantees that can continue to work together when future issues arise. The session format will be an open forum to share current issues and gain from other's experiences in addressing them.

Facilitator: Adam Hott, EdD, HudsonAlpha Institute for Biotechnology

Planning and Developing a Project Website: Tips and Lessons Learned

Representatives of several successful SEPA-funded websites will discuss how to plan and begin a project website or expand an existing site. Making your site search-engine friendly, integrating with social media, adding low-cost video solutions, and managing content are some of the topics that will be explored in this informal session. Bring your questions and ideas to share with your colleagues. Participants will learn strategies for planning and organizing content for the web, tips on website design and navigation, and low-cost ways to publicize and disseminate projects on the Web.

Facilitator: Nancy Moreno, PhD, Baylor College of Medicine
 Panelists: Eric Chudler, PhD, University of Washington
 Nancy Place, MS, University of Texas Health Science Center at San Antonio
 Kevin Pompei, MEd, University of Utah

Using Twitter for Science Education

Have you perhaps set up a Twitter account but never really used it? Do you feel that just keeping up with Facebook is overwhelming enough? Are you curious about Twitter but have never had the chance to check it out? In this interactive introductory session, we'll talk about how this powerful social media tool can be used in science education contexts. This session is aimed at beginners or those relatively new to Twitter, but if you are experienced and want to lend a hand, we would welcome your perspective. Bring your computer (preferred) or smartphone.

We will:

- Set up an account, bio, and photo and build your Twitter identity
- Discuss Direct Messaging, Retweeting, #, and @ symbols
- Follow people and be followed by others
- Discuss the many uses of Twitter, including those related to communicating pressing issues in health/biomedical education

Facilitator: Jeanne Ting Chowning, MS, Northwest Association for Biomedical Research

See also:

Move it Online AND Keep the Quality: Replacing In-Person Workshops with Effective Online Professional Development [Curricula, Teachers & Students]

Underrepresented Populations

Culturally Appropriate Science and Health Education Programs and Materials for Native American and Alaskan Native Students and Families

This session will be a follow-up discussion with Cynthia Lindquist on topics related to her keynote address (presented before this session).

Discussant: Cynthia A. Lindquist, PhD, Cankdeska Cikana (Little Hoop) Community College

Science Education Outreach and Native Communities: Winning Partnerships

To address chronic underrepresentation of Native American/Alaska Native/Pacific Islander populations in biomedical professions, the NIH has encouraged science education partnerships between education outreach and Native communities. Despite this priority, few in-house resources are available to guide Native community and educator efforts to meet community needs and to increase representation of indigenous populations in biomedical professions. This session is part of a supplemental grant examining past and current NIH-supported programs to identify successful partnership and community engagement strategies. Case studies will provide examples of how engagement approaches may vary based on project objectives.

Facilitator: Paul Cotter, PhD, Cotter and Noson Consulting Services, LLC

Teacher Bias and Expectations of ELL Populations

This session will discuss how teacher attitudes and beliefs about ELLs influence their teaching styles in the science classroom. We will present data from our 5-year study, and discuss the relevancy of providing culturally relevant professional development for science teachers.

Presenters: Adela de la Torre, PhD, University of California Davis Rosa D. Manzo, BA, University of California Davis Rosa Gomez-Camacho, MA, University of California Davis Linda Whent PhD, University of California Davis Annie BichLoan Duong, EdD, San Joaquin COE

Teaching Science to English Language Learner Populations

This session will focus on the use of culturally nuanced pedagogical strategies for science teachers of ELL populations. We will discuss the utility of implementing the 5Es model in the science classroom.

Presenters: Adela de la Torre, PhD, University of California Davis Rosa D. Manzo, BA, University of California Davis Rosa Gomez-Camacho, MA, University of California Davis Linda Whent PhD, University of California Davis Annie BichLoan Duong, EdD, San Joaquin COE

Tuesday, May 14, 8:20-9:20am Considering Students' Interest and Engagement through a Framework for Examining Students' Learning Activity

Presenter: Robert H. Tai, EdD, Associate Professor, Curry School of Education, University of Virginia **Reporter:** Steve Reest, University of Utah

Robert Tai began his presentation with the question "Does early interest influence later life interest with high school students?" An analysis of longitudinal data for 300 students spanning 12 years from ages 14 - 26 suggests that 8th graders with an interest in science are 2-3 times more likely to earn degrees in STEM-related disciplines that those who do not report a similar early interest.

When do scientists and graduate students say they first became interested in science? A study showed:

Grades K-8: 70% of scientists and 69% of graduate students

Grades 9-12: 24% of both scientists and graduate students

College: 6% of scientists and 7% of graduate students

When do scientists and graduate students say they first became interested in their career discipline of chemistry/ physics? A study showed:

Grades K-8: 29% of scientists and 23% of graduate students Grades 9-12: 52% of scientists and 56% of graduate students College: 18% of scientists and 21% of graduate students

Interest appears to play an important role in student engagement in a science subject areas.

How might we conceptualize the development of interest?

Hidi, S. & Renninger, K.A. (2206) The Four-Phase model of interest development: Triggered situational interest

Maintained situational interest

Emerging individual interest

Well-developed individual interest

FOCIS (Framework for Observing Children's Interactions with Science) is a typology of learning activities. Originally developed for K-12 learning environments, there are some applications for instruction in high education.

Collaborating Creating/Making Caretaking Teaching Performing Discovering Competing

Robert Tai ended his presentation by showing data about students' decreasing interest in science from lower to higher grades.

Tuesday, May 14, 11:00-12:00pm

Culturally Appropriate Science and Health Education Programs and Materials for Native American and Alaskan Native Students and Families

Presenter: Cynthia A. Lindquist, PhD—also known as Ta'sunka Wicahpi Win (Star Horse Woman) **Reporter:** Susanna Cunningham, University of Washington.

The theme of Dr. Lindquist's presentation was "Nothing about us without us." She began by briefly reviewing the history of how Native Americans have not been involved in decisions that have been made about them. Dr. Lindquist pointed out the similarities between what she termed "Indian Country" had experienced and what NIH science education was currently experiencing in relation to funding decisions. Her view is that no policy should be decided without the full and direct participation of members of the affected group.

Dr. Lindquist went on to discuss the health disparities experienced by American Indians and Alaskan Natives and listed three reasons for them: social status, barriers to access, and history. She pointed out that it is only very recently that American Indians have embraced education as a good thing. She asked the audience if they were aware of the Cobell Settlement – and few were. There is more information about the settlement at: http://www.indiantrust.com/

Dr. Lindquist discussed the importance of avoiding stereotypes. She went on to explain that indigenous knowledge is rooted in oral traditions and stories and traditional values including:

- Extended family
- * Collective well-being
- * Mutual understanding, equality
- * Respect, truth, honesty, humility
- * Humor, gratitude
- * Attention to the day, seasons
- * Harmony, balance, spirituality
- * Connection to the land

Educators interested in working with Native Americans need to involve them from the beginning of a project – NOT after the grant is written. She emphasized that building Native Research Capacity is a priority and involving one of the 37 tribal colleges and universities is strongly encouraged.

Dr. Lindquist finished her presentation by discussing factors that contribute to cultural competence. These factors include:

- * Be open-minded,
- * Understanding occurs through direct interaction
- * A sense of humor
- * LISTEN and be patient
- * Flexibility and adaptability
- * Communication skills.

References:

- * www.aihec.org
- * www.ihs.gov
- * www.dpi.state.nd.us/
- * www.ncaiprc.org/research-curriculum-guide



Considering Students' Interest and Engagement through a Framework for Examining Students' Learning Activity: Follow-up Discussion

Presenter: Robert H. Tai, EdD, Associate Professor, Curry School of Education, University of Virginia **Reporter:** Steve Reest, University of Utah

Robert Tai continued his presentation from his plenary talk, discussing the 7 FOCIS topics and furthering explaining them.

- Collaborating
 - Larger proportion of males than females have a strong preference
 - Closely aligned across all grades
- Competing
 - For males, younger children appear to be more bimodal in preference with older children reporting strong preference
 - For females, the distribution appears flat across all grades
- Creating/Making
 - · For younger children, strong preference for both females and males
 - Weaker preferences among older children
 - Stronger preferences among older males than females
- Discovering
 - Males appear to have strong positive preferences across age groups
 - Younger females have strong positive preferences while older females report neutral-positive preferences
- Perform
 - Among both males and females, preferences appear to be fairly evenly distributed across the range from negative to positive
- Caretaking
 - Stronger among females than males
 - More positive preferences among younger children for both
- Teaching
 - Stronger among females than males
 - More positive preferences among younger children for both

Robert Tai finished the session with a Question and Answer discussion.



Tuesday, May 14, 1:15-2:30pm Culturally Appropriate Science and Health Education Programs and Materials for Native American and Alaskan Native Students and Families: Follow-up Discussion

Presenter: Cynthia A. Lindquist, PhD—also known as Ta'sunka Wicahpi Win (Star Horse Woman) **Reporter:** Molly Stuhlsatz, BSCS

In this session we started by discussing the history of the Native American (NA) boarding schools in American history. The history of the boarding school lives on today and can be a hurdle in gaining the trust of community members. Many parents and grandparents have clear memories of the attempts to assimilate children into the dominant culture (schooling and otherwise). Lindquist emphasized the importance of collaboration when considering partnering with NA schools, and discussed the opportunities for including tribal colleges in new projects. Tribal colleges are "shovel ready" because there isn't as much bureaucracy. They can jump start things very quickly and get things up and running very fast. When the community is involved and we bring it forward as a community-based development, that's a huge advantage. Lindquist also encouraged thinking about middle-school students as a target population for new programs.

Linquist emphasized that mainstream institutions (4-year universities) need to better understand the challenges from a cultural perspective as far as getting students to make the leap from tribal college to 4-year programs. Highlighting role models for students that have had similar experiences and now have careers in health/science fields is essential to helping kids see themselves in health/science school/career later in life. The role model posters developed by the UNMC SEPA project have helped to break the stereotypes with the non-native populations, as well. It's not just motivating for the NA kids; it helps people view NA people in new ways. Additionally, school leadership is important and it varies tremendously from school to school. Some know how to leverage resources, and some do not. Informing and educating the legislature both locally and nationally is very important.

We need to tout NIH science education programs as one of the best examples of programs that provide for the public good. We can take NIH SciEd materials and programs and adapt them to be more Navajo or Dakota. We need to let people know that there are great resources that can be used across many cultures. If SEPA goes away, this is STOPPING THE PIPELINE! There are already so few programs keeping students in the health/science pipeline now.

Projects should be mutually beneficial to the communities and the universities that are partnering. There is a need to be upfront about the length of grant time. If funding is only for a one-time thing, think "what can we learn?" When you are invited in, help create a sustainable relationship. So many things end when the funding ends. Sustainability of these projects is essential to making a lasting impression on NA communities. If a program is in the community for a short time, it feels very typical of past government interventions and causes further distrust within the communities. It takes a much longer time to build up that trust when it is lost.

Participants:

Judy Diamond-University of Nebraska State Museum Molly Stuhlsatz-BSCS Tony Beck-NIH SEPA Maureen Munn-University of Washington Jill Martz-Montana State University Kim Obbink-Montana State University Berri Jacque-Tufts University Boston Lawrence Spezzano-Tufts University of Boston Rosa D. Manzo - University of California, Davis

Michelle Verrochi-University of Nebraska Medical Center Carol Rempp-Nebraska Department of Education Adela de la Torre-University of California, Davis Paul Cotter-University of Alaska Fairbanks Kelley Withy-University of Hawaii at Manoa

Evaluation Designs: When Is It Appropriate To Use Randomized Controlled Trials, Quasi-Experimental Designs and Non-Comparison

Designs Presenters:

Dina Drits-Esser, University of Utah Kristin Bass, Rockman et al **Reporter:** Christine Cutucache, University of Nebraska at Omaha

This group began with defining randomized controlled trials (RCT) & Quasi-experimental designs (QED). Next, the group was asked a research question & asked whether RCT or QED would be a better approach. These points were discussed and the strengths & weaknesses of each approach were described. Small group break out sessions addressed the following:

What are your research projects, questions, and methods of assessments? Did you use RCT or QED? What challenges have you run into with these types of research? How do you get around challenges?

This session was very effective to help with experimental design and networking for researchers working in similar areas.

Participants:

Julia McQuillan-University of Nebraska-Lincoln Marco Molinaro-University of California, Davis Adela de la Torre-University of California, Davis Rosa Gomez-Camacho-University of California, Davis Laurie Collins-Seattle Children's Research Craig Berg-University of Wisconsin-Wilwaukee Jackilen Shannon-Oregon Health and Science University Tania Jarosewich-Censeo Group Paul Guerin-University of New Mexico Health Sciences Center Paul Cotter-University of Alaska Fairbanks Michael Lichtenstein-University of Texas Health Science Center San Antonio Abigail Heithoff-University of Nebraska-Lincoln

Health Wise: Different Approaches to Presenting Health in Museum Settings

Presenters:

Laurie Fink, Science Museum of Minnesota Victoria Coats, Oregon Museum of Sciences and Industry **Reporter:** Christine Cutucache, University of Nebraska at Omaha

Three projects were presented; each in a different stage of development but all employing a certain amount of coupling that which is exotic or popular with that which is misunderstood and fundamental to science.

Laurie Fink, from the Science Museum of Minnesota, presented an early-stage project in its first year. An advisory team is developing a traveling exhibition, website, outreach, actor led demonstration, and impact study aimed at middle school and older guests. Guests will weigh evidence to make informed healthcare decisions using an exhibit inherited from the Museum of Questionable Medical Devices coupled with contemporary counterparts.

The team will recreate a sense of context and rationale of the time periods when each device was conceived and collaborate with Health News Review to create a checklist for guests to use in the decision making process. Experience will be layered with opportunities to reflect and vote and address contradictions that arise in science. The team is currently deciding between three organizing principles 1) placing visitors within decision scenarios (pharmacy, kitchen, hospital room) and presenting risks and benefits using videos, quiz show format, match & sort activities; 2) questioning treatments in the context of juxtaposed historical and modern invisible forces: potions and pills, moods and minds, etc.; and 3) creating a gallery of symptoms and treatments grouped by disease and complexity.

Vicky Coats, from the Oregon Museum of Science and Industry, presented a bilingual traveling exhibit and associated programming, called The Zoo in You, currently in year three of development. OMSI, in collaboration with the J. Craig Venter Institute, will present humans as interdependent, multi-species colonies. Health will be considered from this new perspective of nurturing and partnering with microbes, most of which are beneficial, instead of destroying them. OMSI has established relations with an enthusiastic partner in the field that also prioritizes outreach. JCVI reviews materials and suggests important stories to incorporate. The challenge is the field is so new that the basis for translation has not yet been established. Together, they are working toward an engaging, evidence-based experience to change our health paradigm.

Martin Weiss, of the New York Hall of Science, presented his traveling exhibit in its final year of development. A strong narrative runs through the exhibit that links health and evolution by demonstrating that health is dependent on a combination of ancestry and immediate interactions with the environment. Formative evaluation revealed that guests aren't interested in evolution but they are very interested in applied health topics. So, the two were coupled. For example, back and knee pain is coupled to postural evolution, obesity is linked to metabolic properties inherited from our hunting and gathering ancestors. Guest experiences mostly take the form of scenarios with choices for which they receive feedback. They can trace their own ancestries and learn why certain related health profiles exist today. Fabrication is almost complete. Summative evaluation and research project to be completed this summer to determine if visitors gain a better understanding of evolution when it is presented through the lens of health as compared to purely health- or evolution-based experiences.

Other members of the group have employed the following guiding principles to present content in an engaging way: evidence-based research, presenting the heterogeneity of people and contexts to the public, choosing translatable, age appropriate NIH roadmap items not currently covered in school, and providing opportunities for people to reflect on personal health. Research has shown that people prefer an exhibit as an entry point to programming.

Participants:

Michael Fenzel-Montshire Museum of Science Laura Martin-Arizona Science Center Sarah Sanders-University of New Mexico Health Sciences Center Tracey Meilander-Great Lakes Science Center Nicola Barber-University of Utah **Carole Flores**-Arizona Science Center Laurie Fink-Science Museum of Minnesota Victoria Coats-Oregon Museum of Science and Industry Sherry Hsi-Lawrence Hall of Science Lisa Jacobs-University of Pennsylvania Monique Scott-American Museum of National History Lindsey Travis-Museum of Science and Industry, Chicago Donna Loden-Mississippi State University Charles Carlson-Exploratorium Carl Franzblau-Boston University School of Medicine Adrian Zongrone-Edventure Children's Museum

Legislative Education: Advice and Resources

Presenters: Erin Dolan, University of Georgia **Reporter:** Katherine Nielsen, University of California, San Francisco

This session's objectives included helping participants learn how to:

- Find information about their legislators in order to have an informed conversation with them
- Identify allies and advisors who can help in legislative education efforts
- Generate a one-page description of the importance and impact of SEPA and a site's particular program for a legislative audience
- Request, plan, and implement a meeting with their legislators as permitted by your institution Maintain a relationship with their legislators

The session included comparing and contrasting authorization vs. appropriation, federal budget information, steps on how to reach out and work with legislators, and shared possible allies, advisors, and resources. The session provided detailed information on steps to take before meeting with a representative, such as: figuring out a point of contact, laying groundwork with the district office, developing relationships with individuals responsible for government relations at one's institution, making contact with the Washington office, and planning the conversation. Then expectations and how to structure the in-person meeting, and finally steps to take after the meeting, including how to follow-up.

Participants:

Gerri Cole-City of Hope/Beckman Research Institute Claudia Lutz-University of Illinois Urbana-Champaign Chandana Jasti-University of Illinois Urbana-Champaign Mary Jo Koroly-University of Florida Rebecca Dawn Banks-Louisiana State University Health Science Center Shreveport Catherine Morton-McSwain-West Virginia University Bambi Bevill-University of New Mexico health Scis Ctr **Nell Curran**-Stanford University Karina Meiri-Tufts University Boston Katherine Williams-Edventure Children's Museum Patricia Thomas-University of Kansas Medical Center Ravi Subramanian-Tufts University Boston Carla Romney-Boston University Medical Campus Jenny Williamson-University of Washington Laura Fawcett-Yale Peabody Museum of Natural History Louisa Stark-University of Utah Melani Duffrin-East Carolina University **Catherine Ennis**-University of North Carolina Jayatri Das-The Franklin Institute

Issues Specific to Digital Education Projects

Facilltator: Adam Holt, HudsonAlpha Institute for Biotechnology **Reporter:** Charles Raffety, University of Montana

Common Challenges/Issues (group suggestions):

- * Hardware/network connections
- * Students
- School administration
- * Delivery/distribution
- Teacher training/professional development
- Connectivity issues
- * Security lockdowns on software programs
- * Updated/non-compatible software
- * Software development choices
- * Tech obsolescence
- School/parent/teacher/community buy-in
- * Streamlining research and development
- * Project evaluation
- * Student training
- * Distance education protocols
- * Privacy/security of apps for kids
- * Data gathering and security
- * FERPA issues
- * Iterative design
- * Long development time pre-evaluation
- * Contracting with external parties
- * Production cost
- * Logistical issues (delivery/testing/distribution)

Participants:

Elliott Ostler-University of Nebraska at Omaha Tomas Helikar-University of Nebraska Medical Center Sebastian Diaz-East Carolina University Darrell Porcello-University of California Berkeley Eric Chudler-University of Washington Karen O'Hagen-Tufts University Medford Alexandra Morshed-University of New Mexico Health Sciences Center Eve Wurtele-Iowa State University

Solutions to Common Challenges (group suggestions): Hardware/Network Connections/Connectivity Issues

- * Loading software on loaner laptops or loading the material on a DVD disc that can be run from the disc can ease hardware access issues.
- * Also make the software available at local libraries, museums, etc. to increase student access.
- * If the software is designed to be played/experienced individually or in groups, a teacher can still use it even if there is only one computer in a classroom.
- * Another approach is to provide mobile hotspots for classrooms if they have poor Internet access.
- * HTML5 technology may also allow for interactive design that doesn't require a software download as it runs in the browser.

Tech Obsolescence

* Be aware that technology platforms become outdated very quickly; thinking/planning ahead is imperative.

Project specific challenges that were discussed by the group included the high cost of developing/maintaining a MOOC (Massive Online Open Course), and the difficulties of integrating virtual textbooks in the classroom.

At the end of the session, contact information was exchanged in order to establish a communications network among the members of the breakout session to share advice and updates on our technology-based projects.

Tuesday May 14, 2:45-3:00pm Update on the NIH Science Education Drug Abuse Partnership Award Program (**SEDAPA**)

Presenter: Cathrine Sasek, PhD, NIH SEDAPA Program Officer (via conference call) **Reporter:** Susanna Cunningham, University of Washington

Dr. Sasek began by reviewing the history of the two programs for which she is responsible – SEDAPA and the Blueprint for Neuroscience grants. She then discussed what will most likely occur with these programs if the President's budget is passed.

- * SEDAPA program will be terminated.
- * Current grants will be funded to endpoint, this year will be funded at 96% due to sequester.
- * Applications submitted in FY12 but not yet funded can be held until next year.
- * Applications submitted for the upcoming May 25th deadline some possibility may be able to continue. Review will only be done if the SEDAPA program is allowed to continue.
- * Blueprint for Neuroscience grants are two types, those funded through the NIH Blueprint for Neuroscience Research and those funded through SEPA.
 - * Funding levels will be reduced due to sequester
 - * There was a meeting scheduled with the NIH Blueprint for Neuroscience Research on May 22nd. Hopefully, the outcome of the meeting will clarify years 4-5 funding.
- * For grants funded through the SEPA program, should receive the third year of funding this summer reduced due to sequester.
- * Remaining years' funding? Unclear, probably 4 years not 5.

Dr. Sasek then commented on what NIDA will be looking for in applications, should they be able to continue funding throught the SEDAPA program in the upcoming years. They are looking for applications that are:

- * Innovative
- * Have substantial impact state or nation wide
- * Develop projects with hands-on/minds-on science ideally with experiments that do not have predetermined outcomes
- * Include both neuroscience and drug abuse science
- * Target girls and minorities in appropriate numbers
- * Have a robust evaluation & dissemination plan
- * Have a plan for continuation after the grant periods ends.

Dr. Sasek thanked all the past NIDA grantees for an amazing 21 years of phenomenal science education projects that continue to make a huge difference!

If the president's budget is not passed the SEDAPA program can/will continue.

Tuesday, May 14, 3:00-3:15pm Update on the NIH Science Education Partnership Award Program (SEPA)

Presenter: L.Tony Beck, PhD, NIH SEPA Program Officer **Reporter:** Susanna Cunningham, University of Washington

Dr. Beck began by saying that "All things currently are proposed but not necessarily known" and "We currently do not know that much". He then outlined the current status of SEPA grants:

- * All grants currently funded will receive their fiscal year 2013 funding minus 5%. If they are in the last year they will be able to activate a no-cost extension.
- * SBIR and SEPA grants are on pause. We may not know more until funding for fiscal Year 2014 is known; that could be the end of this calendar year.

Success stories are very helpful. Investigators may consider sending these to Dr. Beck along with any other information they feel might be helpful.

If you have questions, please call Dr. Beck.



Wednesday, May 15, 7:00-8:00am New England Regional (NER) Science Education Partnership (SEP) Meeting

Presenter: Carla Romney, Boston University **Reporter:** Donald DeRose, Boston University

NER SEP has had two prior meetings to discuss the sharing of resources and development of a collaboration among the 10+ SEPA programs in NE as well as former SEPA's that would like to be included. Tony Beck suggested the formation of regional groups a few years ago and provided some administrative supplement funds to other regional groups to develop this concept. Before the 2013 STEM education consolidation, there were plans for an RFA to build regional consortia. This RFA is "paused". Therefore, our goal is to discuss the next phases of collaboration among our programs without additional support

We discussed the mission statement that was developed during last November's meeting. The NER SEP can be a "one stop shop" or clearinghouse for programs. We also developed a database with basic information about each program in tables. It is up and running, but there has been no tracking of access.

The NIH Office of Science Education has warehouses of curriculum supplements and material and now seeks a place to store it and make it accessible so that these resources can continue to be made available through regional alliances.

For those in MA, the Mass Life Sciences Center provides funding for programs related to life sciences. We may want to tap them as a group for funding. They just gave \$10 million to the Museum of Science, Boston. That funding pays for internships for undergraduates in biotechnology firms. Maybe we could present a proposal to MLSC as a group. While previously they had a history of focusing on state institutions, this is no longer the case.

Most states have similar non profits that may support programs. Companies such as Novartis have provided funding to states to support education. We need to present a well organized proposal to some of these larger, regional/national organizations and tout our track record; send a letter to all organizations at one time. Perhaps we should call a meeting and invite potential funders. The real issue right now is workforce development.

We need a great acronym and a mission statement.

Participants: Michael Fenzel-Boston University Tony Beck-NIH Karen O'Hagan-Tufts University Medford Carl Franzblau-Boston University Medical Campus Gregory Defrancis-Montshire Museum of Science Samuel Duboise-University of Southern Maine David Walt-Tufts University Medford Ravi Subramanian-Tufts University Boston Berri Jacque-Tufts University, Boston

Mid-Atlantic Regional SEPA Consortium

Facilitator/Reporter: Michael Chorney, Pennsylvania State University

Topics discussed:

- * A Route 95 informal science corridor.
- $\boldsymbol{\ast}$ The activities of MAR-SEPA over the past year.
- * Reasons for pulling of a MAR-SEPA math and science partnership award to the PA department of education.
- * Plans for 2013-2014 meetings; one at the American Physical Society was suggested and Cornell said they would host a meeting again.
- * The possibility of a joint MAR-SEPA-Northeast regional was discussed; this will go forward for late summer 2013.
- * A focus of MAR-SEPA should be teaching teachers the nature of research.

Participants:

Jayatri Das-Franklin Institute Martin Weiss-New York Hall of Science Robert Bonneau-Penn State, Hershey Michael Chorney-Penn State, Hershey Mary Kay Hinkey-Cornell University Summer Kuhn-West Virginia University Cathy Morton-McSwain-West Virginia University



Wednesday, May 15, 8:20-9:20am

The Next Generation Science Standards

Presenter: Stephen L. Pruitt, PhD, Vice President, Content, Research & Development, Achieve, Inc. **Reporter:** Louisa Stark, University of Utah

The Common Core was adopted by 40 states in 3 months; Race to the Top was an incentive. The political environment around the Common Core has created angst in some states. Adoption of the Next Generation Science Standards (NGSS) is going slower than the Common Core.

The NGSS call for seven conceptual shifts – some are ways to think differently about standards; others are different ways of teaching. They represent the interconnected nature of science as it is practiced and experienced in the real world.

- Science Practices rooted in inquiry and data-based evidence
- Disciplinary Core Ideas give teachers a lot of leeway in how to construct curricula
- Cross-cutting Concepts draw connection among Core Ideas

Instruction needs to take place at the nexus of these three aspects. It needs to shift from "knowing facts" to applying information. The Science Practices need to be woven in with the Core Ideas. We need to move away from the "scientific method," which came out of a person's dissertation in the 1920's, for which they interviewed scientists and distilled their version of what they heard.

Research indicates that significant numbers of students do not have quality opportunities to engage in science and engineering practices. Currently, if students are not doing well in math or science we give them less math and science.

The NGSS are student performance expectations - NOT curriculum

- Describe achievement, not instruction
- Models should be able to predict phenomena and kids should be able to collect data from them
- Assessment boundaries are meant for teachers to guide instruction

Instruction builds toward performance expectations. They are about to release case studies on how this will look in classroom. The intention is to NOT teach one standard or performance expectation at a time.

Science standards build coherently across time. Disciplinary Core Ideas progress understanding across the K-12 grades.

Science and Engineering are integrated. In the 21st century there is not that much difference between what scientists and engineers do. A stand-alone set of engineering design standards will be developed.

The NGSS are designed to prepare students for college, career and citizenship. STEM careers are some of these careers. For example two of the top 10 most desired careers in the next 10 years are geologist and petroleum engineer.

The Math Common Core and English Language Arts Common Core provide examples of how students demonstrate evidence-based arguments in those areas.

keynote address 9:35-10:50am

The NRC Framework: Implications for Instruction, Instructional Materials, and Professional Development

Presenter: Brett D. Moulding, Utah Partnership for Effective Science Teaching and Learning, National Academy of Sciences Board on Science Education, National Research Council Committee on the Framework **Reporter:** Linda Pruski, University of Texas Health Science Center San Antonio

Brett Moulding guided listeners through key aspects of the National Research Council's Framework for K-12 Science Education. He noted the progression of national science benchmarks and standards movements including "Science for All Americans," "Benchmarks for Science Literacy," and "National Science Education Standards" and the outgrowth from these efforts to the K-12 Framework. The NRC Framework provides a vision for science education that was founded in principles about 'how people learn science,' (e.g., "Ready, Set, Science;" "How People Learn"). It includes 'crosscutting concepts,' representations of 'science and engineering practices,' and introduces performance components: constructing explanations, using core ideas in practices, intersection of these in communicating and discussing what is learned.

Categories included in the Framework were voiced by state level organizations, university instructors in colleges of science and education, K-12 classroom teachers, and students. Among its instructional goals are to: 1) educate all students in science and engineering; 2) help students value and use science as a process of obtaining knowledge based upon observable evidence; 3) gain skills to gather, reason, and communicate information; and 4) provide foundational knowledge for those who will become scientists, engineers, technologists, and technicians of the future.

Standards are part of the Framework, but the vision is broader; Mr. Moulding emphasized that "knowing is not enoughscience education requires performance." Science digs deeper, it reasons across core ideas and cross-cutting concepts. Students are to be actively engaged, always using the practices of science. These three dimensions have to be integrated: active engagement, cross-cutting concepts, and core ideas. Teacher professional development (TPD) is key to helping students understand the big concepts; in TPD the three dimensions must be modeled and used by teachers. They must experience science and engineering practices, learn the disciplinary core ideas, and connect the cross cutting concepts. From this, teachers can create/offer lessons for their students using eight practices: 1) asking questions (science) and defining problems (engineering); 2) developing and using models; 3) planning and carrying out investigations; 4) analyzing and interpreting data; 5) using mathematics, information and computer technology and computational thinking; 6) constructing explanations (science) and designing solutions (engineering); 7) engaging in argument from evidence; and 8) obtaining, evaluating, and communicating information. Teachers will then be able to offer authentic experiences to students.



Mr. Moulding further defined:

Gather – obtain information; ask questions; refine problems; plan/carry out investigations; use models to gather data; use materials and complex thinking

Reason – evaluate information; analyze data; use mathematics and computational thinking; apply technology; compile evidence; construct explanations and solve problems; use models to predict and/or describe evidence

Communicate – argue points using evidence in written and oral formats, use models to illustrate points of evidence

The Crosscutting Concepts underlying science were listed including: systems, causality (cause and effect), patterns, scale and proportion, stability and change, matter and energy, structure and function.

In the Framework the big concepts/core ideas are listed for each science area. For example, core ideas in Life Sciences include: 1) from molecule to organisms: structures and processes; 2) ecosystems: interactions, energy, dynamics; 3) heredity: variation and traits; 4) biological evolution: unity and diversity.

Mr. Moulding stressed that learning deeply over many years is critical for both teachers and students.

He closed the session by requesting that participants offer theories in response to two familiar, observable phenomena: 1) the condensation on the outside of a glass, and 2) quaking aspen leaves. Participants worked in small groups, using direct observations, personal experiences, science expertise, and Internet resources to offer their theoretical explanations to the larger group.

BREAKOUT SESSIONS

Wednesday, May 15, 11:00-12:15pm Creation of a National Science Corps - A Nationwide STEM Partnership

Presenters:

Carla Romney, Boston University Donald DeRosa, Boston University Carl Franzblau, Boston University **Reporter:** Linda Pruski, University of Texas Health Science Center San Antonio

A vision of a national "Science Corps" was presented. The Science Corps concept is akin to a Peace Corps for Science. Teachers (recent science or science education graduates) would serve for a period of time and travel the country (with a mobile science laboratory) or serve a designated area.

Some important ideas emanated from the discussion:

- Before we go national, link together three regions on the east coast—New England, Mid-Atlantic, and Southeast (i.e., the I-95 corridor)—and include museum programs. Link not only teachers but also politically important institutions (HBCU's, reservations, urban sites). Have politicians see the value to the constituents. Need to write a mission statement with data to drive the need for such a program. Need to create a non-profit organization for these activities.
- Consider the "Reach Out and Read" program as an example. Every pediatrician gives a book to patients. The
 program started at Boston University and has grown nationally; it raises 20 million dollars annually. This is a model
 for the Science Corps: get it started and then people will join the effort.
- 3. Consider the "Teach for America" and "AmeriCorps" models. The Science Corps participants can use the program as a pipeline into a teaching position. Investigate options for graduate credit and/or service learning credit. AmeriCorps provides \$5K of student loan debt forgiveness, so this could be an attractive opportunity if we connected with this program. Also, may be able to run a summer program staffed by practicing teachers who are not working in the schools during the summer months. The TfA and AmeriCorps programs may be interested in partnering to create a science-specific program. West Virginia's HSTA program has an alumni database that might yield some potential participants.
- 4. Consider whether mobile laboratories need to be the basis for such a program. Some mobile laboratory programs have closed due to a lack of funding, etc. Logistical issues (such as overland travel in Alaska) were mentioned as impediments to basing Science Corps on mobile laboratories. Internet or schools/museums can also serve as base sites for such a broad-reaching program. Investigate hybrid programs that blend online and face-to-face instruction.
- 5. Consider using the "equipment locker/loaner" program model to lend lab equipment to teachers (who may have to complete training in order to be eligible for loans). Teachers/schools need specialists to help teachers with these resources, so this could be a role for the Science Corps.

Participants:

Janet Dubinsky-University of Minnesota Twin Cities Aaron Kallas-University of Alaska Fairbanks Michael Chorney-Pennsylvania State University Robert Bonneau-Pennsylvania State University Mary Jo Koroly-University of Florida Melani Duffrin-East Carolina University Georgia Hodges-University of Georgia Abigail Heithoff-University of Nebraska Lincoln Summer Kuhn-West Virginia University Catherine Morton-McSwain-West Virginia University Samuel Duboise-University of Southern Maine Michelle Verrochi-University of Nebraska Medical Center Maurice Godfrey-University of Nebraska Medical Center

Wednesday, May 15, 11:00-12:00pm

Crosscutting Concepts in the Framework for K-12 Science Education and the Next Generation Science Standards

Presenter: Brett D. Moulding, Utah Partnership for Effective Science Teaching and Learning, National Academy of Sciences Board on Science Education, National Research Council Committee on the Framework **Reporter:** Linda Pruski, University of Texas Health Science Center San Antonio

In this session, Brett Moulding, explained that the concept of crosscutting concepts has been part of all of the national science standards efforts, but has been left out in application of the standards. Crosscutting concepts, for example, have included 1) patterns; 2) cause/effect; 3) scale, proportion, and quantity; 4) structure and function; 5) systems and system models; 6) energy and matter; 7) stability and change.

Mr. Moulding reviewed some of the slides from his plenary session and guided listeners through key aspects of the National Research Council's Framework including student performance. Key to helping students attain the performance levels are the instructional strategies that teachers use to elicit these performances. Teacher professional development must engage teachers in scientific performances and applied instructional strategies – this is not just about science but a good idea in all content (e.g., argumentation). For example in the Common Core English Language Arts students 1) dig deeply to support arguments/views; and 2) use critical thinking.

Cause and effect are 'bigger'/more important than what we think they are for students; teachers have to understand that. We need cause/effect experiences in teacher professional development (TPD) – to talk about it, have examples of it, establish tips to help students/teachers explore – cause/effect is a way of knowing. In religion there is 'belief' as a way of knowing; in science it is about 'evidence.'

Mr. Moulding stated that we need unifying concepts in all content. Most science classrooms don't say anything about crosscutting concepts; when/if used they need to be defined; for example it is too broad for students to grasp 'system' and support that concept from their own experiences. Mr. Moulding asked participants to engage in conversation about shared phenomena; for example 'pain.' Pain is a phenomena; recovery is a phenomena – health/healing processes, medical intervention. Explore 'system' in this phenomena: body systems, nerves; response to pain; expressed and measured; impacts on activities of daily living (such as attendance/missed days of school/work), or economic impact. These components of the total 'pain system' can be examined in patterns (e.g., patterns of attendance can be observed in records review, data collected into spreadsheets).

Another medical example was given – why do doctors tell us to finish the full course of antibiotics – starting with a 'systems' look, students would need to gather more information: narrow view of body systems; look at cellular behaviors and interactions with pathogen and medications; understand bacteria; look at interactions between antibiotics and bacteria. From here, students could be led through a series of 'historical case studies' to look for 'cause and effect,' then move onward from this crosscutting concept to 'natural selection' in the study of antibiotic resistant bacteria.

Another example of utilizing multiple crosscutting concepts in science is starting with the question, "why do multicellular organisms always start out as single cells and then 'just divide'? Are zygotes more complex as they differentiate? To explore the 'cause and effect' relationship involved in growth and development have students observe film, microscope slides, models, pictures of comparative embryos and record their observations. To guide observations suggest that students count, measure, organize by time, set up data tables to visualize the emergent patterns. Ask students what they see; how do the emergent patterns stem from electromagnetic fields; ask students to predict what will happen next (as in the next step/phase in development beyond the embryo levels being observed). What instruction is needed to get students to recognize 'patterns'? Moulding suggested that students need instruction in organizing information, graphing, and discussion that elicits what students already 'know' about 'patterns' by sharing experiences. This raises 'experiences' to a 'level of consciousness' from which additional queries can be made. Children can see 'patterns'; teachers must guide them to make what they see more explicit. The core idea in this example: cellular differentiation.

Crosscutting concepts should not be taught explicitly but allowed to run their course! This, of course, takes time – time that is not available in a prescribed curriculum. We must change TPD to get teachers to the conscious levels of crosscutting concepts so that they may think in these terms and subsequently orchestrate instruction that puts students in a position to experience crosscutting concepts and raise their consciousness of these concepts. For example the standard to "construct an explanation" needs progression: to see patterns before, during, and after school; to recognize, classify, and record patterns; to classify patterns based on analyses of qualities such as rates of change; to observe patterns at the micro and atomic levels hence changing the 'scales' of the systems being studied; to identify trends in data using statistical tools. In this progression, the concept of 'patterns' simultaneously addresses the English language learner / English language arts standards.

Again, Mr. Moulding invited small groups to explore a phenomena: "How is it that a card keeps water in an inverted cup?" Small groups were given supplies (various cards, cups, water, paper towels, etc.) to: 1) explore the demonstrated phenomena, 2) formulate questions and investigate explanations with the group constructing a 'final' explanation of the phenomena; and 3) develop evidence to support the explanation. Individual activity was part of this experience – journaling what was learned and experienced, writing examples of ideas on cause and effect including descriptions/ pictures of the 'evidence' and 'explanations' shared by the larger group. Different small groups shared explanations as Mr. Moulding solicited alternative suggestions for each, and suggested techniques to investigate, support, or refute the explanations that were given – all moving toward 'gathering more evidence.'



Mr. Moulding reapplied his mode asking "what was observed," "what strategies did you try," "how would you design an experiment to explore further," "how do you describe what happened," etc. In this way of teaching we answer 'yes' to a key question about science inquiry: does evidence from what you previously knew and now know count?

Reflection is important – in this case, Brett Moulding challenged attendees to write a short reflection on the nature of science instruction that leads students to develop explanations based upon evidence.

Goal – science helping students to help other people; to prepare students to be better citizens – of crosscutting 'values' that span the lifespan.

Participants:

Mary Kay Hickey-Cornell University **Robert Wallon**-University of Illinois Shiraz Mishra-University of New Mexico Vic Serro-University of Southern Maine Elliot Ostler-University of Nebraska Bert Ely-University of South Carolina Georgia Hodges-University of Georgia **Rob Robertson**-Great Lakes Science Center Mike Fenzel-Montshire Museum Jeff Radsick-City of Hope Michelle Ventura-Georgia State University Suzanne Kirk-Virginia Commonwealth University Amy Spiegel-University of Nebraska Lincoln Louisa Stark-University of Utah Janet Dubinsky-University of Minnesota Twin Cities Michelle Verrochi-University of Nebraska Medical Center Tonya Smith-American Physiological Society Robert Manriquez-American Physiological Society Margaret Shain-American Physiological Society Laura Collins-Seattle Children's Hospital Karina Meiri-Tufts University Boston Ravi Subramanian-Tufts University Boston Marlys Hearst Witte-University of Arizona Nicola Barber-University of Utah Michael Bernas-University of Arizona



Planning and Developing a Project Website: Tips and Lessons Learned

Facilitator: Nancy Place, University of Texas Health Science Center San Antonio

Presenters:

Eric Chudler, University of Washington Nancy Moreno, Baylor College of Medicine Kevin Pompei, University of Utah **Reporter:** Steve Reest, University of Utah

The panelists represented three sets of NIH-funded science education websites that have each received the Science Prize for Online Resources in Education, awarded by AAAS and Science Magazine:

Neuroscience for Kids - Eric Chudler BioEd Online and K-8 Science - Nancy Moreno Learn.Genetics and Teach.Genetics - Kevin Pompei

The panelists shared their expertise in developing project websites. Some of the tips included:

- Listen to users
- Pay attention to national science education standards
- Maintain consistency in structure
- Maintain the site
- Link and share
- Content, Content, Content

Participants:

Renee Hesselbach-University of Wisconsin-Milwaukee Helen Buckland-University of Washington **Jenny Williamson**-University of Washington Nicola Barber-University of Utah Andres Lopez-University of Alaska Fairbanks Susan Kane-City of Hope/Beckman Research Institute Lisa Abrams-Virginia Commonwealth University Sydney Hall-Mississippi State University Sarah Sanders-University of New Mexico Health Sciences Center James Denk-Baylor College of Medicine Jackie Shia-Wheeling esuit University Christina Boelter-University of Kentucky Alisa Lee-University of California Davis Sally Davis-University of New Mexico Health Sciences Center William Roden-Seattle Children's Hospital John Daniel-Seattle Children's Hospital Lisa Marriott-Oregon Health Science University Adam Hott-HudsonAlpha Institute for Biotechnology Meena Selvakumar-Pacific Science Center Katherine Williams-Edventure Children's Museum Adrian Zongrone-Edventure Children's Museum Jana Hovland-Marshall University Lisa Jacobs-University of Pennsylvania Shrawan Kumar-University of Nebraska Medical Center

SEPA Programs in Informal Settings

Presenter: Laura Martin, Arizona Science Center **Reporter:** Jawed Alam, Ochsner Clinic Foundation

Topics Addressed:

- * How can informal science education be integrated into the formal science education framework?
- * How to share information.
- * Tips for reaching rural communities.

Key Points

Integrating with the Framework for K-12 Science Education:

- * A first step in integrating informal science education into the Framework would be to talk to the state Department of Education (DOE).
- * Most, if not all, state DOE's participate in the 21st Century Program which could provide access to informal science education programs.
- State 21st Century Programs are funded by block grants based on population and the specifics of the programs vary considerably by state.
- Only school districts are eligible to apply to the 21st Century Program so it is important to develop partnerships with the districts.
- It may be useful for the informal science education program to develop a menu of options from which the school district can chose.

Participants:

Mary Kay Hickey-Cornell University Robert Wallon-University of Illinois Shiraz Mishra-University of New Mexico Vic Serro-University of Southern Maine Elliot Ostler-University of Nebraska Bert Ely-University of South Carolina Georgia Hodges-University of Georgia Rob Robertson-Great Lakes Science Center Mike Fenzel-Montshire Museum Jeff Radsick-City of Hope Sharing Information (in particular content on the SEPA website)

- Need to find a way to keep the SEPA website operating. The challenge is maintenance costs ~\$25K/year. It doesn't appear that the Smithsonian will be getting funds to support maintenance.
- In actuality, the SEPA website needs to be upgraded (requiring additional funds) to make it searchable and more user-friendly. Functionality of the current design can be compared to an investigator "doing great research but not publishing."
- * Provide website content to CAISE and/or ASTC.
- * Organize a SEPA session at ASTC.
- * Can NSF and SEPA share sessions at meetings?
- * Request listserv from ASTC.

Tips for Reaching Rural Communities:

- Use library network as staging places for informal learning.
- * Develop small exhibits for libraries that can be rented for a nominal fee that provides income for the program and is not overly burdensome to the libraries or museums.
- Think outside the box: (1) Provide exhibits to county fairs (with rental fee). (2) Send mobile labs to football games.
- * Some rural school districts may have the technology infrastructure to support distance learning.

Teaching Science to English Learner (EL) Populations

Presenters:

Annie Bich-Loan Duong, University of California, Davis Adela de la Torre, University of California, Davis Linda Whent, University of California, Davis Rosa D. Manzo, University of California, Davis Rosa Gomez-Camacho, University of California, Davis **Reporter:** Rosa D. Manzo, University of California, Davis

The session presented an overview of English Learner students and the challenges students face in the science classroom. Presenters engaged participants in activities that modeled the teaching strategies to teach science to EL students.

Best Practices

Participants were introduced to teaching science to EL students with an activity called "green dot, red dot". This activity can also be used in the classroom to allow teachers to evaluate what the students already know and what areas they need to learn.

This session also introduced participants to the 5E instructional model and elaborated on how this model can be used in the classroom to teach science to EL students. The strategies are: 1) Engagement, 2) Exploration, 3) Explanation, 4) Elaboration, and 5) Evaluation. Participants engaged in activities that allow them to implement the strategies and were provided with examples that illustrate their use.

The anticipation guide is a strategy to engage students in a discussion about the topics or concepts of interest.

The strategies activate students' prior knowledge, provide a focus, and increase students' science interest by engaging them in inquiry-based learning and contextualizing examples.

Participants: Sandy San Miguel-Purdue University Gerri Cole-City of Hope Michael Chavez-City of Hope Carol Rempp-Nebraska Department of Education Kelley Withy-University of Hawaii Michelle Ventura-Georgia State University Lynn Syer-University of Nebraska Medical Center



The Title I Phenomenon: Experimental Education Program Evaluation in the Face of Radical Disruptive Change

Presenter: John Fraser, Children's Research Institute **Reporter:** Dina Drits-Esser, University of Utah

The speaker discussed his research/evaluation context:

- * Prince George's county
- * Needs and issues (obesity, sleep problems, asthma, violence, blood/sickle cell)
- * Classroom research context challenges (e.g., teachers, multiple grants, migrant population, criminals, prejudice, testing culture)

Culturally responsive frames – approach the evaluation through this approach. Part of this is acknowledging/respecting/ taking into account the complexity of values, habits, behaviors, customs of context in which you are evaluating. Must be responsive and flexible (e.g., in presenter's case shifted from quantitative study to qualitative). Whole-group discussion

Many participants said these ideas resonated with them and their project and the importance of being culturally responsive.

Suggestions for overcoming similar contextual challenges:

- * Post-hoc data collection
- * Encourage participation of community
- * Make experience a partnership with community (build trust)
- * Surface our own biases
- * Evaluators get educated before go in
- * Enter with the attitude of "we are here to represent your truth about this place/experience"

Presenter - culturally responsive frames:

- * Role of informed observers
- * Awareness of experimental parameters in-situ
- * Public advocacy as evidence
- * Youth reporting
- * Clarifying role of humor as evidence
- * Respect for members
- * Communication of group's level of understanding
- * Careful observation and listening
- * Reciprocal flow of information
- * Values explicitly negotiating values

Additional: teachers need to be briefed about what may surface (victimization, etc. at home) Recommended for teachers to be prepared and have guide for what they will encounter

Group discussion

Discussion about difficulty of finding IRBs that understand nuances of these types of projects. Some universities only allow IRB approval from own institution but some allow researchers to seek IRB approval elsewhere.

Message for SEPA community and IRB committees

It can be challenging to study health literacy topics because challenging issues an arise (such as sexual abuse), however it is important to do it. We need advocacy groups that can explain that the benefits to this type of research outweigh the risks.

Other discussions

Difficult to do an experimental design for this type of study. In cultural responsive research, the presenter needed to make major adjustments to research methodology. Discussion about feasibility and appropriateness of doing this type of work with different kinds of research designs.

Advice from participants

Many funders are looking for grantees to provide justification for their choice of research methodology.

Participants: Jane Larson-University of Nebraska Medical Center Michael McKernan-The Jackson Laboratory Kristin Bass-Rockman et al Tania Jarosewich-Censeo Group Samantha Langan-Claremont Graduate University Omolola Adedokum-Purdue University West Lafayette Alexandra Morshed-University of New Mexico Health Sciences Center Paul Guerin-University of New Mexico Health Sciences Center Tammy McKeown-Virginia Commonwealth University Sebastian Diaz-East Carolina University Chiquita Briley-Mississippi State University Susan DeRiemer-Meharry Medical College Kristen Morio-Miami University Oxford Molly Stuhlsatz-BSCS

BREAKOUT SESSIONS Wednesday, May 13, 1:30-2:45pm Assessment in Informal Summer Science Programs

Presenter: Constance O'Brien, University of Nebraska at Omaha **Reporter:** Camellia Sanford, Rockman et al

The main question posed in the session was, how should researchers and evaluators think about the assessment of informal science education programs? The presenter first encouraged audience members to discuss how they felt about assessment, and how they defined the terms "assessment" and "informal." She tried to distinguish between assessment (the tool being used) and evaluation (how the tool can inform decision making.)

During the session, the presenter shared some lessons learned from her experience working as a program director of a large-scale summer math and science outreach initiative called, Aim For the Stars. Her main suggestions were to keep instruments short, to have developmentally appropriate instruments, and to create assessments that internally result in changes to the program and are not just a "pat on the back" for a job well done.

The presenter also asked the audience to share some of the methodologies that they have used to assess informal science programs. Methods that have been used included pre-post surveys, retrospective surveys, embedded assessments, interviews, focus groups and observations. The group seemed particularly interested in methodologies that incorporated cameras, where youth participants took pictures of activities in the program that were "fun" or "scientific," or interviewed one another using the flip camera's video recording features.

The presenter concluded the session by engaging in an exercise with the audience in which they were asked to come up with a list of things that they needed to think about to assess a particular program. The presenter mainly focused on what one would need to know about the parameters of a program in order to effectively assess it. The audience came up with the following areas that would need to be defined before an assessment could be created: Determining the target audience, understanding the value of the program to its community and stakeholders, defining the program aims and objectives, and identifying the unique characteristics of the program that can be further examined.

Participants:

Samantha Langan-Claremont Graduate University Camellia Sanford-Rockman et al Jawed Alam-Ochsner Clinic Foundation Eric Chudler-University of Washington Maurice Godfrey-University of Nebraska Medical Center Abby Heithoff-University of Nebraska, Lincoln Becky Haasman-Seattle Children's Research Institute S. Monroe Duboise-University of Southern Maine



Diabetes, Obesity, Cardiovascular (**DOC**) Working Group

Presenters:

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

Overview of Supplement Grant (Melani Duffrin)

- * History Group started with Pam Koch (Columbia Teacher's College) & Wendy Huebner (Montclair University). DOC submitted previous supplement grant that was not successful. Last year discussed other options for the DOC group, in terms of collective group activity. Group came up with the idea of large-scale evaluation (what types of data could be collected across projects?) Everyone expressed interest in attitudinal data. DOC applied for supplemental grant that was successful looking at attitudes towards science (general). DOC members may be a good place to start collecting attitudinal data. Allows for mass data collection and expansion of data collection.
- * Science in general versus primary focus of DOC topics, but the members of the group are interested in topic foci of members who participated in initiating the project.

Science Attitude Analysis (Sebastian Diaz)

- * Sebastian Diaz is a trained educational statistician.
- * DOC is in unique context due to its rich intellectual capital and valuable connections.
- * Diaz gave overview of work on supplemental grant and explored possibilities for collaborations.
- * Diaz is most interested in how the groups can take advantage of existing attitudinal data sets to move project forward. FoodMASTER has collected sound, thorough comprehensive data on ~670 students. Comprehensive in that it measured knowledge, attitudes and behaviors at the student and teacher level.
- * Science attitudes in the center of model. Affective orientation to science is important. DOC hopes to get feedback from members in terms of individual needs and the context in which a standard attitudinal survey could be used.
- * Goal is to try to make short succinct instrument for dissemination.
- * Current instrument is a 50-item tool created by Duffrin. FoodMASTER already has good data on all the items. The tool was created by identifying important sub-domains/construct related to science attitudes in the literature.
- * The literature revealed the following constructs: efficacy, motivation, family/teacher/peers influences and expectations, science as preference, ease of science learning, science career as preference.
- * (See Handout) Statistically the constructs worked well together. Reviewed basic descriptive analyses. Items with high averages and low SD are the "duh" items – most will agree or disagree with the item. The most valuable items are the ones with a mean in middle and large SD. Allows for differentiation between upper and lower scoring students. Pre and post items are ranged by order. How do ranges differ? Some items show change in ranking yielding a desirable trait. Want items to be sensitive to intervention.
- * (See Handout) Page 4 of handout factor analysis. Running factor analysis is way of statistically saying there are a number of subscales in the survey. Can be compared to the original breakdown of construct. Large factor loadings show distinct item. When have low factor loadings may mean the questions should be potentially tossed. Validity of instrument has most to do with how actionable tool is. If instrument more useful = more valid versus used for esoteric research.

Group Discussion:

General Comments

- * One DOC member project is with high school students and other grades. This group may be used in science academy to measure changing attitudes. Any programs that are longer than one day may find it useful.
- * How likely to tie this data to existing data? Many trying to measuring more to ensure measuring something that will yield outcomes.

Context of Survey Delivery

- * Does change in attitude occur after completing learning experience?
- * Most report delivering surveys online.

Teacher Role/Involvement

- * No one has mentioned, ask about context in which instrument given, important for teacher to establish relationship with class so that they provide valid data. If not taken seriously, data becomes tainted and have not basis to illuminate it. Context almost as important as valid data. What do you think for next group of kids? If all in place and questions good, do not need as many items.
- * Also important to make sure teachers understand what you want from each questions. What does it add? Teachers should understand in case student has question.
- * What are contextual factors that might use survey? Teachers COULD have negative attitude if felt like they were not benefiting from the survey not relevant to their students, would not benefit from results.
- * Instrument providing useful feedback to teachers?? Need this so you can sell the program for funders. More reason to make topic distinct?
- * Do you think teachers would use it to match individual instruction? Yes, more of an emphasis of reporting progress. Some teachers using to reflect on practice and in yearly teacher assessments. Ultimately, if active development may be more apt to use and/or implement. WORTH trying to tweak to make it meet our needs AND the needs of the practitioner. But may be able to achieve both.
- * Regular communication/reflection with teachers important.
- * If asking questions that teacher has no interest in, how far are you from items that SHOULD be important to project.

Meaning of Science

- * High school students may not realize they are learning science. Do you like learning about infectious disease (post)? Do you like science (post)? Using general term for what would be a specific experience. But needs to be widely useable. Is there a way to manage those differences to allow for items to be group topic specific? Example: Different ideas of scientist. Different ideas of science.
- * When looking at science attitudes may want to look at polarizing issues? Potential happenings in media may change need for certain types of learning or activities? Sub-constructs dealing with family important "family opinions strongly influence my own" or "likelihood to change view based on family."

Length of Survey

- * Most projects have a lot of other items that need to also assess this will likely be part of a program that is a subgoal so 8 items max. Another said no more than 20 items for high school students. Another said one side of the page is doable. If have to flip to other side of paper student not likely to finish.
- * Want it to be short enough for school setting.
- * What is max # items tolerable, specific for questionnaire?
 - + 20 (4 attendees)
 - + I-pager (2 attendees)
 - + 30 (1 attendee)
 - + 20-25 (2 attendees)
 - + 10-15 minutes (1 attendee)
 - * 6 minutes, other topics/questions must be able to be incorporated (1 attendee)
 - + 6-8 items, other topics/questions must be able to be incorporated (I attendee)
 - + Survey not appropriate for PreK, 6-8 items because must not be main focus of work

Evidence of Reliability/Validity

- * Prior to use, want it to be published to demonstrate evidence.
- * Validation is specific to group, location etc. Going to adapt validated tools anyways.
- * When you look at constructs, they are very different ideas. Since some people are looking at different end points, may just want to know about certain constructs. Would short items that measure those ideas that would allow for menu selection versus whole tool.
- * Menu complicates validation but potentially a very good real-world application.

Next Steps

- Knowledge questionnaires
- * Project 2061, HEAP, TIMMS.
- * New project? Will start on new project next year.

Participants:

Sebastian Diaz-Diaz Consulting, LLC Tracey Meilander-Great Lakes Science Center Sally M. Davis-University of New Mexico Jana Hovland-Marshall University Melani Duffrin-East Carolina University Lindsey Travis-Museum of Science & Industry Chicago Nicole Kowrach-Museum of Science & Industry Chicago Lisa Marriott-Oregon Health Science University Virginia Carraway-Stage-East Carolina University Ginger Cross-Mississippi State University **Tim Herman**-Milwaukee School of Engineering Greg DeFrancis-Montshire Museum Sarah Sanders-University of New Mexico Prevention Research Center Lawrence Spezzano-Tuffs University, Boston Public School Donna Spruight-Metz-University of Southern California Alexandra Morshed-University of New Mexico



Program Management 101

Presenter: Adam Hott, HudsonAlpha Institute for Biotechnology **Reporter:** Lisa Jacobs, University of Pennsylvania

The session began with each participant sharing their name, affiliation, role, and experience with program management. The group discussed a range of topics including people management/relationship-building, budget management, logistical tasks/skills, materials management, IRB and human subjects management, technology management, and branding. The majority of the session was spent engaging in group brainstorming around issues/challenges presented by participants. General program management tips and ideas discussed included:

- * Technology: "Do" by Google for project management (iPad/mobile capable), "Basecamp" for file sharing and project management (cost associated), National Center for Digital Education weekly emails (including opportunities to signup for free trials of various technologies), Edutopia website/twitter feed for creative technology-based solutions
- Relationship-building: Tips for building trust in new working relationships (colleagues and research participants), facesheet (name/title/description of role) as a relationship and organization tool for large project teams
- * Budget Management: Tips for avoiding problems with subcontracts and general budget management tips

Participants:

Claudia Lutz-University of Illinois Urbana-Champaign Fran Barg-University of Pennsylvania Charles Raffety-University of Montana Bambi Bevill-University of New Mexico Health Sciences Center Gerri Cole-City of Hope/Beckman Research Institute Lisa Jacobs-University of Pennsylvania

Scientific and Engineering Practices in the Framework and NGSS: Implications for Curricula, Teacher Professional Development, and Classroom Instruction

Presenter: Brett D. Moulding, Utah Partnership for Effective Science Teaching and Learning **Reporter:** Elliott Ostler, University of Nebraska at Omaha

This session was largely discussion and activity based. Topics focused on instructional paradigms that involved Scientific Processes and Engineering heuristics as defined by the Next Generation Science Standards.

KEY POINTS:

1. Scientific and Engineering Process and Practices: Science Performances - What do these look like in the classroom and why? How do the processes of collecting data relate to the scientific processes we see in the NGSS? NGSS explicitly talks about engineering standards. Universal design processes are important for solving all problems, and thus science and engineering pedagogies can be distilled down to basic elements that can easily be applied outside of traditional classroom contexts.

Individuals in the group described engineering processes that they do and what they look like in the classroom. The group was encouraged to talk about questions and the use of evidence in defining solutions. The examples included from the group were as follows:

Sundial Tower Building Models of Nervous System

2. Gathering data, Reasoning, and Communicating results: These topics were discussed in the context of scientific and engineering practices and crosscutting big ideas and core concepts (NGSS) by the process of "doing."

Participants:

Jeffery Radsick-City of Hope/Beckman Research Institute Susan Hershberger-Miami University Oxford Tomas Helikar-University of Nebraska Medical Center Laura Collins-Seattle Children's Hospital Rebecca Howsmon-Seattle Children's Hospital Amanda Jones-Seattle Children's Hospital Elliott Ostler-University of Nebraska at Omaha 3. The group discussed the use of models to gather information, reason, and communicate ideas.

4. The group discussed how good activities are all based on practices that are active.

5. Group Activity: How do practices and crosscutting concepts to relate to one another? There is no primacy (i.e. neither processes nor crosscutting takes precedence instructionally) and topics often interrelate in some way that involves both practices and crosscutting (i.e. practices do not stand alone in that they work in conjunction with the ideas of crosscutting). They require more sophisticated understandings of core concepts as the ideas get more involved and complex but the process and crosscutting ideas anchor the content.

6. Performance Activity: Group performance, individual performance, reflection

Experiment using two cups and a chamois. discussion of the results and explanations. How can this solution be engineered to break the traditional rules of energy transfer.

7. Evidence to support explanation took place in the form of reflective discussion.

Students Partnering with Scientists

Presenters:

Catherine Morton-McSwain, West Virginia University Summer Kuhn, West Virginia University **Reporter:** Michael Vu, Baylor College of Medicine

The session focused on an after-school program for "bubble kids", or, students at risk at Health Sciences and Technology Academy in West Virginia. Students are recruited in 8th grade. Partners include students, middle school students, community, parents, and scientists. A "Blueprint for success " was outlined, highlighting important components that lay the foundation for an after-school program. The program utilizes liaisons that bridge the different constituents. Awareness and sensitivity to each partner group is essential to create a dialogue. A brainstorming activity was used to demonstrate how to prepare students for starting a community research project. Ethics in human research are included in the activities with students.

Participants:

Laura Martin-Arizona Science Center Carole Flores-Arizona Science Center Shrawan Kumar-University of Nebraska Medical Center Andres Lopez-University of Alaska, Fairbanks Rabiah Mayas-Museum of Science and Industry Sally M. Davis-University of New Mexico Alexandra Morshed-University of New Mexico Mary Jo Koros-University of Florida Renee Hesselbach-University of Wisconsin, Milwaukee Susan Kane-City of Hope



Using Twitter for Science Education

Presenter: Jeanne Ting Chowning, Northwest Association for Biomedical Research **Reporter:** Neil Lamb, HudsonAlpha Institute for Biotechnology

This was an interactive technology session about using Twitter as a tool for science education. Most individuals brought their laptop, tablets or smart phones. Participants created Twitter accounts if they did not already have one and the facilitator led the group through an excellent tutorial on how to follow individuals (and be followed), how to tweet and retweet messages, and ways to name individuals in tweets and tag topics using the # symbol. Participants also explored the tools needed to search through the twitter stream and discussed appropriate Twitter etiquette.

The session concluded with a discussion of how Twitter can be used to follow items relevant to science and science education. The use of analysis tools to follow the reach and impact of tweets was also explained. Participants left the session with a greater understanding of Twitter and the ways the social media platform can be utilized in science education.

Participants:

Susanna Cunningham-University of Washington Helen Teresa Buckland-University of Washington Neil Lamb-Hudson Alpha Institute for Biotech Shannon Colton-Milwaukee School of Engineering Craig Berg-University of Wisconsin, Milwaukee Sydney K. Hall-Mississippi State University Michael Chavez-Dwarte Unified School District/ City of Hope Laurie Fink-Science Museum of Minnesota Jenny Williamson-University of Washington, Seattle Kelley Withy-University of Hawaii



Thursday, May 16, 8:00-9:15am High School Public Health Advocacy Curriculum

Presenter: Nell Curran, Stanford University **Reporter:** Jeffery Radsick, City of Hope/Beckman Research Institute

During the course of this breakout session the facilitator covered an overview of the health curriculum model developed by Standard Medical Youth Science Program. Some sample lessons such as portion size and diabetes awareness were presented as model lessons to implement in schools or non-school programs. Unit 2, Community Exploration uses photo voice in which students take pictures of items that promote health like bike lanes and pictures of items that need improvement like foods in convenience stores. Unit 3 is the application unit to change social health. This could be on the individual level or volunteer in a local organization. Students also were encouraged to go to city council meeting to promote a strategic plan for issues in public health. All in all, these lessons in these units can be translated and modified into many different urban and rural areas.

Participants:

Tammy McKeown-Virginia Commonwealth University Sally Davis-University of New Mexico Laura Martin-Arizona Science Center Lindsey Travis-Museum of Science and Industry Raci Subramanian-Tufts University Boston

Linking Data From Multiple Sources to Assess the Impact of P-12 Curricula and Classroom Visits on Student Perceptions of Scientists, Attitudes Towards Science, and Content Knowledge

Presenters/Reporters: Sandy San Miguel & Omolola Adedokum, Purdue University

The program began with a brief introduction, by Dr. San Miguel, to the Fat Dog's Project and associated logic model. This was followed by Dr.Adedokun's discussion of the expected outcomes of the program and tools for assessing curricular materials and classroom visits aimed at elementary school students. Outcome and process evaluation, and possible relationships among program outcomes were discussed. Then two groups were formed and participants discussed their own program logic model, expected outcomes and possible links between outcomes. A discussion of process evaluation analytical strategies followed. Statistical analysis approaches that explore relationships among program outcome variables were described.

Discussion centered around evaluation instruments used, establishing baseline data, assessing impact of social media/ digital networks, and digital role models, the "coolness" factor of science, and how outcomes could be linked.

The program ended with participants writing about take-home messages from the workshop. Comment quotes included:

- * The results are useful in informing how the program can be strengthened
- * The session was useful in allowing participants to exchange ideas
- * The results reinforced existing concepts for me regarding specifically how the project influenced students' attitudes about science. Empirical data is critical and I learned about the possibility of revealing several other layers through some of the specific statistical tools. I am not an education researcher or evaluator. My purpose was to gain further insight into this work.
- * Will use "Draw a Scientist"
- * Shows how quantitative data can illustrate results
- * Be receptive to unintended consequences
- * Session was useful for considering new ways to use statistical analysis, turning our first year data in on itself to identify curricular efficacy
- * Consideration of experiences beyond what is in curriculum
- * Very helpful discussion of statistical tools that we can implement in our program that I was not aware of

Participants:

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Move it Online AND Keep the Quality: Replacing In-Person Workshops with Effective Online Professional Development.

Presenters: Margaret Shain, Tonya Smith, and Robert Manriquez, American Physiological Society **Reporter:** Bambi Bevill, University of New Mexico

The American Physiological Society (APS) Frontiers in Physiology program operated for several years to provide professional development for K-12 teachers. Teachers were traditionally engaged in a very intense summer program of applied research, with ongoing development and mentoring over the course of a year. APS used a quasi-experimental design to determine if an almost exclusively on-line format would be as effective for professional development. The on-line format was much less costly and more accessible for teachers from greatly dispersed or rural geographical locations. The study provided PD through an online learning platform (Blackboard) which contained text and video instruction, and provided a means of directed, asynchronous discussions. Unlike the program's prior formatting, teachers spent only one, short in-person session for hands-on research. Mentors were selected who had been through the Frontiers program, and who were located near those in the study.

Teachers who had engaged in the traditional training expressed that the experience was "the most beneficial professional development ever". The large majority learned about research and applied those principles in the classroom. It was found that classroom technique and setting changed drastically when teachers were developed in this manner and students' learning was enhanced.

Teachers who participated in the study expressed great satisfaction with the on-line professional development. On-line discussions were found to be just as rich as the traditional experience, and in many cases, on-line discussion was shown to be broader and deeper than the traditional experience.

Methods for on-line development included: reading & focused discussions, on-line collaborations, personal reflections, and building content knowledge. Instructor involvement through Blackboard was necessary to stimulate ongoing interest and summarize ideas, and mentors were involved as needed. All participants received a stipend. References were provided including work by Jim Slotta - Linn, M. C., & Slotta, J. D. (2006). Enabling participants in online forums to learn from each other. In Collaborative learning, reasoning, and technology (61–97). NJ Erlbaum Mahwah.

Tonya Smith and Robert Manriquez are K-12 teachers who experienced the traditional development sessions and continue to mentor those being trained online. They offered feedback and answered questions, along with the speaker.

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Thursday, May 16, 9:30-10:45am

Challenges and Opportunities in Evaluating Program Implementation

Presenter: Kristin Bass, University of Utah **Reporter:** Laurie Collins, Center for Research and Learning

Large Group Discussion: What comes to mind when thinking about evaluating implementation?

- Process, action, plan, scale up, confusion, reflect/re-adjust, reality, people/resources
- * Why should we care? Need to know what is happening, what is happening affects outcomes
- * Evidence of Quality of Delivery structure, adherence, duration, process, quality, differentiation, participant responsiveness
- * Fidelity and Adaptations:
 - * Fidelity implies there is a model
 - Adaptations what does the program look like in this setting; we want to understand implementation, but cloning may not be a goal
- * Administrative Component:
 - * Capacity, SWOT analysis, critical incident, type of exam, can't control all situational elements
- * Measuring Implementation:
 - * Example: GSLC online survey when, how, adaptations, constraints, challenges

Small Group Discussion: How do/would you study program implementation?

- * Summative implement according to design: Examples how teachers use modules, how school district administration affects teachers, fidelity what were the barriers that caused them to implement/not implement
- * Formative where is loss of fidelity occurring? Need to know as you move along program timeline. Get a better sense of communities with which you are collaborating, possibly do a needs assessment for future sites, teachers need to understand that you value what they are doing, even a small thank you is worthwhile, tiered incentive = get part of incentive after one thing accomplished, the next part after the next thing is accomplished; make it clear that participation in the program is a special opportunity; validate teachers and teachers' time during the day

Large Group Discussion and Report Out of Key Points:

- * Understand the context (important and can be overlooked)
- * Look at administration & infrastructure, capacity in the system
- * Use findings to improve
- * Look at organizational change; track what has directly affected participants, your project
- * Take a broader perspective look from others' perspectives, respect their time and appreciate what they do
- * Triangulate data observe, ask students, administrator input, parents
- * Work to keep in check the expectation of long-term impact. In our timeframe, what are indicators that are likely to predict . . .?
- * Persistent Challenges:
 - + How do you measure real change?

Paul Cotter-University of Alaska Fairbanks

- * How do we know that our program made a difference?
- * How do we know our program impacted behavior?

Participants:

Molly Stuhisatz-BSCS

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Inquiry-Based Learning Using Interactive Technology to Improve STEM Education

Presenters:

Mark A. Pauley, University of Nebraska at Omaha Neal Grandgenett, University of Nebraska at Omaha Tomas Helikar, University of Nebraska at Omaha Christine Cutucache, University of Nebraska at Omaha **Reporter:** Rob Robertson, Great Lakes Science Center

This session was divided into three discussions of currently running initiatives at UNO to enhance student learning at the middle school and undergraduate levels through interactive learning methods. Dr. Pauley shared the results of research performed by running concurrent sections of UNO's introductory computer science course using traditional lecture in the control group and the flipped classroom model in the test group. Dr. Pauley presented anecdotal evidence that using the flipped classroom model provides enhanced retention, teacher/student interaction, and achievement. The implication is that providing greater opportunity for active learning in the classroom will enhance retention and has other beneficial outcomes. Dr. Grandgenette described his work with the CEENbot project-based learning initiative from UNO. This program has grown from initial work in combining middle school math and physical science curricula using an open source robotics program into a series of products and training opportunities for teachers. Curriculum modules are organized around consistent learning practices such as "Asking," "Exploring," and "Understanding." The entire body of work is available for review and use at www.ceen.unomaha.edu/TEKBOTS/SPIRIT2/ Dr. Helikar reviewed his experience with the implementation of a real-time biochemical simulation that gets first year undergraduates involved with complex cell processes without a great deal of math or software development knowledge. The software itself is the collaborative effort of cell researchers, and is used as a research tool and an interactive learning tool. Through this experience, students report greater interest in the underlying math and biology concepts. Efforts to incorporate the simulation in other biology courses and to bring the concepts to the K-12 space are currently underway.

Participants:

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Health Academies-Bringing Health Education

Presenter & Reporter: Holly Carr, Educational Service Unit 4

In this presentation the speaker shared information about what she did to carry out a health career academy for her rural school district. She was able to do this by getting career and technical education funds. The purpose of the health career academy is to allow high school students in her school system the opportunity to explore the science behind a variety of careers. The design of the program is a mix of face-to-face, online, and hybrid. There is also a sequence of 3 courses that are delivered during the regular school day and taught by the school nurses: introduction to health science (high school credit); medical terminology (dual-high school and college credit), and a certified nurse assistant program.

They provide their academy instructors professional development and assistance in the following areas: curriculum, instructions and development coordination, support and accountability.

They have had great outcomes and success, in part through the variety of local and regional partners they have.

One resource she had the audience explore was to Google "career technical education" to get the Perkins guidelines for their state. This is a start to enable exploration of what is required to start a career academy in their own state.

Participants: Sally Davis-University of New Mexico Health Sciences Center Lindsey Travis-Museum of Science and Industry Tammy McKeown-Virginia Commonwealth University Robert Bonneau-Pennsylvania State University Liliana Bronner-University of Nebraska Medical Center Nell Curran-Stanford University Jawed Alam-Ochsner Clinic Foundation Jenny Williamson-University of Washington Rebecca Dawn Banks-Louisiana State University Health Science Center Shreveport Jeffery Radsick-City of Hope/Beckman Research Institute

Practice Makes Perfect: Modeling as an Authentic Practice of Science

Presenters: Tim Herman and Shannon Colton, Milwaukee School of Engineering **Reporter:** Neil Lamb, HudsonAlpha Institute for Biotechnology

This session was a timely reminder of the power of models and modeling and how they are an important part of the Scientific Practices section for the Next Generation Science Standards. Participants explored multiple models related to cellular components, biochemistry, neuroscience and protein folding. Some of these models were posters and static images while others were 2-dimensional foam or 3-dimensional plastic representations. In each case, the facilitators discussed ways the model could be used to elucidate a biological structure, biochemical function or molecular process. Participants were given time to explore the models and think about ways they could be used in the classroom with a wide range of students.

There was also discussion about how to help students realize every model has limitations and the educational power that comes when students are asked to consider and verbalize those limitations. Lastly, participants shared how good models can at times draw multiple fields of science together – for example, providing insight into chemical processes as well as biological structure.

Participants:

Neil Lamb-HudsonAlpha Institute for Biotechnology Andrew Jameton-University of Nebraska Medical Center Michelle Verrochi-University of Nebraska Medical Center Nicola Barber-University of Utah Maureen Munn-University of Washington Rosemary Riggs-University of Texas Health Science Center San Antonio Carole Flores-Arizona Science Center Samuel Duboise-University of Southern Maine

Teacher Bias and Expectations of ELL Populations

Presenters:

Annie Bich-Loan Duong, University of California, Davis Adela de la Torre, University of California, Davis Linda Whent, University of California, Davis Rosa D. Manzo, University of California, Davis Rosa Gomez-Camacho, University of California, Davis **Reporter:** Rosa D. Manzo, University of California, Davis

Introduction

Rosa D. Manzo began with a personal narrative of the graduation rates at her high school and the teacher bias she experienced in science education and discussed how the teacher perceptions were barriers for access to science courses and the overall academic achievement of students.

ARISE

Linda Whent discussed how Addiction Research and Investigation for Science Educators (ARISE) aimed to create awareness of the teacher bias and perceptions and the impact that these can have on students. ARISE targets science teachers of EL in California's Central Valley. The project integrates neuroscience content, research methods, 5E teaching model, and cultural nuanced learning content to help teachers build an understanding of the EL needs and what are the best practices to teach science to diverse populations. In addition to the summer institute, teachers in our study were paired with a university faculty mentor to provide additional support to help them conduct an independent research project with their students. The ARISE project integrates a transformational teaching model that engages the students in discussions, provides hands-on experiences for the students, and is inquiry-based.

A pre- and post-test was administered to ARISE participants to analyze their experiences with diversity and their perceptions about teaching science to diverse student populations. Findings on the following four scales were presented:

- * Diversity Experience Score
- * Attitude Toward Diversity in the Classroom
- * Attitude Toward ELL's Capacity to Succeed in Science
- * Learner Centered Strategies
- * Support for Understanding and Motivation Goals

Findings

Rosa Gomez Camacho presented the findings from the teacher survey and the pre- and post-tests. On the diversity experience score scale, the findings indicated that participating teachers rarely or frequently had diversity experiences. The diversity experience scale was composed of seven items that relied on a Likert scale (1=never, 2=rarely, 3=occasionally, 4= frequently).

Findings on the attitude towards diversity in the classroom scale were mixed. More specifically, teachers changed their believe about adaptation of lesson plans to more culturally relevant lesson plans, but the change was not significant. Also, there was a positive change in the perception of the importance of teachers from similar background as the students. Teachers also changed significantly in their belief about including diverse perspectives while teaching and in the textbooks they use. The teachers also had a statistically significant change in their belief about promoting racial and cultural diversity in classroom libraries.

The attitude toward ELL's capacity to succeed in science scale had more significant changes such that teachers changed their belief about the relationship between EL level of English and the students' academic success. Overall, after the institute teachers believed that EL students can learn science just as well as non-EL students.

The learner centered strategies indicated that after the ARISE summer institute teachers changed their believes about how students learn to a more student-centered model.

The support for understanding and motivation item also indicated that teachers changed their beliefs about students learning science and the implications of student learning on science content on the California Standardized Test.

Although, some of the changes were not significant, the teachers who changed their beliefs and attitudes were the teachers who did not have diverse experiences during their upbringing or as an adult. This finding indicates that professional development can have an impact on changing teachers' attitudes or beliefs.

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NIH SciEd 2013 Poster Presentations

Posters are ordered alphabetically by the contact PI's last name within each topic area **Curriculum Development**

Poster #	Project Name	Institution	Contact PI	Funder
I	Collaborations to Understand Research and Ethics (CURE)	Northwest Association/ Biomedical Research	Chowning, Jeanne	SEPA
2	ASSET:Advancing Secondary Science Education with Tetrahymena.	Cornell University Ithaca	Clark,Theodore G	SEPA
3	Connecting Classrooms and Community with the Health Sciences	Montshire Museum of Science	Defrancis, Gregory	SEPA
4 - A	FoodMASTER: Impacting Middle (Grades 6-8) Science and Mathematics Learning Environments	East Carolina University	Duffrin, Melani W	SEPA
4 - B	FoodMASTER: Impacting Intermediate (Grades 3-5) Science and Mathematics Learning Environments	East Carolina University	Duffrin, Melani W	SEPA
5	The Science of Healthful Living	University of North Carolina	Ennis, Catherine	SEPA
6	Project NEURON (Novel Education for Understanding Research On Neuroscience)	University of Illinois Urbana-Champaign	Hug, Barbara	SEPA
7	Being Me	Children's Research Institute	Luban, Naomi L	SEPA
8	A Collaborative Approach to Real- World Science in the Classroom	Tufts University Boston	Meiri, Karina F	SEPA
9	How Sure Are you? Science, Biostatistics and Cancer Education	University of California Davis	Molinaro, Marco	SEPA
10-A	Gene U: Inquiry-based Genomics Learning Experiences for Teachers and Students	Baylor College of Medicine	Moreno, Nancy	SEPA
10 – B	The Learning Brain – Interactive Inquiry for Teachers and Students	Baylor College of Medicine	Moreno, Nancy	NEURO
10– C	Foundations for Student Success: National After School Network and The Science of Infectious Disease and the Immune System K to 5 Teaching Resources	Baylor College of Medicine	Moreno, Nancy	NIAID

Curriculum Development Cont.

11	Learning Biological Processes Through Animations and Inquiry: A New Approach	University of Georgia	Oliver, J Steve	SEPA
12	Fat Dogs and Coughing Horses:Animal Contributions Towards a Healthier Citizenry	Purdue University West Lafayette	Ratliff,Timothy L	SEPA
13	Neuroscience in Your World:A Partnership for Neuroscience Education Across the K-12 Spectrum	The Franklin Institute	Snyder, Steve	NEURO
4	The Stanford SEPA Project	Stanford University	Winkleby, Marilyn A	SEPA
15	CyberSurgeons:A Unique Medical Experience	Wheeling Jesuit University	Wood, Charles A	SEPA

Informal Science Education

Poster #	Project Name	Institution	Contact PI	Funder
16	Resources for Education and Action for Community Health in Ambler – "REACH Ambler"	University of Pennsylvania	Barg, Frances	SEPA
17	The Zoo in You: Exploring the Human Microbiome	Oregon Museum of Sciences and Industry	Coats, Victoria J	SEPA
18	Partnerships to Promote Healthy Lifestyles for Children and Communities	Mississippi State University	Cross, Ginger	SEPA
19	BioMedTech: Students Translating and Exploring Medicine (BMT: STEM)	Great Lakes Science Center	Davillier, Valence E	SEPA
20	Biology of Human: Understanding Ourselves Through the Lens of Current Biomedical Research	University of Nebraska Lincoln	Diamond, Judy	SEPA
21	Weighing the Evidence: Making Informed Healthcare Decisions	Science Museum of Minnesota	Fink, Laurie A	SEPA
22	Framing New Pathways to Medical Discoveries for Families, Students and Teachers	Arizona Science Center	Martin, Laura W	SEPA
23	Science Club: Building A Science Community Partnership with the Boys & Girls Club	Northwestern University	Kennedy, Michael T	SEPA
24	PlayPads: Mobile Educational Health Science Activities for Children in Hospitals	University of California Berkeley	Porcello, Darrell	SEPA

Informal Science Education Cont.

25	Gaining Options: Girls Investigate Real Life through Health related STEM Disciplines	Wayne State University	Roberts, Sally K	NIMHD
26	Get in the Groove!	University of Miami Coral Gables	Saab, Patrice G	SEPA
27	Out of the Lab and Into the Spotlight: Bringing Current Health Research to the Public	Pacific Science Center	Selvakumar, Meena	SEPA
28	Human Health and 'Human Bulletins': Scientists and Teens Explore Health Sciences	American Museum of Natural History	Scott, Monique R	SEPA
29	SIMLAB: Using Patient Simulation for Student Exploration of Community Health Issues	Museum of Science and Industry	Ward, Patricia	SEPA
30	Evolution & Health Traveling Exhibition and Education Programs	New York Hall of Science	Weiss, Martin M	SEPA
31	Unlocking the Mysteries of Chronic Disease: Bioinvestigations of Family and School	Edventure Children's Museum	Williams, Katherine W	SEPA
32	Grossology and You: Engaging Young Learners in Biomedical Science Through a Fulldome Planetarium Show and Supporting Curricula	University of North Carolina Chapel Hill	Young, Denise L	SEPA

Research Experiences for Students and Teachers

Poster #	Project Name	Institution	Contact PI	Funder
33	Health Sciences Technology Academy	West Virginia University	Chester, Ann L	SEPA
34	Building an Infrastructure for Research Collaborations	University of Georgia	Dolan, Erin L	SEPA
35	SCienceLab	University of South Carolina at Columbia	Ely, Bert	SEPA
36	Biomedical Partnership for Research Education Pipeline in Alaska (Alaska BioPREP)	University of Alaska Fairbanks	Hills, Susan	SEPA
37	BioStart: Clinical Research and Education Experiences for Students, Teachers, Parents and Community	Louisiana State University Health Science Center Shreveport	Kleiner, Heather	SEPA

38	Biology-Environmental Health Science Nexus: Inquiry, Content, and Communication	University of Wisconsin Milwaukee	Petering, David H	SEPA
39	CHIDR Chatter: Translating Community Research Data for Classroom Use	Oregon Health and Sci University	Shannon, Jackilen	SEPA
40	Bioinformatics Inquiry through Sequencing	Tufts University Medford	Walt, David R	SEPA

Research Experiences for Students and Teachers Cont.

Student Science Enrichment

Poster #	Project Name	Institution	Contact PI	Funder
41	Helping K-12 Students Become Fluent in the Language of DNA	Georgia State University	Baumstark, Barbara	SEPA
42	Sowing the Seeds of Neuroscience	University of Washington	Chudler, Eric	NEURO
43	CityLab Promotes Understanding of Clinical Trials	Boston University Medical Campus	Franzblau, Carl	SEPA
44	Building Bridges: Health Science Education in Native American Communities	University of Nebraska Medical Center	Godfrey, Maurice	SEPA
45	Engaging families to enhance science learning and interest in STEM careers	Seattle Children's Hospital	Jones, Amanda Lynsey	SEPA
46	City of Hope and the San Gabriel Valley SEPA Collaborative	City of Hope/ Beckman Research Institute	Kane, Susan E	SEPA
47	Translating Research to Youth through Information Technology (TRY-IT!)	University of Kentucky	Leukefeld, Carl G	SEPA
48	SEPA in New Mexico	University of New Mexico Health Scis Ctr	Mishra, Shiraz	SEPA
49	Genes, the Environment, and Me	University of Washington	Munn, Maureen	SEPA
50	Transforming STEM Learning in Urban Schools Using the SSMV Model	Vanderbilt University	Shepherd, Virginia L	SEPA
51	Pathways: Promoting Access to the Health Sciences through Partnership	University of California San Francisco	Smith, Rebecca L	SEPA
52	PathOlogical Life Sciences Training Program for Students and Families	University of Kansas Medical Center	Thomas, Patricia A	SEPA
Teacher Professional Development

Poster #	Project Name	Institution	Contact PI	Funder
53	Project CRESST: Enhancing Clinical Research Education for Science Teachers, Students and the Community	Virginia Commonwealth University	Abrams, Lisa	SEPA
54	BEST Science! - Bioscience Enrichment for Students and Teachers	Ochsner Clinic Foundation	Alam, Jawed	SEPA
55 – A	ONE-DA – Online Neuroscience about Drug Addiction	University of Washington	Cunningham, Susanna	SEDAPA
55 – B	How Do I Learn: Neurosciences Advances Inform Learning	University of Washington	Cunningham, Susanna	NEURO
56 - A	Addiction Research and Investigation for Science Educators (ARISE)	University of California, Davis	de la Torre, Adela	SEDAPA
56 - B	ARISE	University of California, Davis	de la Torre, Adela	SEDAPA
56 - C	ARISE	University of California, Davis	de la Torre, Adela	SEDAPA
57	Meharry Health Sciences Leadership Academy: IMPACT	Meharry Medical College	Dereimer, Susan	SEPA
58	Changing Brains Through Inquiry, Not Drugs	University of Minnesota Twin Cities	Dubinsky, Janet M	SEPA
59	BRAIN to High Schools	University of Southern Maine	Duboise, S. Monroe	SEPA
60 - A	Drugs, Drug Targets and You: Exploring the Molecular Mechanisms of Drug Abuse	Milwaukee School of Engineering	Herman, Tim M	SEDAPA
60 – B	Teachers FIRST: From Interesting Research to Scientific Teaching	Milwaukee School of Engineering	Herman, Tim M	SEPA
61	Fighting with Food: Battling Chemical Toxicity with Good Nutrition	Miami University Oxford	Hershberger, Susan Ann	SEPA
62	Training Rural/Underserved Youth to Understand and Pursue Scientific Careers	University of Montana	Holian, Andrij	SEPA
63	Biomedical Explorations: Bench to Bedside	University of Florida	Koroly, Mary Jo	SEPA
64 – A	Critical Appraisal to Improve Neuroscience Education (CAINE)	University of Texas Health Science Center San Ant <u>onio</u>	Lichtenstein, Michael J	SEDAPA

Teacher Professional Development Cont.

64 – B	Positively Aging: Maximizing the Healthspan	University of Texas Health Science Center San Antonio	Lichtenstein, Michael J	SEPA
65	Pacific Education and Research for Leadership in Science (PEARLS)	University of Hawaii at Manoa	Withy, Kelley	SEPA
66	Climate Change and Patterns of Vector- Borne Disease: Development of Translational Science Curricula	Yale Peabody Museum	Munstermann, Leonard E	SEPA
67	Birmingham Science Education Partnership: Middle School Inquiry- Based Learning	University of Alabama at Birmingham	Wyss, J Michael	SEPA

Technology – Infused Education Materials

Poster #	Project Name	Institution	Contact PI	Funder
68	It's Complex! Engaging Student Discussions around Complex Genetics and Individuals	Hudson-Alpha Institute for Biotechnology	Lamb, Neil	SEPA
69	Bioscience Montana: Engaging 4-H Teens With Bioscience Research	Montana State	Obbink, Kimberly	SEPA
70	Virtual Sprouts: Web-based Gardening Games to Teach Nutrition and Combat Obesity	University of Southern California and California Science Center	Spruit-Metz, Donna	SEPA
71 – A	The Neuroscience of Our Senses	University of Utah	Stark, Louisa A	NEURO
71 – B	Your Body's Microbial Ecosystem: Web- based Curriculum for Secondary Science	University of Utah	Stark, Louisa A	NIAID
71 – C	Inside Your Body	University of Utah	Stark, Louisa A	SEPA
72	Translating Translation and Scientific Questioning in the Global K-12 Community	University of Arizona	Witte, Marlys H	SEPA
73	Meta!Blast: An Immersive Interactive Learning Module for Cell Biology	Iowa State University	Wurtele, Eve S	SEPA



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University of Nebraska Lincoln

University of Utah



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Mike Fenzel Montshire Museum of Science

Laurie Fink Science Museum of Minnesota





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