



SEPA

SCIENCE EDUCATION
PARTNERSHIP AWARD

Supported by the National Center for Research Resources, a part of the National Institutes of Health

2010 Annual Conference Birmingham Alabama

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Overview

The SEPA 2010: NCRR Science Education Partnership Award Annual Conference was held April 11-14 in Birmingham, AL. Principal Investigators, staff, evaluators, and teachers from 81 SEPA projects as well as NIH NCRR staff members and other interested individuals participated in the Conference; a total of 200 individuals attended.

The Conference theme, “Networking: SEPA Projects and Partnerships” was addressed in plenary and breakout sessions. The Conference also provided opportunities for updates by NIH staff, panel presentations by teachers and students who are involved in SEPA projects, sharing educational materials that SEPA projects have developed, discussing evaluation methods and tools, networking and information exchange among SEPA projects.

Conference Organizing Committee

Jeanne Chowning - Northwest Association for Biomedical Research

Marsha Matyas - American Physiological Society

Cheryl McCallum - Houston Children’s Museum

Louisa Stark - University of Utah

Martin Weiss - New York Hall of Science

J. Michael Wyss - University of Alabama at Birmingham

Conference Supported By

NIH NCRR Grant R13 RR024901

Louisa A. Stark, PhD

Principal Investigator

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SEPA 2010: Annual NCRR Science Education Partnership Award Conference

McWane Science Center I Doubletree Hotel
Birmingham, AL
April 11-14

Schedule

Sunday, April 11 – Doubletree Hotel

- 6:00 - 8:00pm Early Conference Check-in
Rooms: Centennial I & II
- 6:00 - 7:30 Welcome Reception
- 7:30 - 9:00 Satellite Session: **National Association of Health and Science Education Partnerships (NAHSEP) Business Meeting**
Room: Heritage 2
NAHSEP is the professional organization for individuals and programs engaged in health and science education partnerships. Membership is free. Everyone is invited to attend

Monday, April 12 – McWane Science Center

Note: Students engaged in University of Alabama at Birmingham SEPA programs will be in the McWane Science Center labs 8:00am-2:30pm. Conference participants are welcome to observe through the glass walls.

All sessions held in the Special Events Space, 3rd floor, unless otherwise noted

- 7:00 - 8:15am Buses between Doubletree Hotel and McWane Science Center
- 7:15 - 8:30 Late Conference Check-in (area outside Special Events Space)
Buffet Breakfast
Poster set-up (area outside Special Events Space)
- 8:30 - 8:45 **Welcome from the SEPA 2010 Conference Organizing Committee**
Louisa A. Stark, University of Utah
- Welcome from the University of Alabama at Birmingham**
J. Michael Wyss, University of Alabama at Birmingham
- Conference Schedule and Logistics**
- 8:45 - 9:30 **SEPA Program Overview and Update**
L. Tony Beck, NIH NCRR SEPA Program Officer
- SEPA Website Upgrade**
William Sanns, University of Texas Health Science Center at San Antonio
- 9:30 - 10:00 Break

10:00 - 12:00	Keynote Presentation: WHY US? Left Behind and Dying Film followed by panel discussion with: Claudia Pryor , Diversity Films Tamira Noble , Student Jahdiel Lowry , Student Kathryn Kailikole , Louis Stokes Institute for Opportunity in STEM Education, Council for Opportunity in Education
12:00 - 1:15	Lunch SEPA Project Mentor-Mentee groups meet over lunch
1:15 - 2:00	Poster Session 1 (area outside Special Events Space) Speed networking at posters first 10 minutes
2:00 - 2:05	Move to Breakout Sessions
2:05 - 2:50	Breakout Sessions: SEPA Work Groups Models for Building Stronger SEPA-CTSA Connections and Sharing Resources Room: Special Events Space, left side (as one faces the front) Partnering with Historically Black Colleges and Universities Room: Special Events Space, right side (as one faces the front) Diabetes/Obesity/Cardiovascular (SEPA DOC) Room: Classroom 301 Partnering with Native American Communities Room: Classroom 302 Viruses and Infectious Diseases: Exploring Collaboration Room: Classroom 303 Working Group for Program Managers/Coordinators Room: Classroom 304 Networking Among SEPA Projects in the Western US Room: Regions Room, Mezzanine Level
2:50 - 3:00	Break
3:00 - 3:45	Poster Session 2 (area outside Special Events Space) Speed networking at posters first 10 minutes

3:45 - 4:00

Break

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4:00 - 5:30

Scholarship Recipient Panel Discussion

Nadina Aversa, Northern High School, Flint, MI

Rebecca Burg, Dixon School, Dixon, MT

Regina Cowan, Cooley High School, Detroit, MI

Daniel Crockett, West Virginia Higher Education Policy Commission

Karen Deboer, Kettle Moraine High School, Milwaukee, WI

Bruce Evje, West Warwick High School, Warwick, RI

Judi gaiashkibos, Nebraska Commission on Indian Affairs

Charles Geach, El Paso Independent School District, El Paso, TX

Roxanne Hammonds, McAuliffe Middle School, San Antonio, TX

Eugene Roundtree, Madison Park Technical and Vocational High School, Boston, MA

Margaret Shain, St. Joseph School, Corydon, IN

Lynn Tarant, Charles Riley Public School #9, Paterson, NJ

Moderator: Jeanne Chowning, Northwest Association for Biomedical Research

5:30 - 6:00

Networking – 2nd floor, McWane Science Center

6:00 - 8:00

Dinner and Networking – 2nd floor, McWane Science Center

Hands-on labs with University of Alabama at Birmingham SEPA project

5:30 - 8:15

Buses run between McWane Science Center and Doubletree Hotel

Tuesday, April 13 – McWane Science Center

Note: University of Alabama at Birmingham SEPA students will be in McWane Science Center labs 8:00am-2:30pm. Conference participants are welcome to observe through the glass walls.

All sessions held in the Special Events Space, 3rd floor, unless otherwise noted

7:00 - 8:15am

Buses between Doubletree Hotel and McWane Science Center

7:15 - 8:30

Buffet Breakfast

PI meeting for all new SEPA projects (required for new PIs only)

L. Tony Beck, NIH NCRR SEPA Program Officer

Room: Classroom 304

8:30 - 9:15

Valuable Tools from Recent NRC and NSF Reports on ISE Evaluation

Cecelia Garibay, Garibay Group

9:15 - 9:45

Update on the SEPA Evaluation Feasibility Study

Joy Frechtling, Westat

9:45 - 10:00	Break
10:00 - 10:45	Human Subjects Research Primer for Investigators Maria Stagnitto, NIH Extramural Human Research Protection Officer and NIH Extramural Research Integrity Liaison Officer
10:45 - 11:15	Enhancing the NIH Peer Review Process Bonnie B. Dunn, Scientific Review Officer, NIH NCRR
11:15 - 11:25	Networking Requests <i>Participants who would like to discuss a specific topic or challenge with others during meals or breaks may make a 30-second request</i>
11:25 - 11:30	Move to posters
11:30 - 12:15	Poster Session 3 (area outside Special Events Space) Speed networking at posters first 10 minutes
12:15 - 1:15	Lunch
1:15 - 2:30	Breakout Sessions: Outcome Models and Impact Frameworks: How To (Evaluation; ISE) Room: Special Events Space Mock IRB Review (NIH) Room: Classroom 301 How to Transition from Programming to Publishing (Dissemination) Room: Classroom 302 Using Web 2.0 (Networking; Dissemination) Room: Classroom 303 Inside Cancer: A Multimedia Guide to Cancer Biology (Sharing Materials - high school) Room: Classroom 304 Using Cognitive Interviews to Assess Instrument Quality (Evaluation) Room: Regions Room, Mezzanine Level
2:30 - 2:45	Break

Evaluation 101 (Evaluation)**Room:** Special Events Space**NIH Office of Scientific Review: Continued Discussion** (NIH)**Room:** Classroom 301**The SBIR and STTR Grant Programs** (NIH)**Room:** Classroom 302**Choice, Control & Change: Using Science to Make Food and Activity Decisions** (Sharing Materials – middle school)**Room:** Classroom 303**Howtosmile.org: An Avenue for Disseminating Your Project's Activities?**

(Dissemination; ISE)

Room: Classroom 304**Design and Evaluation of Student Assessments Related to SEPA Projects** (Evaluation)**Room:** Regions Room, Mezzanine Level

4:00 - 4:15

Break

Take down posters

4:15 - 5:15

University of Alabama at Birmingham SEPA Teacher and Student Panel

Spencer Horn, Director of Science

Sandra McKell, Curriculum Support Science Teacher

LaRhonda Brown, Science Teacher, W.J. Christian K-8 School

Kaylin Brown, 7th Grade StudentJoleshia Simpson, 7th Grade StudentJacy Stanford, 8th Grade StudentDarrius Robinson, 8th Grade Student**Moderator:** J. Michael Wyss, University of Alabama at Birmingham

5:15 - 8:15

Buses run in a loop with the following stops: (1) McWane Science Center, (2) Birmingham Civil Rights Institute, (3) Doubletree Hotel

5:30 - 8:00

Birmingham Civil Rights Institute

Heavy hors d'oeuvres buffet and time to explore the exhibits

- 7:00 - 8:00 Buffet Breakfast – Heritage II
[Note: Breakfast is ½-hour earlier than the previous 2 days]

Plenary sessions in Heritage I
- 8:00 - 8:15 **New Genomic Careers Online Resource**
Carla Easter, NIH National Human Genome Research Institute
- 8:15 - 9:00 **National Lab Day and US Science Festival**
L. Tony Beck, NIH NCRR SEPA Program Officer
- 9:00 - 9:15 Break
- 9:15 - 10:30 **Breakout Sessions:**
- Facilitating Science and Health Career Exploration** (Networking)
 Room: Heritage I
- Instruments for Assessing Overall Abilities in Science as Inquiry, Science and Health Literacy, and 21st Century Skills** (Evaluation)
 Room: Heritage II
- Best Practices for Teacher Professional Development**
 (Best Practices; Networking)
 Room: Centennial I
- Using Formative Evaluation: If We Design It Will They Learn?** (Evaluation; ISE)
 Room: Centennial II
- Attain, Maintain and Sustain Successful Partnerships with K-12 Schools, Teachers and Districts** (Best Practices; Partnerships)
 Room: University
- It's Not Just Teaching Science, It's Using Science to Teach Thinking**
 (Sharing Materials; grades 7-12)
 Room: Arlington
- 10:30 - 10:45 Break
- 10:45 - 12:00 **Breakout Sessions:**
- Online and On Target: Enhancing Successful Development and Use of Online K-12 Curriculum Materials** (Networking)
 Room: Heritage I

10:45 - 12:00

Breakout Sessions:

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Promoting Institutional Awareness of Educational Outreach Activities and Changing Institutional Culture (Networking)

Room: Heritage II

Rigorous Evaluation Models: Randomized Controlled Trials and Closely-Matched Comparison Studies (Evaluation)

Room: Centennial I

Teaching Workshops for Scientists: Supporting Scientist Volunteers and Promoting Successful K-12 Partnerships (Partnerships)

Room: Centennial II

Organizing Lifespan – Mobility, Obesity and Diabetes Lessons from Positively Aging® (Sharing Materials – middle school)

Room: University

Educating About Concepts That Cannot Be Perceived Directly with Human Senses: A Dialog (Networking)

Room: Arlington

12:00 - 1:00

Lunch

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Breakout Session Descriptions

Breakout sessions are organized into the following strands. Strands are noted in parentheses after each session title

- Dissemination
- Best Practices
- Evaluation
- Informal Science Education (ISE)
- Networking
- NIH Programs and Staff
- Partnerships
- Sharing Materials
- Working Groups

Monday, April 12 2:05 - 2:50 Working Groups

Models for Building Stronger SEPA-CTSA Connections and Sharing Resources

SEPA programs have a unique wealth of resources to share with CTSA nationwide. Some of these connections are facilitated when staff are shared between an institutions SEPA program and the community-based research component of their CTSA. This session will explore alternative models where museum-based and independent SEPA projects have found unique ways to leverage their resources in support of the mission of their local and the national CTSA network.

Facilitators: William Cameron, Oregon Health & Science University
Marilyn Johnson, Oregon Museum of Science and Industry

Room: Special Events Space, left side (as one faces the front)

Partnering with Historically Black Colleges and Universities

Promoting diversity in many areas (student population, faculty ranks, staff, etc.) is a key goal at nearly every university today. One way to begin to tackle the uneven playing fields in the sciences and mathematics, with a relatively short turn-around time, is to establish partnerships with Historically Black Colleges and Universities (HBCU's), which provide immediate access to many promising undergraduates. This session will discuss the positives of such relationships, accompanied by the potential pitfalls that faculty must be alerted to in order to ensure the sustainability and growth of such partnerships. What are the best practices in approaching and growing such partnerships? How does one sustain such activities while simultaneously evoking the support of administrators? It is hoped that participants will highlight their experiences as they relate to establishing this most critical of collaborations/partnerships germane to the success of the SEPA program.

Facilitator: Michael Chorney, Pennsylvania State College of Medicine

Room: Special Events Space, right side (as one faces the front)

Diabetes/Obesity/Cardiovascular (SEPA DOC)

Sharing and Strategy Session for Members Old and New. Is your SEPA trying to educate about and/or help prevent diabetes, obesity or cardiovascular disease? Are you teaching students about the importance of balancing the energy they take in with the energy they use? This session will provide D.O.C SEPAs a face-to-face opportunity to discuss potential collaborations and common ground. We will recharge our enthusiasm for working together and make concrete action plans to continue to work together throughout the coming year.

Facilitators: Virginia Carraway-Stage, East Carolina University

Pamela Koch, Teachers College, Columbia University

Wendy Huebner, Montclair State University

Room: Classroom 301

Partnering with Native American Communities

Establishing and maintaining partnerships between academic institutions and Native American communities requires a sustained relationship built on trust. This session will bring together SEPA grantees and community partners to discuss their experiences in building successful partnerships.

Facilitator: Maurice Godfrey

Panel: Judi gaiashkibos, Nebraska Commission on Indian Affairs

Rebecca Burg, Dixon Elementary School, MT

Kelley Withy, University of Hawaii at Manoa

Room: Classroom 302

Viruses and Infectious Diseases: Exploring Collaboration

This session offers the opportunity for SEPA projects that focus on viruses and infectious disease to share resources and plan future collaborations.

Facilitator: Judy Diamond, University of Nebraska State Museum

Room: Classroom 303

Working Group for Program Managers/Coordinators

Share your experience in the day-to-day responsibilities of running your SEPA project, and your professional growth in working with the Principal Investigator. Identify the challenges and needs of your position, as well as the strategies for building and sharing your network of resources, programs, and colleagues.

Facilitator: Mel Limson, American Physiological Society

Room: Classroom 304

Networking Among SEPA Projects in the Western US

Get to know other western US SEPA projects and discuss potential ways to collaborate.

Facilitator: Marilyn Winkleby, Stanford University School of Medicine

Room: Regions Room, Mezzanine Level

Tuesday, April 13 1:15 - 2:30

Outcome Models and Impact Frameworks: How To (Evaluation; ISE)

Articulating and measuring outcomes can be challenging. In this working session, participants will practice the NSF ISE outcome framework with their projects or others. Garibay will introduce the framework and examples, coach participants as they develop their own outcomes and measurement approaches and then highlight some common pitfalls and also examples from the session.

Presenter: Cecilia Garibay, Garibay Group

Room: Special Events Space

Mock IRB Review (NIH)

In this session we will review an active study protocol and consent and follow the IRB Protocol Review Standards in assessing the protocol/consent for risks, benefits, protection and knowledge gained.

Presenter: Maria Stagnitto, NIH Extramural Human Research Protection Officer
and NIH Extramural Research Integrity Liaison Officer

Room: Classroom 301

How to Transition from Programming to Publishing (Dissemination)

Publishing the results of our SEPA work offers a number of benefits beyond meeting the expectations of colleagues, institutions, and the broader community. For example, by opening up our work to peer review and critique, we can expand our thinking and use feedback to make improvements in our science education scholarship. Also, thanks to Google Scholar, a host of readers both within and beyond our discipline can learn from our work. Yet, finding time to publish and making the leap to publishing in disciplines beyond those in which we were trained is not trivial. This breakout session will bring together panelists who have published their SEPA work in peer-reviewed journals of health, science, science teaching, and science education research, including CBE – Life Sciences Education, International Journal of Science Education, Journal of the American Medical Association, Journal of Science Education and Technology, and The Science Teacher. The session will include small-group discussion about the challenges of publishing SEPA-related work, and large-group Q&A with panelists regarding how they overcame similar challenges.

Facilitator: Erin Dolan, Virginia Tech – editor-in-chief elect of CBE – Life Sciences Education, a peer-reviewed, online journal of life science education published by the American Society for Cell Biology

Panelists: Michael Lichtenstein, University of Texas Health Sciences Center at San Antonio

Dina Markowitz, University of Rochester Medical Center

Marilyn Winkleby, Stanford University

Room: Classroom 302

Using Web 2.0 (Networking; Communication)

Many SEPA projects have an associated web site, but is your project using web 2.0? YouTube, Twitter, Flickr, wikis, and blogs are some of the many ways we can use the web to reach out to our audiences and have them reach back. In this session we will share approaches to using web 2.0 -- what has worked and what has fallen short of expectations.

Facilitators: Theresa Britschgi, Seattle Biomedical Research Institute

Erika Shugart, Marian Koshland Science Museum of the National Academy of Sciences

Panelists: Peter Crown, University of Arizona College of Medicine

Darrell Porcello, Lawrence Hall of Science

Room: Classroom 303

Inside Cancer: A Multimedia Guide to Cancer Biology (Sharing Materials – high school)

Authoritative interviews and animations take students inside modern cancer research to learn what goes wrong inside cancer cells — and how these insights are leading to rational treatments tailored to counter specific defects in tumors. A three-dimensional tour follows a growth signal as it moves from the cell membrane, through the cytoplasm, to the nucleus, and back out again — highlighting the many points at which normal growth signals are hijacked in cancer cells. A Teacher Center includes a search tool for building multimedia presentations, a wiki-based lesson editor, and a concept matrix that aligns Inside Cancer content to educational standards. A blog provides connections to current news about cancer research, treatment, and prevention. <http://www.insidecancer.org/>

Presenter: Bruce Nash, Dolan DNA Learning Center, Cold Spring Harbor Laboratory

Room: Classroom 304

Using Cognitive Interviews to Assess Instrument Quality (Evaluation)

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Crafting the perfect assessment item isn't easy. It can be challenging enough to identify exactly what you want to measure, and more challenging still to ensure your items are written in a way that students can easily understand. In other words, after you've drafted your items, how can you be sure they're valid for the population you'll be measuring? This session will introduce the "cognitive interview" technique, in which a researcher asks a student to think out loud while answering an item. The interviews provide evidence for construct validity by revealing the skills and knowledge that students are using in item responses. This is especially relevant for multiple choice items because students may be able to use general test-taking strategies to identify a correct answer, even if they know nothing about the content being tested.

In this session, you'll learn how to use cognitive interviews to see if an item is working as expected for a particular population, thereby capturing the type of information needed to make informed decisions. We'll first model the technique and then give you the opportunity to practice it in pairs or small groups. We'll conclude with a large-group discussion to reflect on the interviews and decide whether or not the particular items being tested were measuring what they were intended to measure.

Presenters/Facilitators: Kristin M. Bass, Rockman et al

Dina Drits, University of Utah

Room: Regions Room, Mezzanine Level

Tuesday, April 13 2:45 - 4:00

Evaluation 101 (Evaluation)

An overview of evaluation basics, with examples from curriculum development and teacher professional development programs. Topics will include aligning evaluation plans with project objectives, setting evaluation priorities and designing for rigor.

Presenters: Marsha Matyas, American Physiological Society

Nancy Moreno, Baylor College of Medicine

Room: Special Events Space

NIH Office of Scientific Review (NIH)

Continued discussion about scientific review of NIH grant proposals.

Presenter: Bonnie B. Dunn, Scientific Review Officer, NIH NCRR

Room: Classroom 301

The SBIR and STTR Grant Programs (NIH)

This session will provide an overview of the NCRR Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grant programs. These programs provide an avenue for SEPA grantees to commercialize the products they have developed.

Presenter: Krishan Arora, Program Officer, NIH NCRR SBIR and STTR Programs

Panel: Jeanne Chowning, Northwest Association for Biomedical Research

Dina Markowitz, University of Rochester Medical Center

Room: Classroom 302

Choice, Control & Change: Using Science to Make Food and Activity Decisions (Sharing Materials – middle school)

At this workshop you will learn inquiry-based activities for middle school students that deeply engage them in scientific evidence with the goal of motivating them to move toward more healthful food and activity choices in their daily lives. Then, learn how you can teach students goal setting and self-regulation skills through collecting, analyzing and monitoring data on their own food intake and physical activities.

Presenters: Isobel R. Contento, Teachers College, Columbia University

Pamela Koch, Teachers College, Columbia University

Room: Classroom 303

Howtosmile.org is a website that allows educators to easily locate high-quality, hands-on activities across multiple disciplines and contributing institutions. Led by the Lawrence Hall of Science at UC Berkeley, Howtosmile.org is the home of the SMILE (Science and Math Informal Learning Educators) pathway, a national partnership among science and technology centers, museums, community-based organizations, and out-of-school educators. In this breakout session, meet the SMILE PI and learn how to use this newly developed NSF-funded cyberlearning platform to disseminate your learning activities to educators working with children from diverse backgrounds in all settings!

Presenter: Darrell Porcello, Lawrence Hall of Science

Room: Classroom 304

Design and Evaluation of Student Assessments Related to SEPA Projects (Evaluation)

NCLB has placed a focus on student performance issues. Many SEPA projects must implement student assessments. When training teachers in diverse schools who may implement programmatic materials in different ways or to different degrees, how do we assess student performance? The workshop will be an open discussion of the experiences, successes and failures of different strategies used by different groups.

Facilitator: Janet Dubinsky, University of Minnesota

Room: Regions Room, Mezzanine Level

Wednesday, April 14 9:15 - 10:30

Facilitating Science and Health Career Exploration (Networking)

A major component of SEPA is support for stimulating and encouraging careers in science and health related segments of the economy. In this session, models for science and health career exploration will be presented by Great Lakes Science Center and the NIH National Human Genome Research Institute. An open forum discussion will follow with attendees sharing aspects of their projects. Emphasis will be given to approaches used by informal institutions like science centers and hospitals and formal ones such as government agencies and universities.

Facilitators: Val Davillier, Great Lakes Science Center

Carla Easter, NIH National Human Genome Research Institute

Room: Heritage I

Instruments for Assessing Overall Abilities in Science as Inquiry, Science and Health Literacy, and 21st Century Skills (Evaluation)

There is general interest in the SEPA community in defining testable, generic aspects of abilities in science as inquiry, scientific and health literacy, and related aspects of 21st Century skills such as innovation and information/media literacy. Validated instruments to assess these abilities would enhance the impact assessments of many SEPA projects where well-controlled studies are feasible. This topic will be explored by discussing several questions (below). Desired outcomes of the session include information about currently available instruments, identification of gaps, and determination of constructive steps and strategies to fill these gaps.

- What are the characteristics of generic skills and abilities that potentially could be tested in a generic way?
- What generic instruments for evaluating middle and high school students are available (if any) that could be applied to SEPA project evaluations?
- What are the gaps in the availability of appropriate tools, and what are the barriers to their development?

Is there impetus for SEPA-supported development of such instruments?

Facilitator: Wendy Huebner, Montclair State University

Room: Heritage II

Best Practices for Teacher Professional Development (Networking)

Participate in a discussion with panelists about the best ways to create, provide, and evaluate professional development experiences for middle and high school teachers that result in SEPA resources being infused into curricula

Facilitators: Jeanne Chowning, Northwest Association for Biomedical Research

Mark Kaelin, Montclair State University

Margaret Shain, St. Joseph School, Corydon, IN

Lynn Tarant, Charles Riley PS # 9, Paterson, NJ

Room: Centennial I

Using Formative Evaluation: If We Design It Will They Learn? (Evaluation; ISE)

In this session we will explore the use of formative evaluation to develop more effective programs and exhibits. We will highlight our successes as well as the pitfalls of effective formative evaluation through informal presentations of formative evaluation studies.

Facilitator: Martin Weiss, New York Hall of Science

Panelists: Vicki Coats, Oregon Museum of Science and Industry

Lucia Enricone, Miami Science Museum

Ann Lambros, Wake Forest School of Medicine

Laura Martin, Arizona Science Center

Cheryll McCallum, Children's Museum of Houston

Judith Ned, Stanford University School of Medicine

Molly Phipps, Science Museum of Minnesota

Kalyani Raghavn, University of Pittsburgh

Heather Reddick, University of Texas MD Anderson Cancer Center

Virginia Shepherd, Vanderbilt University

Room: Centennial II

Attain, Maintain, and Sustain Successful Partnerships with K-12 Schools, Teachers and Districts

(Partnership)

See your project through the lens of K-12 partners and put in place relationships, structure and policies for success. Go beyond a "handshake" to hook into current needs in K-12 and insure a positive working relationship with schools and districts. Tackle tough topics such as recruitment; effective utilization and integration of curriculum materials, alignment with local standards and school improvement efforts and evaluation issues.

Facilitator: Judi Wilson, San Joaquin County Office of Education

Room: University

It's Not Just Teaching Science, It's Using Science to Teach Thinking

(Sharing Materials – grades 7-12)

Knowing what to do when we don't have an answer is a significant aspect of science. CityLab has been exploring and developing methods for teaching students habits of mind that foster scientific thinking strategies. While the workshop will focus on examples from the biosciences, the strategies are content independent and applicable across disciplines. Preliminary findings suggest that the strategies offer the most potential for underachieving students.

Presenters: Carla Romney, Boston University School of Medicine

Carl Franzblau, Boston University School of Medicine

Don DeRosa, Boston University School of Medicine

Room: Arlington

Online and On Target: Enhancing Successful Development and Use of Online K-12 Curriculum Materials

Online curriculum for K-12 teachers and schools presents both opportunities and challenges. In this session, panelists will address two major questions related to online curriculum materials: What are the needs of the K-12 community? and How can online curriculum be structured to enhance use? Panelists will offer successful approaches as well as raise issues and questions related to online curriculum development and delivery.

Facilitator: Jodie Galosy, University of California, Davis

Panelists: Laura Martin, Arizona Science Center

Marco Molinaro, University of California, Davis

Judi Wilson, San Joaquin County Office of Education

Room: Heritage I

Promoting Institutional Awareness of Educational Outreach Activities and Changing Institutional Culture

This session will promote the exchange of ideas related to building an outreach initiative that seeks to rival the existing institutional mission by drawing from the myriad of ideas and energies that naturally exist in institutions of higher learning; simultaneously, the occasional problems of institutional pushback and apathy will be broached in order to understand best practices applied toward positive growth of outreach programs. Questions we might consider include: In those institutions who are only now undertaking the growth of outreach activities, how do faculty/staff/students coordinate their efforts to achieve efficiency, promote awareness, and avoid redundancy of efforts? How does one obtain buy-in from leadership while simultaneously effecting cultural changes in which the predominant view is that outreach activities, even supported by extramural funds, are inferior to research grants? Concomitantly, how does one attract institutional funds to enhance program growth and sustainability?

Facilitator: Michael Chorney,

Pennsylvania State College of Medicine

Room: Heritage II

Rigorous Evaluation Models: Randomized Controlled Trials and Closely-Matched Comparison Studies (Evaluation)

This session will provide an overview of the purpose and goals of conducting rigorous evaluations of educational interventions using randomized controlled trials (RCTs) and closely-matched comparison studies. Further, the session will provide guidance on the appropriate types of measurements and analyses in these types of evaluation studies. Panelists will briefly share their experiences with rigorous designs and then facilitate small and large-group discussions on conceptual, statistical and practical issues surrounding these kinds of evaluations.

Panelists: Kristen Bass, Rockman et al

Dina Drits, University of Utah

Martin Weiss, New York Hall of Science

Room: Centennial I

Teaching Workshops for Scientists: Supporting Scientist Volunteers and Promoting Successful K-12 Partnerships

One of the aims of SEPA broadly is to create partnerships among biomedical and clinical researchers and K-12 teachers and schools. While many researchers are enthusiastic about working with K-12 teachers and students, the last time most research scientists were in a K-12 classroom was when they themselves were students. They thus have a limited understanding of how to effectively support classroom teachers and how to design meaningful, age appropriate, science-learning experiences, based on research about how students learn science. With SEPA support, the UCSF Science & Health Education Partnership (SEP) has designed a 9-hour workshop series for researchers, specifically designed to prepare researchers for classroom-based partnerships. This breakout session will introduce other SEPA projects to the Scientist Teaching Workshop curriculum by actively engaging participants in hands-on activities from the workshop series, as well as meta-level discussions that will discuss the workshop syllabus, the research supporting use of particular techniques in classroom, and evaluation data that suggest the workshops are a powerful means of introducing scientists to research-based science teaching techniques.

Presenters: Sabine Jeske, University of California San Francisco

Katherine Nielsen, University of California San Francisco

Room: Centennial II

Optimizing the Lifespan – Mobility, Obesity, and Diabetes Lessons from Positively Aging® (Sharing Materials – middle school)

In this hands-on workshop, participants will explore links between aging and mobility, obesity, and diabetes. Try role play through the eyes of ‘Sedentary Stan’ or ‘Dr. Langerhans,’ help ‘Granny Up the Ramp’ and ‘Gauge Your Gait,’ or decide how to a ‘Fat Minder’ off your waist! Health Science Content: physics of movement; relationship between energy intake and use; signs, symptoms, and complications of diabetes.

Presenters: Linda Pruski, University of Texas Health Science Center at San Antonio

Roxanne Hammonds, Southwest Independent School District

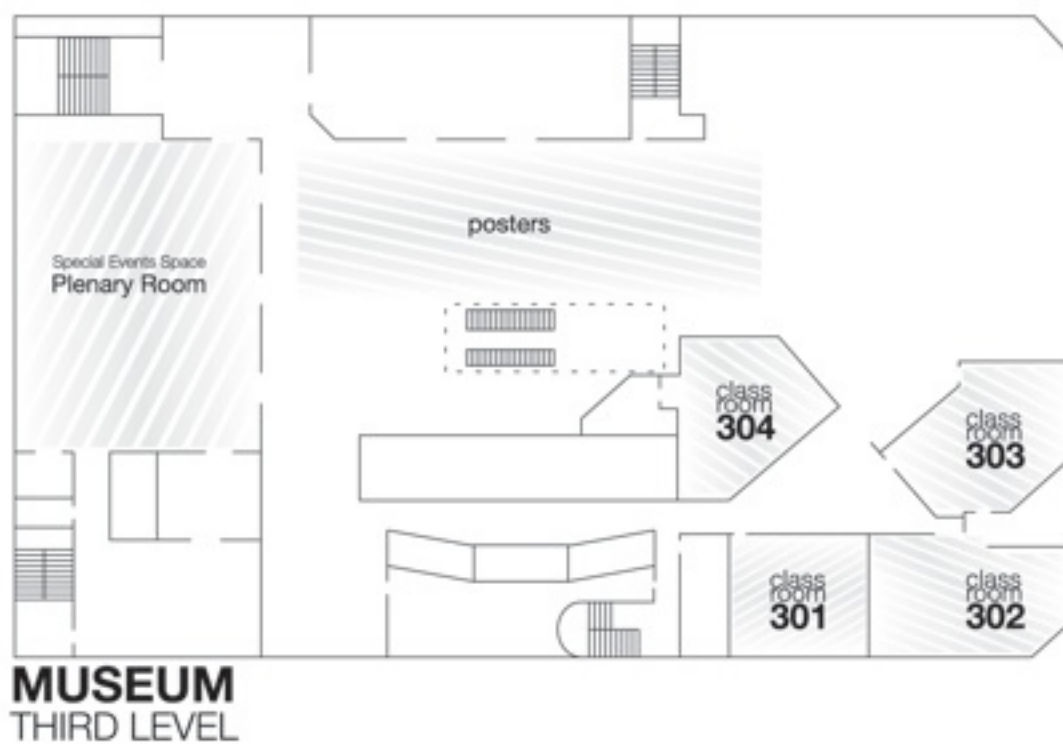
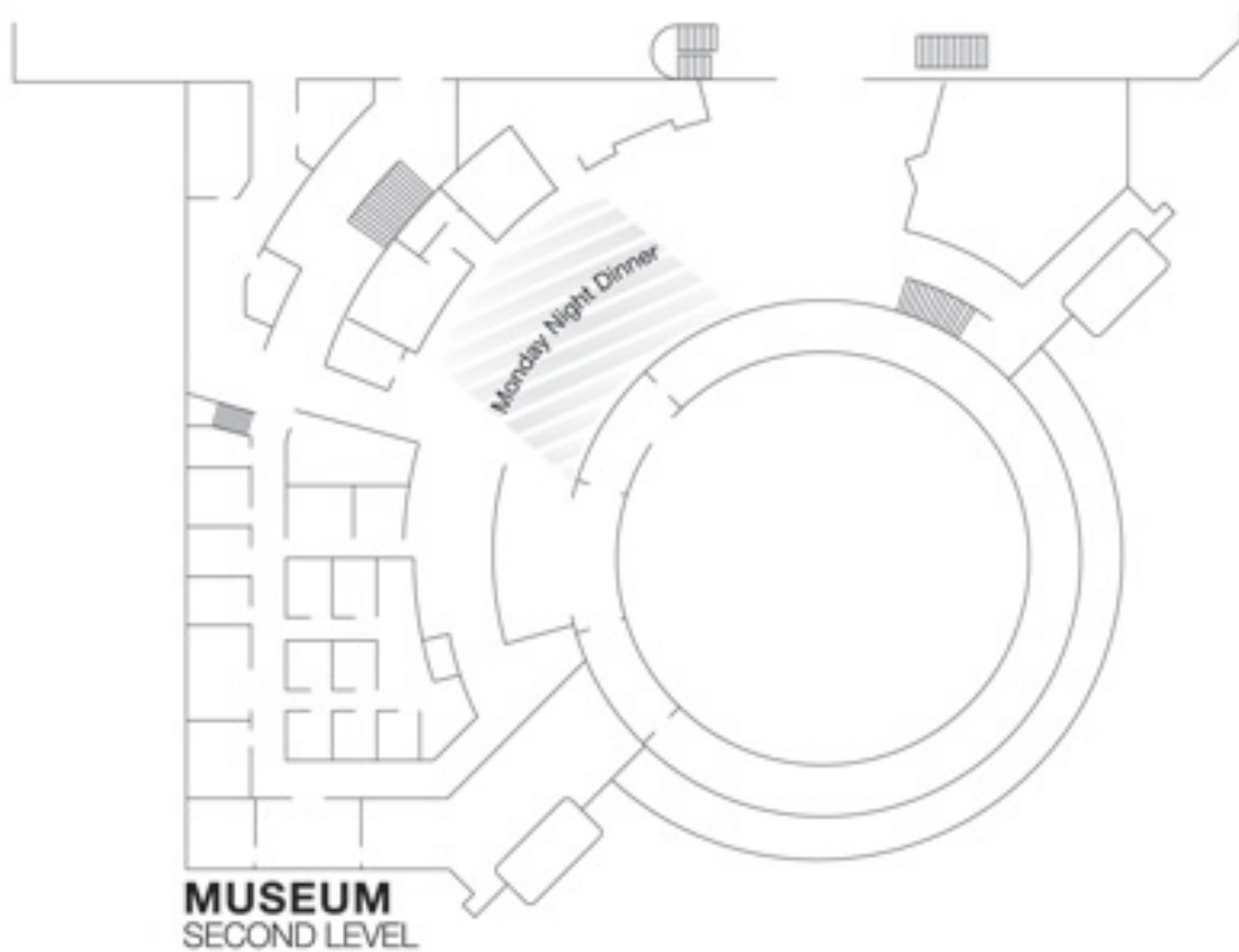
Room: University

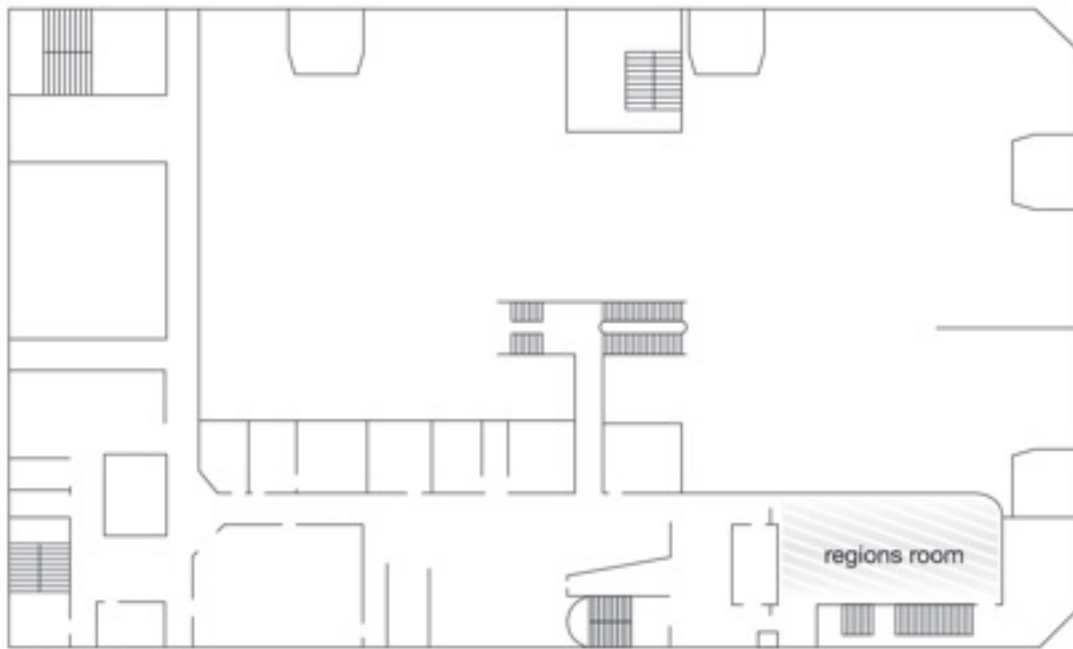
Educating About Concepts That Cannot Be Perceived Directly With Human Senses: A Dialogue

Most of us can see a forest, smell and see and feel a flower, hear a cry of distress, taste a grapefruit. However, many concepts that are central to STEM education cannot be directly perceived. These include space, time, molecular chemistry, and mathematics. What methods are researchers using that are proving effective? Participants should feel free to bring appropriate examples of teaching methods.

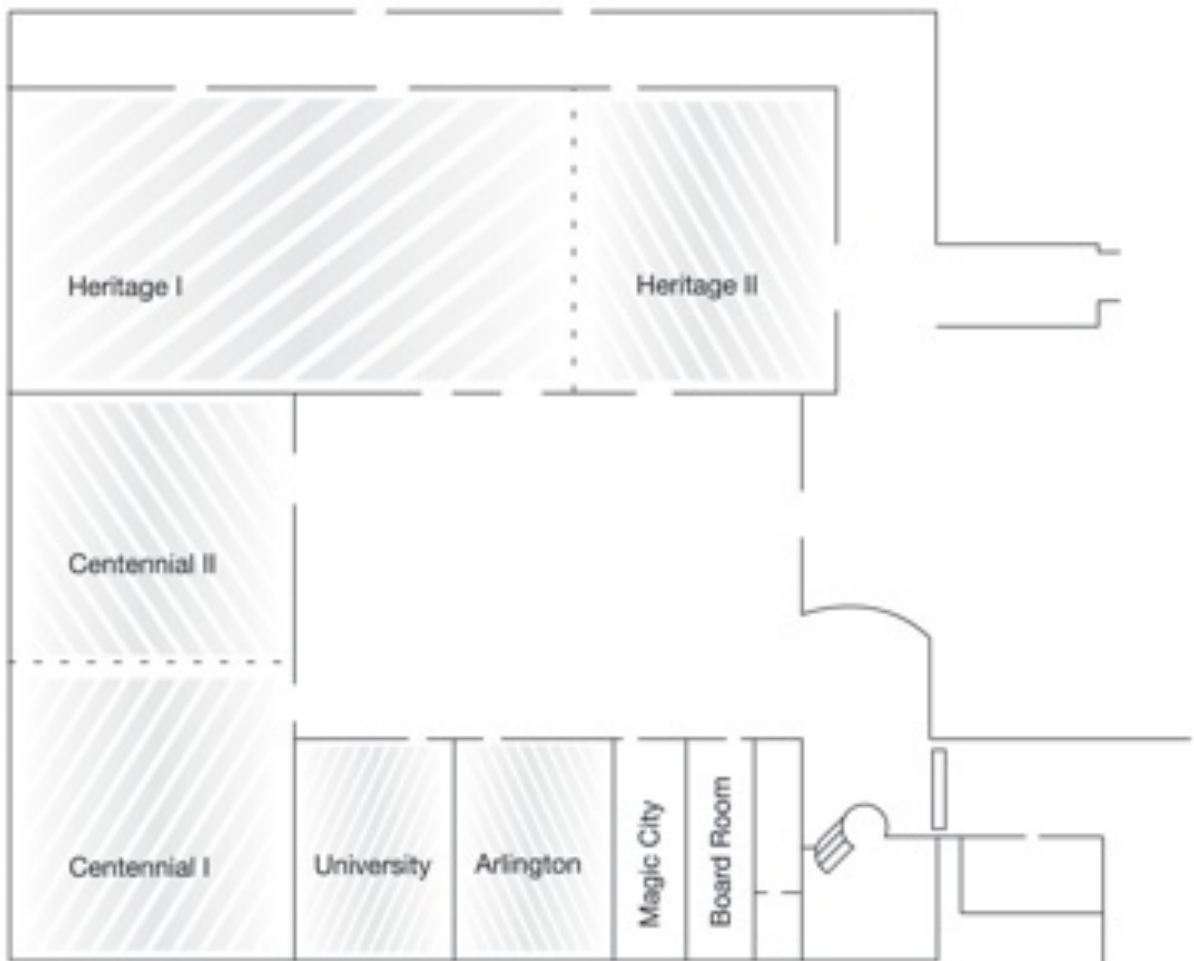
Facilitator: Eve Wurtele, Iowa State University

Room: Arlington





MUSEUM
MEZZANINE LEVEL



Doubletree
Hotel

Monday, April 12 8:45 - 9:30

SEPA Program Overview and Update

L. Tony Beck - NIH NCRR SEPA Program Officer

Reported by: **J. Michael Wyss** - University of Alabama at Birmingham

Overview

Tony Beck opened the 2010 SEPA meeting off with an exciting overview and update of the SEPA program. Overall, the SEPA budget at NCRR has continued to increase each year, due in large part to the outstanding support of Dr. Alving and Tony's exceptional advocacy for the program. 21 new projects were funded this past year and Dr. Alving increased the SEPA budget by \$3M over the FY 2008 – 2011 period. In addition, \$4.2M in NCRR ARRA supplements were funded for SEPA projects. NCRR's SEPA program continues to fund the lion's share of K-12 STEM education at NIH with 77 active projects and is the only NIH source for ISE funding. Further, initial SEPA funding has often provided the seed support for PIs to develop new programs and careers. Also, Tony reported that the SEPA Feasibility Evaluation is nearly completed, thus laying the foundation for a full SEPA program evaluation. The SEPA website is also being greatly improved.

Updates

National Lab Day

Tony also called attention to SEPA's support of National Lab Day(s) and the US Science Festival (National Mall, Oct 2010). All of the SEPA projects are asked to consider ways in which they can actively engage in both programs.

SEPA Partnerships

SEPA partnerships with CTSA remain a very important aspect of the program.

There are currently 47 CTSA's and 27 have SEPAs at the institution or city. Several of these have active partnerships.

There are 23 IDeA states & Puerto Rico and 20 SEPAs are in IDeA states with many collaborations. Eight SEPAs are at RCMI's with several collaborations. Perhaps most importantly, Tony stressed the value of SEPA-SEPA partnerships and asked everyone to form at least two collaborations at the meeting. Many new partnerships & collaborations already exist and new ones facilitate leveraging of SEPA programs into a larger test field and provide proven resources to more teachers and students.



SEPA Website Upgrade

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William Sanns - University of Texas Health Science Center at San Antonio

Reported by: **J. Michael Wyss** - University of Alabama at Birmingham

Bill Sanns from the University of Texas Health Science Center at San Antonio intended to provide a quick update on the SEPA website (<http://ncrrsepa.org/>). Because of lack of time, he only gave a very brief intro.

SEPA Website (Intended Update)

Bill intended to provide the following information: While the site has undergone a tremendous software and hardware update, the functionality has remained virtually unchanged from previous versions. All the work done to date was simply to set the foundation for the next round of development. It is easy to see where we were and understand where we are, but from here, it is really a journey. In this case, it's not about a final destination. The communities that we forge and the good that we do along the way will determine where we go. While he will not "fix anything not broken," he is committed to enhancing functions as new features are added. He was most excited about adding in functionality to allow the website to facilitate collaboration between the SEPA community members through both open and secure environments. In addition, they will be embracing the web 2.0 principles by making the site interactive (e.g., allowing users to create a "mySEPA" experience) and adding in social networking and video production features. For those that would like to provide input, feedback, or just give them your two cents, you can contact Bill at sanns@uthscsa.edu.

10:00 - 12:00

Keynote Presentation: WHY US? Left Behind and Dying

Film followed by panel discussion with:

Claudia Pryor - Diversity Films

Tamira Noble - Student

Jahdiel Lowry - Student

Kathryn Kailikole - Council for Opportunity in Education

Reported by: **Dina Drita** - University of Utah

Film Summary (from Why Us? Left Behind and Dying website: <http://www.diversityfilms.org/>)

"Why Us? Left Behind and Dying" is an in-depth examination of the reasons why HIV rates are disproportionately high in black communities. It was made from the point of view of a small group of inner-city, African-American teenagers, ages 14-17, from Westinghouse High School in Pittsburgh, PA.

The students conduct most of the interviews and one of them narrates it. They participate as "co-researchers" along with the filmmakers. They ask probing and direct questions of scientists, health workers, and people in their own community with HIV and full-blown AIDS. They talked to heterosexuals, homosexuals, and intravenous drug users. The students are also research subjects within the documentary. As the film unfolds, they discuss their ideas and beliefs about HIV as well as their own safe and/or unsafe sexual practices.



To filmmaker: *Showing this movie in schools can be problematic with the explicit language, content, etc. How do you get around this issue in choosing a screening venue?*

I wanted to keep it real. If you can convince districts, especially those with high populations of Hispanic and Black students, that's where you should appeal. We're trying to use cell phone distribution as another means to distribute this film; we can't rely on schools only. This film is not necessarily shown in local high schools in its entirety.

We had a screening in downtown Pittsburgh. Huge turnout, with parents and their children. Great response from students in Pittsburgh.

To filmmaker: *Will you translate this film into any African languages and show it in Africa?*

Yes, we'd like to. We're already translating it into French. We need funding for other translations.

We are planning to distribute to parts of Africa.

To filmmaker: *This film made a major impact on me. It provided a context that is so relevant to SEPA, which is choosing science for a career. Why do students distrust science, and why is considering a career in science such a low priority? How could you use this film to change this?*

Some of the film that did not make it into the final movie relates to this: black students see science as distant, arrogant, not them. Making this movie helped students connect what HIV does and how it operates on a biological and sociological level, and the interplay between these. It shows them that science is connected to their own lives and worlds.



To filmmaker: *How did you decide to do this film and why Pittsburgh?*

Filmmaker talked about her evolution of covering this topic as a reporter from her focus on white gay males to the black community.

To panelists: *How did you convince the students to work with you?*

The filmmaker discussed her process of sitting in classrooms, getting to know students.

The students discussed the fact that they were inquisitive and wanted to learn more about the virus. There was a gift-card incentive. The experience made them more interested in science and in the processes of asking and answering scientific questions.

Kathryn said that Claudia (filmmaker) really approached it like she was interested in what the students know and what they have to teach others.

To filmmaker: *What is a behavioral outcome you'd like to see from this? What behavioral change do you think people are making? Don't keep secrets, don't discriminate, and wear a condom.*

I have never asked the audience members what they will do. But I will. The reaction of the audience is usually, "Oh my god!" They never understood how much self-destruction is going on among the black community and they have never had the experience of looking at the black experience through a virus.

To filmmaker: *How can science come up with a solution to the HIV problem?*

I actually don't see science as the main solution. I see internal solutions as the solution. What will resonate more than science, since people in this community are not scientists, is what they can do, what they can control. We must provide opportunities for communities to engage in these issues that are accessible to the community.

Audience Comments

Students have done well with the science of AIDS in the movie.

Incredibly powerful movie, one of the most powerful I've ever experienced. It addresses so many of the questions that I've been afraid to ask. An important outlet for this movie is through social work and social workers, especially black social work programs. The NIH's National Institutes of Allergy and Infectious Diseases should know about this film. I appreciated the honesty of the film. Important for white, privileged schools to see this film. The broad psychosocial concepts are applicable to all students, not just black students. Suggestions for various venues where this film should be screened. I hope you can next do a film on how to get black students into science. This film has helped us understand one another, and what it actually means to translate science into different contexts for different people. Outstanding film! This film is great for highlighting the problem. The next film could focus on the solution.

BREAKOUT SESSIONS

Monday, April 12 2:05 - 2:50

Models for Building Stronger SEPA-CTSA Connections and Sharing Resources

Facilitators: **William Cameron** - Oregon Health and Science University
Marilyn Johnson - Oregon Museum of Science and Industry

Reported by: **Melani Duffrin** - East Carolina University

Summary of Topics Discussed

The session started with a short presentation by one of the session facilitators, Bill Cameron. Discussed leveraging SEPA resources in local CTSA and other NCRR-funded programs.

- Review of last year's session on developing effective SEPA-CTSA partnerships.
- Goals of current session (review what strategies worked and creative solutions to problems).
- Portland model of collaboration between OMSI and OHSU's CTSA and SEPA programs.

Opening of discussion– Models that work

Susan Adler of the Northwest Association for Biomedical Research began by discussing strategies for approaching the issue of being the public face of the CTSA. The approach of their SEPA program was to offer a book club to discuss bioethics, which was valued by CTSA.

- Barriers to generalizing SEPA-CTSA discussion points
- The ways CTSA's define the community engagement core are different and so there is no one strategy for appealing to them.
- CTSA and SEPA at the same institutions do not meet SEPA methods .
- There are no defined guidelines for CTSA and SEPAs to interact and, therefore, each partnership has to be approached as a unique situation. Thus, no one size fits all solutions.
- Timing can create barriers. The planning for the next submission, resubmission or renewal of a CTSA may not permit adequate time for the SEPA team to discuss leverage and collaboration.
- CTSA's have different focuses. They are charged to interact with the community in order to inform them of research questions that addresses local issues. The CTSA's do not recognize the value of SEPAs in facilitating the public dialogue about this translational research.



Possible Approaches

- One participant commented on the areas of emphasis arising in the new program description for the CTSA.
- Pediatrics is underestimated in CTSA and should be moved forward.
- NCRR should consider requiring K-12 education components for center (CTSA) awards.
- Some questions arose whether SEPAs or CTSA should be using the term “engagement.”
- Danger potentials associated with a CTSA-SEPA partnership.
- SEPA could get absorbed into the community engagement cores. Goals of the SEPA program could be consumed by the larger aims of CTSA.
- SEPAs must be careful not to cross the line from education to subject recruitment. (This was one of the more interesting discussions. Many participants felt that a SEPA program should only educate the public but not be active in recruiting human subjects for the CTSA, while others saw more of a continuum between public education and lowering the threshold for involvement in a clinical trial.)
- Participatory research should stay separate from recruitment. This idea remained unresolved on where education ended and recruitment began.
- Reviewers have commented they did not care for the Stanford CTSA educating K-12 implying that there is no role for K-12 engagement in the framework of the CTSA community-based research component

Conclusions

- There are major cultural differences between the world of SEPA and CTSA that create barriers to effective partnership, starting with language.
- There are no guidelines for CTSA to leverage other NCRR-funded programs in program announcement. There was some discouragement of entering the K-12 arena where SEPA excels.
- The mission of each CTSA is so unique that there is not going to be one ultimate strategy for building trust and a relationship.
- There is a need for guidance from the program on how to navigate the boundaries of public education and clinical trials recruitment.

Katherine Nielson - University of California, San Francisco

Suzanne Olds - Northwestern University

Maggie DeBon - University of Tennessee

Jim Moore - University of Georgia

Joy Frechtling - Westat

Lisa Gough - NIH/NCRR

Patricia Slattum - Virginia Commonwealth University

Monique Scott - American Museum of Natural History

Hilleary Osheroff - American Museum of Natural History

Shaw-Ree Chen - University of Rochester

Naomi Luban - Children's Research Institute

Val Davillier - Great Lakes Science Center

Michael Lichtenstein - University of Texas Health Science Center at San Antonio

Ella Greene-Moton - University of Michigan School of Public Health

Cheryl McCallum - Children's Museum of Houston

Amanda Whitener - Great Lakes Science Center

Lisa Nance - Southwood High School

Susan Rogers - Caddo Parish Public Schools

Tim Herman - Milwaukee School of Engineering

Susan Adler - Northwest Association for Biomedical Research

Melani Duffrin - East Carolina University

Alison Slinskey Legg - University of Pittsburgh

Debra Yourick - Walter Reed Army Institute of Research

Peter Crown - University of Arizona College of Medicine

Marlys Witte - University of Arizona College of Medicine

Susan DeRiemer - Meharry Medical College

Arthur Hussey - University of Alaska, Fairbanks

Partnering with Historically Black Colleges and Universities

Facilitator: **Michael Chorney** - Pennsylvania State College of Medicine

Reported by: **Michael Chorney** - Pennsylvania State College of Medicine

Overview

Many of the SEPA goals focus on promoting the educational development and career advancement of underrepresented students at both the K-12 and undergraduate college level. Participants at the breakout session unanimously felt that the establishment of such a partnership was intrinsically a good expenditure of effort, and the coordinated approach toward garnering funds, sharing resources, identifying enthusiastic students destined for summer programs, and participating in joint research and education ventures, to name but a few, was a laudable outcome of any partnership. Moreover, grants are currently available from the NIH that address mentorship of HBCU faculty by scientists of research-intensive universities, and such collaborations are mutually beneficial, highly rewarding and productive (cf. the NIH Research Structure in Minority Institutions grant).

As a nation, we face a crisis related to piquing the curiosity of students who represent minority groups and getting them to stay the course through college and beyond. While R01 funding for basic science grants has become particularly more difficult to obtain (for a number of reasons including reductions in overall budget), granting agencies have generally maintained or even increased their appropriated dollars as it relates to diversification of postgraduate programs and subsequently, health and science professional workplaces.

Strategies

The group discussed overall strategies for establishing a professional link with a local HBCU. First and foremost, it was strongly felt that any investigator making overtures to the HBCU must be sincere about the collaboration, and realistic as to the expectations. One of the initial meetings must be focused on needs assessment, and the best possible approaches toward filling in academic gaps at both the HBCU (e.g., infrastructural issues such as space and equipment, new hires, technology, teaching expertise, etc.) and the research-intensive university levels (new hires of diverse faculty, establishment of a qualified minority student pipeline, educational partnerships, etc.).

Common Goals

Common goals should be identified, and collaborations devoted to securing extramural funds is always an excellent way to convey one's work ethic, values, determination, and general perseverance in making the association fruitful. Dr. Chorney, Penn State, stressed that it is important to remain visible once trust has been established, and to participate in activities on the HBCU campus; if none exist, talk with the faculty as to what things could be created to promote scientific curiosity and advancement. Others suggested that promoting student awareness of career opportunities was key, and that it is always in the best interest of students to receive advice about softer skills, including resumé writing, public speaking, using IT resources (including the WWW), managing time, learning appropriate study habits, etc.

Personal Experiences

Dr. Chorney relayed his experiences in working with two different HBCU's, one in possession of a large faculty with significant resources, the other a smaller university with a significantly smaller science group. Each offers strengths and a keen interest in developing their research and training capacity. Dr. Shepherd relayed her own situation at Vanderbilt in which she currently partners with three different HBCU's via her NIH CHALLENGE grant, each providing unique opportunities for collaboration. Some of the participants were high school teachers, who expressed their own concerns about falling short with respect to resources, and the wish that their school districts were in proximity to the types of institutions represented by several of the panel members (e.g., Dr. Schanck of PTEI, Pittsburgh). The group concluded that working with an HBCU was highly rewarding, but also fraught with some challenges.

Diabetes/Obesity/Cardiovascular (SEPA DOC)

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Facilitators: **Virginia Carraway-Stage** - East Carolina University
Pamela Koch - Teachers College, Columbia University
Wendy Huebner - Montclair State University

Reported by: **Virginia Carraway-Stage** - East Carolina University

Getting Started: Review of mission statement and very brief history of the group.

The DOC working group is a collaboration of SEPA projects that focus on the study and prevention of diabetes, obesity, and cardiovascular disease through the development of science-education materials that are about the energy balance equation and making healthful food and activity choices on an individual and societal level. The group began working together at the 2008 SEPA annual meeting. SEPA projects that are welcome to participate in the group fall within one or more of the following categories: (1) SEPA programs specifically related to the DOC topic, (2) unrelated projects but project leads who are interested in applying for a new grant with a DOC topic, or (3) unrelated projects but are interested in the DOC topic for future incorporation into their current or future projects.

Introductions: See roster for more detail. Over 30 SEPA projects in attendance. Participants were asked to give a “30- second elevator statement” of their SEPA project and a brief statement of what they would like to get out of the partnership.

Ann Chester highlighted a survey project that Tony Beck hopes to extend to other interested SEPA projects. Her project is based in West Virginia and is geared toward high-school students. Over 800 students have participated in the summer program where they learned about obesity and diabetes in their community. A survey was developed and administered by the students to over 172 community participants resulting in over 1,000 data points. They are currently working on obtaining IRB approval to allow for other SEPA projects to use the survey. The survey takes about 10 minutes to complete online and the information is then dumped into a large database for access by interested SEPA groups. Data will be de-identified once in the large database and will be searchable only by zip code. The questions are simple and are based around behaviors related to obesity and diabetes. SEPA projects will be given the opportunity to review the survey and provide input. Science museums may also be able to provide help by getting visitors to complete the survey.

Evaluation Sharing: Participations were asked to bring copies of their evaluation instruments and a general overview of their evaluation design.

Bill Sanns from the Department of Epidemiology and Biostatistics at the University of Texas Health Science Center at San Antonio stated that he could provide posting capability to the working group to allow for posting of documents for sharing and group discussion. The website can be found at peer.tmau.edu, the left side of the page “regional meeting”, under library. It was suggested that a common site be built where evaluation tools could be shared. Also posting information on validity and reliability was highly recommended.

Planning for Future Ways to Share: Ideas included providing peer support and guidance through emailing, conference calls, and face-to-face meetings, and submitting an abstract to NSTA or another conference together. It was recommended future conference calls take place that are geared toward specific topics within the working group. Also a website for board discussion. Google Groups or the current SEPA website were suggested as potential resources that could be utilized.

Making Connections for Collaborations: Further discussions on specific SEPA-to-SEPA collaborations were encouraged to take place through the remainder of the conference.

PARTICIPANTS

Lynn Tarant - Paterson Public Schools
Michele Ward - Texas A & M University
Mike Wyss - University of Alabama at Birmingham
Bruce Howard - Wheeling Jesuit University
Wendy Huebner - Montclair State University
Larry Johnson - Texas A & M
Louise J. Jones - Jackson State U.
Mark Kaelin - Montclair State University
Pamela Koch - Teachers College Columbia University
Dina Markowitz - University of Rochester
Marsha Matyas - American Physiological Society
Cathy Morton-McSwain - West Virginia University - HSTA
J. Steve Oliver - University of Georgia
David Petering - University of Wisconsin, Milwaukee
John Pollack - Duquesne University
Isobel Contento - Teachers College Columbia University
Linda Pruski - University of Texas Health Science Center at San Antonio
Joseph Reyes - University of Texas M.D. Anderson Cancer Research Center
Leda Cummings - Walter Reed

Vanessa Williams - N/A
Lisa Abrams - Virginia Commonwealth University
Susan Bonk - EdVenture Children's Museum
Miranda Bernhardt - Northwestern University
Christina Boelter - University of Kentucky
Judy Brown - Miami Science Museum
Ann Chester - West Virginia University
Rebecca Daugherty - Northwestern University
Karen DeBoer - Milwaukee School of Engineering
Greg Defrancis - Montshire Museum of Science
Lucia Enriconi - Miami Science Museum
Bruce Evje - West Warwick High School
Samantha Gizerian - Charles Drew University
Lisa Guisbond - MIT
Roxanne Hammonds - McAuliffe Middle School
Mark S. Johnson - UMDNJ

Partnering with Native American Communities

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Facilitator: **Maurice Godfrey**

Panel: **Judy gaiashkibos** - Nebraska Commission on Indian Affairs

Rebecca Burg - Dixon Elementary School, MT

Kelley Withy - University of Hawaii at Manoa

Reported by: **Kim Soper** - University of Nebraska Medical Center

Introduction

There are 570 recognized tribes in 50 states. Be respectful when working with these sovereign nations. Do your research and start your introductions into the community with a formal letter to the tribal council of elders to set up a face-to-face meeting. Then follow through on whatever arrangements you agree to. Ongoing relationships are very important! Keep your word. Approximately 35 states have Commissioners for Indian Affairs, contact and utilize them to help with your introductions to the Native Communities.

How Do You Address the Barrier of Getting Students to Leave Home and Local Ties?

Break some of the barriers of higher education and students' perceptions of these institutions as elitist and uppity. The need is great to show your face often in the community for all kinds of events and activities. Be respectful of the goals of the community. Sometimes students just need exposure to various types of experiences, but it is a slow process. Let them have outside experiences and find ways for them to report back to their communities. Have other Native peoples come to schools and speak and whenever possible have mentors for students, the mentors can encourage and teach social skills that students might not know.



South Dakota School of Mines provides various exit and entry points for students because they know that many times family and other commitments get in the way of students finishing a degree in 4 yrs. Alaska is allowing students to do community research but are connected by technology (email, distance learning, etc.) to researchers in other parts of the state. Important to explain to elders and the community that students could get training/ education and return to help meet a need in the local community that otherwise might go unmet. It is also important to value indigenous science and combine that with western science. Having a tie-in to Native culture is a good way to “hook” students in science classes and getting them to explore further. Linking native culture to science concepts is important because you can’t separate who you are from your culture.

How are You Able to Retain Students in a Program or in a School?

1. Mentors
2. Teach new rules of culture
3. Utilize local resources- people, non-profits, etc. to link students to others in similar circumstances

Has Anyone Encountered any Human Biology Issues?

In some tribes and communities, human specimens or dissection of animals is forbidden and/or taboo. Minnesota did a storybook and used a felt board with students for Brain Awareness activities. They didn’t bring any human specimens, and consequently were able to teach the concepts without any problem. Know your community and tribal culture.

End Thoughts

1. Invest the time needed to make relationships into the schools and communities
2. Commercials and 30-second sells don’t work
3. Be sensitive to local culture, wants, and expectations

PARTICIPANTS

Bonnie Dunn - NIH/NCRR
Carla Easter - NIH/NHGRI
Stan Hill - Wake Forest University School of Medicine
George Reese - University of Illinois Urbana-Champaign
Paul Cotter - University of Alaska, Fairbanks
Kim Soper - University of Nebraska Medical Center
Jan Dubinsky - University of Minnesota
Andrew Sahalie - Pacific Resources for Education and Learning
Kelley Withy - University of Hawaii
Becky Burg - Dixon Elementary School
Craig Berg - University of Wisconsin, Milwaukee
Judi gaiashkibos - Nebraska Commission on Indian Affairs
Brian King - Harvard University Medical School
Laura Martin - Arizona Science Center
Amanda Meyer - University of Alaska, Fairbanks
Fern Lan Siew - Cornell University
Donna Cassidy - Hanley-Cornell University
Kathryn Kailikole - Council For Economic Opportunity
Claudia Pryor - Diversity Films, Inc
Jahdiel Lowery - Diversity Films, Inc
Maurice Godfrey - University of Nebraska Medical Center

Viruses and Infectious Diseases: Exploring Collaboration

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Facilitator: **Judy Diamond** - University of Nebraska State Museum

Reported by: **Anisa Kaenjak Angeletti** - University of Nebraska-Lincoln

This session offers the opportunity for SEPA projects focusing on viruses and infectious diseases to share resources and plan for future collaborations.

A total of **30** participants briefly presented how their SEPA projects related to infectious diseases. We discussed how we might collaborate on exhibits, curricula, teacher professional development, and how the new World of Viruses website might disseminate information on all of these projects. Participants suggested keeping the group connected for discussion and collaboration.

1. Karina Meiri, Tufts University School of Medicine, Boston karina.meiri@tufts.edu. Great Disease curriculum with the Boston Public School, infectious disease modules for 11-12th graders, teacher professional development.
2. Kathleen Bateman, Tufts University School of Medicine, Boston kbateman@boston.kiz.ma.us
3. Maggie Walker, Northwestern University margaretwalker2012@u.northwestern.edu. Working with two Boys and Girls clubs in Chicago.
4. Barbara Baumolack, Georgia State University biobrb@langate.gsu. Genetics and microbiology with grades K-2 with the Biobus mobile lab.
5. Renae Lenhardt, University of Minnesota / Anoka-Hennepin Schools renae.lenhardt@anoka.k12.mn.us. Neuroscience with grades 6-12.
6. Erin Dolan, Virginia Tech edolan@vt.edu. Mobile plant science for high school students.
7. Jennifer Pang, Seattle BioMed Jennifer.pang@seattlebiomed.org. 11th grade, 2-week program on malaria, HIV, TB.
8. Margaret Shain, American Physiological Society meshain6@yahoo.com. Middle-school teachers.
9. Charles Geach, American Physiological Society cegeach@bcm.edu
10. Nancy Mureno, Baylor College of Medicine nmoreno@bcm.edu. Middle school activities, HIV/AIDS.
11. Bart Hays, Helix Charter High School, San Diego bhays@helixcharter.net
12. Jennifer Iriye, Arizona Science Center, Phoenix iriyej@azscience.org
13. Joana Ricou, Dequesne University, Pittsburgh jiricou@gmail.com. Evolution materials, videos, games.
14. Chuck Wood, Wheeling Jesuit University, Virginia chuckwood@cet.edu. Simulations, live video conference for high school.
15. Molly Phipps, Science Museum of Minnesota mphipps@smm.org. Disease Detectives exhibit.
16. Erika Shugart, Koshland Science Museum of NAS, Washington, DC. eshugart@nas.edu. Infectious disease exhibit, is in the process of making duplicate versions for other museums, can make plans available as well.
17. Vicki Coats, OMSI vcoats@omsi.edu. Fitness and nutrition exhibit. Also Ghost Map project not funded by SEPA.
18. Monroe Duboise, University of South Maine. duboise@usm.maine.edu. Electron Microscopy & Virology research, Summer program for middle school & high school teachers, light microscopy two-week workshop (\$1,000 microscope with software).
19. Gail Fletcher, University of South Maine. gffletcher@usm.maine.edu
20. Susan Hershberger, Center for Chemistry Education, Miami U, Oxford, OH. hershbs@muohio.edu. Environmental health with middle school students.
21. Marti Jett, Walter Reed. marti.jet@us.army.mil. SEPA – bringing students for summer program 2-8 weeks, Washington DC area, from middle school 8th grader and up. Has reached 500 kids, 50% return rate.
22. Kalyani Raghavan, University of Pittsburgh kalyani@pitt.edu. Working with the Carnegie Science Center on Tissue regeneration and with U. Pitt. on Gene Team. 7-week sessions teachers and students working in biology labs, teams have 1 teacher with 2 students.
23. Ah-Kau Ng, University of South Maine. ahkaung@maine.edu. Immunologist
24. David Micklos, Cold Spring Harbor Laboratory micklos@cshl.edu. Molecular genetics of cancer. What famous virology experiment was conducted at Cold Spring Harbor? Hershey-Chase blender experiment in 1952.
25. Tim Herman, MOSE. herman@mose.edu. Creates physical models of viruses (H & N proteins), e.g. flu, High-school level
26. Leonard Munsterman, Yale School of Medicine leonard.munsterman@yale.edu. Possibility of collaborating with U of South Maine and U of Nebraska on exhibit. West Nile and Lyme disease.

27. Laura Fawcett, Yale Peabody Museum of Natural History laura.fawcett@yale.edu. Traveling exhibit.
27. Moira Rankin, Soundprint Media Center. moira@soundprint.org World of Viruses radio shows.
28. Anisa Angeletti, Nebraska Center for Virology, University of Nebraska-Lincoln aangeletti2@unl.edu World of Viruses games and curriculum reviews.

29. Judy Diamond, University of Nebraska State Museum. jdiamond1@unl.edu. World of Viruses SEPA project on HPV, HIV, influenza, cold viruses, ocean viruses: Web site and iPad apps includes comics, radio programs, blogs by Carl Zimmer, copyright-free virus images, activities (such as Influenza virus evolution, HPV card game) database of virus curriculum activities for teachers (middle school and high school level) reviewed by virologists & teachers, and more. This site will include links to SEPA projects and materials that were shared today.

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PARTICIPANTS

- Karina Meiri** - Tufts University School of Medicine
Kathleen Bateman - Tufts University School of Medicine
Maggie Walker - Northwestern University
Barbara Baumstark - Georgia State University
Renae Lenhardt-Anoka - Hennepin School District #11
Erin Dolan - Virginia Tech
Jennifer Pang - Seattle Biomedical Research Institute
Nancy Moreno - Baylor College of Medicine
Bart Hays - Helix Charter High School
Jennifer Iriye - Arizona Science Center, Phoenix
Joana Ricou - Duquesne University
Chuck Wood - Wheeling Jesuit University
Molly Phipps - Science Museum of Minnesota
Margaret Shain - St. Joseph School, American Physiological Society
Charles Geach - El Paso Independent School District, American Physiological Society
Erika Shugart - Marian Koshland Science Museum of the National Academy of Sciences
- Vicki Coats** - Oregon Museum of Sciences and Industry
Monroe Duboise - University of Southern Maine
Gail Fletcher - University of Southern Maine
Susan Hershberger - Miami University, Oxford
Marti Jett - Walter Reed Army Institute of Research
Kalyani Raghavan - University of Pittsburgh
Ah-Kau Ng - University of Southern Maine
David Micklos - Dolan DNA Learning Center
Tim Herman - Milwaukee School of Engineering
Leonard Munstermann - Yale University
Laura Fawcett - Yale University
Judy Diamond - University of Nebraska-Lincoln

Working Group for Program Managers/Coordinators

Facilitator: **Mel Limson** - American Physiological Society

Reported by: **Barbara Hug** - University of Illinois Urbana-Champaign

Summary of Topics Discussed, Key Points, Challenges, Conclusions

New Projects

Challenges/Concerns Identified by the Participants:

- How have people addressed working with other professionals at University so that they understand what the program coordinator needs?
- How have different projects addressed the needs of the students?
- For a research-based experience, how have people expanded past the first groups of student interns? (issue of recruitment)
- How have different groups been successful in reaching out to schools for recruitment?
- What are some ways that people have found for dissemination?
- Issue of balance—how to be both a scientist and outreach coordinator?
- Coordinating team of fellows—how have people managed the staff on the project to ensure that things are getting done?
- How have people balanced the different roles that they (and others on the staff) have?
- What are some examples of effective use of technologies in the curriculum materials?
- What are some examples of effective dissemination of materials and findings?
- Recruitment of teachers- how have different projects done this? Recruitment in terms of both getting teachers to participate in a summer research institute and the implementation of the action research. Issues of buy in.
- For projects involving teachers in action research, how have they provided support to teachers?

Ongoing Projects

Challenges/concerns that were identified by the participants included:

- How do different projects deal with the closeout of a project?
- Challenge in identifying what comes next for the project (in terms of support, progress). As one grant closes, how do people plan for the next?
- How have people found venues for publication?
- How have people extended a project? (funding sources, etc.)
- How have people balanced different roles and responsibilities (those required by the grant and the university)? Issue of time was raised by a number of participants.
- How have people developed an understanding of the project if they weren't there from the start? The issue of history, where is it?

Roles and Responsibilities

Key points of discussion included:

- Research program vs. SEPA program
- Staff, resource and grant management
- Balancing scientific research (faculty)

A number of people in the session were involved in basic science research, and management of projects. Because of these different responsibilities, people often had split roles (Needed to attend to both what the SEPA project and what the university required).

- Need to do what the grant is asking you to do—go with the flow of the grant.
- How to work day to day:
 - Different people said different things: some found themselves putting the grant first and others put the university first depending on what the role of the individual is and the support that they had on the projects.
- The suggestion was made that if you don't have paid staff, get the teachers involved. Give the teachers a stipend. Teachers will work and help you with the project.
- Have milestones where tasks need to be completed.
- Delegate to people who have the necessary skills.



A question was asked about the possibility of transferring money to teachers from one budget line to another. Participants were told that there is flexibility in the budget but need to be within the rules that govern budgets, even if one didn't include this in the original budget (25% rule was mentioned). One would only need to request rebudget if one changes the scope of the work. Regardless, one needs to talk with the budget/grant people to see if changes are appropriate.

What's Next-Grant Continuation

Key points of discussion included:

- Progress and annual reports
- Publishing
- Evaluation results and educational research

Questions were raised about what happens when ending a grant. Need to be on top of all of the guidelines of how to close out the grant. People are there to help—make certain to talk to your program officer at SEPA and budget office on campus.

When coming to the end of a funding cycle, you want to think about grant continuation and the no cost extensions. In thinking about the next steps, it was recommended that people use the results from the current work, evaluation reports, progress reports etc. to think about the next grant—all of this information can be used as the background and description of the work to form the next step forward.

Progress reports are a good way of making certain that people can access what was done and develop a sense of the program and the work that it accomplished.

Outreach Recruitment and Dissemination

Key points of discussion included:

- Network with educators
- State level
- Teacher organizations

More specifically, this discussion included the following suggestions and resources for the people involved:

- Network for education renewal (<http://www.nnerpartnerships.org/>) They do professional development and could be a resource for networking and recruiting teachers.
- It was suggested that people work with already established networks. Teacher organizations (NSTA, state level STA, NABT, state level ROEs) all of these organizations can serve as recruitment and as ways of dissemination.
- E-mail is a good way to contact people but if e-mail doesn't get a response don't assume that people aren't interested (e-mail filters often put mail into junk).
- Go to local school district meetings to recruit as well. Before this will happen, one will need to build the relationship with the districts. This was more of a top down model of recruiting.
- Other programs have recruited from the ground up by going directly to the teachers. Send e-mails to the science coordinators at the district level and they can send out to interested teachers.
- Need to go with multiple ways of doing things—both bottom up and top down to be most effective.
- Need to make things connected to what the teachers are doing—if teachers see these connections there will be more buy in and participation.
- Make certain to pay attention to the norms and rules of the organization that you are working with.
- Question raised: has anyone worked with teacher unions? Different states have different strengths of unions and so have had different success rates.

Mel Limson - American Physiological Society

Michelle Ventura - Georgia State University

Bonita L. Harris - Jackson State University

Julie Bokor - University of Florida

Genevieve Edwards - Georgia State University

Mike Kennedy - Northwestern University

Neil Lamb - HudsonAlpha Institute for Biotechnology

Adam Hott - HudsonAlpha Institute for Biotechnology

Heather Kleiner-Hancock - Louisiana State University Health Sciences Center

Heather Reddick - University of Texas M.D. Anderson Cancer Research Center

Michelle Carroll-Turpin - Louisiana State University Health Sciences Center

Daniel Crockett - West Virginia Higher Education Policy Commission

Mary Budd - Montclair State University

Quadira Huff - NIH/NCRR

Lynnsey Dohmen - Children's Museum of Houston

Renee Bayer - University of Michigan School of Public Health

Donna Korol - University of Illinois Urbana-Champaign

Barbary Hug - University of Illinois Urbana-Champaign

Networking Among SEPA Projects in the Western US

Facilitator: **Marilyn Winkleby** - Stanford University School of Medicine

Reported by: **Kristin Bass** - Rockman et al

Discussion 1: **Dissemination**

Is there interest in submitting a proposal to the 2011 NSTA annual meeting to be held in San Francisco?

The deadline is April 15th. The group agreed that there was interest, and Jeanne Chowning volunteered to submit a request for a session to showcase the Western SEPA projects (which she did, and she'll keep us posted on the results).

ASCD is another organization where we might submit proposals – their focus is administrators and teachers. Their signature publication is Educational Leadership and their organizational focus is school improvement. Their conference is also in San Francisco next year and the deadline for proposals is May 1st. You have to finesse your proposals to make them appeal to curriculum experts and administrators, but it can be done. ASCD is interested in curriculum development whereas NSTA prefers take-home materials.

Discussion 2: **Tracking Program Graduates**

How do you find out where students are now?

Facebook is one option that Theresa has used ... in the breakout session on Web 2.0 she'll share an IRB she uses for friending students. You can also make a custom application in Facebook to get data on them (e.g., their experience in their second year of college when being a doctor isn't panning out but they want to stay in school, stay in science and explain all of this to their parents). Students will report where they go to school, what societies they've joined on campus – all indicators of how they're doing. Students also keep in touch with each other through Facebook groups and this helps with retention rates.

The trick is to find out which methods work best with your particular students, and get multiple contacts from them. Programs such as those funded through SEPA create temporary safe havens and equip students with the ability to persist in difficult situations. Students will inevitably run into barriers in college, but the idea is to stay in touch with them and encourage them to hang in there.

PARTICIPANTS

Kristin Bass - Rockman et al

Judi Wilson - San Joaquin County Office of Education

Sonsoles de Lacalle - Charles Drew University of Medicine and Science

Jeanne Chowning - Northwest Association for Biomedical Research

Theresa Britschgi - Seattle Biomedical Research Institute

Karen Kalumuck - Exploratorium

Judith Ned - Stanford University School of Medicine

Andrij Holian - University of Montana

Nancy Marra - University of Montana

Jodie Galosy - University of California, Davis

Marco Molinaro - University of California, Davis

Ron Johnson - UMDNJ-New Jersey Medical School

Tom Scarlett - University of Hawaii

Scholarship Recipient Panel Discussion

Reported by: **Dina Drits** - Genetic Science Learning Center, University of Utah

Panel

Nadina Aversa - Northern High School, Flint, MI

Rebecca Burg - Dixon School, Dixon, MT

Regina Cowan - Cooley High School, Detroit, MI

Daniel Crockett - West Virginia Higher Education Policy Commission

Karen Deboer - Kettle Moraine High School, Milwaukee, WI

Bruce Evje - West Warwick High School, Warwick, RI

Judi gaiashkibos - Nebraska Commission on Indian Affairs

Charles Geach - El Paso Independent School District, El Paso, TX

Roxanne Hammonds - McAuliffe Middle School, San Antonio, TX

Eugene Roundtree - Madison Park Technical and Vocational High School, Boston, MA

Margaret Shain - St. Joseph School, Corydon, IN

Lynn Tarant - Charles Riley Public School #9, Paterson, NJ

Moderator: Jeanne Chowning - Northwest Association for Biomedical Research

Each participant was asked to address the following:

1. Describe your participation with your SEPA project.
2. Describe an event or incident that exemplifies the impact your SEPA project has had on you or the people you work with.
3. Describe the things that have supported your partnership (e.g., supportive elements that have worked in the partnership).

Nadina Aversa - Northern High School, Flint, MI

She is working with genomics unit in classes. Impacts include students liking science more, becoming more engaged with science, taking ownership over their learning in science. In the community, people are surprised to find out humans are 99.99% identical.

Rebecca Burg - Dixon School, Dixon, MT

Received training and supplies. Used all materials in classroom for 2 years. Also uses scientist in the classroom program. She can take her classes to the river and students can connect the familiar river to authentic new scientific experiences. Gives students who live on reservation the ability to connect traditional knowledge of the river with new knowledge. Many opportunities for community involvement on the river trips

Regina Cowan - Cooley High School, Detroit, MI

Works with African American students, many of whom feel isolated from the rest of US population. They learn we are all more alike than different. Highlight of unit is DNA night where students present what they learned with other students from area, faculty from U of Michigan, and other community members.

Daniel Crockett - West Virginia Higher Education Policy Commission

Serves on recruitment and retention board. Offers rewards to students for entering undergraduate education.

Karen Deboer - Kettle Moraine High School, Milwaukee, WI

Teacher development, curriculum development. Outstanding experience was the year students were paired with faculty from university, where students got to learn how authentic research is conducted.

Bruce Evje - West Warwick High School, Warwick, RI

Teaches anatomy and physiology. Students designed research project. Impacted students with hands-on, inquiry-based projects, such as sheep brain dissection. Supported financially to buy dissection and other equipment. Financial support for teachers, the program, and for the mobile labs is key.

Judi gaiashkibos - Nebraska Commission on Indian Affairs

Facilitates dialogue between tribes and schools. Through science and this project, they hope to encourage young students to think about careers in science. The challenge with summer camps has been to get students to leave home and travel to city of Lincoln. Project will share with students the different types of career and research possibilities. The poster series is something tangible and tribal leaders saw evidence that people from their tribes have become doctors and scientists. Critical to establish relationships and built trust with the tribes. Hopefully as a result of these relationships, we can cultivate future scientists.

Charles Geach - El Paso Independent School District, El Paso, TX

Get good teaching resources and also challenges traditional teaching approach. Teaching through inquiry has made huge difference. APA provides excellent resources to learn how to teach through inquiry. Support received has kept him teaching through this approach, and he has passed along this knowledge to other teachers.

Roxanne Hammonds - McAuliffe Middle School, San Antonio, TX

Workshops in summer that teach about neuroscience. Also realized through Positively Aging how important it is to take measures to be able to live a long life.

Eugene Roundtree - Madison Park Technical and Vocational High School, Boston, MA

Building a biology curriculum. Worked with postdocs at Tufts to build knowledge about epidemiology. Now are taking this knowledge to develop hands-on curricula for students. Collaboration with teachers has been most impactful. The financial support from SEPA has supported their practice the most.

Margaret Shain - St. Joseph School, Corydon, IN

She worked in the lab as a science researcher during a summer program. The partnership between her and the scientist she worked with has continued to the present day, with regular classroom visits by the scientist. She also has students visiting the lab regularly at the university. University students and postdocs judge school's science fairs. As a result of the SEPA collaboration, she has many students doing research and advancing in science fairs. So, just the one summer research program has touched numerous students' lives. Lately, what has been most impactful is when APA invited her to be part of a leadership summit, which is a teacher leader and mentorship program. The funding she has received to conduct these professional development programs for K-3 teachers has been the most helpful.



Has taught and developed curriculum to middle school students. Now teaching epidemiology through after school clubs. She is also pilot testing a new curriculum. Her students have developed their own surveys that they administered to younger students, which has helped for students to be scientifically literate, to think critically, and to solve problems. Her support from SEPA partnerships has been for scientists to come in to classroom, and pilot testing the new curriculum.

Question Posed to Entire Panel:

What has been a challenge to your SEPA partnership and how has this been addressed?

- Time constraints to teach great curriculum and in an inquiry-based manner.
- Since No Child Left Behind, it has been difficult to implement the reform-based new curriculum.
- Not enough funds to do project each year. Her fear each grant application time is that the program will not be able to continue.
- Need to develop activities that are quick and easy that teachers can apply quickly in just one class period.
- Many of teachers who are non-Indian and who work in tribal settings have been presented with the project's ideas and materials. However, they hold deficit-based view of the students' learning abilities. Project's solution is to find a way to empower the children to teach the teachers through a scientific-cultural learning experience.

What are your recommendations/advice for SEPA recipients to help them be successful with their projects?

- Continuity, stick with it
- Doing workshops via video conferencing

Question-and-Answer Session from Audience:

- Discussion about teachers' roles in curriculum development
- Discussion about needs that panelists have that have not been met
 - Technology training
- Discussion about the time commitment to be a scholarship recipient and teacher
 - Teachers overwhelmingly glad to take the extra time in order to improve as a teacher, be a teacher mentor, and impact students
 - For some teachers, the financial assistance makes the difference
- Discussion about whether program is part of teachers' regular content
 - Often, more about method (inquiry) rather than content, so it was easier to bring into classroom
 - It is part of regular content, but also promotes deeper knowledge
- Discussion about overall effectiveness of program on students and methods of evaluation
 - Pre-post
 - Quasi-experimental
- Discussion about state accountability tests, and whether inquiry is being tested

Valuable Tools from Recent NRC and NSF Reports on ISE Evaluation

Cecilia Garibay - Garibay Group

Key findings from Two Highly Valuable Reports:

Learning Science in Informal Environments (National Research Council, 2009) and Framework for Evaluating Impact of Informal Science Education Projects (National Science Foundation, 2008)

I. Learning Science in Informal Environments (NRC, 2009)

National Academies of Science, Engineering, Medicine: Independent, non-profit, not NSF or federal agency. Goal is to advise government and public.

National Research Council (NRC): Is part of National Academies. Does consensus studies and writes report (e.g., How People Learn, Taking Science to School, Rising Above the Gathering)

NRC reports:

- Are Pro bono.
- Go through an intensive review process.
- Focus on synthesizing published evidence.

NRC committee members—cross discipline from research, psychology, evaluation, etc.

Six Strands of Science Learning

K-8 School science learning strands

- 1.Understanding scientific explanations
- 2.Generating scientific evidence, explanations and arguments.
- 3.Reflecting on how science knowledge is produced and used in society
4. Participating in the practices of science: specialized talk, disciplinary tool use, representations

- 1.Developing interest in science
- 2.Understanding science knowledge
- 3.Engaging in scientific reasoning
- 4.Reflecting on science
- 5.Engaging in scientific practices
- 6.Identifying with the science enterprise

There is a match between these strands and the 6 strands outlined above.

We should think about these strands as less as a ladder and more of strands of an intertwined rope.

ISE Outcomes

- Can be broad in nature.
- Can be unanticipated.
- Can become evident at different points in time.
- Can occur at different scales.

II. Framework for Evaluating Impact of Informal Science Education Projects (NSF, 2008)

Background

- NSF's Project Monitoring System
- Academic Competitiveness Council (ACC)
- Informal Education and Outreach Working Group

ACC Statement...

"The nature of these programs makes it difficult rigorous evaluation because among other reasons: (1) the audience for these programs is diffuse and difficult to identify; (2) the multiple factors affecting and affected by these activities cannot be isolated for assessment; and (3) the modest scale of these efforts does not warrant a costly assessment approach..."

"Federal STEM education programs designed to improve STEM education outcomes should not increase unless a plan for rigorous, independent evaluation is in place, appropriate to the types of activities funded."

The Informal Education and Outreach working group adopted a framework, which was the result of the discussion of the working group and from panel of experts. Pulled together components that addressed ACC report. Impacts are commonly used to describe.

- Who will be impacted (the target audience).
- What the impact will be on a target audience.
- Where/when the impact will occur/be measured.
- How the impact will be measured.

Impact type:

Knowledge: Club member participants will learn about the practical applications of bioengineering

Attitude: Visitors will appreciate plants, in terms of their sophistication as organisms and their vital role on earth.

Skills: Girls participating in the program will learn how to use lab equipment and tools.

Indicators: The measurable criteria used to assess progress toward achieving a specific ISE impact

It is more than the methods used for evaluation or reframing of impact. It should explicitly convey criteria of evidence for determining whether a broader impact has been met.

Examples of Impact: Visitors will seek out additional information about the Earth's moon after attending the exhibit

Indicator:

- Visitors will go to the museum's Internet site about the moon after attending the exhibit
- Visitors will read a book about the moon after attending the exhibit.

Impact Category	Impact	Indicator
Knowledge		
Attitude		
Skills		

NSF Definition of Impact

A broad goal that an ISE project hopes to achieve with its public or professional audience(s)

Impacts describe how a target audience will change or benefit as a result of exposure to an ISE activity or experience

NSF Categories of ISE Impact

- Awareness/Knowledge/Understanding
- Engagement/Interest
- Attitude
- Behavior
- Skills
- Other

This encourages you to identify your intended impacts up front, identify your target audience, determine how you will accomplish intended impacts, determine specific strategies for accomplishing intended impacts.

Impact Category	Impact	Indicator	Evidence
Knowledge			
Attitude			
Skills			

Is there any relationship between the two publications?

There is not a complete 1-to-1 relationship, but there is considerable overlap.

NSF Impact Categories	NRC Strands
Knowledge	Strand 2
Engagement/Interest	Strand 1
Attitude	Strand 6
Skills	Strands 3 & 5
Behavior	

Question-and-Answer Session:

Yes, the NSF is using the framework in their submissions process

NRC produced Surrounded by Science (NRC), which is designed to appeal more to practitioners

Update on the SEPA Evaluation Feasibility Study

Facilitator: **Joy Frechtling** - Westat

Reported by: **Lisa Gough** - National Center for Research Resources, National Institutes of Health

Introduction

Dr. Joy Frechtling, the lead for the SEPA Evaluation Feasibility Plan, reported on the progress of the feasibility study, presenting what has been done since the study began last August, where the study stands currently, and where the study is headed as it comes to a completion this summer. The study is more than halfway through and the activities undertaken to date include the following:

- The development of a logic model
- The identification of the potential program evaluation questions
- A literature review on the evaluation of similar programs
- External/internal stakeholder interviews regarding evaluation questions of interest/value
- The integration of findings into a revised, working set of questions

Products of the feasibility study activities include the following:

- Logic Model
- Initial set of potential evaluation questions
- Report on the Literature Report
- Report of Stakeholder Interviews
- Revised Questions for Evaluation

Logic Model

Dr. Frechtling presented a detailed overview of the Logic Model. She covered its development and emphasized the use of the model as a starting point to clarify the SEPA program goals, understand the expectations for both the short- and long-term outcomes, and examine how different components interact.

Components of the Logic Model (Figure 1) include:

- **Inputs**—the funds/resources that support the program/project.
- **Activities**—what is done that characterizes the program and projects.
- **Outputs**—evidence of the activities that have taken place.
- **Outcomes**— the results a program/project is trying to achieve. Short and medium outcomes are more specific in nature, while long-term are more general and require more rigorous evaluation.
- **Impacts**—broad systemic change.

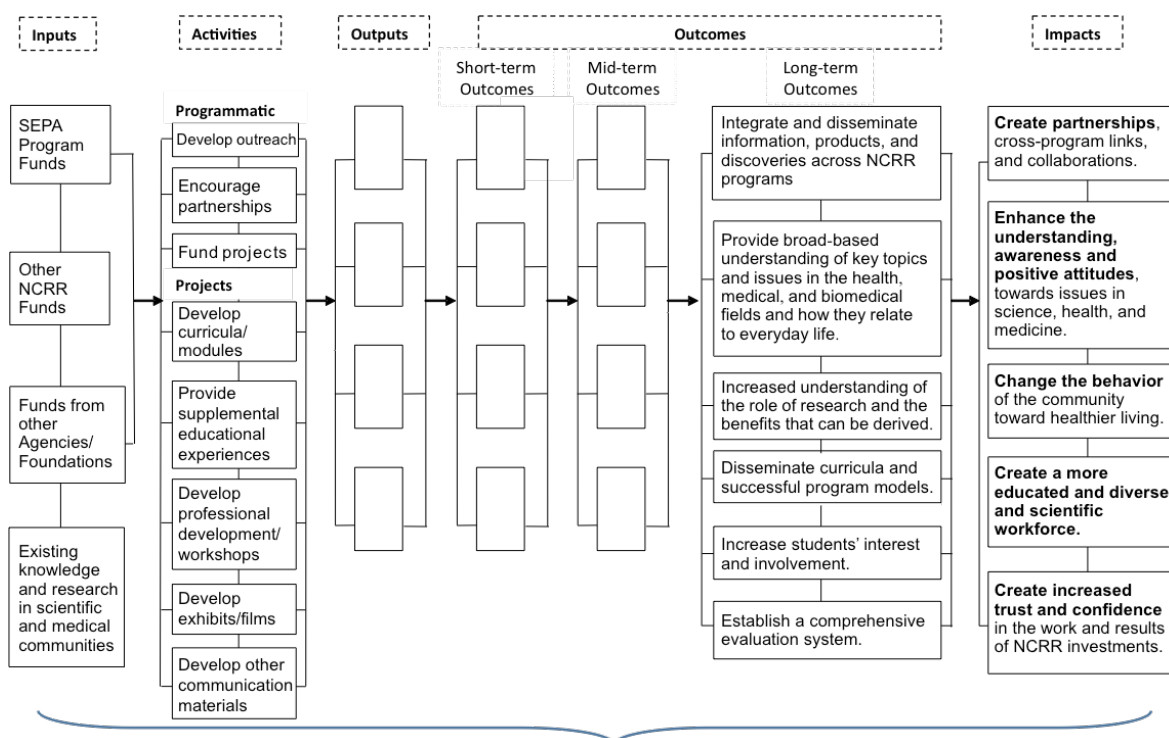


Figure 1. Abbreviated Version of the Logic Model developed for the SEPA Evaluation Feasibility Study.

Separate logic models were created for each of the activities and outcomes, distinguishing between the various audiences (Students, Teachers, Parents/Community, and STEM/SEPA Professionals). As examples, Dr. Frechtling expanded upon two of the listed activities: (I.) Develop professional development workshops (Figure 2) and (II.) Develop exhibits/films (Figure 3):

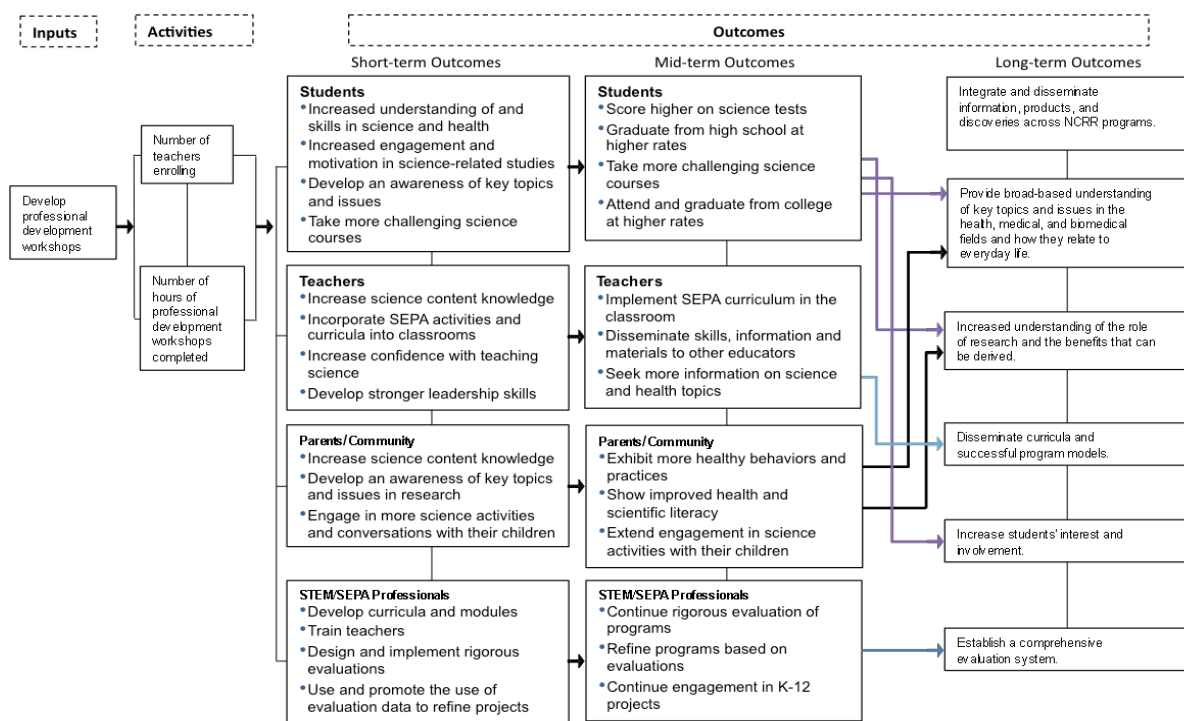


Figure 2. A Logic Model: Professional Development or Workshops

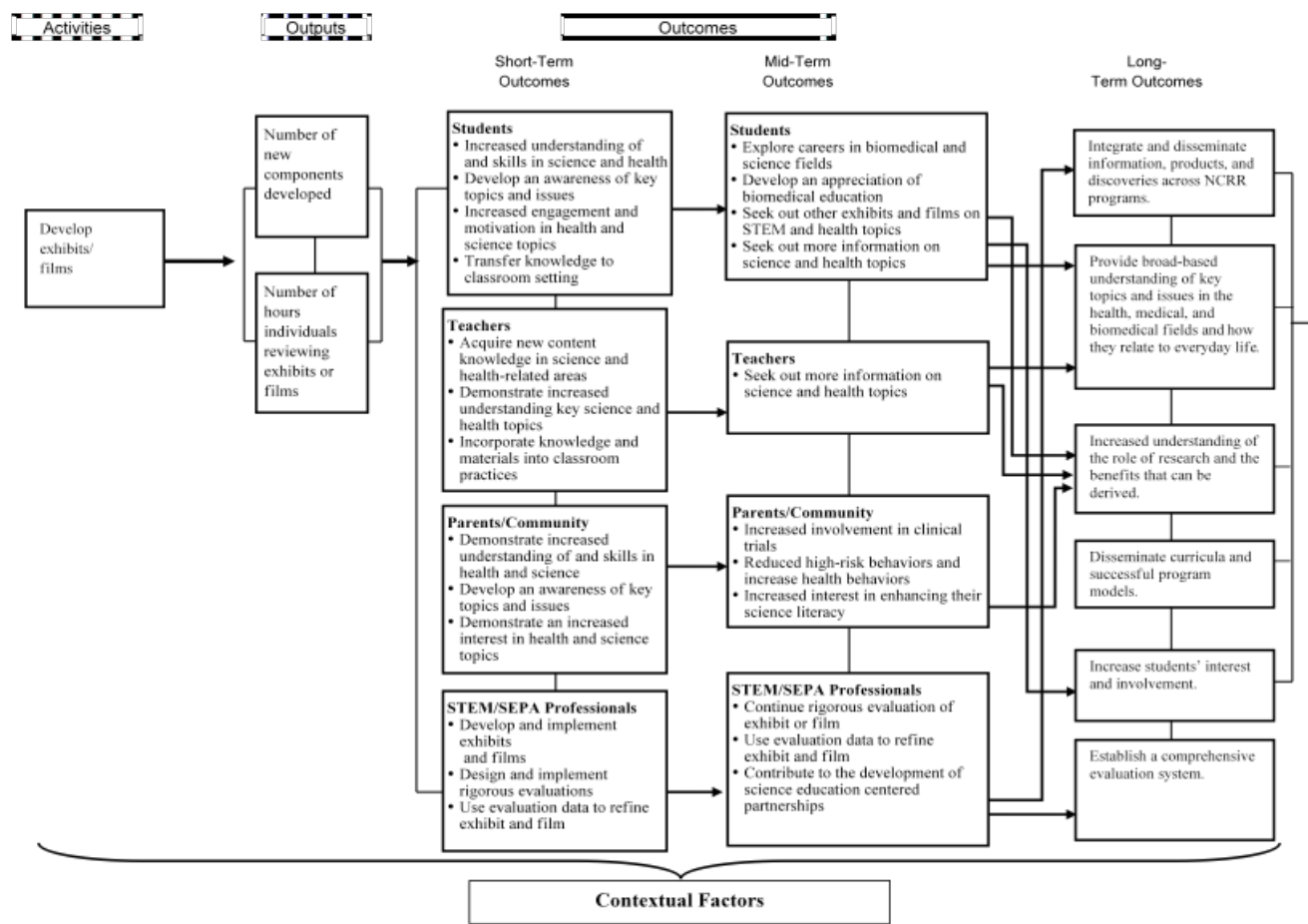


Figure 3. A Logic Model: Develop Exhibits or Films

Literature Review

A comprehensive literature review focused on relevant evaluation examples from various fields to reflect the diversity of the SEPA portfolio, and resulted in a report summarizing approaches to evaluating program impacts of other large, federal programs and foundations. Approaches to evaluating different types of formal and informal education projects were also included in the report.

Stakeholder Interviews/Grantee Interviews
For the stakeholder interviews, the Westat team interviewed:

- 21 SEPA grantees
- 4 federal government experts, and
- 6 non-government agency experts

Dr. Frechtling noted, based on the SEPA grantee comments, grantees were more comfortable discussing project evaluation rather than program evaluation overall. With regard to project evaluation, grantees expressed:

- A “hunger” for technical assistance and instruments for evaluation.
- Assistance with museums/exhibit evaluation.
- Mentoring from those with more experienced projects.

Grantees comments regarding the SEPA program evaluation touched on:

- SEPA management, specifically the review process, expressing concern about the lack of a standing review panel with regard to program evaluation.
- Evaluation of lessons learned, both good and bad, for identifying what works and what doesn't.
- Evaluation of the partnership aspect of the SEPA program, especially relationships between SEPA and other NCRR programs.

Within this discussion of stakeholder interviews, Dr. Frechtling touched on the notions of comparison groups and long-term tracking. She noted that they “hit the wall” when looking for answers with regard to comparisons groups, with no great revelations found. With long-term tracking, while the idea is great and worthwhile, it's not known how to do effectively, resource-wise.

Revision of Evaluation Questions-Current Focus

The study recently focused on the revision of the evaluation questions that will serve as the conceptual framework for the SEPA study. These questions will be used to examine the implementation and impact of the SEPA program. The revised evaluation questions include:

- What is the SEPA portfolio? Is it aligned with the program's overall goals?
- Has the SEPA program contributed to the creation and/or enrichment of beneficial and productive partnerships?
- Is the SEPA program generating a rigorous evidence-based system that provides high quality evaluations to inform the knowledge base?
- Has the SEPA program been successful in achieving its goals?

Next Steps

Dr. Frechtling outlined the next steps in the feasibility study, which include:

- Enumerating subquestions
- Determining data collection approaches (mixed methods)
- Determining sampling strategies
- Determining data analysis strategies
- Providing an initial draft of data collection
- Developing a detailed study design

It was noted that the burden on grantees must be kept in mind. The targeted submission date to NCRR is July 2010.

Floor Discussion

The discussion following the presentation centered on two main areas, the Logic Model and evaluation:

With regard to the Logic Model, the following points and suggestions were discussed:

- A request that the current SEPA Evaluation Logic Model (and perhaps reports) be shared with the SEPA community.
- Include the impacts on clinical and translational researchers .
- Separate STEM/SEPA professionals into STEM Professionals and SEPA Professionals groups.
- Further separate STEM Professional into Informal Science Education (ISE) Professionals.

The evaluation discussion centered on rigorous evaluation and long-term tracking:

- Will the new rigorous evaluation requirement be analyzed? Are we learning more with the more rigorous evaluation?
Suggestion that this could also be a metric.
- Long-term tracking—for the evaluation, consider looking at the past up to the current time, and also consider what should be put in place now to look at long-term evaluation in the future.

Human Subjects Research Primer for Investigators

Facilitator: **Maria Stagnitto** - NIH Extramural Human Research Protection Officer and
NIH Extramural Research Integrity Liaison Office

Reported by: **Jeanne Ting Chowning** - Northwest Association for Biomedical Research

Ms. Stagnitto noted that the Office for Human Research Protections (OHRP) is responsible for ensuring compliance with 45 CFR part 46: Protection of Human Research Subjects (the “Common Rule”). Some grant applications have a “bar to funding” after being peer reviewed due to human subjects concerns. Often, more information is needed to ensure that human subjects are duly protected. Her office reviews the applications that have a bar related to human subjects, and discussion centered on how to avoid the bar when first applying for grants.

Ms. Stagnitto defined research as a systematic investigation, including research development, and testing and evaluation, designed to develop or contribute to generalizable knowledge. She noted that the Office of Extramural Programs provides policy guidance on the inclusion of human subjects in research.

One of the most frequently asked questions by investigators is, “*Am I doing human subjects research?*” Ms. Stagnitto noted that a human subject is a living individual about whom an investigator is conducting research (obtaining data or identifiable information). Examples clarified this concept; samples from autopsy research are not considered human subjects research. Coded human data are still considered human subject research if the person with the identifying information is a collaborator.

Ms. Stagnitto reviewed the six categories of human subjects research designated as being “exempt” because of their low risk. The first two categories are:

- Research conducted in established or commonly accepted educational settings, involving normal educational practices.
- Research involving the use of educational tests, surveys, interviews or observations of public behavior UNLESS: identification and information disclosure put subject at risk of criminal or civil liability or damaging to the subjects financial standing, employability or reputation. (Not applicable to research w/ children). Exemption 2 is “tricky” and may not apply in cases such as studies with teachers, where a teacher with students who performed worse than others in a study might be identified and subsequently might risk losing his or her employment.

Focus groups are sometimes considered research: if the study involves a small group representing target population and individually identifiable information will be obtained, that could result in risks.

Federal funds administered by a Department or Agency may not be expended for research involving human subjects unless the requirements of the 45 CFR part 46 policy have been satisfied. The human subjects evaluation can impact the grant score and may cause a grant not to be funded if there are significant problems with it.

Exempt research must include justification for the exemption, human subject involvement and characteristics, and sources of material. She noted that all information should be complete for each peer review, even if an investigator has applied before (one should not make the assumption that the same individuals will be reviewing again).



If the protection of human subjects is deemed unacceptable in peer review, the proposal receives a “Code 44” on the Summary Statement sheet, which represents the “bar to funding”. Ms. Stagnitto noted that a “48” that means that an investigator can begin their project and receive funding, but may not begin work involving human subjects. Investigators can also request a “30”, which codes for a grant with a delayed onset. 42

Ms. Stagnitto discussed research with children, noting that studies involving children are not eligible for Exemption 2. In such studies, the proposal needs to clarify who will collect information from children and the type of information that will be obtained. Children (over 7) must provide assent and parents must provide permission. In addition, the proposal must clarify how participants are to be recruited. The regulations define a “child” as under 18 years old for legal purposes.

Ms. Stagnitto explained in detail how to address each required category for Non-Exempt Research:

Risks to Human Subjects

- Human subjects involvement and characteristics
- Sources of materials
- Potential risks

Adequacy of Protection Against Risks

- Recruitment
- Informed consent
- Protections against risk

Potential Benefits of Research to Human Subjects and Others

- May not be direct benefit to subjects
- Compensation is not a benefit
- Discuss risks in relation to anticipated benefits

Importance of Knowledge to be Gained

- Discuss in relation to risks
- Often generalizable

Description of the inclusion of women/minorities, children, and targeted enrollments were also mentioned in the context of items necessary for proposals.

Ms. Stagnitto noted that all proposed research will fall into one of six scenarios:

- No Human Subjects
- Non-Exempt Human-Subjects Research
- Exempt Human-Subjects Research
- Delayed-Onset of Human-Subjects Research
- Clinical Trial
- NIH-defined Phase III Clinical Trial

She clarified approximately how to fill out the grant forms for each scenario, and referenced the “decision trees” that can help to clarify what type of scenario/exemption is applicable. Only the first three scenarios usually apply to SEPA proposals. She also identified a new pamphlet from the NIH Department of Clinical Bioethics targeted towards students/teachers entitled, “Research Ethics.”

The complexities of language related to human-participant research were discussed briefly by attendees; for example, some study populations react negatively to the term “trial”. Some SEPA Conference participants expressed frustration related to the application of a framework originally designed for clinical research to social/behavioral research, and noted that their work is often hindered by the review process. Attendees expressed the desire for more opportunities for conversation centered on the challenges related to human-subjects review.

Facilitator: **Bonnie B. Dunn** - NIH NCRR Scientific Review Officer

Reported by: **Jeanne Ting Chowning** - Northwest Association for Biomedical Research

Dr. Dunn's presentation focused on introducing the new agency-wide changes in the NIH review system as a result of the Enhancing Peer Review initiative.

New 1-9 Scoring System

Dr. Dunn described how the 1-5 scoring system has been replaced by one that scores 1-9 (with 1 continuing to be the most meritorious). The new system applies to both individual criterion scores and to the overall impact/priority score. She described how impact (high, medium, or low) is mapped to the scores, descriptors and additional guidance on strengths and weaknesses. Impact is defined as the capability of the proposal to move the field forward. A score of 5 represents the anchor/average. She noted that the definitions of minor, moderate, and major weaknesses are new and are tied to their relative impacts on the project.

Scoring of Individual Criteria

The scoring of individual criteria is a new concept. The 1-9 scale is used by the assigned reviewers to score five individual criteria (e.g., Significance, Investigator(s), Innovation, Approach, Environment). Criterion scores are provided in Summary Statements for both discussed and "not discussed applications" (a new term).

Templates for Structured Critiques

A template will guide reviewers in providing feedback in bullet form and in complete sentences. Discussed applications will receive an Overall Impact/Priority score based on all eligible reviewers (e.g., without conflicts of interest). Reviewers are guided to use the full range of the rating scale and spreading their scores to better discriminate among applications. The Impact/Priority score is NOT expected to be the average of the individual criterion scores. After the meeting, individual reviewer scores will be averaged and the result multiplied by 10 to determine the Overall Impact/Priority score. The resulting range of the final application score is from 10 to 90, in whole numbers only.

Overall Impact Versus Significance

Dr. Dunn discussed the difference between "Overall Impact" and "Significance," and stressed that there is a new emphasis on "Overall Impact." The regulations define impact as "the overall impact that the project could have on the research field involved." While the Overall Impact/Priority score takes into account all elements and core review criteria, Significance is more limited. The evaluation of Significance assumes that the "aims of the project are achieved" and/or will be "successfully completed." "Overall impact priority score" used to be called "priority score" and soon will be just called "impact score."

Changes in Applications

The format for the applications has changed. The 25-page Research Plan section is now entitled "Research Strategy," or, in the case of SEPA, as "Research Education Program Plan" (which is still uploaded in the Research Strategy section). One page is reserved for the Specific Aims, and one for any Introduction to Resubmission. Biosketches must now include a personal statement addressing the individual's role and describing how their qualifications make them suited for that role. Publications are now limited to 15. Applicants will only have one opportunity for resubmission, rather than two. Another new element (not part of the page limitation) is the need to explain and provide evidence about the "Responsible Conduct of Research."

Tips on Writing a Strong Application

Dr. Dunn walked the audience through tips for writing a successful application, including the following: 1) Have a clear scientific rationale, 2) Demonstrate original ideas 3), Use appropriate literature citations, 4) Write a focused research strategy, and 5) Be realistic in what you can accomplish. She stressed the need for organization and clarity, and for not assuming that reviewers will know what you mean to say. Well-designed tables and figures are essential. A strong proposal will identify honestly any gaps in the experience of the team in the essential methodology and will clarify how those gaps will be filled.

Common errors include lack of a plan to publicize or disseminate proposed curriculum, lack of a description of the selection process for participants, and lack of an external evaluator (although an internal evaluator may be used if a justification that they are unbiased can be made). Dr. Dunn noted that while the majority of applications to SEPA say that they have no human subjects, most actually do.

During the review phase, PIs can check their NIH eRA eCommons account, look at the review section assignment, and identify their Scientific Review Officer (SRO). Thirty days prior to review, the roster will be made available. If there are conflicts, PIs should contact their SRO before review. Dr. Dunn described the role of the peer reviewers, SROS, and Advisory Council, and noted that Dr. Barbara Alving, Center Director, makes the ultimate funding decisions. Dr. Dunn also described the summary statement contents and the new information online about peer review.

The SEPA meeting participants were eager to engage Dr. Dunn in discussion following her presentation. Special concerns voiced by many participants included the need to develop a standing study section for the SEPA program, in order to provide continuity in review, facilitate mentorship among the review community, increase ethnic diversity, and increase the effectiveness of the review. The importance of a strong, experienced leader who can remain with the review over time was emphasized. Dr. Beck noted that he had been working on this issue. One roadblock may be that the SEPA program is not perceived to be enough of a workload to justify a study section. The idea was raised that maybe the SEPA program study section could be combined with similar programs or could meet less frequently. Alternatively, the SEPA announcement could come out three times a year. Dr. Witt recommended that NCCRR choose a competent study group with strong leader, ask people to serve for several years as a transition to a permanent section.

BREAKOUT SESSIONS

1:15 - 2:30

Outcome Models and Impact Frameworks: How To

Presenter: **Cecelia Garibay** - Garibay Group

Report is unavailable

PARTICIPANTS

Lisa Gough - NIH/NCCRR

Joy Frechtling - Westat

Rebecca Daugherty - Northwestern University

Suzanne Olds - Northwestern University

Michael Kennedy - Northwestern University

Mike Chorney - Penn State College of Medicine

Judi gaiashkibos - Nebraska Commission on Indian Affairs

Kim Soper - University of Nebraska Medical Center

Paul Cotter - University of Alaska, Fairbanks

Naomi Luban - Children's Research Institute

Mock IRB Review

Presenter: **Maria Stagnitto** - NIH Extramural Human Research Projection Officer and NIH Extramural Research Integrity Liaison Officer

Reported by: **Bonnie Dunn** - NIH NCRR

An IRB committee needs at least five people including:

≥ 1 scientist

≥ 1 non scientist

≥ 1 person not from xyz hospital

Same membership meets once or twice a month. Members rotate off every three years.

- Conflict of Interest individuals will need to be out of the room during the discussions.
- There may be a primary and secondary reviewer for each protocol.

Meetings follow IRB Protocol Review Standards: Every protocol is required to be reviewed at least once per year. The consent form is dated and requires a renewal every year. The IRB reviews the participant questions, study design, and methods, in relation to the subject population.

Mock protocol entitled: Parental permission and adolescent assent and decision making in clinical research was reviewed in this of the session.

Note that the IRB language was translated to the language of the participant group.

- There are no anticipated risks
- The participant may withdraw at any time.
- Follows the Belmont Report

Benefit: No direct benefit is acceptable if risk is very low.

New application review: The principal investigator may come to the meeting and give an overview and explain how they met all the IRB Protocol Review Standards.

Second year review: Report what was done, including the number of subjects.

The Consent Process:

The language must not be higher than an eighth grade level.

Assent = not written, from adolescent

Consent = written

Adverse Event Reporting – No side effects, but if you do, what's your plan? What are the side effects including death (and if death what percentage rate)?

Handouts from the Session:

1. The Office for Human Subject Research (OHSR) Information Sheet #10) Research Involving Children
2. Attachment 5-12 continued on Research Involving Children
3. Office for Human Research Protections (OHRP); OHRP Quality Improvement; Activities Frequently-Asked-Questions
4. Human Subjects Regulations Decision Charts
5. Code of Federal Regulations
 - Title 45
 - Public Welfare
 - Dept HHS
 - Part 46
 - Protection of Human Subjects
 - Revised January 15, 2009\
 - Effective July 14, 2009
6. IRB Protocol review Standards

IRB PROTOCOL REVIEW STANDARDS
Minimal regulatory requirements for IRB review,
discussion and documentation in the meeting minutes

<u>Regulatory review requirement</u>	<u>Suggested questions for IRB discussion</u>
1. The proposed research design is scientifically sound & will not unnecessarily expose subjects to risk.	(a) Is the hypothesis clear? Is it clearly stated? (b) Is the study design appropriate to prove the hypothesis? (c) Will the research contribute to generalizable knowledge and is it worth exposing subjects to risk?
2. Risks to subjects are reasonable in relation to anticipated benefits, if any, to subjects, and the importance of knowledge that may reasonably be expected to result.	(a) What does the IRB consider the level of risk to be? (See risk assessment guide on back of form.) (b) What does the PI consider the level of risk/discomfort/inconvenience to be? (c) Is there prospect of direct benefit to subjects? (See benefit assessment guide on back of form.)
3. Subject selection is equitable.	(a) Who is to be enrolled? Men? Women? Ethnic minorities? Children (rationale for inclusion/exclusion addressed)? Seriously-ill persons? Healthy volunteers? (b) Are these subjects appropriate for the protocol?
4. Additional safeguards required for subjects likely to be vulnerable to coercion or undue influence.	(a) Are appropriate protections in place for vulnerable subjects, e.g., pregnant women, fetuses, socially- or economically-disadvantaged, decisionally-impaired?
5. Informed consent is obtained from research subjects or their legally authorized representative(s).	(a) Does the informed consent document include the eight required elements? (b) Is the consent document understandable to subjects? (c) Who will obtain informed consent (PI, nurse, other?) & in what setting? (d) If appropriate, is there a children's assent? (e) Is the IRB requested to waive or alter any informed consent requirement?
6. Risks to subjects are minimized.	(a) Does the research design minimize risks to subjects? (b) Would use of a data & safety monitoring board or other research oversight process enhance subject safety?
7. Subject privacy & confidentiality are maximized.	(a) Will personally-identifiable research data be protected to the extent possible from access or use? (b) Are any special privacy & confidentiality issues properly addressed, e.g., use of genetic information?
<u>Additional considerations</u>	
1. Ionizing radiation.	If ionizing radiation is used in this protocol is it medically indicated or for research use only?
2. Collaborative research.	Is this domestic/international collaborative research? If so, are SPAs or other assurances required for the sites involved?
3. FDA-regulated research	Is an IND or IDE involved in this protocol?
4. MTA/CTA/CRADA?	Samples being sent out of the NIH?
5. Conflict of Interest	Sponsored Study, Relationship with Sponsor, etc. Patents??

RISK

Regulatory definition of minimal risk: Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests Adults (45 CFR 46.102 (h)(i)). Children (45 CFR 46.404-407)

Adults (45 CFR 46.102 (h) (i))

BENEFIT

Definition: A research benefit is considered to be something of health-related, psychosocial, or other value to an individual research subject, or something that will contribute to the acquisition of generalizable knowledge. Money or other compensation for participation in research is not considered to be a benefit, but rather compensation for research-related inconveniences.

Check appropriate risk category:

1. _____ The research involves no more than minimal risk to subjects.
2. _____ The research involves more than minimal risk to subjects.

Check appropriate benefit category:

1. _____ the research involves the prospect of direct benefit to individual subjects.
2. _____ no prospect of direct benefit to individual subjects, but likely to yield generalizable knowledge about the subject's disorder or condition (mainly for patient subjects);
3. _____ no prospect of direct benefit to individual subjects, but likely to yield generalizable knowledge to further societies understanding of the disorder or condition under study (mainly for healthy volunteers);

Children (45 CFR 46.404-407)

Check the appropriate category

1. _____ §46.404 Research not involving greater than minimal risk.
2. _____ §46.405 Research involving greater than minimal risk but presenting the prospect of direct benefit to the individual subjects.
3. _____ §46.406 Research involving greater than minimal risk and no prospect of direct benefit to individual subjects, but likely to yield generalizable knowledge about the subject's disorder or condition.
 - The risk represents a minor increase over minimal risk
 - The intervention or procedure presents experiences to subjects that are reasonably commensurate with those inherent in their actual or expected medical, dental, psychological, social, or educational situations
 - The intervention or procedure is likely to yield generalizable knowledge about the subjects' disorder or condition which is of vital importance for the understanding or amelioration of the subjects' disorder or condition;
 - Adequate provisions are made for soliciting assent of the children and permission of their parents or guardians, as set forth in §46.408.
4. _____ §46.407 Research not otherwise approvable which presents an opportunity to understand, prevent, or alleviate a serious problem affecting the health or welfare of children. (This requires review by an HHS panel)

Lynn Tarant - Paterson Public Schools

Mary Budd - Montclair State University

Arthur Hussey - University of Alaska, Fairbanks

Greg DeFrancis - Montshire Museum of Science

Bonnie Dunn - NIH/NCRR

Karen Kalumuck - Exploratorium

How to Transition from Programming to Publishing

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Facilitator: **Erin Dolan** - Virginia Tech-editor-in-chief elect of CBE-Life Sciences Education, a peer-reviewed, online journal of life science education published by the American Society for Cell Biology

Panelists: **Michael Lichtenstein** - University of Texas Health Sciences Center at San Antonio
Dina Markowitz - University of Rochester Medical Center
Marilyn Winkleby - Stanford University

Reported by: **Erin Dolan** - Virginia Tech

Goals for Publishing

This breakout session began with introductions and feedback from conferees on their goals for publication (e.g., what, where, and why they would like to publish). Some conferees were just starting their SEPA projects and were not yet in a position to publish, while others had published their work.

Conferees were interested in publishing in multiple venues, including online and in peer-reviewed journals that reach teacher, education researcher, scientist, and clinician audiences (e.g., *The Science Teacher*, *Journal of Research in Science Teaching*, *New England Journal of Medicine*). Others were interested in publishing books, curricula, and other instructional resources (e.g., resources for use in planetaria).

Conferees aimed to achieve multiple goals by publishing, including disseminating project models, methods (e.g., “how-to”), outcomes (e.g., evaluation results and “what works”), as well as contributing to the body of knowledge about science teaching and learning in formal and informal settings. Finally, some conferees were interested in publishing with and for community groups and in ways that reach multiple audiences or across disciplines.

Barriers

Conferees worked in nine small groups to identify barriers to achieving their publishing goals. Groups then reported their three most significant barriers. Eight groups reported that finding time to write as a major challenge, and six groups reported that identifying an appropriate journal for publishing their work was a significant issue. Groups reported the following additional challenges:

- Determining what is publication worthy
- Navigating the peer review process in a discipline other than science or health
- Developing familiarity with characteristics of journals in another discipline (e.g., Who is the target audience? What kinds of work does the journal publish? How long does the review process take? How long does publication take once a manuscript has been accepted? How many readers does the journal have? What is the journal’s “impact?”)
- Writing collaboratively, including managing different levels of investment in and motivation to publish within an investigative team
- Writing in different disciplinary styles and formats
- Understanding ways of knowing in another discipline (e.g., not all knowledge is generated through experimentation)
- Being evaluated in science/clinical departments based on metrics that may not be appropriate for social science research
- Framing work within the context of what is known in the field, including finding relevant literature
- Ensuring a good research design by determining if methods yield sufficiently compelling evidence to be published (e.g., Is the sample as representative as possible? Are potential confounding factors addressed?)
- Reaching multiple audiences, including whether and how this can be done with a single publication

Strategies

The panelists and other conferees offered advice regarding strategies that they had employed in overcoming these barriers.

Barriers Strategies

Finding time

- Set aside chunks of time (3-4 hours) that are “sacred” – no email, phone calls, other interruptions. Schedule these chunks when you are at your “peak” (e.g., if you are a morning person, schedule morning writing sessions).
- Anticipate that your article might take up to six months to write, with many drafts, edits, and rewrites.

Writing a Publishable Article

- Write an abstract that will convince the reviewers that they want to read further.
- Write clearly – scholarly writing should be easy to read – you aren’t writing a mystery.
- Be absolutely clear about your study aims, methods, and analytic approach.
- Use consistent terminology, and make sure terms in the results and tables all agree.
- Make sure all numbers, dates, etc., are correct and consistent between the text and tables.
- Make sure you have strong topic sentences and that the rest of the paragraph is related to the topic sentence.
- Don’t make claims above and beyond your findings.
- Tell a story – your introduction and discussion should weave a story and capture interest; your methods, results, and tables/figures are your research.
- Read your article out loud – it will help you “hear” problems.
- Before submitting your article, do a final spell check and proofreading of the entire document, including figures, tables, and references.
- Create a working group of colleagues to discuss / critique ideas, share writing on a regular basis (e.g., monthly). This can be more or less formal, within or across disciplines, with or without “homework.” You can bring just the paper’s outline, figures / tables, results, or abstract and ask for critical feedback. This strategy also can help make writing a priority if your colleagues are expecting you to share works-in-progress. It can be fun – have a little food, start exactly on time, schedule only one hour, or even connect by video or phone conference. Ask your colleagues when they finish reading your paper if they can they restate the two to three main findings.

Finding a Journal

- Look at Dolan, E.L. (2007). Grappling with the literature of education research and practice. *CBE – Life Science Education*, 6, 289-296. [<http://www.lifescied.org/cgi/content/full/6/4/289>] for table of journals.
- Make a regular practice of perusing tables of contents for a few journals of most interest to see trends and interests of editors.
- Look at the journals that you reference in your manuscript. Submit to the journal you reference most.
- “Shop” around the abstract or a brief summary of your manuscript to different editors (one at a time!) to determine fit with journal – be sure to craft your inquiry such that you make an argument about why your work is a good fit with the journal.
- “Walk the stacks” – find the area of the library with relevant journals, pull issues off the stacks, and peruse tables of contents.
- Look at impact factors or consider other measures of prestige of journals to determine an appropriate “fit” for your article – don’t aim too high or too low.

Issues related to working in another discipline

- Collaborate or co-author with an individual who had had success (e.g., first author publications) publishing in the discipline.
- Identify colleagues in the discipline who are willing to be “critical friends” by reading and giving you feedback on your work.

Impact, Prestige, and Promotion/Career Evaluation Metrics

- Find colleagues who can provide informed perspective on your work (e.g., other SEPA PIs)
- Align your work with outcomes valued in your own discipline (# publications, total grant dollars, etc.)
- Let the community know if you have any measures of journal impact in social sciences. The only document that the group was aware of was: Barrow, L. H., Settlege, J., Germann, P. J. (2008). Institutional research productivity in science education for the 1990s: Top 30 rankings. *Journal of Science Education & Technology*, 17, 357-365, which lists the acceptance rates for several top science education journals.

Framing Work

- If writing a commentary, frame your work with respect to timely issues (e.g., What are leaders [President, other legislators, journal editors, leading scientists / clinicians / educators] paying attention to?). This may also be appropriate for introduction or discussion sections of research articles.
- Become familiar with the best literature in the area as well as the most recent. What is known? What are the potential gaps? How will your research address those gaps? What evidence will convince readers that you have done this? Use Google Scholar (<http://scholar.google.com>) to identify peer reviewed articles on topics of interest. Once you have found a reference that is of interest, click on “Cited by” link to find other articles of interest (like Web of Science). Have your university reference librarian help with searches. Check which articles and authors are being cited most. Ask colleagues in the discipline which articles they have found most influential or useful.

Ensuring Good Research Design

- Don't conduct an evaluation and then start to think about how to publish the results. Think about research and evaluation from the start, i.e., when you are writing the grant proposal. What question do you want to answer and why is that an important question to ask? Then design project accordingly. Try to frame study questions or hypotheses so they are "fail safe," in other words, results will be publishable regardless of the outcome.
- Be clear on the difference between research and evaluation. See the following for definitions:
 - Michael Scriven, renowned evaluator, on the difference between evaluation and social science research: <http://www.hfrp.org/evaluation/the-evaluation-exchange/issue-archive/reflecting-on-the-past-and-future-of-evaluation/michael-scriven-on-the-differences-between-evaluation-and-social-science-research>
 - Fain, J. (2005). Editorial: Is there a difference between research and evaluation? The Diabetes Educator, 31, 150-155. <http://tde.sagepub.com/cgi/content/full/31/2/150>

Learn more about the hallmarks of good research design in social sciences. See these resources:

- Anfara, V. A. Jr., Brown, K. M., and Mangione, T. L. (2002). Qualitative analysis on stage: Making the research process more public. Educational Researcher, 31, 28-38.
- Ercikan, K., and Roth, W-M. (2006). What good is polarizing research into qualitative and quantitative? Educational Researcher 35, 14-23.
- Lamont, M., White, P. (2005). Report of NSF workshop on interdisciplinary standards for systematic qualitative research. www.nsf.gov/sbe/ses/soc/ISSQR_workshop_rpt.pdf; <http://www.wjh.harvard.edu/nsfqual/>

Avoid these pitfalls:

- Not framing your work in what is known (just because you have just learned something doesn't mean other folks don't already know it!). Be sure to read so you know the current state of the field and cite literature so that you can make a convincing argument that your work is relevant, timely, important, and novel.
- Not aligning your research / evaluation questions with your methods. Ask yourself whether the way you've designed the study and collected and analyzed the data will actually address your question.
- Not backing your arguments with evidence. Ask yourself whether your data actually support your claims. Your passion for science and health education will not get your work published, but your well-reasoned argument will!

Katherine Nielson - University of California, San Francisco

Dina Markowitz - University of Rochester

Barbara Hug - University of Illinois Urbana-Champaign

Marilyn Winkleby - Stanford University School of Medicine

Mary Jo Koroly - University of Florida

David Radford - University of Alabama at Birmingham

Don DeRosa - Boston University School of Medicine

Gail Fletcher - University of Southern Maine

Karina Meiri - Tufts University School of Medicine

Kathleen Bateman - Tufts University School of Medicine

Jeryl Erickson - Foundation for Blood Research

Virginia Shepherd - Vanderbilt University

Bruce Howard - Wheeling Jesuit University

Mel Limson - American Physiological Society

Lucia Enriconi - Miami Science Museum

Jeanne Chowning - Northwest Association for Biomedical Research

Michael Lichtenstein - University of Texas Health Science Center at San Antonio

Heather Reddick - University of Texas M.D. Anderson Cancer Research Center

Maurice Godfrey - University of Nebraska Medical Center

Samantha Gizerian - Charles Drew University of Medicine and Science

Ella Greene-Moton - University of Michigan School of Public Health

Amanda Whitener - Great Lakes Science Center

Wendy Huebner - Montclair State University

Mike Wyss - University of Alabama at Birmingham

Carl Franzblau - Boston University

Leonard Munstermann - Yale University

Andrij Holian - University of Montana

Laura Fawcett - Yale University

Louisa Stark - University of Utah

Joana Ricou - Duquesne University

Michelle Ventura

Barbara Baumstark - Georgia State University

Susan DeRiemer - Meharry Medical College

Renae Lenhardt - Anoka-Hennepin School District #11

Ah-Kau Ng - University of Southern Maine

Liam Casey - University of Rochester

Using Web 2.0

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Panelists: **Peter Crown** - University of Arizona College of Medicine
Darrell Porcello - Lawrence Hall of Science

Reported by: **Vicki Coats** - Oregon Museum of Science and Industry

Is it Social Media?	Facebook talk to kids, funny, geeky 3-4x day. Regular communication makes 2s less intrusive.
Email : maybe	Staying in touch with underserved kids. Not for under 13. IRB process approved Facebook use
Facebook : yes	release form available.
Wiki : maybe	NING global health curriculum: controlled site, free, post media
Blogs : yes	YouTube to recruit students-students made or produced can comment
Youtube : yes	gapminder-metrics highly animated, x+y are pullable and changeable
Amazon.com : no	
Lists en : yes	Do economically disadvantaged have access? Yes is Seattle no in other areas. Youtube and FB
Four square : yes	no in classroom.
Google : no	5 billion cell phones-underserved heavy use. Text messaging public library possible access. Cell phones will=land lines and surpass. 15-16 years ago cell phone last tech they will give up.

Darrell-SMILE

Fast company article on tech+ed teachermate, iPad independence, self guided, but content is king. NSF project-howtosmile.org pointer to activities , add meta data to catalog by characteristics/meta data fields leg cost. You can create profiles and make lists through RSS feed can broadcast elsewhere content can live elsewhere widget-small piece of code that can transfer information. Smile widget connected to other sites to provide more information on other pages.

NING

Kelly tried to start teacher network on NING - teachers did not use it, they use email. Theresa keep trying. Google groups comfortable for teachers like email using Google groups, lacks good calendar feature. These are most common "voice thread" used - don't give up early, took 8 months for teachers to get comfortable. Degree to which medium is message. High School student program all exchanged Facebook, cell phone number, set up listserve-complete failure for serious discussion.

Erica-use social media for dissemination. Go where they are good for certain things like promotion, if its not habitual, wont get sued 67 different groups at science pubs, don't know about them. Steps:

- (1) monitoring-you are out there-time cost
- (2) response mode-correct errors as much as 3-4 hours in a day
- (3) how do you feel
- (4) set up facebook page
- (5) can't keep on top of all the groups

Facebook has peaked in popularity. Budget for upkeep. Anonymous posts are monitored. Time commitment, but it gets used. Why do people come? Content is valued. Finds posts on Flickr, Twitter. Help review look at it-can be biased Science museums are good partners for these connections. Measuring attention span. Use Google analytics-dwell time on site can monitor your website, google page. Culture is training kids to very short attention spans-not good for science. How to increase attention spans?Its a hook, not end in itself. Citizen science, data analysis. Mini cancer registry. Friends vs. fans page on FB. Fans- personal and professional blurry. Fan is a group page, but set up by personal account. Fan page can have other administrators, gathers stats for you, not personal page.

Attention span: 6000 tests 1 mo. You need to decide what you want to do drove students to google groups, only science attention span in classroom seems the same. Facebook gives you credibility. Younger kids are ahead of us on groups and will be more open to it. Teachers have asked to use Youtube, school library has access. IRB issues with Facebook need high privacy levels. Families need to know. In PA teachers can be fired for appearing on Facebook. Don't even need account. Perceived as evil. Youtube is hosted video site-program, materials, videos from courses, watch anytime. Your own channel youtube.com/medical.

JOVE-publish video on experiments. Youtube often blocked. Pictures and other media sign release. Don't use names. Journal of visual experiments. UW: learning communities in hosted e-environments.

Name	Institution	What do I use?	What I want to use.
Vicki Coats	Oregon Museum of Science and Industry	Facebook	I want to understand
Carla Easter	NIH/NHGRI	Facebook, twitter, flicker	Everything
Theresa Britschgi	Seattle Biomedical Research Institute	Facebook, Ning, Youtube, Twitter, Gapminder	Distance Learning Portals
Nadina Aversa	Flint Community Schools	Youtube, Ning	Cell phone
Amanda Meyer	University of Alaska, Fairbanks	None	Everything
Jennifer Iriye	Arizona Science Center	Facebook, Youtube, Twitter, Google, email	Word press/blogger
Michele Ward	Texas A&M University	Email, Facebook, Text	Teleconferencing
Peter Crown	University of Arizona College of Medicine	Facebook, Youtube	Cell phone
Fern Lan Siew	Cornell University	Wiki, Facebook, Youtube, WebConf	
Donna Cassidy-Hanley	Cornell University	Wiki	
Kelley Withy	University of Hawaii	Ning, Facebook	Everything
Charles Geach	El Paso Independent School District	Facebook, Youtube, Wiki	
Bart Hays	Helix Charter High School	Youtube, Google, Facebook	Cell phone
Nancy Marra	University of Montana	Youtube, TeacherTube, Skype	
Molly Phipps	Science Museum of Minnesota	Facebook, Youtube, Wiki	
Val Davillier	Great Lakes Science Center	Linkd, email, flickr	
Deborah Spencer	ASSET Inc.	Facebook, Email, Ning	Video conferencing
David Anderson	Illinois State University	Facebook, Myspace	Lots
Sonsoles de Lacalle	Charles Drew University of Medicine and Science	Facebook, Twitter, Youtube	
Cynthia Ortiz	University of Texas Health Science Center at San Antonio	Wiki, Facebook, Youtube	
Judy Brown	Miami Science Museum	Teen Second Life	

Name	Institution	What do I use?	What I want to use.
Susan Hershberger	Miami University, Oxford	Facebook, NING, Youtube, linkd	Voice thread
Marcus Girley	Charles Drew University of Medicine and Science	Google Groups, Email	Facebook, google, email, cell phone
Isobel Contento	Teachers College Columbia University	Email	Lots
Jennifer Pang	Seattle Biomedical Research Institute	Facebook	Everything
Marco Molinaro	University of California, Davis	Facebook, Youtube,	Everything
Monroe Duboise	University of Southern Maine	Skype, email, website	Cell phone/facebook/youtube
Craig Berg	University of Wisconsin, Milwaukee	Youtube	
Laurie Fink	Science Museum of Minnesota	Youtube, Facebook	
Pam Koch	Teachers College Columbia University	Linkd, email, flickr	Text Messaging
Laura Martin	Arizona Science Center	Email, Facebook, Skype, Youtube	Cell phone applications
Lynnsey Donner	Arizona Science Center	Facebook, Youtube	Cell phone apps
Cathy Morton-McSwain	West Virginia University HSTA	Facebook, Twitter, Teachertube	
Joan Schanck	Pittsburgh Tissue Engineering Initiative	Facebook, email	Twitter, everything
Chuck Wood	Wheeling Jesuit University	Web conf, Wiki, Facebook, Youtube, Ipad, Second Life Learning	
Kim Soper	University of Nebraska Medical Center	Skype, email	
Christina Boelter	University of Kentucky	Email, youtube, text	
Randy Knuth	University of Montana	Wiki, Facebook, Skype, Youtube	

Inside Cancer: A Multimedia Guide to Cancer Biology

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Facilitator: Bruce Nash - Dolan DNA Learning Center, Cold Spring Harbor Laboratory

Reported by: **Miranda Bernhardt and Maggie Walker** - Northwestern University

The Breakout Session “Inside Cancer: A Multimedia Guide to Cancer Biology” focused on exploring the website www.insidecancer.org, the product of a SEPA program at Cold Spring Harbor’s Dolan DNA Learning Center. Following brief introductions from each session attendee, Dr. Bruce Nash, the session presenter, introduced the six hallmarks of cancer on which the website is based. Session attendees were provided with copies of the 2000 review article “The Hallmarks of Cancer” by D. Hanahan and R.A. Weinberg (Cell 100:57-70) that first outlined these features of cancer, as well as CDs of the student-facing Inside Cancer website materials. CDs are available for distribution and may be copied or saved to hard drives to allow use in facilities without Internet access.

The basis for developing the site and its utility as a teaching tool were discussed. Cancer is highly prevalent and remains a leading cause of death, making the topics presented relevant and interesting to a wide range of students and allowing students to make personal connections with the material. The diversity and heterogeneity of tumors, diverse genetic components, and treatment challenges provide useful tools to teach many aspects of molecular biology in a contextualized manner. The environmental aspects of carcinogenesis lend to lessons focused on behavioral changes that can impact cancer risk and on the importance and uses of epidemiological studies.

After these introductions, attendees were provided with time to explore the student facing side of insidecancer.org, consisting of 4 sections (Hallmarks of Cancer, Causes and Prevention, Diagnosis and Treatment, and Pathways to Cancer), each with a series of multimedia slides covering a wide range of topics. Content of the various sections include animations of cell processes, accompanied by video narrations by scientists (including Dr. Hanahan and Dr. Weinberg), epidemiological data that may be explored in various ways, and detailed 3D animations of intricate molecular pathways involved in a particular signal transduction pathway.

In addition to the student materials, a link to the “Teacher Center” provides numerous helpful tools for educators. The Teacher Center must be accessed online, and full access teacher materials requires creating a username and password for the website. Tools featured in this session include: a search feature (“Atomizer”) allowing users to view content on specific topic areas; “My Presentations” feature allowing users to piece together provided content into customized multimedia slide-shows, make small edits to slides or add custom text, and generate sharable URL links to personalized content (by selecting “make public” in the presentation organizer); information on alignment of particular content components with national standards, including ability to view these alignments in a matrix form; and a Wiki used for sharing of lesson plans.

Following the overview of the Teacher Center, the floor was opened to comments and general discussion.

Topics raised include:

- Graphics are “cool” and very detailed, but adding text-based, 2D, simplified diagrams (e.g. of signaling pathways) as additional support would be helpful for students with different learning styles.
- Addition of a terminology index or glossary would be helpful for students, as well as teachers less familiar with the material.
- The content matrix tool allowing teachers to align content with national standards is very useful.
- The intended audience for Inside Cancer is high school biology and health classes, but it would also be useful in undergraduate courses.
- Having more information available on dissemination/workshops/teacher feedback would be helpful.
- Additional resources on hands-on activities to accompany these curriculum materials would also be useful; teachers involved in workshops could be helpful in contributing to these activities.

Insidecancer.org provides a comprehensive, multimedia approach to teaching cancer biology to students at the high school level and beyond. The website is accompanied by a valuable “Teacher Center” component, providing a searchable framework, allowing tailoring of lesson plans to suit various needs and scopes by piecing together provided materials in customized orders, and offering processes for dissemination of presentations and resource sharing.

Lisa Nance - Southwood High School

Jackilen Shannon - Oregon Health & Science University

Susan Rogers - Caddo Parish Public Schools

Maggie Walker - Northwestern University

Miranda Bernhardt - Northwestern University

Genevieve Edwards - Georgia State University

Judith Ned - Stanford University School of Medicine

Donna Korol - University of Illinois Urbana-Champaign

Joseph Reyes - University of Texas M.D. Anderson Cancer Research Center

Jim Moore - University of Georgia

David Petering - University of Wisconsin, Milwaukee

Bruce Evje - West Warwick High School

Alison Slinskey Legg - University of Pittsburgh

Regina Cowan - Detroit Public Schools

Bill Cameron - Oregon Health & Science University

Jodie Galosy - University of California, Davis

Using Cognitive Interviews to Assess Instrument Quality ⁵⁵

Presenters/Facilitators: **Kristin Bass** - Rockman et al
Dina Drits - University of Utah

Reported by: **Eugene Roundtree** - Madison Park Technical and Vocational High School

How do you know you're getting what you want out of tests and assessments?

Summary of topics discussed, key points, challenges, conclusions:

During this workshop we reviewed protocols for cognitive interviews to assess instrument quality. Participants received two handouts, one that contained the interview protocol and one that included sample questions. Facilitators modeled how to use the protocol by play acting an interview, then participants modeled the process in groups of three, with one person taking the role of student, interviewer and note taker.

Key Issues to Pay Attention to:

- You can ask kids in their own words what they think they are being tested on
- Question wording- sometimes students will make associations that you don't intend
- Will students interpret the test item the way you want them to

Purpose of Cognitive Interviews:

- Validity
- ELL students may misinterpret an item
- Function of items
- Suitable for adults or children/students
- You want a range of kids because it is formative assessment
- You need IRB approval for all interviews
- SEPA module- they interviewed between 11 and 12 kids and tested 2/3 of questions

Protocol:

- Explain to student how interview will go and what the information will be used for
- Ask students to think aloud while they are answering the question
- Continuous reinforcement and encouragement
- Think about whether they are giving you the right answer for the right reason, or the right answer for the wrong reason, etc.
- If they don't know the answer because the student doesn't know, then the item is measuring what it is supposed to. For e.g., Quickgrow vs. Supergrow question
- Ask about each answer, let student discuss thought process
- Ask whether any of the questions/answers may have confused a classmate
- there is validation of content and validation of the response
- We're looking to see if some items are too distracting or if some items are too easy.

Role-Play Process:

- Short discussion/clarification of purpose
- Break up into groups of 3: student, interviewer, notetaker
- Whole group debriefing and discussion

Sabine Jeske - University of California, San Francisco

Andrew Sahalie - Pacific Resources for Education and Learning

Shaw-Ree Chen - University of Rochester

Debbie Stark - University of Texas Health Science Center at San Antonio

Margaret Shain - St. Joseph School

Mark Kaelin - Montclair State University

Virginia Carraway-Stage - East Carolina University

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John Stein - Brown University

Kalyani Raghavan - University of Pittsburgh

George Reese - University of Illinois Urbana-Champaign

Linda Pruski - University of Texas Health Science Center at San Antonio

Roxanne Hammonds - McAuliffe Middle School

Eve Wurtele - Iowa State University

Ishara Mills-Henry - TERC/Massachusetts Institute of Technology

Evaluation 101

Presenters: **Marsha Matyas** - American Physiological Society
Nancy Moreno - Baylor College of Medicine

Reported by: **Nancy Moreno** - Baylor College of Medicine

Does a survey of satisfaction help determine whether

- An activity is appropriate or needs to be revised?
- Learners are gaining knowledge, attitudes or skills?
- A project is making progress toward meeting its goals?

These types of questions can be answered by a high quality evaluation plan.

Evaluation relates to project goals and objectives:

Goals: **Major aims of a program or project**

- “Develop materials proven effective in engaging students in inquiry-based learning”
- “Increase the production of doctoral degree recipients in life sciences”
- “Increase teachers’ use of hands-on instructional approaches”

Objectives: **Indicators that progress is being made toward achieving goals**

- Should be measurable
- Process/Operational (What tasks have to be completed?)
- “Develop three draft modules in Year 1”
- Impact/Summative (Is it having an effect?)
- “Students using the new microbes unit will be able to identify and categorize ten required microorganisms with significantly better accuracy than students in a comparison group.”

Project Goals Evaluation

Formative or process evaluation

- Are we moving toward achieving project goals?

Documentation (implementation evaluation)

- Did we do what we said we would do?

Summative evaluation

- To what extent did we meet project goals? Why or why not? Is further research needed? What else did we learn?

Objectives evaluation

Objectives should also capture summative impacts such as:

- Impacts on student learning
- Teacher uses of effective pedagogy
- Effectiveness of dissemination
 - Did it get in the hands of the target audience of teachers?
 - Did they plan to use it?
 - Did they actually use it?
 - Did they observe an impact? If so, what was it?

You can’t measure everything!

- Set priorities.
- Evaluation strategies should be related to goals and objectives
 - Are you collecting evidence related to each goal and objective?
 - Does the evidence tell you what you need to know?
 - Are you collecting data that is not (or no longer) needed?
- Evaluation strategies change over the life of a project

Evaluation challenges

- Cost
 - Leverage strategies/tools across projects
 - Don’t use an external consultant for everything
- Limited funds and time for evaluation
 - Work to build a “culture of evaluation”
- Goals and objectives are hard to measure
 - If they can’t be evaluated, should the goals be redefined?
- Teacher and student mobility
- Designing, maintaining, administering and interpreting survey instruments and data
- Finding ways to handle qualitative and anecdotal data

Agents of Change

Most educational projects seek to create change

- Students who achieve more
- Students who develop and act on career interests
- Teachers who teach “better”

In most cases, it is the project staff or consultants who are the agents of change.

Materials as Agents of Change

- Curriculum Development Projects
- Agents of Change = Materials Developed!
- Lead to deeper student understanding, greater student interest, etc.
- As a result, the evaluation of these projects has a slightly different focus.
- NOTE: The same principles of evaluation apply.

Meaningful Comparisons

Need some type of meaningful comparison

- Pre/post test with comparison group
- Pre/post test without comparison group
- Post test only, with comparison group
- Post test only, without comparison group

You must use an appropriate comparison group

- Randomized samples
- Matched samples
- Timeline studies using “self” baseline groups

You need to use the appropriate measurement tools for YOUR population

- Validity
- Reliability

Designing for Rigor

- Plan all data collection and design in advance.
- Random assignment to groups > well-matched groups > pre/post assessments only
 - Avoid “contamination” among groups
- Sufficient sample sizes (~ 30 teachers per group)
- Pay attention to instruments (reliability and validity issues)
 - Even established instruments may need to be piloted
 - KNOW what you are measuring!

Common Cases

Case #1: **Curriculum materials development**

Goal

- General goal: The development of new materials that are effective in teaching scientific concepts and/or skills
- The specific project goal should include:
 - Scientific topic or concepts
 - Specific skills to be developed
 - What is unique about these materials that call for their development (if appropriate)

Objectives: **Materials Development**

- Objectives should capture important parts of the development process such as:
- Setting criteria and standards for a product
- Establishing a development process that documents: content accuracy, effective pedagogy, grade appropriateness, formative data (teacher feedback, student field-testing feedback), and field-testing for initial impact on student learning.

Evaluation: Science of Microbes

- Elementary and middle school students
- Aligned with National Science Education Standards
- Topics
 - Nature of scientific inquiry
 - Microbe diversity and roles
 - Tools and science
 - Infection and immune system
 - Infectious diseases, such as HIV/AIDS
- Embedded Assessments
 - Pre/post assessment of students knowledge
 - Students groups develop their own concept maps throughout the unit
 - Teacher strategies for assessing student work and classroom extensions

Field Test: The Science of Microbes

18 Houston-area middle school classrooms

- 12 additional classrooms served as comparison groups (matched, within same schools)
- Student population = 53% Hispanic/Latino; 11% African American, 23% White; 9% Asian; 4% Other.
- Pre/post content knowledge assessment (multiple choice); quasi-experimental design
 - Field test and comparison classrooms were statistically similar in student content knowledge before beginning unit ($t = .325$, $p = 0.745$, $df = 563$).
 - At the end of the program, field test groups saw an average gain of 18% on the posttest ($t = 18.847$, $p < .001$, $df = 330$, $d = 1.036$), while students' scores in the comparison classrooms actually decreased (8.96 and 8.61 pre-test and post-test means, respectively).

Field Test: Food and Fitness

Quasi-experimental design with matched comparisons classrooms in same schools

- 15-item pre/post assessment
- Matched comparison classrooms in same schools
- 447 implementation/343 comparison group students
- Implementation teachers also completed an evaluation survey about each activity and participated in a focus group.
- Field-test group increased from 44% to 66% correct ($p \leq 0.01$ paired t-tests, $d = 1.0$); comparison group scores declined.
- No statistically significant differences among scores from students in grades 4–7
- Teachers rated the unit on pedagogy, student interest and learning (overall rating of 4.5 on 5-point scale) and provided qualitative feedback.

Case #2: Teacher Professional Development

- General goal: Increasing teacher content knowledge or specific skills. May include increased awareness of an issue.
- Specific project goal should include:
 - Specific skills or knowledge targeted
 - Specific issue or focus group
 - What is unique about the program that calls for its development (if appropriate)

Comparison Groups

- Randomized samples
 - Great if you can do it
 - Consider randomizing AFTER data collection
- Matched samples
 - Match on meaningful variables
 - Use variables from large databases if you can
 - Don't match to one individual as a comparison
 - Too much individual variability
 - Can match AFTER data collection, but risky
 - Timeline studies using "self" baseline groups

Example: **Matched samples to evaluate a program component**

- Comparison: Two experimental programs, one with a research experience, one without
- Matching variables for teachers
 - Middle versus high school
 - Years of experience
 - Advanced degree
 - Student population (minority/majority, SES)
 - Community type (rural, suburban, etc.)

Where is the control group?

- Staggered Intervention

Benefits of Staggered Interventions

- Schools serve as their own baseline and their own control group
- At any point in time, we can see the effect of the implementation
- Consistent repeated measurements go beyond "Did it work?"
- Analyzed with growth curve modeling

Evaluating teacher professional development

- Program delivery
- Content knowledge
- Pedagogical content knowledge
- Teaching skills
- Collaboration
- Leadership
- Related student skills, attitudes and knowledge

Assessing knowledge requires a "test"

- Traditional "test"
 - What are you measuring?
 - Content validation – are you asking about the right content? Do the test questions cover the workshop content?
 - Construct validation – are you measuring the right skill, concept, etc.? If a student can name the steps in the scientific method, does that indicate she/he "understands" it and can apply it?
 - Is the measure reliable?
 - Statistical methods to test this (test-retest, etc.)
 - For YOUR specific population?

Example: **Content knowledge in physiology**

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- Pre/post test
- Instrument: Adapted from HAPS standard undergrad test for anatomy & physiology
- Validation – Trial with teachers in program
 - Content: Expert panel selected "physiology" questions from the test and validated the correct answers
 - Construct: Saw increases in content knowledge among teachers in program pre/post trial use. Doing taxonomy of questions now.
 - Reliability was very high
 - Average scores provided "room" for increases (not skewed distribution)
 - Item-total correlations were high for most questions. Remove or edit those that are low.

Artifacts Can Demonstrate Change

- Teaching skills can be assessed by
 - Tests and surveys
 - Observations (use validated observation protocol and check inter-rater reliability)
 - Products (materials developed or revised) (use validated rubric and check inter-rater reliability)
 - Reflections, online discussions, etc. (use validated rubric and check inter-rater reliability)
- Collaboration and Leadership
 - Survey
 - Artifacts: reports, emails, reflections, products

Do program goals require student assessment?

- Consider the Negatives:
 - Cost
 - Privacy and security of data
 - School regulations
 - Will change in teacher behavior influence student performance in a measurable way?
- Consider the positives:
 - Demonstrated impact of professional development program on student achievement or interest.
 - Increases the likelihood that program can be disseminated.
- Do your homework!
 - Do not collect data "under the radar" in schools.
 - Allow lead time to establish needed approvals.
 - Get approvals before submitting your proposal.

Should I use an external evaluator?

- Yes
 - Objectivity is important
 - You need specific kinds of expertise for your program evaluation.
 - Required by funder
- Not necessarily
 - You have internal expertise to plan, design and conduct the evaluation.

Consider hiring an evaluation consultant for certain specialized tasks:

- Evaluation plan development
- Survey/instrument development
- Summative evaluation only
- Focus groups/interviews
- Data analysis and report generation

Final Suggestions for Your Program Evaluation Design

- Be greedy about data! Gather it in the finest granularity you reasonably can.
- Use the most “powerful” statistical tools you “might” be comfortable with.
- Prove the process so that you can make a judgment about the outcome.
- Set up protocols for handling personal info; train staff and work/study students.
- Involve your statistician/evaluator at the beginning of the study.

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Carla Easter - NIH/NHGRI

Rebecca Daugherty - Northwestern University

Suzanne Olds - Northwestern University

Michelle Ventura - Georgia State University

Samantha Gizerian - Charles Drew University of Medicine and Science

Monroe Duboise - University of Southern Maine

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NIH Office of Scientific Review: Continued Discussion

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Facilitator: **Bonnie Dunn** - Scientific Review Officer, NIH NCRR

Reported by: **Melvin Limson** - The American Physiological Society

NIH Office of Scientific Review: Continued Discussion from Morning Session

- Role of SRO, Grants Management, PO
- Call Program Officer after receiving summary statement
- Council: veterinarians, bioinformatics, senior-level (3-4 year terms)

Overview of “Enhancing Peer Review at NIH” (on website); still taking comments:
<http://enhancing-peer-review.nih.gov/>

The different types of review processes include the following options:

Teleconference/virtual reviews? Small number of proposals.

Internet Assisted Review (IAR): Critiqued online

Virtual: IAR: reviewing critiques, followed by feedback from SRO

Teleconference: fewer and fewer face-to-face, on-site most common

Museum and SEPA: who’s looking at museum proposals? Different expertise; attempts to make well-balanced

What motivates people to be on review panels?

- giving back
- learning experience

Overall Impact Priority Score (not average of criterion scores):

- even if “1”s can rate an overall impact priority score
- “2” if it doesn’t demonstrate impact on the field.

Criteria for Evaluation Component:

- learning science
- evaluation
- assessment

Next FOA for 2011 budget year (potentially good for next 3 years):

- 9-10 month turn-around

Showcasing a website:

- How within proposal?
- How demonstrate? (if no appendices) or museum exhibit photos most relevant screenshots within narrative.
- Not necessarily required to preview websites online.

Reviewing FAQs on Enhancing Peer Review website:

- <http://enhancing-peer-review.nih.gov/>

PARTICIPANTS

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Erika Shugart - Koshland Science Museum
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The SBIR and STTR Grant Programs

Presenter: Krishan Arora - Program Officer, NIH NCRR SBIR and STTR

Panel: Jeanne Chowning - Northwest Association for Biomedical Research

Dina Markowitz - University of Rochester Medical Center

Reported by: **Jodie Galosy** - University of California, Davis

Summary of topics discussed, key points, challenges, conclusions:

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) are sponsored by the National Center for Research Resources (NCRR) of the National Institutes of Health (NIH) to support small businesses in researching and developing drugs, devices, tools, services, and products that improve human health. Both programs offer potential funding sources for commercializing SEPA products via the following goals: (1) Development of discovery-oriented software, tools, and technology for science education for K-12 and undergraduate students and (2) Innovative neuroscience educational tools for children in grades K-12.

Sample projects funded include*:

- Virtual MD: an e-learning tool for improving health science literacy (Terra Nova Learning Systems, WI)
- EdvoCycler: an affordable instrument for polymerase chain reaction (PCR) in classrooms (Edvotek)
- GK: a multimedia curriculum on genetics for middle school students (KDH Research and Communications, Inc., GA)

* amounts are guidelines, not ceilings

The award is made to a small business. For SBIR, the PI's primary employment must be with the small business concern at the time of the award and for the duration of the project period (subawards are permitted). STTR requires a US research institution partner (e.g., university) with a minimum of 40% effort from the small business and 30% from the research institution. There are three program phases:

- | | | |
|-------------|-------------------|---|
| • Phase I | Feasibility Study | 100K/6 months (SBIR)/12 months (STTR) |
| • Phase II | Full R & D | 750K/2 yr (commercialization plan required) |
| • Phase III | Commercialization | non SBIR/STTR funds |

The PI does not have to have a Ph.D. or M.D. but must have the scientific and technological expertise to oversee the project.

Jeanne Chowning described how previous and present SEPA awards led to SBIR funding Ethics Oriented Health Training Software (ETHOS)—a multiple PI partnership between a non-profit for biomedical research she directs (NWABR) and a for-profit scientific visualization business (ARKITEK Studios). Dina Markowitz explained the steps she took to create a small business—Science Take Out—that sells science education kits. The kits evolved from Markowitz's work with science curriculum development, teachers and students through the SEPA-funded Life Science Learning Center at University of Rochester.

There are multiple receipt dates for grant submissions: April 5, August 5, and December 5, 2010.

More information can be found at the following links:

- www.ncrr.nih.gov (NCRR Web Site)
- <http://funding.niaid.nih.gov/ncn/sbir/default.htm> (Sample application)
- http://grants.nih.gov/grants/funding/sbirsttr_sites.doc (NIH SBIR/STTR Internet Guide)
- <http://sbir.cancer.gov/news/recent/> (Video presentation on writing successful SBIR Application)

Omnibus Solicitations for Grants available at these links:

- <http://grants.nih.gov/grants/guide/pa-files/PA-10-050.html> (SBIR)
- <http://grants.nih.gov/grants/guide/pa-files/PA-10-051.html> (STTR)

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Choice, Control and Change: Using Science to Make Food and Activity Decisions

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Presenters: **Isobel R. Contento** - Teachers College, Columbia University
Pamela Koch - Teachers College, Columbia University

Reported by: **Pamela Koch** - Teachers College, Columbia University

Choice, Control & Change: Using Science to Make Food and Activity Decisions (C3) is a 19-lesson curriculum appropriate for sixth through eighth grade students. Middle school is a time when students are gaining independence and are buying snacks and meals with peers. At the same time they are making choices about what kinds of activities they do with peers. Often the foods that are readily available and inexpensive are sweetened beverages, processed packaged snacks (chips, candy and baked goods), and fast foods. These foods contain high amounts sugar and fat that we, as humans, naturally like. They are also foods that most adolescents have seen thousands of advertisements for throughout their lives. Yet, they are not the foods that will promote the health of growing adolescents, and regular consumption of these foods can promote weight gain and lead to the development of chronic diseases. Additionally, adolescents are having increased recreational screentime, decreasing their physical activity, making it even more difficult for them to maintain energy balance.

This curriculum developed out of a belief that childhood obesity and its long-term health implications are a critical societal concern and a key topic for science education. It is of paramount importance to all of us that we decrease the rates of Type 2 diabetes, heart disease, and other lifestyle-driven diseases so that today's youth can grow up to be productive and fulfilled citizens.

Yet we live in a culture that includes supermarkets filled with more than 50,000 items, of which most are highly processed food products, often high in added fat, sugar, and sodium; heavily advertised; and relatively cheap — particularly when compared calorie for calorie with more healthful foods.

Additionally, we fill our lives with sedentary activities. Modern conveniences make many of our daily chores easier and vehicles move us from place to place. The forceful combination of readily available and commonplace food with a lack of vigorous activity can compromise our health. For our youth, this is the only reality they have ever known.

With this situation as a backdrop, LIFE's team of science educators, nutrition educators, and teachers has worked in classrooms across the country for several years to develop and evaluate Choice, Control & Change. This innovative curriculum provides teachers and youth with hands-on investigations about what they can do to make healthy food and activity choices. This partnership of science and nutrition education has been like most relationships, with disagreements and thoughtful conversations that allowed us to understand and learn from each other to create something better than any of us could have ever created alone. The result is a curriculum that is driven by a carefully crafted question that frames all of the students' experiences:



How can we use scientific evidence to help us maintain energy balance?

Through the C3 lessons, students learn about life science by investigating how the human body works; why a state of dynamic equilibrium — balancing energy in and energy out — is important for our bodies to be able to function well; how conditions such as high blood cholesterol and high blood sugar develop and what we can do to prevent them; and how to make food and exercise choices that will promote health and decrease the risk of many lifestyle-related diseases, such as heart disease, Type 2 diabetes, and some cancers. The curriculum also includes investigations of students' food environment and physical-activity environment. The emphasis on the environment reduced guilt by taking a system-blaming approach instead of a victim-blaming approach. The curriculum empowers students to take action. After learning “why-to” knowledge, they use a guided goal-setting process to make action plans for how they will navigate their food and physical-activity environments. Often nutrition education is thought of as teaching students about food groups. C3 takes the stance that to change students' food and activity choices, we need to focus the curriculum around concrete behaviors that make sense in the context of their lives. In C3, students gain an understanding of why healthful food choices are personally relevant and the skills they need to make these choices in the context of their lives. The curriculum focuses on behaviors that can help students achieve energy balance and over which youth have a large degree of control. The six food and activity goals for C3 are:

1. eat more fruit and vegetables;
2. drink more water;
3. increase activity, particularly through walking more and taking the stairs more often;
4. drink fewer sweetened beverages;
5. eat less frequently at fast-food places, choose healthier options, and ask for smaller portions; and
6. eat fewer processed snacks (candy, chips, and packaged baked goods).

These goals are supported by the recommendations of the federal government's MyPyramid and by a panel of experts on childhood obesity from 15 professional organizations.

Students confront the risks associated with current diets and learn the benefits of the C3 behaviors for reducing those risks as well as how to reduce the barriers that can keep them from carrying out healthier behaviors. Once students are motivated, they use a process of guided goal-setting through which they analyze their data from personal food logs to choose one of the C3 food goals. They create concrete action plans and collect data so they can track and analyze progress toward their goal. Through this approach youth learn the why-to and how-to of making healthful choices.

This curriculum emphasizes science agency: “realized capacity of students to utilize their science understandings to purposefully and reflectively act upon their world with the aim of transforming themselves and the conditions of their lives.” When students develop this agency, also called personal agency, they become intentional about making healthful choices, they think ahead about the consequences of their choices, they are self-directed at creating goals for themselves and making plans to achieve their goals, and they reflect on their actions in order to build confidence that they can make healthful choices.

While personal agency is an important goal for everyone, it is critical for disadvantaged youth who need empowerment. Middle school students are responsive to an approach that helps them understand that they have choices, can exert control, and can make changes in their own eating and physical-activity behaviors as well as their personal food environments to enhance their health and help their bodies do what they want them to do. This is particularly relevant for youth who are becoming more involved in both in-school and out-of-school activities. In addition, at this age, students are gaining independence and spending more time with peers, which often includes buying and eating food together.

In C3, students spent considerable time analyzing their own eating and physical-activity patterns and comparing them to the C3 food and activity goals. Research has shown that conducting such self- assessments can be motivating because they increase a sense of concern. This motivation can lead to behavior change.

C3 is currently being published by National Gardening Association and is available at:

<http://www.gardeningwithkids.org/11-3345.html>

Lynnsey Dohmen - Children's Museum of Houston
David Petering - University of Wisconsin, Milwaukee
Laura Martin - Arizona Science Center
Lucia Enriconi - Miami Science Museum
Judy Brown - Miami Science Museum
Genevieve Edwards - Georgia State University
Mike Wyss - University of Alabama at Birmingham
Jackilen Shannon - Oregon Health & Science University
Cathy Morton-McSwain - West Virginia University HSTA
Daniel Crockett - West Virginia Higher Education Policy Commission
Marcus Girley - Charles Drew University of Medicine and Science

Regina Cowan - Detroit Public Schools
Christina Boelter - University of Kentucky
Maggie Walker - Northwestern University
Wendy Huebner - Montclair State University
Michele Ward - Texas A&M University
Liam Casey - University of Rochester
Bruce Evje - West Warwick High School
Kelley Withy - University of Hawaii

Howtosmile.org: An Avenue for Disseminating Your Project's Activities? ⁶⁴

Presenter: **Darrell Porcello** - Lawrence Hall of Science

Howtosmile.org is a website that allows educators to easily locate high-quality, hands-on activities across multiple disciplines and contributing institutions. Led by the Lawrence Hall of Science at UC Berkeley, Howtosmile.org is the home of the SMILE (Science and Math Informal Learning Educators) pathway, a national partnership among science and technology centers, museums, community-based organizations, and out-of-school educators. Participants met the SMILE PI and learned how to use this newly developed NSF-funded cyberlearning platform to disseminate their learning activities to educators working with children from diverse backgrounds in all settings.

Design and Evaluation of Student Assessments Related to SEPA Projects

Facilitator: **Janet Dubinsky** - University of Montana

Reported by: **J. Steve Oliver** - University of Georgia

Introductions

The session began with each of approximately 30 individuals introducing themselves. As a component of this introduction each person spoke to the degree to which they are already involved in the assessment of student learning. Many of the participants indicated that they are not yet conducting student assessments, but many plan to add this to their ongoing projects.

Key Topics of Discussion

One of the first issues that came up is how to compensate participants who are no longer in the formal educational setting. One audience member wants the participants in their project to be able to receive gift cards as compensation for participation.

A second issue was related how one might acquire support for getting into a school district by invoking the NIH name and reputation. Audience members felt that invoking the NIH name would carry a great deal of weight. Several people reiterated that it is important to have an approved IRB before attempting to get in the door. The challenge for getting into the school district may be centered on the type of student data that is being expected or that must be released by the school district.

When discussing getting into school districts, several audience members felt that the difficulties settled on the issue of comparable classrooms. Getting a school district to agree that not only the students who are taught by teachers who have received a professional development treatment will participate in the data collection but also students who are in classrooms of teachers that did not receive the treatment is a major challenge.

But it is clear that a proper approach is as important as any aspect of the plan for evaluation. One implementation required that participant teachers had to find the "comparable" teacher to complete the study. This plan created school and teacher buy-in for the professional development that was also being offered to the teachers.

One audience member discussed a summer workshop for 25 teachers who learned about the use of a package of curricular materials. The question was posed, "What is a valid instrument to be able to use to measure the outcomes of their students' learning?" One participant asked, "What do you mean by 'validated'?" Another individual pointed to how pre and post tests are not necessarily the best way to approach the evaluation.

A participant from the group described in detail their work on validating attitude instruments. This procedure is focused on several major steps: literature review, attempt to get copies of the instruments, recreation of the original validation of those instruments, and modification as necessary.

Basic Definitions of Terms

- Reliability – how consistent is the measure. For instance, if you give it on multiple events.
- Content validity – identify the content domain and examine how well an assessment represents this domain.
- Face validity – does the assessment tool appear to have the necessary content characteristics to measure the outcomes of interest.
- Predictive validity – how well does an assessment predict what a learner will do in the future.
- Two overarching issues – test validity and test use. You are constructing an argument for why you believe that this test measures what you think it measures and thus it is as much an art form as an objective measure.

We have many things we want teachers to do in their classroom. For instance, we have 12 different topics on an assessment. If a teacher only chooses to use a subset of those, then we cannot test across all 12. We then have to identify test items that are related to the small components of 12 topics. We correlate this with an assessment of “how much of the curriculum did you (the teacher) use?”

Issues of Concern

There is not one source of validity. When is the cutoff for deciding that an instrument has been validated? More sources of evidence are better than fewer. The more that you can triangulate the better. You need multiple sources.

Cognitive interview is a conversation you have about a test item both about the stem and the multiple responses. If you are just using pre and post items that you have developed without the extensive evaluation, then it needs an additional source of data. The really complicated stuff is “what is this measuring?” and “what is this not measuring?”. Use mixed methods and collect as much as you possibly can. Ideally you want your work to be published and validated instruments will support this.

The challenge with the cognitive interview is that the teacher can stack the deck toward what was taught rather than what was intended by the intervention. One uses this tool because there may be popular culture references (or similar issues) that may cloud the evaluation.

Sometimes the curricular materials are so specific about topics (i.e., mosquitoes and tick and their role in the transmission of disease) that it is not possible to have a valid comparison group. One member of the group suggests looking at evaluations that are released by the state or other agency. Looking through these assessments will show whether the specific topics are covered in the test in previous versions. Assessments are available at Mspnet.org. Assessments found there are presumed to be valid and reliable.

Should we expect that a “hired” outside evaluator will automatically zone in on the “validity” issue? The answer collectively from the group is “not necessarily.” But it is clear that directing the evaluator to collect the data that is needed, will necessitate a conversation (an ongoing conversation) about how validity will be established.

What about concept mapping? Can we use concept mapping as a pre- and post-assessment? There is a good bit of discussion about whether the students are prepared to make a concept map and so we must ensure that they are not learning how to make a concept map rather than learning a science concept. One of the biggest issues is what the structure of the map means related to the knowledge the student has about the concepts under study. How can we code the concept maps to learn what level of literacy the students are expressing? Within the science education literature there are many studies that illustrate the use of concept maps in collecting learning data from students. A good rubric is one that provides a robust tool for evaluating concept maps. If the rubric can be used by multiple users and get the same result, then this is a robust rubric.

Susan DeRiemer - Meharry Medical College

Andrew Sahalie - Pacific Resources for Education and Learning

Bruce Nash - Dolan DNA Learning Center

Mary Jo Koroly - University of Florida

Margaret Shain - St. Joseph School

Jeryl Erickson - Foundation for Blood Research

Barbara Hug - University of Illinois Urbana-Champaign

Roxanne Hammonds - McAuliffe Middle School

Don DeRosa - Boston University School of Medicine

Jan Dubinsky - University of Minnesota

Suzanne Olds - Northwestern University

Kathleen Bateman - Tufts University School of Medicine

Theresa Britschgi - Seattle Biomedical Research Institute

Renae Lenhardt - Anoka-Hennepin School District #11

Debbie Stark - University of Texas Health Science Center at San Antonio

Linda Pruski - University of Texas Health Science Center at San Antonio

Joseph Reyes - University of Texas M.D. Anderson Cancer Research Center

Gene Roundtree - Madison Park Technical and Vocational High School

Sonsoles de LaCalle - Charles Drew University of Medicine and Science

Kristin Bass - Rockman Et Al

Barbara Baumstark - Georgia State University

Lisa Abrams - Virginia Commonwealth University

Karina Meiri - Tufts University School of Medicine

Steve Oliver - University of Georgia

Dina Drita - University of Utah

Shaw-Ree Chen - University of Rochester

Bert Ely - University of South Carolina

Lewis Jacobson - University of Pittsburgh

Paul Cotter - University of Alaska, Fairbanks

Alison Slinsky Legg - University of Pittsburgh

Simeon Slovacek - California State, Los Angeles

Bill Cameron - Oregon Health & Science University

Laura Fawcett - Yale University

4:15 - 5:15

University of Alabama at Birmingham SEPA Teacher and Student Panel

Moderator: **J. Michael Wyss** - University of Alabama at Birmingham

PANEL

Spencer Horn - Director of Science
Sandra McKell - Curriculum Support Science Teacher
LaRhonda Brown - Science Teacher
Kaylin Brown - 7th Grade Student
Joleshia Simpson - 7th Grade Student
Jacy Stanford - 8th Grade Student
Darrius Robinson - 8th Grade Student

Reported by: **Dina Drita** - University of Utah

Overview

This SEPA project focuses on middle school students. There are three main programs:

1. Summer camps
2. LabWorks! (laboratory projects at the museum)
3. School-year program in the classroom (brings materials and expertise into the classroom, and provides opportunities for hands-on learning experiences).

Teacher experiences in the program

Did these experiences help students in your classroom?

- Yes, these students are well prepared. They are also able to teach other students, and often this can be an effective way for the students to learn.
- Students are performing better on assessments, and doing more sophisticated work. Will be looking at impact on standardized tests in the future.

What did you gain from facilitating these programs?

- Teacher skill enhancement - "I've learned new skills that I can bring back to the classroom."
- Received professional development, both in summer camps and in school-year programs, that they can take back to classrooms. Teachers are trained and gain skills on new activities during these experiences.
- The instructors who helped facilitate the camps are more likely to use the hands-on labs in their school-year classrooms. These teachers use a lot of the manipulatives, and they are not afraid of using the technology.
- They learn that science isn't just for the best students, but it's for all students.

Spencer Horn - Science Director of Birmingham

What are your goals?

- If a student can come out saying "I like Science" and can talk to you about science. If this is the end result, then all of the other stuff in the middle will happen.
- We are very targeted with what we teach them, but we want them to come out saying "Science is great, I want more." The rest can't happen without this.

What are some challenges?

- Identifying a constant stream of funding.
- Teacher turnover (important to have a standardized structure in place to train new teachers).

Student experiences in the program

- Which were your favorite activities?
- Many students enjoyed the "diving into the gene pool" experience, and one student described liking an environmental engineering experience the best.

Did these experiences help you in class?

- All of the students answered affirmatively.
- These experiences helped prepare students to gain more knowledge in class and they felt ahead of the game compared to other students.
- They found they were able to teach some new concepts to their peers who had not attended camp.
- One student described some of the experiments they conducted during the chemistry summer camp. This experience enabled her to understand easily information presented in class during the following school year.

Questions from the Audience for Panelists

What is the application/selection process for the camps for the students?

- 500 kids/summer, 100 high school institute. Birmingham city students receive a 100% scholarship—no cost. 25% are from privileged schools and they pay \$250/wk.
- For camp, no selection, but for the high school program there is a selection process.

What motivated the students to go to camp?

- “At first, my parents’ initiative, then I started liking it.”
- “Science is one of my favorite subjects, my mom signed me up.”
- “My mom signed me up, but I liked science anyway.”
- “My science teacher asked who wants to go and I signed up.”

What are the relationships/partnerships among program stakeholders?

- The leaders of the program have maintained close relationships with one another, school, administrators, districts.
- Must have teacher input into program design, function.

What is the history of program?

- Discussed evolution/development of the program. It has been through many iterations.

How will you continue program if funding runs out?

- A fair amount of Title money comes into district (Title 1 and 2)
- Relationships with industries around.
- We have to make a case for why this program is important.

What are you doing as a school district to prepare elementary teachers in science?

- Professional Development continuum.
- Fully supplied FOSS kits for teachers. District refurbishes the kits, etc.
- Trying to vertically align the curriculum.
- Some of summer camps involve K-5 teacher facilitators.

Students: How should we engage younger students in science?

- Hands-on activities are much better for elementary students to learn science than using textbooks and writing.

What is the curriculum of camps based on?

- The state core curriculum and national curriculum for each grade, but with a focus on presenting the information in an engaging way through opportunities for exploration and experimentation.

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Wednesday, April 14 8:00 - 8:15

New Genomic Careers Online Resource

Presenter: **Carla Easter** - NIH National Human Genome Research Institute

Reported by: **Cheryl McCallum** - The Children's Museum of Houston

Purpose of New Genomic Careers Online Resource:

Give students interested in genetics and genomics information on the vast amount of careers available in the field.

Website co-designed by high school students. YouTube look.

<http://www.genome.gov/genomicCareers/>

One of the coolest parts of the site is that people who use the site can actually create their own site based on their interests, using Web 2.0-type technology.

One of my favorite parts is the genomic challenge. Guess the career trajectory of students currently pursuing degrees in the field. Six individuals come up (randomized) in the challenge and you guess. New ones come up every time.

Welcoming feedback on the site as it is evolving.

National Lab Day and US Science Festival

Presenter: **L. Tony Beck** - NIH NCRR SEPA Program Officer

Reported by: **Cheryl McCallum** - The Children's Museum of Houston

National Lab Day(s)

- A yearlong program to get scientists working with kids and communities to get people excited about science.
- 200 pages of National Lab Day projects on National Lab Day website -- <http://www.nationallabday.org/>. Number of federal organizations sponsor the project.
- Very nice Google-type map that shows ongoing projects.
- Register as a scientist or techie and submit application.
- The section on teachers shows teachers who are asking for help on particular topics.

Challenge: Tony proposes that SEPA projects go to the National Lab Day site and register, since our projects are in large part National Lab Day style labs. 10-12 projects raised their hands that they are already associated with National Lab Day in some way. Please send press items, no matter how small, so that Tony can showcase our involvement and support in National Lab Day. Opportunity to better disseminate projects and also market SEPA projects.

One of the things that we could do is modify the SEPA website to develop a Google-type map for SEPA projects.

Examples of National Lab Day SEPA Connections.

- **Great Lakes Science Center, Cleveland** – opportunity to launch favorite labs like DNA extraction. Introducing PCR lab in May. They do these labs on Friday (with school students) and Saturday (with public).
- **University of Florida** – combined with industry to develop CDs to send around with faculty so that they can get the idea of types of lab activities that students can do. 100 teachers come from around the state each year, inform them about the kinds of things that are happening in the health field.
- **East Carolina University** – rural institution in outer banks, no one at East Carolina U had registered on National Lab Day website yet so on May 12 they are having an National Lab Day kickoff to bring everyone together and create more awareness of National Lab Day. Sending out invites to administrators and scientists.
- **APS** – national outreach in November during Physiology Understanding Week, that's where they try to get as many physiologists in the schools as possible. Will be pushing to APS members to register, most of whom are completely unaware. Challenge: try to get your major associations to put announcements out about National Lab Day.
- **McWane and UAB** – Brain Awareness Week during Spring Break. 6,000 -7,000 visitors through the McWane labs. Got two minutes on local TV.
- **Mark Calan** – All of us have something that we do during the coming year that we can plug into National Lab Day. Use information to invite congressional representatives and NIH staff to understand more about our projects.

U.S. Science Festival (next is October 2010 on D.C. National Mall)

Last year in Balboa Park. Video available that shows activities -- <http://www.usasciencefestival.org/news/press-releases>. Dilemma for NIH is to follow up with a dynamic set of activities for this year. NIH has 30 booths reserved.

The Institutes do not have any interaction with the target metric. SEPA has a great opportunity to provide resources for these folks. One idea is to get a big tent with subareas with specific focus. Tony committed 15 SEPA units of stuff.

Think about what you might have available. Tony might be able to provide some supplemental money to provide mobile versions of projects.

Erica Shugar will assist with setting up the flow of the booths for the event.

How many folks here are participating already through their institutions?

- **Erica Shugar** – Festival is aimed at 7th grade and above. Very little power. “Million” restrictions – paper, stickers, etc. Short, hands-on activities are the most successful things. Hundreds of thousands of people expected. Everybody that's anybody in D.C. science will be there.
- **Marsha Matyas** – 6,000 kids at every booth. Park Service has to approve every activity that you do.
- **Oregon Health** – Portable exhibits doing a dietary assessment, collecting normative information. Give public an idea of what it is like to be a human subject.
- **UC Davis** – NSF has 15 booths. Davis is doing an activity about how to use light to see what is going on in your body. Developing a website that has access to all of the activities that can be done at home. Another possibility for SEPA to link to what NIH is doing at festival through the SEPA website.
- **Pittsburgh** – Anticipate serious security issues.
- **UC San Francisco** – National Science Festival is part of a growing movement for festival growth around the nation. San Francisco science festival will be Fall 2011.



BREAKOUT SESSIONS

9:15 – 10:30

Facilitating Science and Health Career Exploration

Facilitators: **Val Davillier** - Great Lakes Science Center

Carla Easter - NIH National Human Genome Research Institute

- Linking advances in biotechnology with health
- Target many audiences in programming
 - Students, educators, public, visitors, science and education professors, distance learners
 - Feature a variety of topics (research, career, testimonials)
- Involve different kinds of presenters
 - Faculty, grad students, people impacted by biotechnology
 - Distance learning presentation via Web
 - Also live with help from PBS for questions
 - Archived presentations available on Web
 - 56 schools and one retirement community has taken advantage of distance learning
 - Expressions—science and art presentations
 - 141 pieces generated
 - Website dedicated to local health careers (information, pathways, interviews with professionals, list of employers)
 - Availability of teacher resources
 - Bringing scientists and students in to exhibit development and make process transparent to public to generate interest
 - Prosthetic arm exhibit, engineering = better health (work in progress)
 - Show process of development to public
 - Genomic Career Resource
 - For students, career counselors, parents and teachers
 - Expose audience to breadth of genomic field
 - DVD—website – so easily updated
 - Interactive videos, career profiles, introduction to genomics, career resources

PARTICIPANTS

Renee Bayer - University of Michigan
Christina Boelter - University of Kentucky
Bart Hays - Helix Charter High School

Instruments for Assessing Overall Abilities in Science as Inquire, Science and Health Literacy, and 21st Century Skills

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Facilitator: **Wendy Huebner** - Montclair State University

Reported by: **Theresa Britschgi** - Seattle Biomedical Research Institute

Action item: produce an annotated inventory/bibliography of resources, authors and websites on this topic to share with attendees and the SEPA community at large.

A handout was provided by Wendy Huebner, outlining a framework for discussion (Premise, Rationale, Discussion) and two pages of background information (e.g., the history of 21st Century literacy skills and the major components of the “Program for international Student Assessment” that relate to scientific literacy).

Project 2061 (from AAAS, <http://www.project2061.org/>, http://64.130.44.78/documents/21stcskillsmap_science.pdf) and others have called for, and drafted century careers. Databases are available from Atlas that cultivate such skills – in ways that are better articulated than perhaps even the NRC has done to date. So far assessments have primarily focused on emerging national science standards (NRC framework is out, so the NSES should be out this year).

According to session attendees many of the current set of public tools produce qualitative outputs. While many states are increasingly aligning their science standards towards stated industry sectors and skills (e.g., engineering, design and health care), attendees expressed anxiety about the drivers, motivators and politics of this movement. States like Texas have expressly requested to opt out of this migration. Some attendees questioned whether a student who is workforce ready is actually scientifically literate. Others pointed out that stakeholders such as the BMGF, the Dept of Ed and industry players (Microsoft, Boeing, etc) are vocal supporters (in words and in dollars) for professional development that results in teachers who are producing college-ready high-school graduates. Specifically, a teacher is successful if her/his kids go to college.

Attendees offered their experience with tools that they felt were worthy of consideration:

1. Wendy shared a PISA test question as a good example of an assessment question.
2. Apparently Minnesota and Washington State offered, previously, standardized tests that allowed for opened-ended questions that attendees felt could be valuable questions (editor's note: it is my perception that the tools were interesting, but the rubric was not consistently used for grading).
3. The ACT test has been a good indicator for college biology success <http://www.actstudent.org/>).
4. The Education Development Center, EDC, has an Inquiry working group. <http://www.edc.org/>
5. The MSP Network has set of tools, www.mspsnet.org
6. The Nanoscale Informale Science Education, NISE, team (at <http://www.nisenet.org/>)
7. The Journal of Research in Science Teaching, JARST, (at <http://www3.interscience.wiley.com/journal/31817/home/ProductInformation.html>)
8. The American Medical Association (at <http://www.ama-assn.org/ama/home/index.shtml>) is working on a scripted prompt that will encourage patients to ask their consulting physicians questions. Marlys knows more.
9. The (table) from “Inquiry in the National Science Standards”.
10. John Osbourne?
11. Kreitschzech?
12. Iris Weiss, Horizon Research (at <http://www.horizon-research.com/>)
13. CRESST (at <http://www.cse.ucla.edu/index.asp>)

Isobel Contento - Teachers College Columbia University
Jan Dubinsky - University of Minnesota
Marilyn Johnson - Oregon Museum of Sciences and Industry
Lynnsey Dohmen - Children's Museum of Houston
Paul Cotter - University of Alaska, Fairbanks
Randy Knuth - University of Montana
Sonsoles De LaCalle - Charles Drew University of Medicine and Science
Barbara Hug - University of Illinois Urbana-Champaign
Marilyn Winkleby - Stanford University School of Medicine
Jodie Galosy - University of California, Davis
Peter Crown - University of Arizona College of Medicine
David Anderson - Illinois State University
Dina Drits - University of Utah
Bruce Howard - Wheeling Jesuit University
Marlys Witte - University of Arizona College of Medicine
Theresa Britschgi - Seattle Biomedical Research Institute

PARTICIPANTS

A valuable question therefore to ask is whether or not your tools show that your content and projects are getting teachers to that point – and be sure that you are assessing near- and far- transfer components.

Best Practices for Teacher Professional Development

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Facilitators: **Jeanne Chowning** - Northwest Association for Biomedical Research

Mark Kaelin - Montclair State University

Margaret Shain - St. Joseph School, Corydon, IN

Lynn Tarant - Charles Riley PS #9, Paterson, NJ

Panelists: **Jeanne Chowning** - Northwest Association for Biomedical Research, Seattle, WA

Margaret Shain - Science Educator, Academic Olympic Coach, St. Joseph School, Corydon, IN

Lynn Tarant - Middle School Science and Health Teacher, Epidemiology and Public Health Club Advisor,
Charles Riley PS # 9, Paterson, NJ

Mary Budd - Montclair State University, Epidemiology and the Energy Balance Equation

Mark Kaelin - Montclair State University, Epidemiology and the Energy Balance Equation

Reported by: **Mark A. Kaelin** - Montclair State University

Description: Participated in a discussion with panelists about the best ways to create, provide, and evaluate professional development experiences for middle and high school teachers that actually result in SEPA resources being infused into curricula.

Orientation:

- Gather the "wisdom in the room."
- Assumptions:
 - You want to participate in a discussion about the best ways to create, provide, and evaluate professional development experiences for middle and high school teachers that actually result in SEPA resources being infused into curricula.
 - There is wisdom in the room.
- Goal:
 - Everyone leaves with two useable ideas.

Carousel Process Description: How we hope to harvest and share your wisdom

Carousel Questions:

1. What is best professional development strategy you have ever used? (Jeanne Chowning)

- Long term – follow up, 1 day 2x semester
- Teachers become leaders (past participants can become facilitators in future years)
- Lesson study – video tape, peer feedback (see Critical Friends links at end of notes)
- 6 weeks – teams – partnerships with scientists to write curriculum and revise (builds leadership / confidence)
- Help teachers understand and experience what inquiry is and how to incorporate it
- Provide accurate science content
- Understand differences between science teaching at university vs. secondary
- Build confidence in content – give them flexibility, range of ideas
- Teach alongside students (involve students in the professional development)
- Interact as individuals
- Model what you want teachers to do back in classroom through professional development (don't lecture about how to do inquiry)
- Provide access to resources when teachers are implementing (equipment, "co-teacher" scientist)
- Individual weekly meetings with teachers
- Ongoing collaboration
- Explicitly give "challenges" in leadership and team building through facilitated exercises and norm-setting
- Respect each other's strengths explicitly.
- Provide teachers time for written reflections on teaching/learning in classroom.
- Have teachers set goals for themselves on paper.
- Set ideal about what exemplary teaching /learning would look like and think about moving toward it.

2. What professional development strategy will you never use again? (Mark Kaelin)

- Talking at participants is deadly, avoid didactic teaching, especially after lunch.
- Scientists are treated as "experts" but they have never taught. Treat teachers as experts.
- Forced to come – angry people.
- Principals may set professional development agenda, teachers do not know why they are there, goals are unclear, do not have "rules of engagement."
- No teacher input into professional development - "Here's your binder."
- Professional development points are not a good currency, teachers have many ways to earn.
- Overestimation of teachers' knowledge, unaware of teachers' prior knowledge.
- One week is too short but teachers will not come for week.
- Professional development experiences stand in "isolation," there is no follow-up.
- Trying to be all things to all people – Hate to say "No."

3. What is your biggest unaddressed professional development challenge? (Margaret Shain)

- Evidence - based as the be all end all
- How do you transition to web-based? When funding is ending for a program, how / what are options for continuing to make it available?
- Distance learning – How does it work? Is this another option for making the program more available and if so, how do you make it work?
- Scheduling - How do you find the “right” time for everyone involved?
- Connecting professional development together to adopt new practices
- Engagement over time - this seems to be the most effective method
- Scaling-up
- Measuring long-term impact (research says that this take a minimum of 80 hours of participation in the program)
- Continued use after the grant
- Linking professional development to student outcomes
- How do you address everyone’s needs?

4. How do you get professional development participants to follow-through and do what you want them to do? (Lynn Tarant)

- Teachers should be involved in the creation of the professional development opportunities.
- Empower teachers by allowing their feedback to be considered before or after the professional development takes place
- Teachers should know that professional development will be ongoing throughout year(s)
- Partner with local universities for sustainable ongoing opportunities
- Conduct follow up activities – focus groups rather than a one day/hour experience
- Repeated contact with group who received same professional development so that a dialogue about their experiences can be ongoing.
- Stipend – half before and during training and after report of implementation is completed
- Graduate credits or continuing education credits
- There should be a clarity of expectations both for the teacher and those conducting the professional development
- District and building administration must be supportive of the teacher participating for necessary release time from classroom teaching
- Allowing teachers to visit a site where this strategy is being implemented
- Professional Development MUST be relevant topics to what is taught by the participants
- Building community support – parents/local business
- Teacher should be given the opportunity for self selection to participate or not
- There should be a clear understanding of what benefits are in it for them and their students
- Understanding the big picture – and trying out activities. If teachers are just “talked to” without getting their hands dirty they will never implement new strategies and materials.
- Reliable evidence should be provided to teachers that this strategy or material produced positive results
- Professional development should address problems you think are important to the teachers
- Teachers must become vested in the content of professional development topic if it is to be successful and implemented in their classrooms

5. What would you call a successful professional outcome? How do you measure it? (Mary Budd)

- Success:
 - Improving science literacy
 - Teachers are engaged, excited, and self-confident
 - Implement / incorporate workshop materials
 - Teachers take ownership of the new curriculum
 - Increased recruitment
 - On-going communication between SEPA alumni (feedback to developers)
 - Monthly alumni emails (to past workshop participants)
 - Skills development (tool kit) – evidence of application
 - Turn-key
- Measure:
 - Student outcomes (embedding pre-post tests)
 - Long term integrations
 - Improvement in student learning

Debriefing:

- Awarding graduate credit for professional development – At Colorado State University - \$140 per 2 credits (At Montclair State in 2005, the cost of the graduate class was \$464.96 per credit)
- Avoid “Here’s your binder” approach
- Professional development for professional development providers
 - West Ed
<http://www.wested.org/cs/we/view/serv/55>
 - Critical Friends (Coalition for Essential Schools Coach Training)
<http://www.nsrharmony.org/faq.html>
<http://www.cesnorthwest.org/cfg.php>
http://www.newhorizons.org/spneeds/inclusion/staff/gray_hudson.htm
 - Understanding by Design (Grant and Wiggins) ASCD
http://www.ascd.org/research_a_topic/Understanding_by_Design.aspx
<http://www.grantwiggins.org/ubd/ubd.lasso>

Closure:

Return to goal. Have we gathered the “wisdom in the room” and are you leaving with two useable ideas?

PARTICIPANTS

Pam Koch - Teachers College Columbia University

Kathleen Bateman - Tufts University School of Medicine

Karina Meiri - Tufts University School of Medicine

Ishara Mills-Henry - TERC/Massachusetts Institute of Technology

Kim Soper - University of Nebraska Medical Center

David Radford - University of Alabama at Birmingham

Marsha Matyas - American Physiological Society

Maurice Godfrey - University of Nebraska Medical Center

Gene Roundtree - Madison Park Technical and Vocational High School

Jeanne Chowning - Northwest Association for Biomedical Research

Jeryl Erickson - Foundation for Blood Research

Michael Lichtenstein - University of Texas Health Science Center at San Antonio

Lynn Tarant - Paterson Public Schools

Mark Kaelin - Montclair State University

Mary Budd - Montclair State University

Louisa Stark - University of Utah

Deb Spencer - ASSET Inc.

Gail Fletcher - University of Southern Maine

Miranda Bernhardt - Northwestern University

Walter Allan - Foundation for Blood Research

Lisa Abrams - Virginia Commonwealth University

Greg DeFrancis - Montshire Museum of Science

Using Formative Evaluation: If We Design It Will They Learn?

Facilitator: **Martin Weiss** - New York Hall of Science

Panelists: **Vicki Coats** - Oregon Museum of Science and Industry

Lucia Enriconi - Miami Science Museum

Ann Lambros - Wake Forest School of Medicine

Laura Martin - Arizona Science Center

Cheryll McCallum - Children’s Museum of Houston

Judith Ned - Stanford University School of Medicine

Molly Phipps - Science Museum of Minnesota

Kalyani Raghavn - University of Pittsburgh

Heather Reddick - University of Texas M.D. Anderson Cancer Research Center

Virginia Shepherd - Vanderbilt University

Key Points

Laura Martin – Arizona Science Center

Characteristics: pilot test of instruments, protocols, quick and dirty. Tells one what needs to be changed/modified.

Iterative. Make changes as you go. Conducted by project staff rather than external evaluator. Obstacles: building time in schedule for formative loop. Scientists/designers often don’t want feedback. Benefits: unintended findings come up and can be “corrected”.

Many types of forms – storyboards, paper forms

Ann Lambrose - Wake Forest University

Real time formative evaluation – use results in real time. Professional development. Collect info from each session. Team goes through each week, and makes immediate corrections. Teachers become participants. Time reserved each morning to revise and make corrections. Results in improved experience for participants. Overall evaluation at end of session becomes more valuable for overall impact.

Cheryl McCallum – Museum/Houston

Evaluating exhibitions as prototypes before they go into exhibits. Adds another layer in the process, which frustrates designers. Also realized that they needed to do conceptual step to determine what kids could do – adding another step.

Laura Martin – Arizona Science Center

Guide for scientists talking to public. Wrote out set of points with pitfalls – always audition scientists. Design team – scientists, educators, community partners. Critical to know what children “know” and can understand at what age. Scientists – don’t want to read much; condescending; make a menu of options for what they need. Creating an interactive PPT based on these suggestions. After paring down – not enough info. Balance now between little example, some child development; can read what you need. Ex: tell your research as a story.

Molly Phipps – Science Museum of Minnesota

Developing video podcasts. How to adapt for teen populations. Used participatory evaluation approach. Developed rubric while teens made their own podcasts. Students then showed podcasts to 100 other teens with evaluation.

Lucia Enriconi – Miami Science Museum

Health exhibit. Collecting data from visitors. Go out to evaluators. Will visitors be willing to contribute data – 8,000/10,000 agreed. Evaluated for language – supposed to be bilingual. Was language working? Additional language – Haitian Creole. Had to consider specific terms that were used that had different meanings in each language. Privacy – computer collection of data from visitors on health issues. Visitors were fine with open booths. Certain populations did self select out (as in overly obese people). Did this skew data? Can gather this from information/data submitted by each visitor.

Vicky Coats – Portland – Oregon Museum

Exhibit project – fitness and nutrition. Build mock ups; test with visitors to museum. Bilingual. Model of doing family nights for formative using prototypes. Team collects data. Also adapting exhibits (as in food) that will be culturally appropriate.

Virginia Shepherd – Vanderbilt

Use of online surveys with students participating in on campus part time school. The answers have been used to incorporate changes and modifications in the program and will continue to be used as more classes are added.

Heather Reddick – Houston

Teacher PD; scientists in classrooms. Pre/post tests for formative. Post test scores were coming back lower; scientists were not covering material on tests Teachers – evaluate each workshop. When teachers knew that their answers were being used to revise/improve program, they were more anxious to continue participation.

Judith Ned – Stanford

Work with undergraduates. Focus now on assisting UG trainers. University-based residential program (24 students). 23rd year – 500 “graduates”. UGs mentor students in summer program. Use formative evaluation with UGs. Don’t understand: CA requirements for college entrance; what is PD; how to facilitate meeting/session. Based on formative evaluation – UG course, PD for UG. In course – develop activities that will be taught in summer. School of Medicine course for UG!

Karen Kalumuck – Exploratorium

Teacher PD

Steve Oliver – University of Georgia

In-school programs to show student gains. Using observation and individual assessments/interviews as initial stage. Listen to student language that can be used in formative/qualitative evaluation.

Kim Tanner – asks scientists to write in less than 100 words a description of their research. Then ask 6th graders or 6th grade teachers read and revise for 6th grade understanding. Teachers would underline what they couldn’t understand or what they felt their students couldn’t comprehend. This would be great exercise for SCP “course” for graduate students.

Steve Oliver - University of Georgia

Karen Kalumuck - Exploratorium

Molly Phipps - Science Museum of Minnesota

Lucia Enriconi - Miami Science Museum

Judith Ned - Stanford University School of Medicine

Rebecca Daugherty - Northwestern University

Cheryl McCallum - Children's Museum of Houston

Joana Ricou - Duquesne University

Vicky Coats - Oregon Museum of Sciences and Industry

Debbie Stark - University of Texas Health Science Center at San Antonio

Heather Reddick - University of Texas M.D. Anderson Cancer Research Center

Laura Martin - Arizona Science Center

Ann Lambros - Wake Forest University

Virginia Shepherd - Vanderbilt University

Laurie Fink - Science Museum of Minnesota

Susan Bonk - EdVenture Children's Museum

Attain, Maintain and Sustain Successful Partnerships with K-12 Schools, Teachers and Districts

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Facilitator: **Judi Wilson** - San Joaquin County Office of Education

Reported by: **Judi Wilson** - San Joaquin County Office of Education

Guiding Questions for Session:

- How can we be more savvy with the “culture” of K-12?
- What to do when the timing of the available money and resources is off? (such as now with the economy)
- How can we share resources more effectively with K-12?
- How can we deal better with administrators of K-12?
- How do we conquer the issues of teachers who move assignments frequently?
- How can we establish a true partnership?
- What to do with a district that has too much on their plate?
- How can we approach K-12 so they are more receptive?
- What about specific strategies for rural schools/teachers?

Discussion/Input/Outcomes:

Answers to these and more came from slides that can be downloaded from:

<http://imeet.sjcoe.net/k12help>

Outcomes:

1. Discussion and sharing needs to occur at meetings to answer and assist each other to conquer these issues.
2. Resources for working with K-12 would be helpful, especially for new projects.
3. It takes time and effort for a partnership to develop, but is easier when the K-12 partners are part of the planning and writing of the proposal.
4. More K-12 representatives need to be present on Leadership/Advisory teams.
5. While low performing schools need to be served, they can be more difficult.
6. Incorporating content literacy strategies and alignment to local standards is advisable for project success.
7. Partnering a K-12 teacher with higher education institute presenters is recommended. One has the content expertise, while the teachers help with matching the content to high quality pedagogy that should be modeled for the teachers.
8. Even very experienced project leaders and programs need to refine and adjust to accommodate the ever-changing K-12 scene.
9. An IRB approval from the university does not always mean it will fit the requirements of the state education code or district guidelines.

PARTICIPANTS

Judi Wilson - San Joaquin County Office of Education

Michelle Ventura - Georgia State University

Barbara Baumstark - Georgia State University

Genevieve Edwards - Georgia State University

Mary Jo Koroly - University of Florida

Ella Greene-Moton - University of Michigan School of Public Health

Naomi Luban - Children's Research Institute

Patricia Slattum - Virginia Commonwealth University

Bart Hays - Helix Charter High School

Cathy Morton-McSwain - West Virginia University HSTA

Ah-Kau Ng - University of Southern Maine

Monroe Duboise - University of Southern Maine

Nancy Marra - University of Montana

Michael Chorney - Penn State College of Medicine

It's Not Just Teaching Science, It's Using Science to Teach Thinking

Presenters: **Carla Romney** - Boston University School of Medicine
Carl Franzblau - Boston University School Of Medicine
Don DeRosa - Boston University School of Medicine

Habits of Mind

Process (to move past memorization):

1. Develop descriptive model
2. Develop explanatory model
3. Hypothetical
4. Evidence?/Testing

More than Inquiry:

- Look for elements, properties, background/spatial
- Actual explanations, more than questioning
- Explicit explanation to counteract misconceptions
- Non-linear method, revisions are OK

10:45 - 12:00

Online and On Target: Enhancing Successful Development and Use of Online K-12 Curriculum Materials

Facilitator: **Jodie Galosy** - University of California, Davis
 Panelists: **Laura Martin** - Arizona Science Center
Marco Molinaro - University of California, Davis
Judi Wilson - San Joaquin County Office of Education

Reported by: **Nancy Marra** - University of Montana

This session was presented using a continuum approach: beginning with a presentation focused on how to get an online course started, followed with a presentation that discussed the steps to take once the online approach is undertaken, and ending with a presentation highlighting some SEPA-developed online materials.

Framing New Pathways to Medical Research for Families, Students, and Teachers

Laura Martin - **Arizona Science Center**

This project was interested in offering a self-paced, free or low cost, introductory course regarding new ideas in biomedical research. Before beginning any development, ASC conducted a study with 60 teachers (via written survey) to establish the need, interest, and feasibility. The survey included questions such as “Are you interested in such an online course? How many modules do you think you’d complete? What length of time should it take to complete a module? What are the advantages of taking such a course? What are the disadvantages of taking such a course?”

Respondents indicated that such an online course would be an effective and convenient way to learn new content and would provide an opportunity to earn professional development credit. They also reported that time, workload, and applicability of materials to their curriculum were viewed as disadvantages. Cumulative survey results indicated to ASC that there is interest among teachers to take this online course, so they are proceeding.

Take away message: Do your homework first.

Developing and Enhancing Online Curriculum

Marco Molinaro - UC Davis

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Schools have many different levels of needs as well as of equipment, for instance, teacher comfort, district Internet controls, availability of computers, and age of computers. However, even with these various “hurdles” it is still effective for outside sources to offer online materials for teachers because the advantages outweigh the disadvantages:

- access to databases (cancer registries)
- video can be included (TeacherTube)
- possible to utilize visualization tools (Gapminder, MiniTools)
- possible to include simulations (NetLogo)
- access to Web 2.0 social and collaborative tools (Facebook)
- can track usage (Google Analytics)
- availability of online surveys and questionnaires
- low cost
- scalability (can easily present/offer to small groups and/or large)

Important things to remember when creating online materials:

- work with teachers, curriculum writers, scientists and mathematicians (Facebook is definitely useful during recruitment phase)
- use online tools during the development to keep the group informed (Google Docs, Spreadsheets, Facebook, Email)
- test the efficacy of online materials frequently

HealthWISE

Judi Wilson - San Joaquin County Office of Education

This SEPA Project designed and now offers an elective online course for pharmacy students. The course consists of five weeks of background information and homework interspersed with seven visits to schools. The school visits find the participating pharmacy students working with 2nd and 5th graders to present lessons that were designed to increase science literacy and health education (www.healthwiselearning.org). The background portion of the course includes four training modules used to prepare scientists and engineers for classroom visits (www.vistaslearning.org). SJCOE has determined that one of the best ways to achieve a successful “first visit” for the pharmacy students, is for those students to create a “Me Poster” and then use that to tell their story – interests, science classes taken, etc. - to the school children.

PARTICIPANTS

Marsha Matyas - American Physiological Society

Charles Geach - El Paso Independent School District

Ah-Kau Ng - University of Southern Maine

Monroe Duboise - University of Southern Maine

Anisa Angeletti - University of Nebraska Lincoln

Jeryl Erickson - Foundation for Blood Research

Walter Allan - Foundation for Blood Research

Louisa Stark - University of Utah

Moir Rankin - Soundprint Media Center, Inc.

Fern Lan Siew - Cornell University

Kim Soper - University of Nebraska Medical Center

David Radford - University of Alabama at Birmingham

Tom Scarlett - University of Hawaii

Nancy Marra - University of Montana

Chuck Wood - Wheeling Jesuit University

Mike Wyss - University of Alabama at Birmingham

Promoting Institutional Awareness of Educational Outreach Activities and Changing Institutional Culture

Facilitator: **Michael Chorney** - Pennsylvania State College of Medicine

Two reports were submitted for this session.

Report #1

One common thread running through the experiences of all who participated in the breakout session was that getting institutional support was not easy. Moreover, people were often at odds with administrative thrusts and administratively appointed leaders who were often uninformed about the full breath of activities within the institution. Such top-down initiatives are rarely as successful as grassroots activities which arise from energetic and interested faculty, staff and students. In rare circumstances, such as conveyed by Dr. Koroly of Florida, the administration sought out an accomplished and dynamic leader (the author's conclusion here) to take on the task of seeking funds for a major institutional endeavor, in this case support of the state science fair, which placed Dr. Koroly in a very favorable position, which advanced her initiatives.

Several thoughts emerged, and included the need for anyone wishing to promote their educational work and collaborations to remain steadfast and persevere in the face of rejection and even sometimes, apathy. Seek a grant application to pursue and enlist the aid of collaborators across departments. An attempt to draw folks into a coalition or umbrella type of structure, with a suggestion to leadership for the creation of a central clearinghouse to oversee activities, is meritorious as it cuts back on internal competition and general chaos of counterproductive endeavors.

Before attempting this, make sure that one assesses the needs of the basic and clinical departments and determine if diversity requirements (for instance, on NSF grants) are being met. The group generally thought that institutions do not yet accept funded activities related to outreach as being tantamount to other extramural funds designed to support basic and clinical science. It is unclear as to how to change this significant, academic impediment toward getting chairs and administrators to accept the importance of outreach and the benefits that such efforts bring to any institution. The group also felt that in general the publicizing of one's efforts is extremely important, and that this must be accompanied by published articles on outreach outcomes in such journals as *Academic Medicine* and *Science Education*.

As one pushes PR initiatives, some felt it a good idea to identify a recognizable spokesperson to attach to the thrust, and that it is advantageous to know one's public affairs and development people. It is also beneficial to contact city leadership, create worthy entities such as mini-med schools and approach the local Chamber of Commerce. One may even enhance visibility and acceptance by partnering with other outreach groups and to alert legislators about the impact of any work especially as it relates to developing kids in their district, state, etc.

Questions:

- Does educational outreach count in the promotion/tenure world?
- Can “outreach” ever be a career? If it is/will be, what is the training needed?

Challenges:

- Getting institution/chair/dean to value our activities [not mission of the university]
- Competing for space/budget \$\$
- Grants are important – raise prestige for educational outreach faculty
- Promote outreach activities through university and community PR - become known in community and university community; RAISE AWARENESS OF OUTREACH ON CAMPUS
- How to sustain when leadership of university turns over (president, deans, chairs)
- Different cultural worlds exist between medical schools; education schools; A&S; administration

Strategies:

- Become involved on campus as the broker for broader impacts on NSF grants – universities with infrastructure can integrate into university community in this way. NIH NEEDS TO DO THIS. But mandate from Congress for NIH does not include education, but a focus on health research.
- Use/leverage current mandates from national organizations and societies; Rising Storm report and commission have all raised awareness that scientists need to connect.
- Persevere!
- Administration support; support of colleagues (PIs and students).
- Need for campus-wide organization of outreach efforts. Umbrella structure. NSF I-cubed grant could be solution for NSF funded campuses.
- Get Division of Sponsored Research to list Center as the “go to” group for outreach activities.
- Build internal relationships on campus and off.
- Build value in the outreach profession so that it moves from “add-on” to part of our mission.
- Go to legislators (state and national).
- Use internal publications; TV stations and newspapers; make contact with News/PR people on campus to get stories out.
- Connect to Office of Community Engagement on campus.
- Create graduate and/or undergraduate level courses to educate students about outreach and to provide service learning opportunities.
- Establish network/connections with other universities.

Virginia Shepherd - Vanderbilt University

Maurice Godfrey - University of Nebraska Medical Center

Amanda Meyer - University of Alaska, Fairbanks

Lisa Abrams - Virginia Commonwealth University

Sonsoles de Lacalle - Charles Drew University of Medicine and Science

Barbara Baumstark - Georgia State University

Rigorous Evaluation Models: Randomized Controlled Trials and Closely-Matched Comparison Studies

Panelists: **Kristen Bass** - Rockman et al
Dina Drits - University of Utah

Reported by: **Dina Drits** - University of Utah
Kristin Bass - Rockman et al

The Primary Learning Goals:

- Definitions of Randomized Controlled Trials (RCTs) and Closely-Matched Comparison Studies
- Understanding differences between rigorous and non-rigorous designs
- Identifying control groups
- Setting up an RCT

The group collectively decided to use one participant's ideas and goals for her SEPA project as a case study to develop the appropriate design to match these goals.

The group brainstormed the advantages and disadvantages, and feasibility issues, of using a randomized control design or closely-matched comparison design for this study. Further, the group discussed the advantages and disadvantages to using a regression discontinuity design. This type of design is one of the most rigorous alternatives to an RCT because the researchers make assignments to conditions based on specific cutpoints such as test scores.



Beyond RCTs:

The group discussed aspects of research design beyond RCTs that are important to address. First is a solid theory of change that explains what is happening in the intervention and why it is expected to lead to particular outcomes. One of the session presenters attended a training on RCTs last year sponsored by the Institute for Education Sciences (IES), a division of the Department of Education. The instructors at this training emphasized the value of beginning a project with a clear theory of change based on prior research evidence and/or research literature.

A rigorous design also requires documentation of what is happening in the treatment and control conditions. This issue - labeled fidelity of implementation in the research literature - has become increasingly important in the design and implementation of RCTs.

Final Thoughts:

The group agreed that there is a great need for technical assistance on evaluation for SEPA PIs.

PARTICIPANT

Bruce Howard - Wheeling Jesuit University
Michelle Ventura - Georgia State University
Simeon Slovacek - California State, Los Angeles
Paul Cotter - University of Alaska, Fairbanks
Karina Meiri - Tufts University School of Medicine
Jan Dubinsky - University of Minnesota
Barbara Hug - University of Illinois Urbana-Champaign
Judith Ned - Stanford University School of Medicine
Wendy Huebner - Montclair State University
Kathleen Bateman - Tufts University School of Medicine

Teaching Workshops for Scientists: Supporting Scientist Volunteers and Promoting Successful K-12 Partnerships

Presenters: **Sabine Jeske** - University of California, San Francisco
Katherine Nielsen - University of California, San Francisco

Reported by: **Katherine Nielsen** - University of California, San Francisco

Session Description:

One of the aims of SEPA broadly is to create partnerships among biomedical and clinical researchers and K-12 teachers and schools. While many researchers are enthusiastic about working with K-12 teachers and students, the last time most research scientists were in a K-12 classroom was when they themselves were students. They thus have a limited understanding of how to effectively support classroom teachers and how to design meaningful, age appropriate, science-learning experiences, based on research about how students learn science. With SEPA support, the UCSF Science & Health Education Partnership (SEP) has designed a 9-hour workshop series for researchers, specifically designed to prepare researchers for classroom-based partnerships. This breakout session will introduce other SEPA projects to the Scientist Teaching Workshop curriculum by actively engaging participants in hands-on activities from the workshop series, as well as meta-level discussions that will discuss the workshop syllabus, the research supporting use of particular techniques in classroom, and evaluation data that suggest the workshops are a powerful means of introducing scientists to research-based science teaching techniques.

Points of Discussion/Questions:

- How to get institutional buy-in? Participants commented on the large number of scientist volunteers participating in SEP programs. UCSF SEP is now over 20 years old; in part, institutional buy-in comes with time and many from the university having the opportunity to see the value in this work. There has also been a shift to viewing science careers more broadly than before – that not all doctoral students will go on to be faculty at research institutions and programs like SEPs provide opportunities for career exploration.
- Participants experienced a short activity designed to highlight the value of hands-on, concrete learning experiences. Many teaching strategies were modeled during the activity (hearing from everybody, giving instructions before handing out materials, each person had their own materials, writing responses down, and more) and each of these strategies were explicitly debriefed as a way for participants to learn them.
- We then summarized the three Teaching Workshops we host.
 - Teaching Workshop 1 focuses on how to get to know your students and how to use a variety of teaching strategies
 - Teaching Workshop 2 focuses on the importance of teaching science process skills, how to do inquiry-based (student-centered) lessons in the classroom, how to help students translate their questions into ones they can investigate, and how to make small changes to open up cookbook lessons
 - Teaching Workshop 3 focuses on student misconceptions and the role they play in student learning and how to develop lesson plans.
 - We concluded by sharing some outcome data from the Teaching Workshop Series. For example, 100% of participants strongly agree that they plan to use what they learned in the workshop in their future teaching and 100% of participants strongly agree that the teaching strategies taught in the workshop could also be used in college-level teaching.

PARTICIPANT

Miranda Bernhardt - Northwestern University
Maggie Walker - Northwestern University
Rebecca Daugherty - Northwestern University
Naomi Luban - Children's Research Institute
Christina Boelter - University of Kentucky
Genevieve Edwards - Georgia State University
Karen Kalumuck - Exploratorium
Mel Limson - American Physiological Society
Ishara Mills-Henry - TERC/Massachusetts Institute of Technology
Donna Cassidy-Hanley - Cornell University

Optimizing the Lifespan-Mobility, Obesity, and Diabetes Lessons from Positively Aging

Presenters: **Linda Pruski** - University of Texas Health Science Center at San Antonio
Roxanne Hammonds - Southwest Independent School District

Free lessons at: <http://teachhealthK-12.uthscsa.edu>

Hands-on Examples:

- How restricted breathing/health issues affect learning
- Sedimentary Stan – learn how diabetes affects life style; health problems associated with disease
- Mobility/Gait kinesthetic activity
- Make you own “Fat Minder” blob to teach caloric intake, energy transfers
- Melodramatic play to teach diabetes

Visit the website for fun, hands-on curriculum developed by teachers and researchers

PARTICIPANTS

Lynnsey Dohmen - Children's Museum of Houston
Margaret Shain - St. Joseph School
Lynn Tarant - Paterson Public Schools
Cathy Morton-McSwain - West Virginia University HSTA
Patty Slathum - Virginia Commonwealth University
Marlys Witte - University of Arizona College of Medicine
Jahdiel Lowery - Diversity Films, Inc
Steve Oliver - University of Georgia
Mark Kaelin - Montclair State University
Becky Burg - Dixon Elementary School
Michael Lichtenstein - University of Texas Health Science Center at San Antonio



Educating About Concepts That Cannot Be Perceived Directly with Human Senses: A Dialog

Facilitator: **Eve Wurtele** - Iowa State University

Reported by: **Bruce Evje** - West Warwick High School

The networking session consisted of two modules. The first part consisted of participants discussing the concept(s) they taught and solutions or strategies used to teach the concept. The second component focused on difficulties encountered teaching various topics. The following topics and strategies were discussed:

1. Cell biology

- Animated computer game and tutorial

2. Genetics- Recombinations through generations

- Developed web site

3. Interpreting ultrasonography in veterinary medicine

- Developed 3-D models showing slice of area

4. Hormones

- Regulation of calcium levels graphing activity

5. Visitors disappointment at not being able to see double helix structure

- Fruit fly chromosome visualization activity for visitors

6. Difficulty in showing large-scale concept of ocean currents and temperatures

- Meaningful color coordination

7. Dynamic bones

- Video animation of bone healing process and look at cow leg bones

8. Viruses

- Animation and model building

9. Oxygen dynamics in the atmosphere and in cell interactions

- Cell animation and game illustrating energy exchange

10. Seeing cells in museum setting

- Cheek swabs and sheep blood under the microscope

11. Explaining nanotechnology

- Developed sets of materials and applications

Some difficulties discussed were getting the audience of a video to recognize components of animated work without extensive labeling, how to show inflammation at the capillary level and whether to show molecules in false scale. Solutions discussed included consistent coding and repetition on websites and video clips and using filters in video games to visualize parts of complex molecules.

The most common difficulty reported was understanding the prior knowledge of the target audience in order to start presentations at the proper knowledge level and then striking a balance between advanced detail and background information. Pre testing and front-end surveys were mentioned as possibly being helpful with this problem.

Open discussion focused on the development and use of video games, which pose significant challenges considering the resources of the commercial competition.

Gail Fletcher - University of Southern Maine

Jennifer Iriye - Arizona Science Center

Molly Phipps - Science Museum of Minnesota

Laurie Fink - Science Museum of Minnesota

Bert Ely - University of South Carolina

Jim Moore - University of Georgia

Joana Ricou - Duquesne University

Vicky Coats - Oregon Museum of Sciences and Industry

Bruce Evje - West Warwick High School



Lisa Abrams

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Susan Adler

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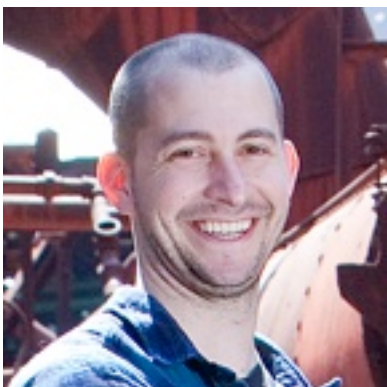
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David Anderson

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Pete Anderson

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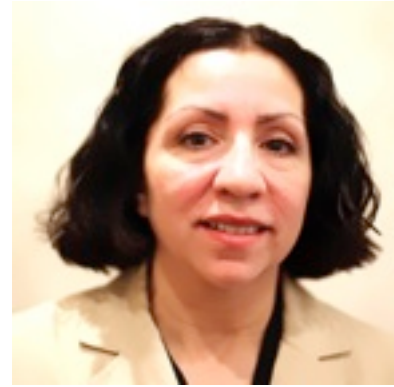
Anisa Angeletti

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Krishan Arora

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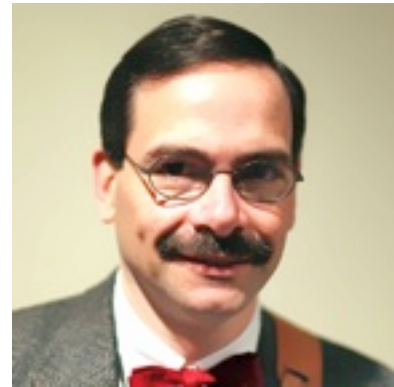
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Rockman et al



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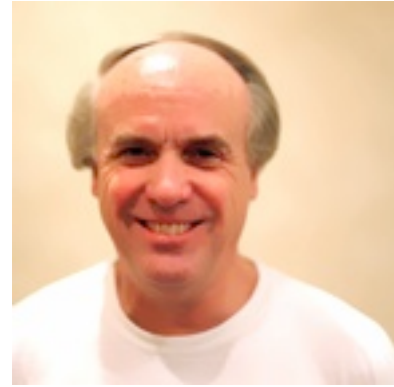
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EdVenture Children's Museum



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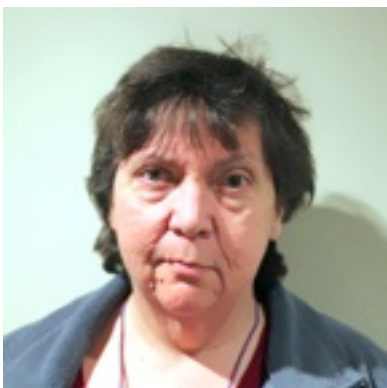
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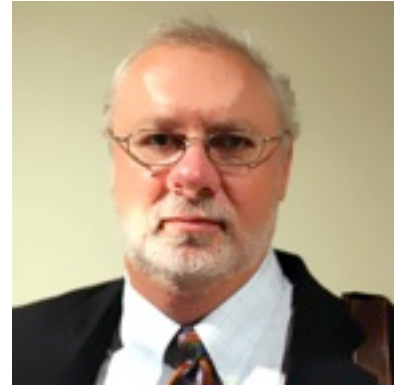
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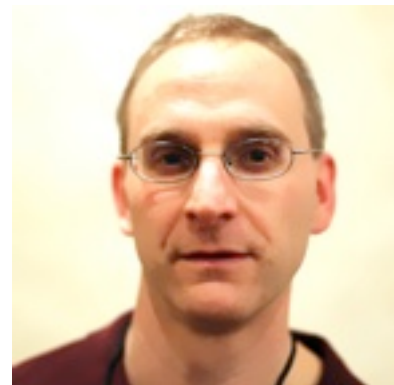
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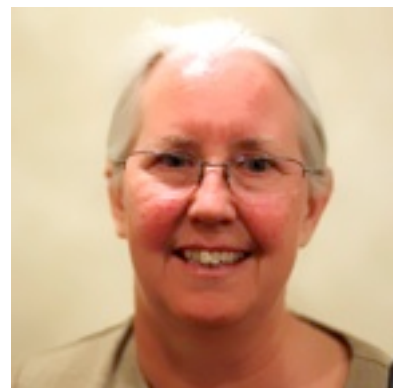
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Children's Museum of Houston



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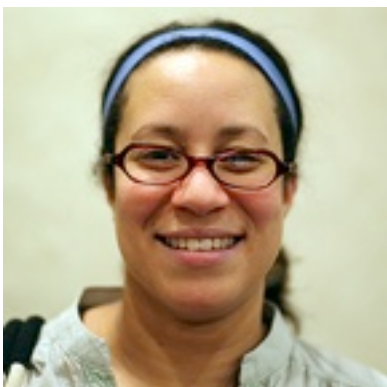
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Jeryl Erickson

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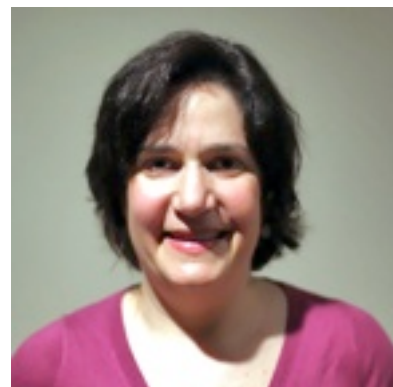
Bruce Evje

West Warwick High School



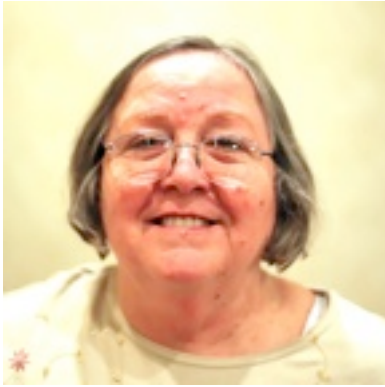
Laura Fawcett

Yale University



Laurie Fink

Science Museum of Minnesota



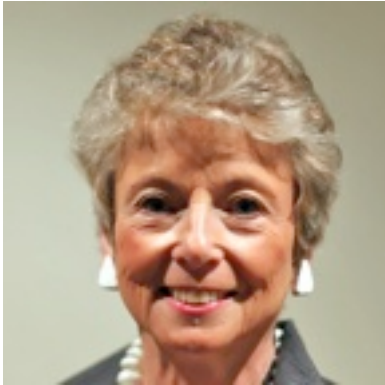
Gail Fletcher

University of Southern Maine



Carl Franzblau

Boston University



Joy Frechtling

Westat



Judi gaiashkibos

Nebraska Commission on Indian Affairs



Jodie Galosy

University of California, Davis



Cecilia Garibay

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Charlie Geach

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Marcus Girley

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Samantha Gizerian

Charles Drew University of Medicine and Science



Maurice Godfrey

University of Nebraska Medical Center



Lisa Gough

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Ella Greene-Moton

University of Michigan School of Public Health



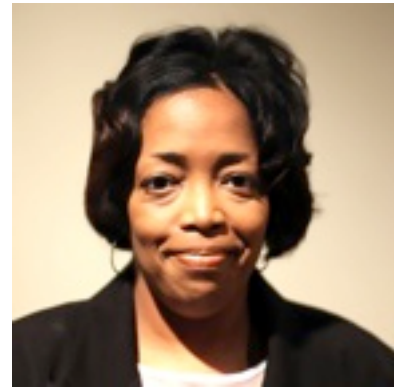
Lisa Guisbond

Massachusetts Institute of Technology



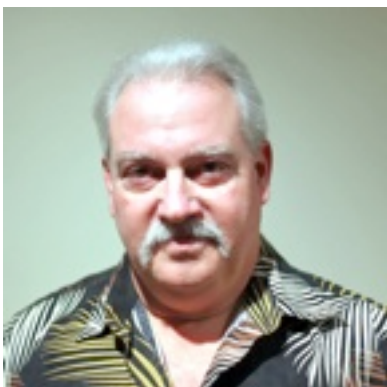
Roxanne Hammonds

McAuliffe Middle School



Bonita Harris

Jackson State University



Bart Hays

Helix Charter High School



Tim Herman

Milwaukee School of Engineering



Susan Hershberger

Miami University, Oxford



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Wake Forest University School of Medicine



Andrij Holian

University of Montana



Adam Hott

HudsonAlpha Institute for Biotechnology



Bruce Howard

Wheeling Jesuit University



Wendy Huebner

Montclair State University



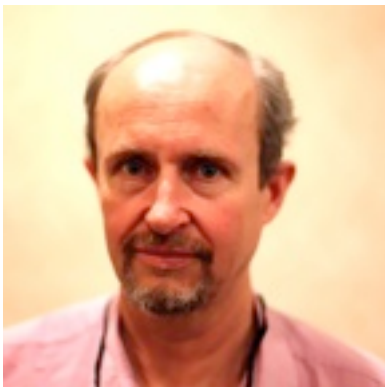
Quadira Huff

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Barbara Hug

University of Illinois Urbana-Champaign



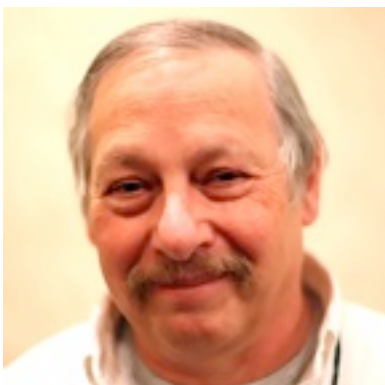
Arthur Hussey

University of Alaska, Fairbanks



Jennifer 'Rei' Iriye

Arizona Science Center



Lew Jacobson

University of Pittsburgh



Sabine Jeske

University of California, San Francisco



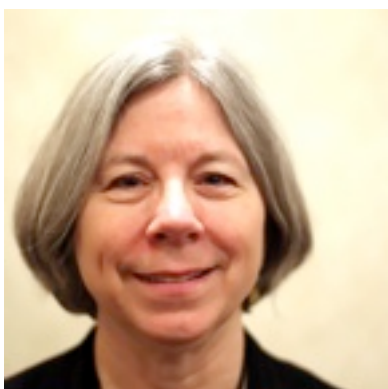
Marti Jett

Walter Reed Army Institute of Research



Larry Johnson

Texas A&M University



Marilyn Johnson

Oregon Museum of Sciences and Industry



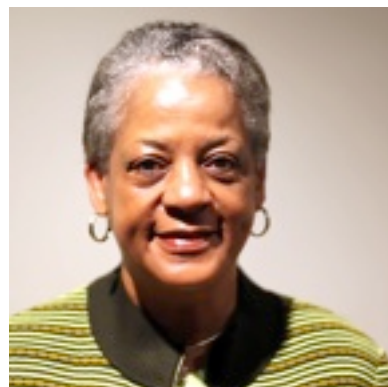
Mark S. Johnson

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Ron Johnson

UMDNJ-New Jersey Medical School



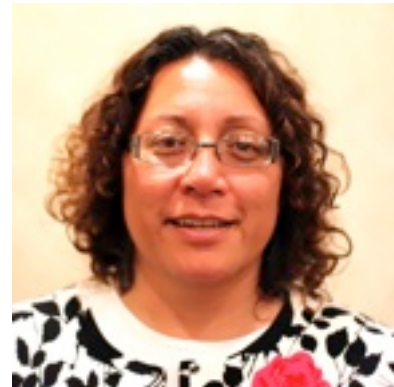
Louise Jones

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Mark Kaelin

Montclair State University



Kathryn Kailikole

Council For Economic Opportunity



Karen Kalumuck

Exploratorium



Michael Kennedy

Northwestern University



Brian King

Harvard Medical School



Heather Kleiner-Hancock

Louisiana State University Health Sciences Center



Randy Knuth

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Pamela Koch

Teachers College Columbia University



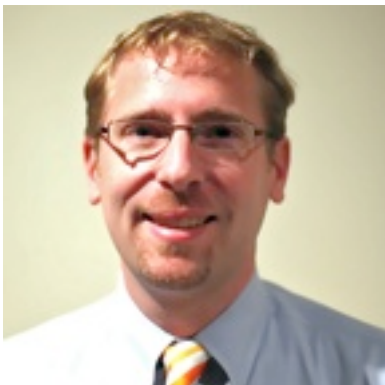
Donna Korol

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Mary Jo Koroly

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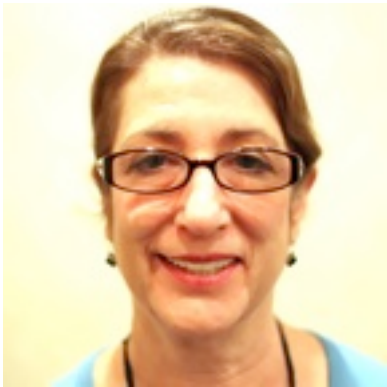
Dina Markowitz

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Jennifer Pang

Seattle Biomedical Research Institute



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Jackson State University



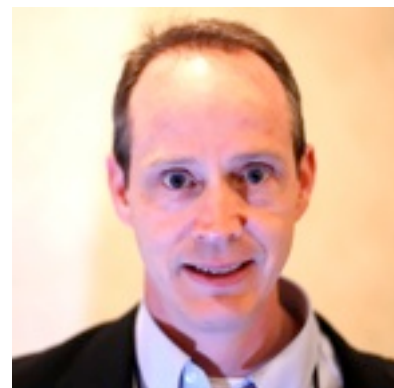
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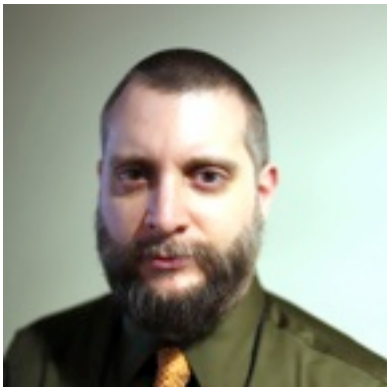
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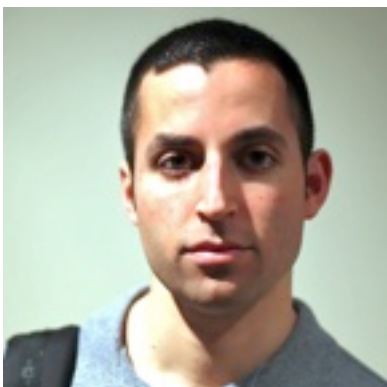
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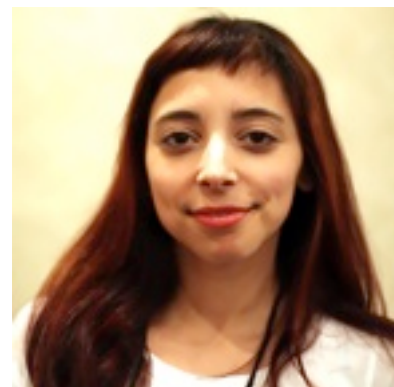
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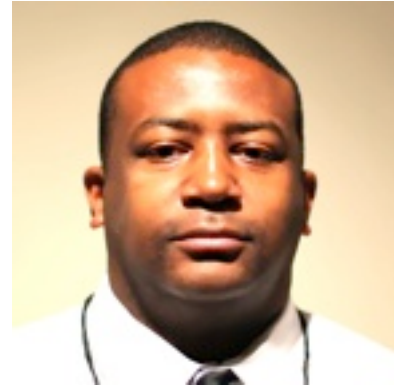
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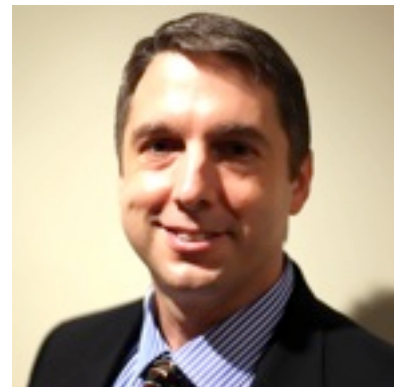
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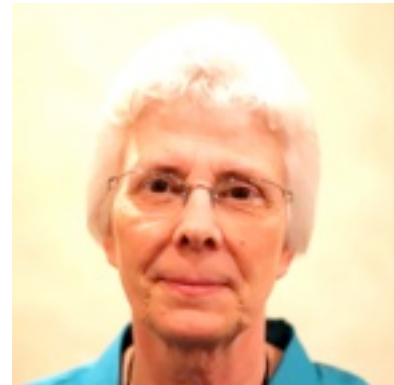
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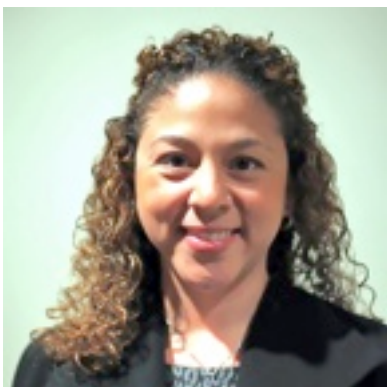
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Lynn Tarant

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Michelle Ventura

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Maggie Walker

Northwestern University



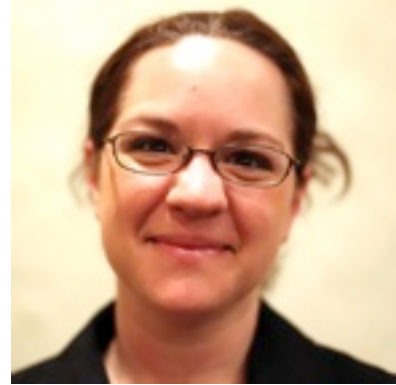
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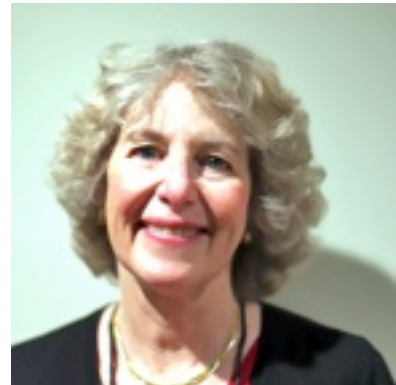
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