NIH SciEd 2022
Annual Conference for NIH Science Education Projects

Grand Hyatt Washington at Metro Center
1000 H Street NW, Washington, DC
May 31 – June 3, 2022

Executive Summary

NIH SciEd 2022

NIH SciEd 2022 was the tenth NIH-wide conference for science education projects funded by the National Institutes of Health. Conference participants were excited to gather in person for the first time since 2019.

The 217 participants included 101 project PIs and Co-PIs from the mainland US, Alaska, Hawaii and Puerto Rico, 44 project staff, 14 project evaluators, 10 project participants/students, 4 K-12 teachers, and 24 other individuals as well as 15 NIH staff (NIGMS, NCATS, NCI, NIA, NIAID, NIDCR, NINDS, NINR, the *All of Us* Research Program and Scientific Review Officers), 5 staff from other federal agencies (NSF, ED, and Walter Reed Army Institute of Research), and 2 staff from professional societies (NSTA and ASHG) *(see Common Acronyms and Abbreviations at the end of this report)*

The conference included four keynote addresses:

- Jon R. Lorsch, Ph.D., Director of the NIH National Institute of General Medical Sciences (NIGMS) where the Science Education Partnership Award (SEPA) program is housed, highlighted new online resources related to K-12 education and NIGMS investments in new programs whose aim is to enhance workforce diversity in the fields of health of medicine.
- Romuladus E. Azuine, Dr.Ph., M.P.H., R.N., Director of Research Platforms for the *All of Us* Research Program, introduced this program which aims to enroll at least one million people across the U.S., helping to build one of the most diverse health databases of its kind. Data collected by the program are freely available to researchers and educators after required training.
- Carla Easter, Ph.D., the Broh-Kahn Weil Director of Education for the Department of Education Outreach and Visitor Experience at the Smithsonian National Museum of Natural History, focused on the role of informal science education institutions in the STEM+Medicine movement. By way of illustration, she pointed out multiple collections and exhibits at the Smithsonian that have health-related connections.
- Teresa Blankmeyer Burke, Ph.D. Professor of Philosophy and Bioethics at Gallaudet University, highlighted the importance of accessibility in all aspects of life, including physical, technological, and social accessibility. She emphasized the need for equity and justice in communication for deaf individuals, including the necessary accommodations and qualified interpreters, which enable them to flourish in their careers.

Conference participants planned and presented the other conference sessions, which focused on the themes of broadening participation, curriculum development, informal science education, interactive multimedia for STEM Learning, project administration, research and evaluation, research experiences for students and teachers, science

teaching and learning, and teacher professional development. Best practices, lessons learned, and trainings were shared in 24 concurrent breakout sessions, 14 concurrent roundtable discussions, 12 short talks, a curriculum sharing "fair" with 8 tables, and 95 posters; an additional 19 roundtable discussions focused on STEM+Medicine priorities and opportunities.

On the end-of-conference evaluation participants were asked about their most valuable learnings from the conference. Five broad themes emerged: (a) learning from others, including information sharing and collaboration; (b) SEPA developments and opportunities, including grant writing, funding, and goals/future directions; (c) project evaluation, including methods and instruments used by SciEd projects; (d) networking with colleagues who do similar types of work and "rejuvenating the spirit to continue our work;" (e) social justice, including learning about culturally appropriate approaches, critical inputs for the research workforce, and databases available for students. Additional minor themes included celebrating successes and professional development. Anticipated outcomes of attendance included: (a) improving project and programs, including design, execution, and evaluation; (b) increased confidence in project execution; (c) increased connections and resources; (d) insights into grant writing; and (e) strengthening outreach and community engagement.

Acknowledgements

Conference Support

Partial funding for this conference was provided by grant number 5R13GM143826 from the National Institute of General Medical Sciences, the National Institutes of Health. The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.

Report prepared by

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Table of Contents

SciEd 2022 Conference Organizing Committee

Conference Chair

Louisa A. Stark, PhD, H.A. and Edna Benning Presidential Endowed Chair, Professor of Human Genetics, and Director, Genetic Science Learning Center, University of Utah School of Medicine

Broadening Participation Strand

Luke Bradley, PhD, Professor of Neuroscience and of Molecular and Cellular Biochemistry, University of Kentucky

Maurice Godfrey, PhD, Professor, Munroe-Meyer Institute, University of Nebraska Medical Center

Debra Yourick, PhD, Director, Science Education and Fellowship Programs, Walter Reed Army Institute of Research

Curriculum Development Strand

Jeanne Chowning, PhD, Senior Director, Science Education, Fred Hutchinson Cancer Research Center

Daniel Fernandez, PhD, Professor of Applied Environmental Science, California State University, Monterey Bay

Carla Romney, DSc, MBA, Boston University School of Medicine

Informal Science Education Strand

Julia McQuillan, PhD, Willa Cather Professor of Sociology, University of Nebraska, Lincoln

Bonnie Sachatello-Sawyer, Executive Director, Hopa Mountain

Interactive Multimedia for STEM Learning Strand

Berri Jacque, PhD, Associate Professor of Medical Education, Tufts University School of Medicine

James Lester, PhD, Distinguished University Professor of Computer Science, and Director, Center for Educational Informatics, North Carolina State University

Project Administration Strand

Bethany Hornbeck, President, Apis Creative

J. Michael Wyss, PhD, Professor and Director, Center for Community Outreach Development, University of Alabama at Birmingham

Research and Evaluation Strand

Alana Newell, PhD, Assistant Professor of Education, Innovation and Technology, and Center for Educational Outreach, Baylor College of Medicine

Loran Carleton Parker, PhD, Associate Director, Senior Research and Evaluation Associate, Evaluation & Learning Research Center, Purdue University

Research Experiences for Students and Teachers Strand

Robin Fuchs-Young, PhD, Professor of Molecular and Cellular Medicine, Texas A&M University

Derrick Scott, PhD, Associate Professor of Biology and Executive Director, Molecular Diagnostics Laboratory, Delaware State University

Tony Ward, PhD, Professor and Chair, School of Public and Community Health Sciences, University of Montana

Science Teaching and Learning Strand

Kristin Bass, PhD, Director of Research Development, Rockman et al

Renee Bayer, MHSA, Associate Director for Engagement, CREATE for STEM Institute, Michigan State University

Teacher Professional Development Strand

Virginia Stage, PhD, RDN, LDN, Associate Professor of Nutrition Science, East Carolina University

Carmela Amato-Wierda, PhD, Associate Professor of Materials Science, University of New Hampshire

Sarah Wojiski, PhD, Director of Education, The Jackson Laboratory

Ex Officio Members: NIH Program Officers

Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Interactive Digital Media STEM SBIR/STTR, Division for Research Capacity Building, NIH National Institute of General Medical Science

Belem López, PhD, Program Director, Youth Enjoy Science Research Education Program, Diversity Training Branch, Center to Reduce Cancer Health Disparities, NIH National Cancer Institute

Conference Code of Conduct

Each person's attendance and contributions are valued for this conference. Together, we strive to have a positive and productive experience for everyone through an open exchange of ideas in a professional setting. Attitudes and behaviors that support this goal include:

- Be fully present when others are speaking, listening thoughtfully
- Be respectful of differing points of view
- Be mindful of how frequently you contribute to the discussion, allowing time for others to share
- Be concise, constructive and meaningful when you speak
- Examine your assumptions and perceptions
- Be curious
- Laugh and enjoy each other

The Conference Organizing Committee will not tolerate behaviors that create an uncomfortable or unsafe space for anyone. Unacceptable behaviors will result in a request to leave the conference. These behaviors include, but are not limited to:

- Harmful or prejudicial verbal or written comments or visual images
- Harassment, intimidation, or discrimination in any form
- Disruption of presentations during sessions

Anyone who experiences these or other unacceptable behaviors is asked to report them to Louisa Stark, SciEd 2022 Conference Organizing Committee Chair, either in-person or via email at louisa.stark@utah.edu. Unacceptable behaviors may also be reported to any member of the Conference Organizing Committee (see the conference program).

Schedule

SciEd 2022: Annual Conference for NIH Science Education Projects

Grand Hyatt Washington at Metro Center
1000 H Street NW, Washington, DC
May 31 – June 3, 2022

Tuesday, May 31

4:00-6:00 **Conference Check-in**
Grand Foyer (Declaration Level, 1B)

5:00-7:00 **Networking Session**
Grand Foyer (Declaration Level, 1B)

Wednesday, June 1

All sessions meet in Constitution Ballroom A/B, unless otherwise noted.

7:15-8:30 Breakfast and Poster Set-up for Poster Session 1

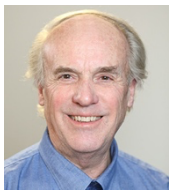
7:30-8:30 Conference Check-in
Registration Desk, Constitution Foyer

8:30-8:45 **Welcome**
Louisa A. Stark, PhD, Chair, NIH SciEd 2022 Conference Organizing Committee, Professor of Human Genetics and Director, Genetic Science Learning Center, University of Utah

8:45-8:55 **Welcome & Introduction of Dr. Jon R. Lorsch**
Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH

8:55-9:30 **Keynote Address: NIGMS Update**
Jon R. Lorsch, PhD, Director, National Institute of General Medical Sciences (NIGMS), NIH

9:30-9:50 **Update on the NIGMS Science Education Partnership Award (SEPA) Program**



Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH

9:50-10:10 **Update on the NCI Youth Enjoy Science Research Education Program**

Belem López, PhD, Program Director, Diversity Training Branch, Center to Reduce Cancer Health Disparities, National Cancer Institute (NCI), NIH

10:10-10:30 Break

10:30-10:45 **Flash Talks for Roundtables**

10:45-12:00 **Roundtables** (2 rounds of 30 minutes each with 5 minutes between rounds)

Broadening Participation

1. Co-designing Youth Outreach with Youth Partners – *Priya Mohabir, Laycca Umer*
2. Data Sonification – *Luke Bradley*
3. Termighty Guts, Version 2.0 – *Holly Brown, Kathleen Umayam*

Curriculum Development

4. Using Storylines to Align SEPA Projects with the NRC framework and the NGSS – *Ralph Imondi*

Informal Science Education

5. VENOM-venture/A-VENENO-tura: Learning in an Immersive, High-Motivation Serious Game for Families in Informal Environments – *Lisa White, Teresa MacDonald*
6. Working Without a Protocol: Supporting Participants Through Experimental Uncertainty – *Caitlin Nealon*

Research and Evaluation

7. Creating a Learning Assessment System to Evaluate Curriculum Efficacy – *Ang Chen*
8. Developing and Disseminating a SEPA Project's Results and Material – *Linda Morell, Katherine Nielsen, Michelle Phillips*

Research Experiences for Students and Teachers

9. Rural and Indigenous Student Engagement in Biomedical Science and Research: Culture, Place, and Perspective – *Jan Straley, Ellen Chenoweth, Paul Cotter, Aklei Helen Dangel*

Science Teaching and Learning

10. Conceptual Model Building: Developing Understanding through Revision & Collaboration – *Regina Wu, Jeanne Chowning, Kristen Bergsman*

11. Designing Brain-based Informed Positive Impact Learning Environments – *Melanie Duffrin*
12. What can you do with 22 minutes? Exploring ESTA's Litterati Efforts for 22 in 22 on 22 – *Corin Slown, Virginia Vigil, Eros Gonzalez-Lopez, Kenneth Tran, Kariya Hunter, Dan Fernandez, Enid Rice, Amir Attia, Brenda Eskenazi, Asa Brandman*
13. Resources to Engage and Inform Students About the Health Effects of Vaping – *William Folk*

Teacher Professional Development

14. Creating a Multi-institutional Course Collaborative for Middle and High School Teachers – *Nathan Vanderford and Louisa Stark*

12:00-1:15 Lunch

1:15-1:45 **Keynote Address: The *All of Us* Research Program**
Romuladus E. Azuine, DrPh, MPH, RN, Director of Research Platforms, All of Us Research Program

1:45-2:00 Break

2:00-3:15 **Concurrent Breakout Sessions**

Let's party like it's 2019! Broadening Participation through Data Parties
Kristin Bass, Alison Allen
Strand: Broadening Participation
Room: Roosevelt/Wilson

Engaging Students and Teachers with the Big Data from the *All of Us* Research Program
All of Us Research Program staff, Louisa Stark
Strand: Curriculum Development
Room: Ballroom D

Using the Better Evaluation Rainbow Framework to Improve the Quality of SciEd Evaluations and Using the NSF/IES Common Guidelines for Education Research in Your SciEd Research and Evaluation Plans
Alana Newell, Loran Carleton Parker
Strand: Research & Evaluation – Training Session
Room: Arlington/Cabin John

Promoting Computational Thinking through Neuroscience & Engineering Design Activities
Ido Davidesco
Strand: Science Teaching and Learning
Room: Ballroom E

Themed Session: Informal Science Education
(20 minutes/presentation, including Q&A)

Room: Latrobe

- Community Listening Sessions: Inviting Community Participation in Exploring Racially Inequitable Health Outcomes and Public Health Careers – *Laycca Umer, Priya Mohabir*
- Bicultural & Bilingual Co-development for Informal Science Education Projects – *Cecilia Nguyen*
- Puzzling out Ancient DNA Stories: Lessons from Developing an Unplugged Bioinformatics Activity – *Abbey Thompson*
- Assessing Cancer Literacy and Risk Behaviors among Appalachian Kentuckians through an Oral History Approach – *Courtney Martin*

Game Design for Systems Thinking
Ailea Stites
Strand: Interactive Multimedia for Learning
Room: Plenary

3:15-3:30 Break

3:30-4:00 **Flash Talks for Poster Session 1**

4:00-5:00 **Poster Session 1**
Remove posters at the end of the session

Thursday, June 2

7:15-8:30 Breakfast and Poster Set-up for Poster Session 2

Meeting for New SEPA PIs and Individuals Interested in Applying for a SEPA Grant
Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH
Room: Arlington/Cabin John

8:30-10:00 **STEM+Medicine (STEM+M) Session**

Keynote Address: Cultural Institutions as Allies
Carla Easter, PhD, Broh-Kahn Weil Director of Education, Department of Education Outreach and Visitor Experience, Smithsonian National Museum of Natural History

World Café Discussion of STEM+M Priorities and Opportunities
Nancy Moreno, PhD, Professor and Chair, Department of Education, Innovation & Technology, Baylor College of Medicine
Alana Newell, PhD, Assistant Professor, Department of Education, Innovation & Technology, Baylor College of Medicine

10:00-10:15 Break

10:15-11:30 **Concurrent Breakout Sessions**

Pandemic Lessons Learned: Stories from the SEPA Community
Anjan Nan, Molly McAndrew, Luke Bradley, Debra Yourick, Brittany Swift, Nico Ekanem,
Strand: Broadening Participation
Room: Latrobe

Using Seminars to Discuss Health Inequities in the Science Classroom
Jeanne Chowning, Regina Wu
Strand: Curriculum Development; Broadening Participation
Room: Ballroom C

How to Develop Science and Health Outreach Stories for All Ages
Susan Gertz, Lauren Bates
Strand: Informal Science Education
Room: Ballroom E

Stories from the Field: A Panel Discussion on SEPA Project Replication
David H. Holben and Melani Duffrin; Monica Strada and Jane Disney; Kathleen Hill and Tim Herman; Robin Bartlett and Ann Chester
Strands: Project Administration, Informal Science Education
Room: Roosevelt/Wilson

Professional Writing Groups: How to Start and Maintain a Collaborative (and Fun) SciEd Writing Group to Support Project Dissemination
Renee Bayer, Kristin Bass
Strands: Research and Evaluation; Project Administration
Room: Arlington/Cabin John

Systems Thinking Applications Across Multiple Distinct Fields
Daniel Fernandez, Beth Calegan, Corin Slown, Enid Ryce
Strand: Science Teaching and Learning
Room: Ballroom D

11:30-12:30 Lunch

Diabetes, Obesity and Cardiovascular (DOC) Group meeting
Melani Duffrin, Virginia Stage (organizers)
Room: Arlington/Cabin John

12:30-12:45 **Report on World Café STEM+M discussions**
Nancy Moreno, PhD, Chair, Department of Education Innovation and Technology, Baylor College of Medicine

12:45-1:45 **Keynote Address: Deaf Flourishing and Well-Being: Inclusion and Equity**
Teresa Blankmeyer Burke, PhD, Professor of Philosophy and Bioethics, Gallaudet University

1:45-2:00 Break

2:00-3:15 **Concurrent Breakout Sessions**

Best Practices for Engaging Members of the Deaf Community in Science Education Programs: An Informal Discussion with Teresa Blankmeyer Burke, PhD
Teresa Blankmeyer Burke (Facilitator: Louisa Stark)
Strand: Broadening Participation
Room: Ballroom D

Engaging Different Audiences in the Importance of Genetics and Genomics
Maurice Godfrey, Rochelle Cassells, Kara Flynn, Marnie Gelbart, Charles Wray
Strand: Broadening Participation
Room: Ballroom C

Funding Opportunities from Federal Agencies
National Science Foundation: Robert Russell
Department of Education: Christina Chhin
NIGMS Interactive Digital Media STEM SBIR/STTR: Tony Beck
Strand: Program Administration
Room: Latrobe

Conceptualizing and Evaluating Partnerships: Invitation to Discuss and Revise Tools (frameworks and instruments)
Michelle Phillips, Lindley McDavid, Loran Carleton Parker
Strand: Research and Evaluation
Room: Arlington/Cabin John

Using Research Inside and Outside the Classroom to Increase Students' Interest in Science
Tony Ward, Derrick Scott, James Breeden, Carolyn Cannon
Strand: Research Experiences for Students and Teachers
Room: Roosevelt/Wilson

Themed Session: Teacher Professional Development
(20 minutes/presentation, including Q&A)
Room: Ballroom E

Moderator: Carmela Amato-Wierda, Associate Professor of Materials Science, University of New Hampshire

- SHAPE MATTERS: Building Teachers' Capacity to Incorporate Authentic Modeling Practices that Mirror the Work of Molecular Biology Researchers in Secondary-level Science Classrooms – *Kathleen Hill, Tiffany Lewis, Amber Cesare*

- The NH CREATES Teachers Institute: A Model of Professional Development for Middle and High School STEM Teachers – *Carmela Amato-Wierda, Amy Booth, Alison Allen*

- Strategies for Expanding Your Program's Teacher Network – *Atom Lesiak, Joan Griswold*

- Interventions to Support Teacher and Student Engagement in the Citizen Science Project "All About Arsenic" during the Covid-19 Pandemic – *Jane Disney, Kate Buckman, Sarah Hall, Isadora Muñoz, Anna Farrell, Abby Roche, Hannah Lust, Karen Bieluch, Bill Zoellick, Bruch Stanton*

3:15-3:30 Break

3:30-4:00 **Flash Talks for Poster Session 2**

4:00-5:00 **Poster Session 2**
Remove posters at the end of the session

5:30-7:00 Informal Smithsonian Museum Visits – Museums open tonight until 7pm
Meet in the hotel lobby to visit these museums with other SciEd attendees; 6-7 minute walk; 0.3 miles
- American Art Museum
- National Portrait Gallery

Friday, June 3

7:15-8:30 Breakfast

8:30-9:45 **Concurrent Breakout Sessions**

Gamification to Engage Youth with Ecological Networks and Health Implications
Nik Stevenson
Strand: Informal Science Education
Room: Arlington/Cabin John

Teaching the Genome Generation: Incorporating Data Analysis and Quantitative Skills into Biology Classrooms through Bioinformatics
Sarah Wojiski, Erica Gerace, Christina Vallianatos, Charlie Wray
Strand: Curriculum Development
Room: Roosevelt/Wilson

Congratulations! You're a Grant Recipient! Now What??
J. Michael Wyss (moderator), L. Tony Beck, and TBA
Strand: Project Administration
Room: Ballroom C

Inclusive Measurement of Trainee Demographics within Biomedical Research Training Programs
Lisa Marriott, Megan Mekinda, Nathan Vanderford
Strand: Research and Evaluation
Room: Ballroom D
**This will be a hybrid session.*

Authentic Research Experiences in Faculty Labs and Citizen Science
James Breeden, Carolyn Cannon, Robin Fuchs-Yong
Strand: Research Experiences for Students & Teachers
Room: Ballroom E

Themed Session: Programs for Elementary Students and Teachers
(20 minutes/presentation, including Q&A)
Room: Latrobe

Moderator: Virginia Stage, PhD, RDN, Associate Professor of Nutrition Science, College of Allied Health Sciences, East Carolina University

- Implementing Professional Learning Communities (PLCs) in the Early Childhood Settings: Resources Developed, Lessons Learned, and the Path – *Archana Hegde, Virginia Stage*

- Authentic Community Engagement in Sciences Strikes Again! – *Matt Queen*

- Biomechanics to Develop Interdisciplinary Experiences in Early Elementary Science: Exploring Informal Education and Community Based Learning – *Amelia Knarr*

- Climate Club: Environmental Health Research Education for Young Citizen Scientists - *Lauren Bates, Susan Gertz*

Strands: Informal Science Education, Teacher Professional Development, Curriculum Development, Instructional Multimedia

9:45-10:00 Break

10:00-11:15 **Concurrent Breakout Sessions**

Program Sustainment, Integrity and Continuity: Finding the Gaps
Debra Yourick, Holly Brown, Laura Tenenbaum
Strand: Broadening Participation, Program Administration
Room: Latrobe

Explore the National Science Teaching Association's (NSTA) High Quality Lesson Plans for Implementing the Next Generation Science Standards (NGSS)
Erika Shugart, Wendy Binder
Strand: Curriculum Development
Room: Roosevelt/Wilson

DNA Barcoding in a Pandemic: Hands-on Techniques for Remote Learning
Sharon Pepenella
Strand: Informal Science Education
Room: Ballroom C

STEM Storytelling Bootcamp: Meet Your Project Coach
Leah Clapman, Mohammad Pasha
Strand: Interactive Multimedia
Room: Arlington/Cabin John

Curriculum "Lemonade Stands" – browse curriculum materials developed by SciEd projects that are ready for dissemination
Strand: Curriculum Development
Room: Constitution Ballroom A/B

1. The Mystery of the Monkeyflower: Explore a Biology High School Curriculum through a Comic Book and Real-World Research – *Renee Bayer*

2. More PEAS Please! Engaging Preschool Head Start Children in the Process of Science – *Jocelyn Dixon*

3. The Adaptive Immunity Kit and Making the Cut…with CRISPR – *Tim Herman Heather Ryan*

4. Blood Sugar Balance – *Atom Lesiak, Joan Griswold*

5. Discover SCIENCE with Dr. Bear – *Naomi Luban, Rachel Smilow, Julia Miller, Annika Hvide*

6. The Scientist Spotlights Initiative: Teaching Science Content through Curricular Supplements that Feature Counter-stereotypical Scientists and Engage Students with Written Reflections – *Dax Ovid, Lucy Luong, Kimberly Tanner, Jeff Schinske*

7. Biotinkering Activity Resources for Families, Educators, and Institutions – *Anja Scholze, James Wong, Caitlin Nealon, Abbey Thompson*

8. Frontiers in Cancer Research – *Regina Wu, Jeanne Chowning, Kristen Bergsman*

11:15-11:30 Break

11:30-12:00 **Town Hall Discussion**
Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH

Lunch on your own

Session Reports

Keynote Address

Wednesday, June 1, 2022 – 8:55 AM – 9:30 AM

NIGMS update

Presenter: Jon R. Lorsch, Ph.D., Director, National Institute of General Medical Sciences
Reporter: Loran Carleton Parker, Ph.D., Associate Director, Purdue University

NIGMS is the major funder of training, education, diversity and capacity building programs at NIH. Dr. Lorsch transitioned to his role as Director of NIGMS after participating in curriculum development in the provost's office as a faculty member at his Johns Hopkins.

Biggest education news: Other NIH Institutes, Centers and Offices (ICOs) will begin funding SEPA projects. This will increase the overall funding available for the SEPA program and enable more projects to be funded. So we need more SEPA applications. To help promote an increase in applications, NIH will drop the one SEPA /institution rule. The normal proposal review process will still be in effect. NIH Institutes and Centers will select promising SEPA applications that they are interested in funding after the review process has been completed.

Other updates:

Please visit the STEM Teaching Resources page on the NIH website which will gather resources from all Institutes and Centers. It launched in April and is free and easy to access.

The newest issue of Scholastic Pathways features careers in biomedical research, using mRNA vaccine development as example. It has reached 2.5 million students and features Vice President Kamala Harris.

NIH has sought direct input from trainees on how to improve programs, career progression, and training environments. The deadline to provide feedback has ended, but look for updates on the NIGMS Feedback Loop blog.

NIGMS is investing in new programs to enhance workforce diversity in the health and medicine field.

- MOSAIC—Maximizing Opportunities for Scientific and Academic Independent Careers (K99/R00 and UE5). Funds the transition from postdoc to independent scientist, which is a place in the career path where we lose talented and diverse scientists. It also funds support for scientists through projects with the professional organizations. Organizations propose support projects and individuals are funded in cohorts through K99s. The program funds awards from across NIH.

- MSTP—Medical Scientist Training Program (T32) for institutions in states eligible for Institutional Development Awards (IDeA) states and for Minority-Serving Institutions (MSIs). This program funds MD/PhDs and partners with MSIs to train these scholars.

- NARCH—Native American Research Centers for Health. This program will be enhanced based on program evaluation results and in consultation with Tribal Councils. New elements will increase the capacity building of tribes with respect to career development of members, cultural sensitivity of assessment, and tribal ownership of research. The application and administrative processes will also be simplified. Additional support programs and funding will be added to assist with planning and capacity building for applications and administration. IRB processes and organizations will be enhanced as well. Training grants for emerging scientists will also be added.

- A new cloud computing initiative aims to democratize access to computational resources and big data research. This initiative hopes to lower barriers of access so that institutions with resource limitations can conduct important computational research in the cloud, rather than having to fund super computer clusters. Pilot grants indicate that more training in cloud computing is needed to make these aims a reality—access is not enough. Institutions and researchers need data science training. NIGMS has funded pilot modules to build capacity in cloud computing basics and specific analyses.

The NIH UNITE Initiative is NIH-wide and aims to identify and address structural racism within the biomedical research enterprise, as well as bolster the efforts of the NIH offices involved in diversity, equity, inclusion, and accessibility. Dr. Lorsch is heading the portion of this initiative dealing with extramural research funding. NIH is working to "refund" the "minority tax" that many Underrepresented Minority (URM) scholars pay when they are burdened by administrative, mentoring, and other capacity building work that is not rewarded by funders and institutions. Excellence in Diversity, Equity, Inclusion, and Accessibility (DEIA) investigators grants will reward this work by supporting DEIA work and research. These awards are managed by NIGMS but will support NIH-wide Institutes and Centers.

9:30 AM – 9:50 AM

Update on the NIGMS Science Education Partnership Award (SEPA) Program

Presenter: Tony Beck, Ph.D., Program Director, Science Education Partnership Award, Division For Research Capacity Building, NIGMS, NIH

Reporter: Carmela Amato-Wierda, Associate Professor of Materials Science, University of New Hampshire

Tony Beck, NIH SEPA program director, provided an update and a brief historical summary of SEPA. SEPA began in 1991, when it made ten awards and was part of the NIH NCRR (National Center for Research Resources). A major goal of the SEPA program is to provide a diverse pipeline into the biomedical field. SEPA is not just a grant program, but a longstanding community of like-minded folk interested in building a biomedical pipeline. SEPA was moved several times among NIH Institutes and in 2017, it was placed in its current home, at the National Institute of General Medical Sciences (NIGMS).

Dr. Beck reported on the exciting update that in 2022 SEPA will partner with 18 Institutes, Centers and Offices (ICOs) across NIH. Additionally, institutions may now apply for multiple SEPA awards since the restriction of one grant per institution has been lifted.

Dr. Beck also reminded us of a key attendee goal during SciEd 2022 – develop two new collaborations.

9:50 AM – 10:10 AM

Update on the NCI Youth Enjoy Science Research Education Program

Presenter: Belem López, Ph.D., Program Director, Diversity Training Branch, Center to Reduce Cancer Health Disparities, NCI, NIH

Reporter: Jeanne Ting Chowning, Ph.D., Sr. Director of Science Education, Fred Hutch Cancer Center

Dr. López began by introducing the variety of diversity-focused programs within the National Cancer Institute (NCI). The extramural programs fall under the Continuing Umbrella of Research Experiences (CURE), which provide opportunities to students from middle school all the way to early-stage investigators. NCI is always thinking about next steps for career advancement.

The CURE programs are focused on enhancing diversity. The R25 YES program rose out of P30 CURE supplements and is intended to inspire interest in biomedical and cancer research careers. The YES program incorporates three components: Research Experience, Curriculum Methods, and Outreach. The Outreach component is relatively unique and asks programs to meaningfully engage families/community members.

The current announcement is RFA-CA-21-020, and the next submission deadlines are September 28, 2022, and September 28, 2023. Funding is available for up to $400K annually for 5 years. The last round saw over 100 applications from 36 states. There are currently 16 awards.

The PI and grant staff community is strong and meets monthly with the Program Officer to collaborate and share experiences/best practices. A Virtual Hub ("YES HQ") exists for the community. The *Journal of Stem Outreach* is also working on a special issue featuring the YES program.

Dr. López discussed the elements shared by successful proposals. Applications should demonstrate a clear need (specific to the application), integrated design with connection between different components, and a clear cancer focus. However, applications do not need to include all career levels in one program. Participants should be involved over 2 years, with a 3 month/year commitment.

She also stressed the elements important for program evaluation and discussed outcome measures that would map to major grant activity categories.

Dr. López reviewed data related to the YES program. Over 1,175 students have been trained, and most students are Black, Hispanic, and Latine. The majority also identify as female. Five programs have outreach to middle school students.
YES programs have published 17 manuscripts, 1 book, and 6 podcasts.

Among the topics discussed with the audience was the challenge of tracking students over time. The use of CareerTrac is planned, although there are challenges with high school students needing university emails to get into the system. LinkedIn and Google Scholar were also mentioned as resources for long-term follow up.

Keynote Address

Wednesday, June 1, 2022 – 1:15 PM – 1:45 PM

Keynote Address: The *All of Us* Research Program

Presenter: Romuladus E. Azuine, Ph.D., MPH, RN, Director of Research Platforms, All of Us Research Program

Reporter: Steve Ortiz, M.L.S., University of Utah

This presentation highlighted the NIH All of Us Research Program, which aims to enroll at least one million people across the U.S., helping to build one of the most diverse health databases of its kind. Researchers will use the data to learn how our biology, lifestyle, and environment affect health. This may one day help them find ways to treat and prevent disease. Dr. Azuine, who is both a researcher and an educator, highlighted the importance of this program and encouraged the audience to participate in it.

Dr. Azuine emphasized the unique opportunity that the *All of Us* program offers to revolutionize medical research by making it more inclusive and representative of all members of the population. By participating in the program, individuals can help contribute to a better understanding of health and healthcare that truly benefits everyone.

Dr. Azuine also noted that the *All of Us* Research Program has all the necessary processes and support in place to ensure that participants can easily take part in the program. He encouraged the audience to take a closer look at both the participant website and the Research Hub, which provides resources for researchers and access to the data.

Breakout Sessions

Wednesday, June 1, 2022 – 2:00 PM – 3:15 PM

Let's party like it's 2019! Broadening Participation through Data Parties

Facilitators: Kirstin Bass, Ph.D., Director of Research Development, Rockman et al Cooperative
Alison Allen, M.A., Senior Research Associate, Rockman et al Cooperative

Why a data party you might be asking? Data parties are a form of participatory data analysis that can include all types of project partners including scientists, educators, and even students. They're not just limited to evaluation data, but can be done with scientific research data that is compiled and shared across classrooms, programs, or other project sites. Our goal is to share the ingredients for making a successful data party that can provide your project and stakeholders maximum impact with the data with minimal preparation time on your part.

There is no need to RSVP to our session or to BYOD (Bring Your Own Data). We'll have a set of anonymous responses that we can discuss together. After a brief introduction, we'll spend our time trying a data party activity or two. You'll get plenty of chances to ask questions along the way and share your experiences with similar activities. At the end, you'll have the opportunity to reflect on what you've learned and begin to plan your own party if you feel so inclined.

As a result of participating in this session, conference attendees will:

- think creatively about engaging scientists, teachers, and students with data
- give at least one purpose for a data party
- identify some simple strategies for sharing qualitative and quantitative data
- learn some data analysis games
- generate ideas for their own data parties

Participant List:
Ren Rountree, University of South Carolina
Amy Booth, University of New Hampshire
Holly Brown, Walter Reed Army Institute of Research
Thomas Boland, University of Texas at El Paso
Bryan Shaw, Baylor University
Renee Bayer, Michigan State University
Anna Kiley, University of Montana
Katherine Nielsen, University of California, San Francisco
Mehnaaz Ali, Xavier University of Louisiana
Rochelle Cassells, University of Utah

Engaging Students and Teachers with the Big Data from the *All of Us* Research Program

Presenters and Facilitators:
Rubin Baskir, Ph.D., Engagement Specialist, NIH All of Us Research Program
Yong Crosby, Special Assistant, NIH All of Us Research Program All of Us Research Program
Louisa Stark, Ph.D., Professor of Human Genetics and Director, Genetic Science Learning Center, University of Utah

The NIH *All of Us* Research Program is inviting 1 million people across the US to help build one of the most diverse health databases in history. Researchers - including citizen scientists - will use the data to learn how our biology, lifestyle, and environment affect health.

In this workshop you'll learn about the data available through the *All of Us* Research Program, with a focus on the publicly-available data that is most accessible to teachers and secondary students. You'll then have an opportunity to explore a research question that uses the data. Finally, we'll brainstorm ideas for educational materials and teacher guides that could support use of this data at the secondary level.

Participant List:
Debra Yourick, Walter Reed Army Institute of Research
James Breeden, Texas A&M University
Patrice Saab, University of Miami
David Micklos, Cold Spring Harbor Laboratory
Carmela Amato-Wierda, University of New Hampshire
Carolyn Cannon, Texas A&M University

Marisa Pedulla, Montana Technological University
Karen Yanowitz, Arkansas State University
Kathy Hill, Pennsylvania State University
Tiffany Lewis, Pennsylvania State University
Karin Chang, University of Missouri- Kansas City
Molly McAndrews, University of Kentucky
Gwendolyn Stovall, University of Texas at Austin
Dana Haine, University of North Carolina at Chapel Hill
Regina Wu, Fred Hutchinson Cancer Center
Erica Gerace, The Jackson Laboratory
Manuella Yassa, University of California, Irvine
Melinda Gibbons, University of Tennessee, Knoxville
Sarah Wojiski, The Jackson Laboratory
Joan Griswold, University of Washington
Peter Faletra, New Hampshire Academy of Science
William Folk, University of Missouri
David Petering, University of Wisconsin-Milwaukee
Maya Adam, Stanford University
Ralph Imondi, Coastal Marine
Nancy Moreno, Baylor College of Medicine
Ben Greenfield, University of Southern Maine
Susan Gertz, Miami University
Melissa DeJonckheere, University of Michigan
Rochelle Cassells, University of Utah
Jacqueline Genovesi, Drexel University

Game Design for Systems Thinking

Facilitator: Ailea Stites, BS, Youth Engagement Lead, CI3 University Of Chicago
Reporter: Daniel Fernandez, Ph.D., Professor, California State University, Monterey Bay

Introductions: “What is an example of a game you designed?”

Definitions of games: They involve making people get engaged with a topic.

Characteristics of games: We discussed that good ones should be fun, motivational and rewarding (generating dopamine in the players’ minds), and engaging people. Question – is getting myself to work on something a game? Checklist simulator, for example? Something to keep in mind.

Researcher called Joulle said that games must be interactive, and a player must have agency to affect an outcome. Games must have some sort of learning involved. Player action/agency, rules and constraints (a system). Self-efficacy.

Systems and systems thinking. Systems have rules and constraints.

In the game-design context, games model a system—some literally. An example of a game that models a system is monopoly. An example of a game that does not is gin-rummy.

An affect is a response to something in the game system. Some points of affect in games you’ve played? Beating the boss, anticipation. Good games give affect at specific points resulting in causing emotional impacts that stick, but which are low-stakes.

Game examples:

Uno example. Do this or draw 25 cards. House Rules is a good point in game design.

Another example – the game of operation. If the operator slips, it can cause an alarm, but in a low-stakes case (no one really gets hurt).

Emotion should be tied to a learning experience.

Game design workshop.

In small groups, we used conceptualization questions. Goals of game:

Smokestacks – I am a tobacco executive and I want to get as many customers as possible, but they die. Provided some youth reactions to the game.

Another game called “pipeline” or “defund the police.” Play a game as police commissioner or mayor or drug dealer. All strive for gains in their viewpoint. Shows negative aspects of over-policing and criminalization on urban communities. A good game is typically a well-rounded experience with a mix of emotions.

Some discussion: Question on how/whether playing alone or in groups affects the outcomes. Try to “break” the game.

Term: rubber-banding. E.g. in Mario cart, a strategy is to ‘lightning bolt’ the one in the lead to even the playing field. What you don’t want is for people to get frustrated and stop playing. Some people may be more drawn by a competitive field but others might want something more cooperative. Cooperative vs competitive. Each aspect of a game has its own narrative (that is an emergent narrative).

Example: Baby Town game shows complications of being a parent while in high school and leads to a greater understanding of the challenges of parenting.

Guiding questions: Need to model something/get a take home message.

Activity: Can we re-purpose the game in front of us to something else?

For example, in a smoking game, what if the company selling cigarettes had to pay for every death? Also, for the plastic game, what if the company had to pay end-costs of disposal or recycling. Staggered rate of paying for plastic collection from offending companies. Pay for sorting and disposal. Plastics could be found in different places, e.g. in sea/land. A time limit for plastics collection to have it completed in a certain time.

Perhaps games can unlock ideas that were inaccessible previously?

Perhaps, winning could represent how different game outcomes may result in different environmental outcomes, e.g., UN decision to ban all plastics.

Shared different ideas on game design, e.g. travel “ticket to ride.”

Also, navigating a new city. Take home – a game for building empathy for newcomers. Easiest level is to get from point a to point b. A more difficult level is to reach different landmarks to reach within a city.

Another game idea proposed—different foods were modelled based on a Monopoly theme.

The game system was designed to help families make better nutritional choices.

Participant List:
Ingrid Rodriguez, University of Puerto Rico
Julia McQuillan, University of Nebraska, Lincoln
Anja Scholze, The Tech
James Wong, The Tech
Daniel Fernandez, California State University, Monterey Bay
Amir Attia, California State University, Monterey Bay
MJ Belanger, NIH-Center for Scientific Review
Sarah Henes, University of Georgia
Bethany Hornbeck. Apis Creative
Brinley Kantorski, Partnerships in Prevention
Lisa White, University of California

Using the Better Evaluation Rainbow Framework to Improve the Quality of SciEd Evaluations and Using the NSF/IES Common Guidelines for Education Research in Your SciEd Research and Evaluation Plans

Facilitators:
Alana Newell, Ph.D., Assistant Professor, Center for Educational Outreach, Baylor college of Medicine
Loran Carleton Parker, Ph.D., Associate Director, Purdue University

The co-presenters designed this session to be interactive, addressing the questions shared below in bold. If quotation marks are provided, then this is a statement from the co-presenters. Overall, the session was informative, and it is clear that there is a lack of continuity related to evaluation across SEPA projects.

Why does everyone need to consider quality in SEPA evaluation?

- so others can replicate the study
- increase participant comfort
- to make adjustments based on formative feedback from evaluator
- "no matter how you define evaluation, it should be an integral part of the project design cycle."
- "everyone on the team needs baseline understanding of the evaluation process so that the project has continuity"

The Better Evaluation Framework

- the framework helps provide an overarching understanding of the purposes and parts of evaluation
- betterevaluation.org is a great resource that is undergirded with this framework
- Consists of seven main parts: manage, define, frame, describe, understand causes of outcomes and impacts, synthesize data, and report and support findings
- this talk focuses on managing, defining, framing, and reporting - due to areas that the evaluators believed would support the SEPA community

Which stakeholders are engaged in the evaluation process?

- students, teachers, scientists, advisory committee

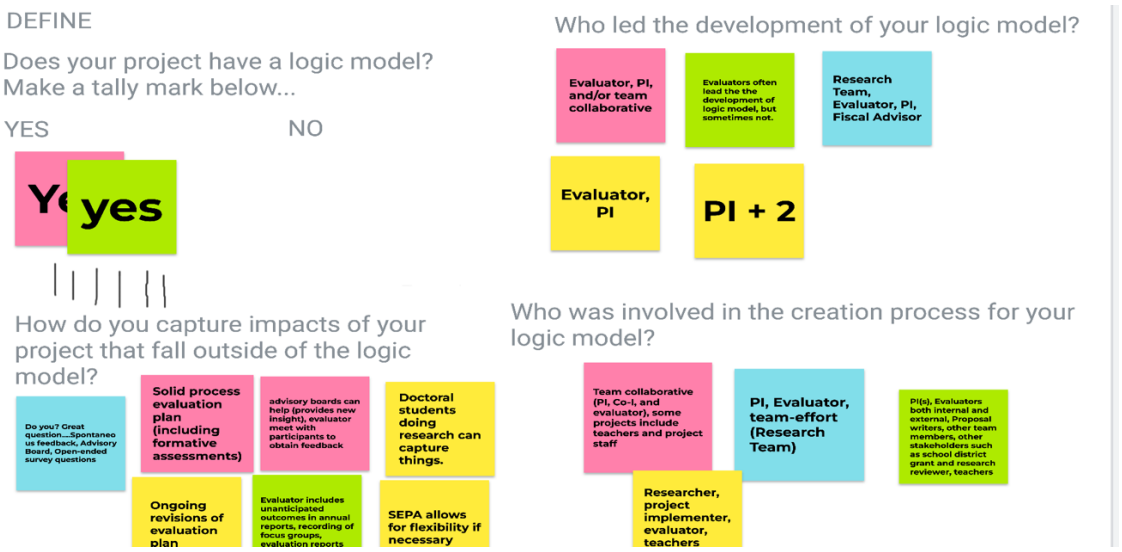
What processes are used to make decisions about the evaluation?

- project leaders, evaluators, funding agency has guidelines, IRB, thinking of the whole process as a logic model

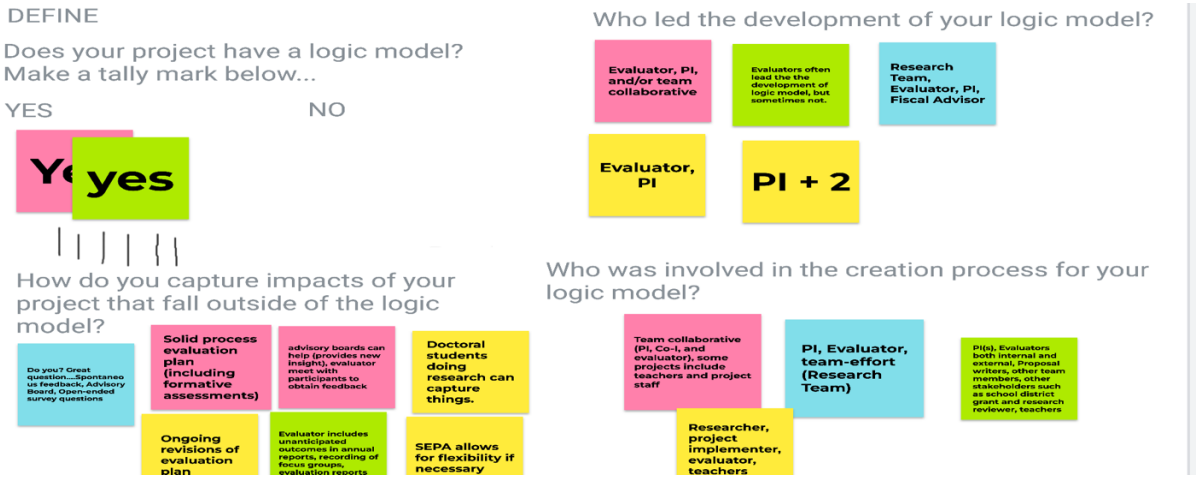
Small group discussions at tables, followed by synthesis using Google Jamboards

- How do you support the development of evaluation capacity- the ability to conduct and use evaluations?
- How do we justify the resources?

- How do you know how much a good evaluation should cost?
- Send evaluators to SEPA conferences
- Examine the knowledge of the given discipline



- Logic Models
  - Mostly created by the PI
  - Some suggested constructing multiple logic models to help make sense of such a big process
- Frame
  - Who are the users of the SEPA evaluations?



- Report
  - We need to do a better job here of highlighting what we do and sharing these resources

- Upload and share evaluation reports on the SEPA website

"Write down at least one way in which you will support development of evaluation capacity—the ability to conduct and use evaluations—within your SEPA moving forward"

Participant List:
Anjan Nan, University of Maryland, Eastern Shore
Chad Carrig, University of Maryland, Eastern Shore
Janice Montero, Boys & Girls Club, Puerto Rico
Georgia Hodges, University of Georgia
Abha Verma, Xavier University of Louisiana
Michelle Phillips, Exploratorium
Osvaldo Morera, University of Texas at El Paso
Helen Lin, University of South Carolina
Michelle Borrero, University of Puerto Rico-Rio
Edjean Calderon, University of Puerto Rico
Jocelyn Dixon, East Carolina University
Virginia Stage, East Carolina University
Tom Cho, NIH – CSR
Dave Jones, University of Montana
Sunita Chaudhary, Rutgers Cancer Institute of New Jersey
Tim Herman, Milwaukee School of Engineering
Heather Ryan, 3D Molecular Design
Ang Chen, University of North Carolina at Greensberg
Scott Randol, Oregon Museum of Science and Industry
Sharon Locke, Southern Illinois University, Edwardsville
Shelley Stromholt, Aspect Research & Evaluation
Elizabeth Parker, University of Maryland, Baltimore
Misty Lee Harris, West Virginia University
Erica Davis, Hawaii/Pacific Basin Area Health Education Center
Alyson Michael, New Hampshire Academy of Science
Laura Tenenbaum, Walter Reed Army Institute of Research

Promoting Computational Thinking through Neuroscience & Engineering Design Activities

Presenter: Ido Davidesco, Ph.D., Assistant Professor of Learning Sciences, University of Connecticut

Computational thinking (CT) practices like abstraction, pattern recognition, and modeling are now used in virtually all STEM disciplines. This has been recognized by the Next Generation Science Standards (NGSS), which views CT as a core science and engineering practice. However, most existing K-12 CT efforts focus on computer science courses, which are taken by small numbers of students, especially those from groups underrepresented in STEM. Therefore, there is a critical need to integrate CT more broadly into science and engineering courses. In this interactive session, participants will explore a new approach to facilitating CT through neuroscience and engineering design activities. They will experience this approach by measuring their own muscle activity and using a human-machine interface, where muscle activity is used to control a robotic claw. Based on this activity, participants will discuss what is CT and what specific practices it entails. The session will review some existing theoretical frameworks and approaches and conclude with a discussion on the relevance of these approaches to SEPA-funded programs.

As a result of participating in this session, conference attendees will be able to:

- describe computational thinking practices
- describe how these practices can be incorporated into K-12 science courses

Participant List:

Jamina Mesic, Northern Illinois University
Melani Duffrin, Northern Illinois University
Kevin D. Phelan, University of Arkansas
Gregory Gage, Backyard Brains
Amber Cesare, Pennsylvania State University
Joel Acevedo Nieto, Sharp Focus
Dax Ovid, San Francisco State University
Karina Meiri, Tufts University
Berri Jacque, Tufts University
Reyka Jayasinghe, Washington University
Luke Bradley, University of Kentucky
Rebecca Rudd, University of Kentucky
Carolina Rocha, University of Nevada, Reno

Themed Session

Wednesday, June 1, 2022 – 2:00 PM – 3:15 PM

Themed Session: Informal Science Education

Presenters:

Laycca Umer, MS, Manager, Research, Exhibits & Programs, New York Hall of Science

Priya Mohabir, BA, Senior Vice President, Youth Development and Museum Culture, New York Hall of Science

Cecilia Nguyen, BA, Senior Exhibit Developer, Oregon Museum of Science and Industry

Abbey Thompson, Ph.D., Director of Educational Outreach, Stanford Genetics

Courtney Martin, Undergraduate, University of Kentucky

Community Listening Sessions: Inviting Community Participation in Exploring Racially Inequitable Health Outcomes and Public Health Careers

During Year 1 of our SEPA project, The New York Hall of Science, in partnership with Elmcor Youth and Adult Activity Inc., ran a series of community listening sessions to help us better understand how local residents perceive the impacts of the COVID-19 pandemic on our local community of Corona and Elmhurst, Queens, New York City. A series of focus groups with community members and advisory conversations with local medical experts provided critical insight toward how best to support dialogue between local residents and scientific and medical experts around shared issues of importance during two community forums. The community forums brought together community members and medical and public health experts to further reflect on how their lived experiences relate to empirical evidence, and engage in future thinking about professional roles, careers, structures and systems in public health that can help address inequitable health outcomes.

Presenters will discuss key takeaways from these community listening sessions around what issues were of most importance to local residents, and what we have learned about best practices for crafting a productive dialogue among community members and scientific, medical, and public health experts in ways that the community truly feels they have a voice

- Bicultural & Bilingual Co-development for Informal Science Education Projects – Cecilia Nguyen
- Puzzling out Ancient DNA Stories: Lessons from Developing an Unplugged Bioinformatics Activity – Abbey Thompson
- Assessing Cancer Literacy and Risk Behaviors among Appalachian Kentuckians through an Oral History Approach – Courtney Martin

Participant List:
Julia Miller, Children's National Hospital
Naomi Luban, Children's National Hospital
Cathy Morton, West Virginia University
Lauren Bates, Cincinnati Children's National Hospital
Robin Bartlett, University of Alabama
Christina Vallianatos, The Jackson Laboratory
Charlie Wray, The Jackson Laboratory
Rebecca Mandt, NIG/NIAID
Misty Sailors, University of North Texas

Paul Gregg, Health Resources in Action
Laurie Wallace, Health Resources in Action
Jeb Owen, Washington State University
Phuong Luong, San Francisco State University
Kristina Yu, Exploratorium
Hilleary Osheroff, Exploratorium
Victoria Coats, Oregon Museum of Science & Industry
Abbey Thompson, Stanford University
Priya Mohabir, New York Hall of Science
Laycca Umer, New York Hall of Science
Caitlin Nealon, The Tech

Keynote Address

Thursday, June 2, 2022 – 8:30 AM – 10:00 AM

Keynote Address: Cultural Institutions as Allies

Presenter: Carla Easter, Ph.D., Broh-Kahn Weil Director of Education, Department of Education Outreach and Visitor Experience, Smithsonian National Museum of Natural History
Reporter: Steve Ortiz, M.L.S., University of Utah

Dr. Carla Easter is the Director of Education at the National Museum of Natural History, which is part of the Smithsonian Institution. She has been an advocate for community education for over 15 years, establishing local and national science education partnerships. Prior to joining the museum, she served as Chief of the Education and Community Involvement Branch of the National Human Genome Research Institute of the National Institutes of Health.

Dr. Easter has three major goals in her role at the museum. Firstly, she aims to cultivate internal and external partnerships through collaborations. Secondly, she wants to promote equity, inclusion, diversity, and accessibility. Lastly, she wants to re-center the Natural History Museum as a community ally and resource. With the current situation, where science is under attack, she believes that now is the time to focus on diversity and inclusion.

Dr. Easter chairs the Diversity Council at the museum and is concerned about maintaining the momentum for diversity and inclusion. She believes that Generation Z will carry the baton for the cause and it is important to activate and engage them in the movement. Dr. Easter sees STEM+M as an amazing opportunity to provide students with the means to act on their interests in medicine, biomedical engineering, and other STEM fields, with a focus on diversity, equity, and inclusion.

Dr. Easter focused on the role of informal education institutions in the STEM+M movement. She highlighted the connections and initiatives of the Smithsonian National Museum of Natural History to health and natural world activities.

The Museum houses the US National parasite collection, which was founded in 1892 and today holds more than 20 million specimens of animal parasites that affect humans, livestock, and wildlife. The Museum is also home to the exhibit "Outbreak," which was developed in partnership with the American Society for Microbiology, National Institutes of Health, and hundreds of researchers, epidemiologists, veterinarians, and public health workers. The exhibit emphasizes the identification and response to infectious diseases and includes a section on COVID-19.

Another exhibit at the Museum is the "Genome: Unlocking Life's Code" exhibit, which was created in partnership with the NIH National Human Genome Research Institute. This exhibit highlights the impact of genomes on personalized medicine, human ancestry, and the natural world.

The Museum is working on the inclusive Science Initiative, which aims to increase access to natural history and the natural history profession for students from all backgrounds, especially those from underrepresented and underserved communities. The initiative includes digital learning resources and support for teachers.

Dr. Easter noted that educational institutions, whether formal or informal, are committed to creating inclusive and accessible environments. The Smithsonian National Museum of Natural History, as a trusted and valued source, can provide materials that reach classrooms in ways that others cannot and is at the intersection of art, history, science, and culture.

In conclusion, Dr. Easter emphasized the importance of museums as trusted and neutral spaces for discussion and their role in the STEM+M movement. The Smithsonian National Museum of Natural History is committed to being a better ally and support in the movement, leveraging its resources and expertise to reach all audiences and provide inclusive and accessible education opportunities.

World Café Discussion of STEM+M Priorities and Opportunities

Facilitator: Nancy Moreno, PhD, Professor and Chair, Department of Education, Innovation & Technology, Baylor College of Medicine

Reporter and Facilitator: Alana Newell, Ph.D., Assistant Professor, Department of Education, Innovation & Technology, Baylor College of Medicine

Participants discussed the following topics in table groups. Below is a summary of key points from these discussions.

STEM+M Successes

- SEPA projects integrating these topics into schools through
    - Teachers in research
    - Student visits to biomedical institutes
- SEPA curriculum dissemination
- Connections between day-to-day and real-life science and health issues
- Community action research
- Near peer mentors

STEM+M Missed Opportunities

- Multiple modes of information dissemination
    - Especially child-to-child communication/advocacy

- Inclusion and celebration of diverse viewpoints and individuals
- Help students (especially elementary) identify as scientists
- Better parent and community engagement needed
- Targeting students who don't have an innate interest in science
- Training and resources for teachers
- Better understandings and connections between up-to-date science and how science changes/updates

Health Equity and Social Determinants of Health

- Fun, friends and finances to get young people interested in this topic
- Building community connections
- Bridging disconnect between what children learn and caregivers' beliefs (children are vectors of change); balancing caregiver expectations (children can be viewed as subversive with knowledge)
- Co-designing with community from idea inception
- How do you handle differences in opinion? Mutual partnership, agree to reach a consensus
- Relationship between religion, science and community
- Culturally responsive health interventions, all parties open to humility and flexibility
- Having a space for all concerned parties to connect about issues important to communities

Wellness and Mental Health

- STEM+M will not be successful unless we address mental health of the students first
- High achievement ≠ mental health
- Maslow's Hierarchy: Need to address basic needs
- Societal narrative around wellness/self care needs to change; mental health system is broken.
- Throwing a lot of opportunities for career prep does not help/stick when there are emotional/mental health issues.
- Throwing a lot of opportunities for career prep does not help/stick when there are emotional/mental health issues.

Policy Issues: Not Supportive

- Get health science into NGSS
- Connect advocacy, outreach, connectors, mavens, sellers
- Teacher training:
    - Health and science teachers need to be trained alike (include biomedicine courses)
    - Be taught as if they were scientists
- State level initiatives to create pipeline between health education, science training/curriculum.
- No home in US government for health education (National Institute of Health Education???)
- Teachers don't know how to teach the science behind health and don't have opportunities to learn it
- Standards were constructed to avoid health science on spurious grounds (not enough hands-on); scientists were "left holding the bag"
- NIH needs and education mandate focused on K-12

- Need pipeline between health education and state levels, to open up definition of science to include health education (and vice versa)

Desired Future State

- Broader, interconnected, interdisciplinary funding opportunities
- In Schools:
    - Move away from linear thinking and content-based knowledge
    - Include interdisciplinary examples
    - Encourage connections between topic areas, real-world examples
    - Teacher partnerships
    - Integration of art across curriculum
- Break down barriers between what's in school and outside of school/how are families involved

Short Term Wins

- Policy takes a long time (not a short-term win)
- Use existing channels to meet "kids" and others where they are (desires, aspirations, goals) and where they seek information
- Replication and scale-up is essential
- Repetition and focus on mastery as essential to wisdom
- Community-based participatory learning can support cultural knowledge gain
- Focus on finding ways to connect elders with youth for co-learning
- Fund an edit of high school biology textbooks (e.g., global health funded by Gates)
- Complementary textbook supplements

STEM+M Allies: Future

- Organizations already prevalent and trusted in communities
    - Museum/zoos/nature centers/art galleries
    - Girls/Boy scouts, Sororities/fraternities, Public libraries
- Primary Care Physicians/Health Professionals
- Schools and School Nurses
- Families
- Using:
    - Webinars, traveling exhibits, other events

Opportunities for workforce and future careers

- Outreach requirements within grants: Make health literacy-based outreach components of NSRA training grants NIH-wide
- Work with groups younger than HS to be interested in science (include career technical education, med tech and health professions)
- Support continuum from MS students, HS students, graduate students
- Involve families and caregivers
- Communicate career pathways that do not require 4+ years of higher education
- Create continuum of programs from MS through graduate schools
    - Near peer mentors from similar backgrounds and experiences

Opportunities for Teacher PD and Curriculum

- Add items to state assessments
- Co-create curricula with researchers
- ”Un-silo” content: biology and health
- Schools should sanction sustained, content-based PD
- Support hands-on learning, give teachers time to do with students; REAL LABS and information; community research practices and citizen science
- Support opportunities for science and health teachers to partner and co-teach
- Show how biomedical science connects to NGSS – provide specific examples
- Provide “quick” ways teachers can incorporate (vs. weeks-long units)
- PD needed to provide teachers with content knowledge so they can make connections

Other Topics

- New partnerships
    - Focus on youth - can teach parents (informal setting or formal)
- Smaller grants to try innovative ideas, such as high risk/high rewards (like an R21 for STEM Education)
- Develop health literacy through meeting community needs (food access, skills development)
- Education opportunities for caregivers with childcare provided
- Formal and informal institutions as community resources

Breakout Session

Thursday, June 2, 2022 – 10:15 AM – 11:30 AM

Pandemic Lessons Learned: Stories from the SciEd Community

Presenters and Facilitators:
Anjan Nan, Ph.D., Associate Professor of Pharmaceutical Sciences, University of Maryland Eastern Shore
Molly McAndrew, M.S., START Graduate Teaching Assistant, University of Kentucky
Luke Bradley, Ph.D., Professor and Acting Chair of Neuroscience, University of Kentucky School of Medicine
Debra Yourick, Ph.D., Director, Science Education and Fellowship Programs, Walter Reed Army Institute of Research
Brittany Swift, Ph.D., Walter Reed Army Institute of Research
Nico Ekanem, Ph.D., National Academy of Sciences, Engineering and Medicine/National Research Council Fellow, Walter Reed Army Institute of Research

This was a follow-on session for interested NIH SciEd participants to bring their own stories of their findings carrying out SciEd projects during the pandemic.

As a result of participating in this session, conference attendees will:

- gain a broader understanding and perhaps usable information regarding SciEd projects' responses and outcomes during the pandemic

Participant List:
Anjan Nan, University of Maryland Eastern Shore
Marie Barnard, University of Mississippi
Alyson Michael, New Hampshire Academy of Science
Chad Carrig, University of Maryland Eastern Shore
Debra Yourick, Walter Reed Army Institute of Research
Patrice Saab, University of Miami
Rebecca Rudd, University of Kentucky
Marie-Jose Belanger, NIH
Elizabeth Parker, University of Maryland, Baltimore
Karina Meiri, Tufts University
Laycca Umer, New York Hall of Science
Linda Morell, University of California, Berkeley
Osvaldo Morera, University of Texas at El Paso
Molly McAndrew, University of Kentucky
Brittany Swift, Walter Reed Army Institute of Research

Using Seminars to Discuss Health Inequities in the Science Classroom

Presenters:
Jeanne Chowning, Ph.D., Senior Director, Science Education, Fred Hutchinson Cancer Center
Regina Wu, BA., Program Manager, Fred Hutchison Cancer Center

Frontiers in Cancer Research, a program developed by the Science Education Partnership at Fred Hutchinson Cancer Research Center, increases understanding of molecular and cellular biology and how scientific practices such as argumentation and sensemaking are used in research. Working with teachers and scientists, we have developed NGSS-aligned curricula and kits which focus on research at Fred Hutch and include topics such as immunotherapy and stem cell transplantation.

In this session, we will engage participants in a seminar discussion from our Intro to Cancer: Leukemia & Hina's Story unit. This unit investigates the case of Hina Marsey, an eleven-year-old girl, who is diagnosed with leukemia. By exploring Hina's case, students develop conceptual models on cell growth/development, cancer, and cancer treatments. Students have opportunities for collaborative model building, discussions about health inequities in cancer, and evidence-based argumentation.

Presenters will model how to conduct a seminar discussion. Participants will engage in the seminar, which is based on a short article related to health inequity, as students. Participants

will also have the opportunity to share and discuss how their SEPA projects touch on this important topic.

As a result of participating in this session, conference attendees will:

- gain a deeper understanding of how social issues affect health and medicine
- experience how seminar discussions on social issues can be done in a science classroom
- reflect on how the exploration of health disparities within a classroom can help students connect their science content to their own lives
- explore and share how other SEPA projects are addressing health disparities and social issues in health

Participant List:
Tiffany Lewis, Penn State University
Erica Gerace, The Jackson Laboratory
Berri Jacque, Tufts University
Marnie Gelbart, Harvard University
Courtney Martin, University of Kentucky
Priya Mohabir, New York Hall of Science
Maria Llabre, University of Miami
Belem Lopez, NIH
Sarah Wojiski, The Jackson Laboratory
Dax Ovid, San Francisco State University
Carolina Rocha Becerra, University of Nevada, Reno
Manuela Jaramillo, University of Miami
Louisa Stark, University of Utah

How to Develop Science and Health Outreach Stories for All Ages

Presenters: Susan Gertz, MS., Creative Development, Miami University

Lauren Bates, Ph.D., Program Director for CRA Program We Engage 4 Health

The session will begin with a short overview of the power of science and health outreach stories in informal education and the process We Engage 4 Health uses to create and evaluate them. Participants will work in groups, each with a chosen health science topic, to identify three big ideas for a story, plan a story arc, and write a short script for a 3-panel, graphic-style story. Groups will exchange stories, read them out loud taking the parts of characters, and evaluate the stories using a story impact survey. If time permits, presenters will demonstrate putting one of the scripts into a graphic format using Comic Life software. Presenters will later put all group's scripts into a graphic format and e-mail attendees the resulting PDFs to help demonstrate how the story creation process plays out. Links to a story development guide and other resources will be provided.

As a result of participating in this session, Conference attendees will:

- become aware of the power of stories to help them accomplish goals in their own SEPA projects
- learn the components of successful stories
- begin the process of writing their own stories
- leave the session ready to continue developing their stories.

Stories from the Field: A Panel Discussion on SEPA Project Replication

Panelists:
David H. Holben, Ph.D., Professor and Gillespie Distinguished Scholar of Nutrition and Hospitality Management and Director of the Office of Food and Nutrition Security, The University of Mississippi
Melani Duffrin, Ph.D., RDN, Professor of Health Sciences, Northern Illinois University
Monica Strada, MAT., Science Teacher, research Triangle High School, Durham, North Carolina
Jane Disney, Ph.D., Associate Professor of Environmental Health and Director of Research Training, MDI Biological Laboratory
Amer Cesare, MEd., STEM Education Outreach Specialist, Penn State University
Tim Herman, Ph.D., Director, MSOE Center for BioMolecular Modeling, Milwaukee School of Engineering
Robin Bartlett, Ph.D., Professor and Associate Dean of Research, Capstone, College of Nursing, University of Alabama
Ann Chester, Ph.D., Senior Consultant, HSTA Hatch
Reporter: Jasmina Mesic, FoodMASTER

The purpose of this panel was to jumpstart the replications of programs. NIGMS is accepting applications for the replication or adaptation of successful SEPA programs. This panel discussion reviewed the replication of multiple SEPA programs, how replication was successful, and some of the challenges that the programs had to overcome. The key topics discussed include adaptation and establishing partnerships.

Adaptation was discussed by many of the panelists. Each replication of each program discussed that in order for the replication to be successful, adaption was required. Because the program was going to be implemented with different populations, some programs needed to be revised to suit each population. For example, FoodMASTER in one state was implemented in classrooms while in another location, it was implemented in library settings. For All About Arsenic, one state focused data collection on arsenic in the water supply, while another state noticed another substance of concern that needs to be addressed.

Establishing partnerships is key to making a replication sustainable. Some partnerships that programs have established have provided participants for the program, infrastructure to house the program, and funding to continue the program. A relationship needs to be established with key members of the community, which can be schools, libraries, outreach centers, universities, and other organizations. By establishing these relationships, a steady flow of participants can be recruited. This way, the program can be sustainable without a loss of participants. Partnering with an institution or organization may also be key to keeping the program sustainable. The institution or organization may be able to adopt the program and integrate it into their infrastructure to house the program. The institution or organization will be able to implement the program as they normally do with their other programs. They may also be able to continuously fund the program with the funding they already receive to operate.

Successful replication of programs typically require adaptation and strong partnerships in order to be effective and sustainable. NIGMS is accepting applications for the replication or adaptation of successful SEPA programs.

Participant List:
Rebecca Mandt, NIH/NIAID
Ellen Chenoweth, University of Alaska Southeast
Helen Liu, University of South Carolina
Candice Lucas, University of Rochester
Anja Scholze, The Tech
Caitlin Nealon, The Tech
John Fraser, Knology
Jacqueline Genovesi, Drexel University
Aaron Kyle, Columbia University
Ben Greenfield, University of Southern Maine
Summer Kuhn, West Virginia University
Kate Mattern, Anaconda High School
Maribel Campos, University of Puerto Rico
Marisa Pedulla, Montana Technological University
Helen Dangel, University of Alaska Southeast
Dina Markowitz, University of Rochester
Kathleen Hill, Penn State University
Jasmina Mesic, Northern Illinois University
Melani Duffrin, Northern Illinois University
Monica Strada, University of North Carolina, Chapel Hill
Jane Disney, MDI Biological Laboratory
David Holben, University of Mississippi
Amber Cesare, Pennsylvania State University
Tim Herman, Milwaukee School of Engineering
Robin Bartlett, University of Alabama
Ann Chester, West Virginia University
Bethany Hornbeck, Apis Creative

Professional Writing Groups: How to Start and Maintain a Collaborative (and Fun) SciEd Writing Group to Support Project Dissemination

Facilitators:
Renee Bayer, Michigan State University CREATE for STEM Institute
Kristin Bass, Ph.D., Senior Research Associate, Rockman Et Al Cooperative
Tania Jarosewich, Censeo Group
Reporter: Renee Bayer, Michigan State University CREATE for STEM Institute

Our slides are at Tinyurl.com/sciedwriting. This session builds on a session presented last year at SciEd 2021 that one of the presenters (Kristin Bass) organized on dissemination. This presentation was intended to model a writing group experience, so that participants could make meaning of it, similar to what we do in NGSS-aligned instruction.

Introductions and prior knowledge: our participants varied in their experiences with writing groups from no experience, to having scheduled time for post docs and an agenda. One person had experience with a writing group for middle school students where the topic was violence.

We discussed the background of our SEPA writing group, why we write together, our writing process, and ideas for writing in one hour, (examples include prewriting, writing, and review and revisions). We encouraged people to think about their audiences very broadly.

Questions/discussion: People asked about incorporating special sessions in their writing groups such as on topics such as script writing or social media. One person suggested that a breakout room could be opened for a special topic. It's important to have a conversation about what the group wants the norms to be and have consensus. Can we have a special issue that we might write together on a common topic? Kristin, as an editor for the *Journal of STEM Outreach* suggested this is something we could do. Another question was about co-authorship, and how we talk about that in our writing group.

Then we broke up into small groups and encouraged people to write. After people talked for a bit about what stops them from writing or other topics, the room became pretty quiet as most people settled into writing. One group had more sharing to do - later they shared that their discussion was about writing.

Because this was a talkative group, we broke a few minutes early to debrief: People shared about the difficulties of developing the practice of writing, including engaging students in writing groups, making writing a practice, settling into writing, getting distracted by email during writing time (hint, close your email application), and balancing speakers to learn about new styles/outlets of writing with time for writing.

One person asked for more information about disseminating our SEPA projects. Kristin shared information about the *Journal of STEM Outreach* as a potential place for SEPA.
There was a request to connect people by email to organize cross-project writing groups.

Several Short Sentences About Writing by Verlyn Klinkenborg was suggested as a resource to read.

We will send out one email to all participants to see about interest in forming groups.

Participant List:
Stephen Koury, University at Buffalo
Sharon Locke, Southern Illinois University, Edwardsville
Georgia Hodges, University of Georgia
Mehnaaz Ali, Xavier University of Louisiana
Carmela Amato-Wierda, University of New Hampshire
Charlie Wray, The Jackson Laboratory
Sunita Chaudhary, Rutgers Cancer Institute of New Jersey
Janice Montero, Boys & Girls Club Puerto Rico
Melinda Gibbons, University of Tennessee, Knoxville
Loran Parker, Purdue University
Maya Adam, Stanford University
Gregory Gage, Backyard Brains
Brinley Kantorski, Duquesne University
Sandy San Miguel, Purdue University

Systems Thinking Applications Across Multiple Distinct Fields

Facilitators:
Daniel M. Fernandez, Ph.D., Professor, California State University, Monterey Bay
Beth Callaghan, M.S., Teacher Program Specialist, Monterey Bay Aquarium
Corin Slown, Ph.D., Associate Professor of Biology and Chemistry, California State University, Monterey Bay
Enid Ryce, M.F.A., Professor of Cinematic Arts and Technology, California State University, Monterey Bay
Reporter: Amir Attia, Cal State University, Monterey Bay

- Slinky interactive demo

Q: What made the Slinky bounce?
A: Gravity, spring, hand movement
Note: People sometimes overthink the systems they interact with, thus ignoring the obvious components/parts of the system that may be very simple.

- Systems

The emerging properties of a system, the connection between its parts, and how they relate to each other (example: Think of the heart).
Q: What is a model?
A: Replica, Physical manifestation of a concept or device
Q: How do Model relate to systems?
A simple diagram of a systemic issue is the first step is to look for the connections between the different parts of a system.

- Group discussion

Discuss the following question as a group
Q: Why do use Model in Science? Why use them engineering? Why ask students to develop and use models?

Feedback:
A way to figure out how things work, and allow teachers to assess.
Visual manifestation
Multi-sensory communication process

Systems have rules (Examples: government, banks, learning systems…)
A system can tell a story (Example: Dagitty system used in epidemiology).

- Group Activity:

Plastic ingestion by marine life: The attendees were divided into groups.
Each group resembles a set of marine life species on the food chain ingesting different food elements including pollutants.
The groups interact mimicking the ingestion cycle till they reach to a human.
Results were summed on the posterboard.

Participant List:
Amir Attia, California State University, Monterey Bay
Viviana Vigil, California State University, Monterey Bay
Eros Gonzalez-Lopez, California State University, Monterey Bay
Jeb Owen, Washington State University
Abbey Thompson, Stanford University
Virginia Stage, East Carolina University
Ang Chen, University of North Carolina at Greensboro
Lisa White, University of California, Berkeley
Julia McQuillan, University of Nebraska, Lincoln
Joel Acevedo, Sharp Focus
Ido Davidesco, University of Connecticut
James Wong, The Tech
Amy Booth, University of New Hampshire
David Petering, University of Wisconsin-Milwaukee

Thursday, June 2, 2022 – 11:30 AM – 12:30 PM

Diabetes, Obesity and Cardiovascular (DOC) Group meeting

Facilitators:

Melan Duffrin, Ph.D., Professor, Interdisciplinary Health, Northern Illinois University

Virginia Stage, Ph.D., R.D.N., L.D.N., Assistant Professor of Nutrition Science, East Carolina University

Reporter: Jasmina Mesic, FoodMASTER

The purpose of this group meeting was to share information and experiences as well as learn from each other about our current projects. Some members of the group are working on educating the community on diabetes while others are working on disseminating curriculum related to diabetes or nutrition.

During the discussion, members spoke about the need to have more conversations on learning theories and brain based learning. Members would like to learn more about how learning happens in the brain and how to make learning more effective. Members also believe that having interdisciplinary teams to examine how learning happens in the brain would be beneficial. A member shared that they had taken a course in learning theories and shared that learning theories and the science of the brain are often disconnected and treated as though they are not related even though how the brain works is deeply connected to how the brain learns. The group discussed how there should be teams of learning theorists and neuroscientists to inform practices on how to work with people with diabetes, obesity, etc.

The group also discussed how the specialty group should be held next year. Some members discussed how it would be more beneficial to have round table discussions during lunch, with each table having different conversation topics with conversation leaders. This way, there will be more opportunities for networking with others with similar interests.

Particpant List:
Joan Griswold, University of Washington
Atom Lesiak, University of Washington
Amber Cesare, Pennsylvania State University
Virginia Stage, East Carolina University
David Holben, University of Mississippi
Melani Duffrin, Northern Illinois University
Jasmina Mesic, Northern Illinois University

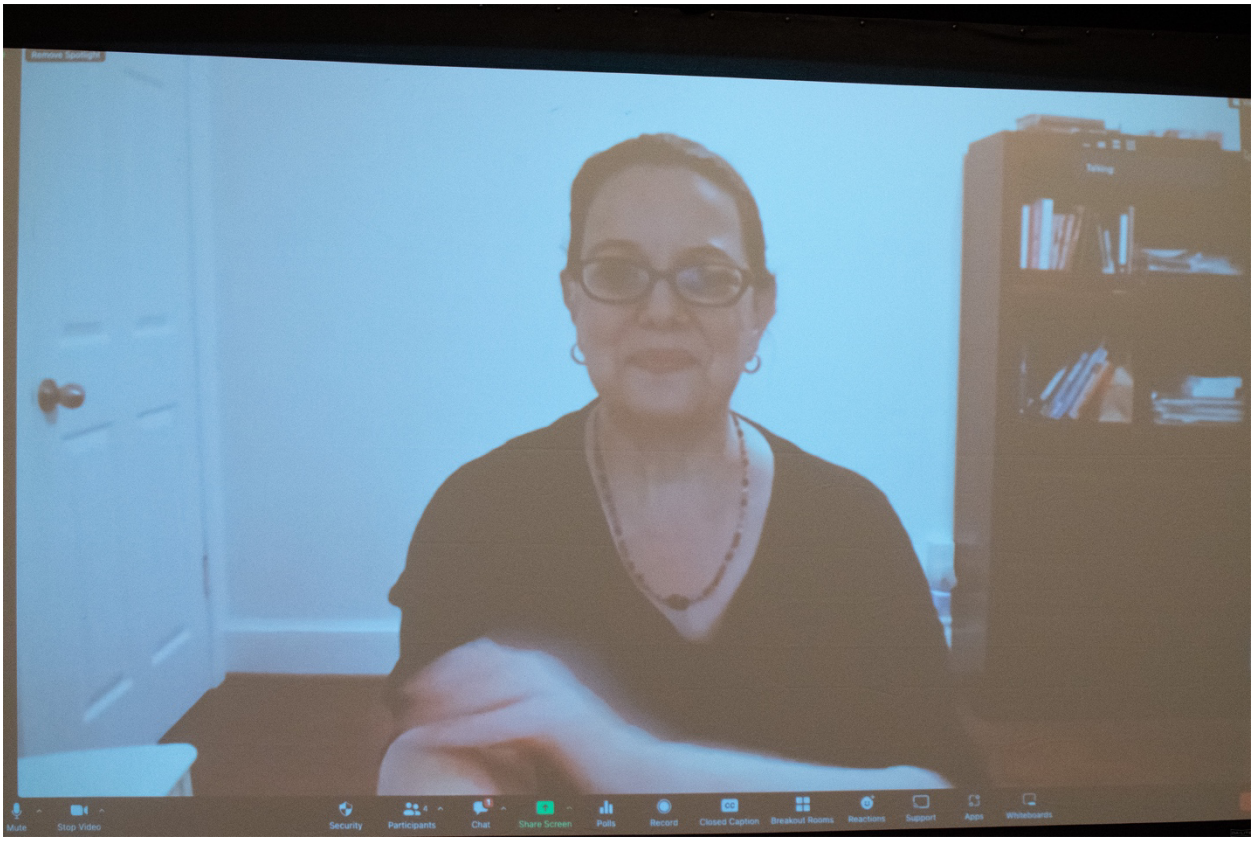
Keynote Address:

Thursday, June 2, 2022 – 12:45 PM – 1:45 PM

Keynote Address: Deaf Flourishing and Well-Being: Inclusion and Equity

Presenter: Teresa Blankmeyer Burke, Ph.D., Professor of Philosophy and Bioethics, Gallaudet University

Reporter: Steve Ortiz, M.L.S., University of Utah



Dr. Teresa Blankmeyer Burke began by giving a brief overview of the history of disability rights and how they have evolved over the years. She talked about how the concept of "normalcy" has changed and how society's attitudes towards people with disabilities have shifted towards a more inclusive approach.

Dr. Burke then went on to highlight the importance of accessibility in all aspects of life, including physical, technological, and social accessibility. She emphasized that accessibility should not just be seen as a burden, but as an opportunity to create a more inclusive society.

In addition, Dr. Burke also touched upon the topic of Universal Design, which is the concept of designing products and environments that are usable by as many people as possible,

regardless of age, ability, or disability. She discussed the benefits of Universal Design, including increased accessibility and independence for people with disabilities.

Finally, Dr. Burke concluded her presentation by emphasizing the need for continued advocacy and education to promote disability rights and accessibility. She encouraged the attendees to consider the perspectives of people with disabilities and to work towards creating a more inclusive society.

In conclusion, the session was very informative and provided a valuable insight into the challenges faced by people with disabilities. Overall, Dr. Burke emphasized the need for equity and justice in communication for deaf individuals, particularly in academia and policy-making circles. She stressed the importance of providing access to communication, including the necessary accommodations and qualified interpreters, for deaf individuals to flourish in their careers.

Thursday, June 2, 2022 – 2:00 PM – 3:15 PM

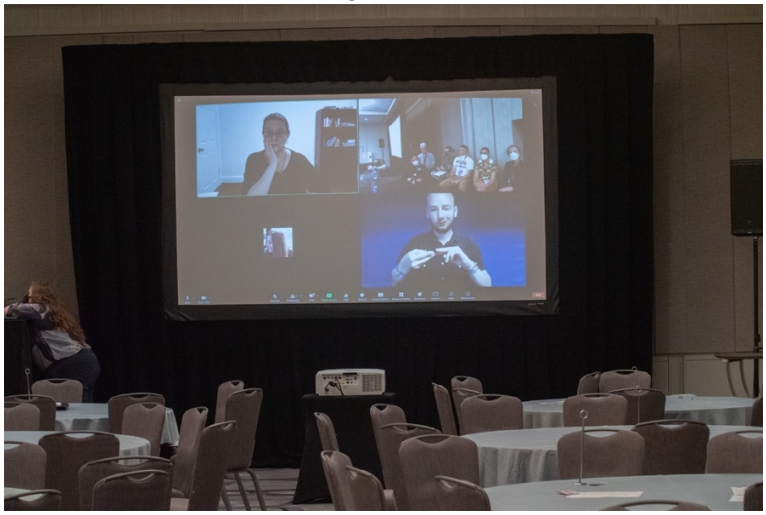
Best Practices for Engaging Members of the Deaf Community in Science Education Programs: An Informal Discussion with Teresa Blankmeyer Burke, Ph.D.

Presenter: Teresa Blankmeyer Burke, Ph.D., Professor of Philosophy and Bioethics, Gallaudet University

Come participate in an informal discussion with Dr. Burke about best practices for engaging members of the Deaf community and individuals with other "disabilities" in science education programs. This session provides time for extended discussion with Dr. Burke after her keynote address.

As a result of participating in this session, conference attendees will:

- gain an understanding of best practices for engaging with and including members of the Deaf community in science education programs



Engaging Different Audiences in the Importance of Genetics and Genomics

Presenters and Facilitator:
Maurice Godfrey, Ph.D., Professor, University of Nebraska Medical Center
Kara Flynn, Senior Director, Public Engagement, Communications, and Marketing, American Society of Human Genetics
Rochelle Cassells, Ph.D., Assistant Director for Research and Evaluation, Genetic Science Learning Center, University of Utah
Marnie Gelbart, Ph.D., Director of Programs, pgEd, Harvard University Medical School
Charlie Wray, Ph.D., Vice President for Education, The Jackson Laboratory

The American Society of Human Genetics has recently done several surveys to better understand the needs, limitations, and barriers to genetics and genomics in underserved populations. This session will highlight some of these findings and discuss how public programs that are part of the SciEd community can help increase awareness of the promise of the genetics and genomics revolution.

As a result of participating in this session, conference attendees will:

- learn about the public perception of genetics and genomics
- develop strategies to include diverse communities in the future promise of the genetics and genomics revolution

Participant List:
Hilleary Osheroff, Exploratorium
Kristina Yu, Exploratorium
Reyka Jayasinghe, Washington University
Marisa Pedulla, Montana Technological University
Stephen Koury, University at Buffalo
Abbey Thompson, Stanford University
David Micklos, Cold Spring Harbor Laboratory
Sharon Pepenella, Cold Spring Harbor Laboratory
Naomi Luban, Children's National Hospital
Evelyn Mantegani, American Society of Human Genetics
Charlie Wray, The Jackson Laboratory
Marnie Gelbart, Harvard University
Rochelle Cassells, University of Utah
Maurice Godfrey, University of Nebraska Medical Center

Funding Opportunities from Federal Agencies

Presenters and Facilitator:
Robert Russell, Ph.D., Program Director, National Science Foundation
Christina Chhin, Ph.D., Program Officer-STEM Education, National Center for Education Research, Institute of Education Sciences, U.S. Department of Education
Tony Beck, Ph.D., Program Director, Science Education Partnership Award (SEPA), and Interactive Digital Media STEM SBIR/STTR, Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH
Facilitator: Bethany Hornbeck, President and CEO, Apis Creative

In this session, experienced program officers from NSF, NIGMS, and the Department of Education will each describe the opportunities their programs offer for STEM education funding and support. Presentations will be followed by a facilitated question and answer session. The officers will provide information, brochures, and websites that will describe how the attendees can peruse the programs that will be presented from these agencies.

As a result of participating in this session, conference attendees will:

- gain information about science education funding opportunities available through NSF, the U.S. Department of Education, and NIH

Participant List:
Jeb Owen, Washington State University
Thomas Boland, University of Texas at El Paso
Molly McAndrew, University of Kentucky
Dax Ovid, San Francisco State University
Christina Chhin, Institute of Education Sciences/US Dept of Education
Sarah Brasiel, U.S. Department of Education, NCSER
Lauren Bates, Cincinnati Children's Hospital
Gregory Gage, Backyard Brains
Amelia Lanier-Knarr, University of Nebraska at Omaha
Sarah Wojiski, The Jackson Laboratory
Lisa White, University of California, Berkeley

Jan Straley, University of Alaska Southeast
Ingrid V. Rodriguez Rivera, Center for Community Outreach for Health Across the Lifespan
Jeanne Chowning, Fred Hutchinson Cancer Research Center
Ren Rountree, Medical University of South Carolina
Peter Faletra, New Hampshire Academy of Science

Conceptualizing and Evaluating Partnerships: Invitation to Discuss and Revise Tools

Presenters:

Michelle Phillip, Ph.D., Senior Researcher and Founder, Phillips & Associates

Lindley McDavid, Ph.D., Senior Evaluation and Research Associate, Purdue University

Loran Carleton Parker, Ph.D., Associate Director, Principal Scholar, Evaluation and Learning Research Center, Purdue University

For projects with a Science Education Partnership Award, healthy collaborations are essential. There is an increasing focus in US education on partnerships as promising means for science education improvement, whether they be research-practice partnerships, scientist-teacher partnerships, school/university partnerships, informal-formal partnerships, or some other arrangement that can be construed to be an alliance in service of mutual goals. Yet we don't always consider how to conceptualize and design partnership early in our planning beyond what is most logistically feasible for partners. Nor do we often discuss how to evaluate the actual partnership aspect of a SEPA in action. What is the nature of the work of the partners? How do the partners work together and what supports or constrains their work? What is important and unique about a SEPA partnership? What outcomes can we or might we expect from a SEPA partnership?

In this session, we invite SEPA projects to share and discuss the conceptualization and evaluation of partnerships themselves. We will begin by briefly sharing highlights from a literature review on education partnerships and science education partnerships specifically, to contextualize the ensuing discussion of frameworks and tools used to guide the initiation, implementation, and evaluation of partnerships. We will draw on the Representing Partnership Practice framework and others, to characterize SEPA projects and explore the relative costs and benefits of three types of partnerships: Connective, Generative, and Transformative. We will also lead a companion discussion on the potential value of studying partnerships that have 'failed'—either in their efforts to launch, their ability to meet 39 their goals, or to complete the work. The evaluation of and lessons learned from SEPA projects that didn't evolve as expected could help inform the design and support of future investments.

As a result of participating in this session, conference attendees will:

- consider and shape potential future directions for partnership evaluation, drawing on Coburn & Penuel's (2016) outline of the types of studies that would benefit the field of research-practice partnerships that are relevant to SEPA partnerships:

- documentation of outcomes such as the growth in individual and partner capacities, including the capacity to scale innovation
- comparative studies that show how partnership design matters for different outcomes, and what the relative costs and benefits are for particular partnership designs
- targeted studies of strategies that go beyond identifying challenges to finding strategies that help partners address challenges studies of the larger political dimensions of partnerships that reveal the role does the SEPA project play in the political contexts of the partners and what strategies help partners address their needs.

Participant List:
Abha Verma, Xavier University of Louisiana
Georgia Hodges, University of Georgia
Shelley Stromholt, Aspect Research & Evaluation
Priya Mohabir, New York Hall of Science
Susan Getz, Miami University
Rebecca Rudd, University of Kentucky
Jamie Cornish, Montana State University
Karin Chang, University of Missouri-Kansas City
Scott Randol, Oregon Museum of Science and Industry
Melinda Gibbons, University of Tennessee, Knoxville
Brittany Swift, US AMRMC
Maribel Campos, COHeAL
Anja Scholze, The Tech
Linda Morell, University of California, Berkeley
Renee Bayer, Michigan State University
Julia McQuillan, University of Nebraska – Lincoln
Michelle Phillips, Exploratorium
Loran Carleton Parker, Purdue University
Lindley McDavid, Purdue University

Using Research Inside and Outside the Classroom to Increase Students' Interest in Science

Presenters:
Tony Ward, Ph.D., Professor and Chair, School of Public and Community Health Sciences, University of Montana
Derrick Scott, Ph.D., Dean, College of Natural and Health Sciences, Virginia State University
Robin Fuchs-Young, Ph.D., Professor of Molecular and Cellular Medicine, College of Medicine, and Director, Community Engagement Core, Texas A&M Center for Environmental Health Research
James Breeden, BBA., Management Information Systems, Operations Director, K-12 and Community Programs, Texas A&M University College of Medicine
Reporter: Dave Jones, Education Coordinator, School of Public and Community Health Sciences

Tony Ward:
Research Education on Air and Cardiovascular Health Program overview:

- Teaching students about indoor and outdoor air quality and facilitating research projects with their science teachers
- Network of schools throughout Alaska, Montana, New Zealand, Idaho and Hawaii
- REACH focus: indoor air pollution and its impact on health
- Four primary Aims: citizen science (inquiry-based curriculum modules and research experiences), science communication (research symposium/classroom presentations), student mentoring (student research portal), teacher professional development (webinars, summer teacher workshop)
- Overview of REACH equipment – Wynd PM2.5 sensors

Robin Fuchs-Young and James Breeden
MENTORS – model education networks to optimize rural science overview:

- Aims: engage a network of K12 teachers to enhance STEM instruction, provide authentic, field, research and service learning experiences for MS and HS students
- Summer educator fellowships, K12 summer institute, workshop
- Mentored classroom lessons and activities
- Field experiences
- School based health awareness and regional education program
- Summer research “lab rats”
- Shared evaluation data supporting value of program participation

Derick Scott:
Overview of SEPA project:

- 6^{th}-8^{th} grade focus to keep interest in science
- Track students year by year to see if they continue in science
- All minority women team

LaTia Scott:

- 3 components: engage students in science (hands-on research experience), teacher professional development (STEM teachers engage students in summer, PD days with research faculty)
- Residential program – 2 weeks in summer for middle school students
- Teachers go on to implement lessons during the academic year
- Scientific communities engage throughout the year
- Partner with wastewater management and landfill to educate students

Whole group discussion:

- What are some student research strategies that have been successful?

Ben: Southern Illinois program – lots of ups and downs with Covid, but success found with field based projects with middle school students, grouping students with teachers, with facilitated research experience. Blend of student-developed learning with mentored learning experience. Also introduction to possible tools and provide blocks of time to work on research projects.

Aaron: Coordination with local education nonprofit placing students into research internships. Students were losing time on the front end building technical competency, so a training program was developed to develop basic laboratory training.

Michelle: Geared toward undergraduate students, but another program at her institution (Bridges program) holds a 2 week boot camp for students going over basic laboratory skills.

Rural Alaska project: Students are unprepared to ask research questions in the beginning, so the mentors take students out to show them different types of environmental research techniques to elicit ideas. Planning next project at the conclusion of their experience.

- What are some challenges you have encountered with student research programs? What are some solutions you have used to address the challenges?

Funding for student stipends. James: written as line item in their SEPA grant as well as additional funding sources.

Research method: Sudents struggle generating research questions and following the research method. LaTia – day activities during summer camp that expose them to science practices (isolating DNA from strawberry, for instance). Beginner activity to introduce the concept and then build upon / practical research project.

If you can teach it to someone else, you can conceptualize it better yourself. Lecture, “doing” experiment, flip-grid video

Watch one, do one, teach one. Supervised portion sometimes done more than once. The ability to execute at least one multi-step technique by themselves is the end goal.

Team-based and project-based groups working side by side with an educator.

Whole class research projects first, then break in small groups.

Nature of Science.

- How do you engage community members and stakeholders in student research?
- What does the future of student research look like?

Participant List:
Michelle Borrero, University of Puerto Rico-Rio
Kevin D. Phelan, University of Arkansas
Karen Yanowitz, Arkansas State University
Aaron Kyle, Columbia University
Ben Greenfield, University of Southern Maine
Anjan Nan, University of Maryland Eastern Shore
Viviana Vigil, California State University, Monterey Bay
Josefina Tinajero, The University of Texas at El Paso
Paul Denton, University of Nebraska at Omaha
Abha Verma, Xavier University of Louisiana
Alyson Michael, New Hampshire Academy of Science
Michelle Johnson, University of Alabama at Birmingham
Ellen Chenoweth, University of Alaska Southeast
Joel Acevedo, Sharp Focus
Elizabeth Parker, University of Maryland, Baltimore
Julia Miller, Children's National Hospital
Phuong Luong, San Francisco State University
Nathan Vanderford, University of Kentucky
Ido Davidesco, University of Connecticut
David Jones, University of Montana
Anna Kiley, University of Montana
Chad Carrig, University of Maryland Eastern Shore

Themed Session

Thursday, June 2, 2022 – 2:00 PM – 3:15 PM

Themed Session: Teacher Professional Development

Moderator:
Carmela Amato-Wierda, Associate Professor of Materials Science, University of New Hampshire
Presenters:
Kathleen Hill, Ph.D., CSATS Director and Associate Professor of Science Education, Pennsylvania State University Main Campus
Tiffany Lewis, MEd., STEM Education Specialist, Center for Science and the Schools, Pennsylvania State University
Amber Cesare, MEd., STEM Education Specialist, Center for Science and the Schools, Pennsylvania State University
Carmela Amato-Wierda, Ph.D., PI, NH CREATES the Future, University of New Hampshire
Amy Booth, MEd., NH CREATES Project Director, University of New Hampshire
Alison Allen, MEd., Project Evaluator, Rockman et al
Jane E. Disney, Ph.D., Associate Professor of Environmental Health and SEPA PI, MDI Biological Laboratory
Kate Buckman, Ph.D., Research Scientist and SEPA coordinator, Dartmouth College
Sarah Hall, Ph.D., Professor of Earth Science, College of the Atlantic
Isidora Muñoz, Human Ecology Student, College of the Atlantic
Anna Farrell, Digital Communications Specialist, MDI Biological Laboratory
Abby Roche, Graduate Student in Environmental Communication, University of Maine
Hannah Lust, Ph.D., Assistant Director of Research Training and SEPA Program Coordinator, MDI Biological Laboratory
Karen Bieluch, Ph.D., Practice-based Learning Specialist and SEPA evaluator, Dartmouth College
Bill Zoellick, Emeritus Educator and SEPA evaluator, Schoodic Institute
Bruce Stanton, Ph.D., Professor of Microbiology and Immunology, Dartmouth Geisel School of Medicine
Atom Lesiak, Ph.D., Director of Education Outreach Genome Sciences, University of Washington
Joan Griswold, MIT., Continuing Education Specialist, Genome Sciences Education Outreach, University of Washington
Reporter: Erica Gerace, The Jackson Laboratory

In this session, moderated by Carmela Amato-Wierda, we heard from four different programs and research groups focused on teacher professional development.

- **Shape Matters with Kathleen Hill, Tiffany Lewis, and Amber Cesare**

Over the last year, Shape Matters engaged eight teachers in a hybrid teacher professional development (PD) program with three strands: lab-based, physical modeling, and computer modeling. In the first week of the program, the teachers engaged with modeling as a pedagogical practice using Toobers to model protein structure based on amino acid sequence and used JUDE to conduct computational modeling. In the second week of the program, the teachers partnered with a scientist and created a molecular story based on the research of their partner scientist. Pre- and post-PD evaluations (n=8) indicated notable improvements in teacher understanding of 3D modeling, using JUDE for computational modeling, and telling a molecular story. Interestingly, the teachers' understanding of models as non-exact replicas decreased. Four teachers who completed the PD implemented the program in their classrooms this year. Overall, this year's implementation indicated that a teachers need a good amount of support during the process and that in the end, students struggled to explain the chemistry of the structure-function relationship.

- **The NH CREATES Teachers Institute with Carmela Amato-Wierda, Amy Booth, and Alison Allen**

The NH **C**ollaborative for **R**egenerative Medicine **E**ducation **A**nd **T**raining for **E**ngineers and **S**cientists of the Future has three aims: to train teachers in regenerative medicine and biotechnology, to informally educate youth in a summer program, and to build a ecosystem/pipeline for careers in regenerative medicine and biotechnology. The program engages K-12 schools, institutions of higher education (NH-INBRE) and University of New Hampshire (UNH), and industry (Advanced Regenerative Manufacturing Institute) in New Hampshire. At a two-week PD program at UNH, teachers experience a live learning lab where they explore problem-based learning and regenerative medicine. Teachers then develop a project and test it with regenerative medicine camp students and receive live feedback. During the following school year, teachers implement their project and continue to engage with NH CREATES through bimonthly meetings to ensure needs are met. Teachers have the option to return and help with the regenerative medicine camp the following summer. Pre- and post-PD evaluations (n=4) indicated that there is improved knowledge of regenerative medicine and biotechnology as well as increased knowledge of regenerative medicine and biotechnology fields.

- **The Citizen Science Project, "All About Arsenic" with Jane Disney**

This collaborative project between MDI Biological Laboratory and Dartmouth College aims to improve data literacy and public health through the scientific process. In this project, teachers and students across Maine learn about potentially dangerous levels of naturally occurring arsenic in well water and how arsenic is linked to several health risks. In the program, teachers train with scientists at DataLit Institute workshops, implement the citizen science project with their classes by having students collect well water and then sending the water for testing, the students then create graphs and maps of the data, and finally classes engage in community outreach. All About Arsenic needed to pivot for the COVID-19 pandemic and did so with

success and published their adaptations in the *Journal of STEM Outreach*. They created online training for teachers with breakout rooms for teacher-scientist partnerships, provided office hours via Zoom with weekly themes to support teachers, and shifted community outreach to advocacy for arsenic action. Lastly, a pilot of household surveys indicated that the more family interaction that takes place, the more arsenic action is taken, supporting the idea of intergenerational learning.

- **Strategies for Expanding Your Teacher Network with Atom Lesiak**

The Genome Sciences Education Outreach at the University of Washington in Seattle has developed and tested curricula on diabetes. The next step is to determine how to best disseminate the materials and reach more teachers. The team collaborated with a master's student (in communication) who identified that they have a very low presence on social media and little budget for marketing. While money spent on PD is a lot greater than the money needed for targeted advertisements, both have value in the dissemination of curriculum and should be used synergistically. Because advertisements directly through NSTA or NABT are very expensive, it is possible to bypass these organizations and directly target state social media pages. This, combined with making catchy advertisements for social media has resulted in huge growth and impact. Spending $35 on a Facebook advertisement resulted in 585 users on their website in one day.

Friday, June 3, 2022 – 8:30 AM – 9:45 AM

Program Sustainment, Integrity and Continuity: Finding the Gaps

Presenters:
Debra Yourick, Ph.D., Director, Science Education and Fellowship Programs, Walter Reed Army Institute of Research
Holly Brown, Ph.D., National Academy of Sciences, Engineering and Medicine Fellow, Walter Reed Army Institute of Research
Laura Tenenbaum, Ph.D., ORISE Fellow, Walter Reed Army Institute of Research
Reporter: Alana Newell, Ph.D., Assistant Professor, Department of Education, Innovation & Technology, Baylor College of Medicine

In this 75-minute session, discussion topics included the challenges faced in sustaining and retaining key elements of SEPA programs along with possible means to address those challenges and critical concerns. Meeting attendees were asked to bring forward successes in program sustainment and, if still in development, each attendee's plan for sustainment. Dr. Debra Yourick's program staff provided some tools from their own sustained program called Gains in the Education of Mathematics and Science or GEMS, now part of a suite of programs offered through the US Army Educational Outreach Program, which provides full GEMS program funding for rising 5th to rising 12th graders in an informal, near-peer mentor-led, one-week program of experiential learning across STEM fields; programs are held at more than a dozen Army research institutions across the US. Provided for GEMS via a QR code were lesson fidelity checklists, and near-peer mentor training program details plus its fidelity checklists; more information was provided through a short oral presentation. Attendees noted challenges with funding, needing to volunteer for their work, finding appropriate staff to run programs, especially from underserved groups so as to best serve underserved participants, and allowances for staff of an organization to participate in these activities along with managing outreach to recruit additional supporting staff (e.g., faculty) and finding appropriate participants. Very importantly, attendees noted that not all elements of a successful program need to be sustained but rather defining what is most important in the success and finding sustainment for utilizing it and perhaps even sustaining it without funding. What are some successes? – being able to compensate participants, maintaining outreach to STEM industries and new partners for funding and goods, showcasing successes to parents or a community that leads to stakeholder support (administrators, deans, commanders, politicians and staffers), creating scholarships, establishing courses within a university for service learning, providing course credit for participants at the college level, and finding strong partnerships and powerful allies. Some attendees noted that programs should do effective marketing to their institutions that define benefits to their university or institution for continuing a program. Finally, several attendees suggested that the SEPA FOA should offer sustainability awards for additional years of successful/efficacious program support.

Gamification to Engage Youth with Ecological Networks and Health Implications

Presenter: Nik Stevenson, MS, STEM Professional Development Educator and Programs Coordinator, University of Nebraska at Omaha STEM TRAIL Center

The session will actively engage participants in several dimensions of gamification of health-related science topics. First participants will play a hands-on, minds-on activity. The activity was adapted from a "tumbling tower" game for youth to explore a model of a food web system with various destabilizations (e.g. fire or hunter). Our Worlds of Connections SEPA project is focused on systems, systems models, and network science, therefore the goal of the activity is in part to learn basic network science concepts that are useful for understanding many complex systems. Second, participants will collectively learn about and use the basic principles of gamification of health science concepts as a tool for youth 43 exploration and discovery. In small groups, participants will extend the existing tumbling tower game to a new perturbation of the food web—e.g. insecticide or parasite to practice creating a fun game that allows youth to engage and discover topics. In partnership with the NE STEM 4U team, we have developed several games primarily for informal settings, but teachers also see value in the activities for formal classrooms. Participants will reflect upon how they could make games to engage youth in their SEPA projects.

As a result of participating in this session, conference attendees will:

- have a deeper understanding of the potential value—and challenges—involved in "gamification" of core concepts
- see how a Next Generation Science Standards (NGSS) cross-cutting concept such as "systems and system models" can be incorporated in a fun, interactive game designed primarily for learning in an informal setting
- have the beginning elements of a potential game to help youth learn about participants' SEPA topics.

Participant List:
Heather Ryan, 3D Molecular Design
Jacqueline Genovesi, Drexel University
Cecilia Nguyen, Oregon Museum of Science and Industry
Abha Verma, Xavier University
Paul Denton, University of Nebraska at Omaha
James Wong, The Tech
William Folk, University of Missouri
Julia McQuillan, University of Nebraska, Lincoln
Janice Montero, Boys & Girls Club Puerto Rico
Joel Acevedo, Sharp Focus
Karin Chang, University of Missouri
Daniel Fernandez, California State University, Monterey Bay
Michelle Phillips, Phillips & Associates
Laycca Umer, New York Hall of Science

Teaching the Genome Generation: Incorporating Data Analysis and Quantitative Skills into Biology Classrooms through Bioinformatics

Presenters and Facilitators:
Sarah Wojiski, Ph.D., Director of Education, The Jackson Laboratory
Erica Gerace, Ph.D., Genomics Education Fellow, The Jackson Laboratory
Christina Vallianatos, Ph.D., Genomics Education and Outreach Program Manager, The Jackson Laboratory
Charlie Wray, Ph.D., Vice President of Education, The Jackson Laboratory
Reporter: Charlie Wray, Ph.D., Vice President of Education, The Jackson Laboratory

This quantitative skills/bioinformatics session began with an overview of the Teaching the Genome Generation (TtGG) professional development program. Participants then shared strategies used to incorporate math and data analysis skills across curricula. The group agreed that bioinformatics remains daunting for some teachers, but that consistent, redundant touch points to bioinformatics resources will bring teachers back to these datasets. A demonstration of a new Basics of Cancer Genetics bioinformatics lesson followed. The new content introduced usage of cBioPortal, first with participants navigating without strict instructions into a pancreatic cancer dataset in cBioPortal, followed by a refined student lesson on the same data set. The content allows teachers and learners to navigate to an authentic cancer study (dataset), find and view demographic (patient) data and investigate mutations across genes. A second narrative lesson was then introduced. The narrative lesson focused on cancer inheritance (germline variants) and is set in the near future when most patients have a full genomic sequence as part of the their electronic health record. The inheritance lesson also introduces a STEM career entry points, in the demonstrated instance of an oncologist seeing melanoma patients, both young and old. The learning goals of the two new content lessons included: Germline variations are inherited, but somatic variations are not; Risk for cancer increases with age; Cancer is a multifactorial disease with genetic & environmental influences; Not all variations contribute to cancer progression; There are significant disparities with cancer.

Participant List:
Charlie Wray, The Jackson Laboratory
Kevin D. Phelan, University of Arkansas
Ralph Imondi, Coastal Marine
Dana Haine, University of North Carolina at Chapel Hill
Hilleary Osheroff, Exploratorium
Laird Kuhn, Florida International University
Jessica Siltberg-liberles, Florida International University
Melinda Gibbons, University of Tennessee, Knoxville
Stephen Koury, University at Buffalo
Reyka Jayasinghe, Washington University
Louisa Stark, University of Utah
Renee Bayer, Michigan State University
Amber Cesare, Pennsylvania State University
Tiffany Lewis, Pennsylvania State University
Kathy Hill, Pennsylvania State University
Rebecca Mandt, NIH-NIAID
David Petering, University of Wisconsin-Milwaukee
Kelly Salmon, New Hampshire Academy of Science
Kristin Bass, Rockman Et Al Cooperative
Marisa Pedulla, Montana Technological University
Carmela Amato-Wierda, University of New Hampshire
Linda Moreil, University of California, Berkeley

Gwendolyn Stovall, University of Texas at Austin

David Micklos, Cold Spring Harbor Laboratory

Inclusive Measurement of Trainee Demographics within Biomedical Research Training Programs

Presenters:

Sunita Chaudhary, Ph.D., Associate Professor of Surgery, and Director of Research Education, Robert Wood Johnson Medical School, Rutgers Cancer Institute of New Jersey

Karen Burns White, MS., Deputy Associate Director, Initiative to Eliminate Cancer Disparities, DanaFarber/Harvard Cancer Center

Linda Kennedy, MEd., Associate Director for Strategic Initiatives and Global Oncology, Dartmouth Cancer Center

Megan Mekinda, Ph.D., Program Manager, University of Chicago

Lisa Marriott, Ph.D., Associate Professor, Oregon Health & Science University

Nathan Vanderford, Ph.D., Assistant Professor, University of Kentucky

This session builds on a collaborative work from the NCI YES programs which explored programmatic approaches for measuring demographics among our programs. We identified large variability in how programs were measuring demographics when assessed by survey. Programs cited wanting guidance in how to measure demographics inclusively. This session will offer approaches for programs and use an interactive jamboard approach to surface questions, concerns, and considerations within demographic measurement.

As a result of participating in this session, conference attendees will:

- identify approaches for measuring demographics across gender, racial/ethnic, disability, and disadvantaged populations
- label emotions and concerns related to demographics measurement that will support development of frequently asked questions
- build a community of researchers interested in approaches for measuring inclusive demographics of biomedical trainees and considerations for reporting outcomes

Themed Session:

Friday, June 3, 2022 – 8:30 AM – 9:45 AM

Themed Session: Programs for Elementary Students and Teachers

Moderator:
Virginia Stage, Ph.D., RDN, Associate Professor of Nutrition Science, College of Allied Health Sciences, East Carolina University
Presenters:
Archana V. Hegde, Ph.D., BK, Professor, East Carolina University
Virginia C. Stage, Ph.D., RDN, More PEAS Please! PI, Associate Professor of Nutrition Science, East Carolina University
Jocelyn Dixon, BS., More PEAS Please! Project Coordinator, Nutrition Science, East Carolina University
Matt Queen, Ph.D., Assistant Professor of Chemistry, Montant State University Billings
Amelia Lanier Knarr, Ph.D., Instructor, Outreach Coordinator, University of Nebraska at Omaha
Facilitators
Lauren Bates, Program Director for Community Research Advocates, We Engage 4 Health
Susan Gertz, MS., WE4H Creative Development, Miami University
Reporter: Jocelyn Dixon, East Carolina University

In this session, four individuals presented on their work with elementary populations. The first speaker, Archana Hegde presented on implementing Professional Learning Communities (PLC) in early childhood settings. Hegde works on the More PEAS Please grant, a professional development program for Head Start preschool Teachers in North Carolina designed to improve science knowledge, language and dietary quality of preschool children. Hegde presented on the benefits of PLCs such as giving teachers the opportunity to rethink their practices and learn new ways of teaching. In the PEAS program, teachers' PLCs are supported by trainings and guidebooks developed by the team using research best practices. Hegde discussed the PLC challenges due to COVID such as the need to adapt to teachers and chaos in centers. The result of these changes led to adapting PLCs to be virtual and guided by Hegde, rather than teacher guided.

The second speaker, Matt Queen works on the Authentic Community Engagement in Science (ACES) grant. Queen described the aim of the grant as improving attitudes towards STEM learning and future careers in biomedical sciences among native/rural communities. The program puts on chemistry theatrical shows to teach children about chemical and physical change. In one year, the program reached 13,500 students in Montana. The next step for the grant is evaluation of the program to determine if the show is truly teaching chemistry. Queen discussed the addition of workshops, educational videos and moving beyond Billings, Montana to other cities.

The third speaker, Amelia Knarr, presented work on the grant Biomechanics to Develop Interdisciplinary Experiences in Early Elementary Science (BODIEES). The program teaches young children how to use their bodies to make sense of the world by using play to explore and learn about STEM learning. Their BODYMODELS project uses biomechanics to increase interest in STEM in 3-6th grade. The program has a cohort of 60 teachers who participate in a 2-week professional development followed by a 1-week student academy. Results of the program revealed an improvement in STEM efficacy and inquiry skills; however, there was no change in biomechanics content knowledge. Additional evaluation in children is needed to determine if the program leads to content knowledge gain. Going forward, the program will be establishing a partnership with the Omaha Children's Museum to create informal science learning experiences in a sport/agility travelling exhibit.

The last speaker, Lauren Bates, from the Climate Club, discussed their program's engagement of 60-80 children grades K-12 in Norwood, OH in health research programming. The goals of the climate club are to help children see the impact of local environment on health and help children view themselves as scientists throught the use of graphics to engage in complex science concepts. The program co-authors graphics with the community to fill a health science need. Graphics are intended to be read aloud and end with 3 facts about the health issues and 3 action statements. The Climate Club helps children learn how to gather data and analyze it to share with the community. Children also engage in reading health graphics designed by Bates and her colleague Susan Gertz that describe common health issues and encourage community engagement in health prevention. At the end of Climate Club, 95% of children who attended felt that what they do matters.

Participant List:
Archana Hedge, East Carolina University
Viriginia Stage, East Carolina University
Jacelyn Dixon, East Carolina University
Jasmina Mesic, Northern Illinois University
Roger Sloboda, Dartmouth College
Lauren Bates, Cincinnati Children's Hospital Medical Center
Marie Barnard, University of Mississippi
Shelley Stromholt, Aspect Research & Evaluation
Patrice Saab, University of Miami
Melani Duffrin, Northern Illinois University
Jamie Cornish, Montana State University
Manuella Yassa, University of California, Irvine
Teresa MacDonald, University of Kansas
Cathy Ringstaff, WestEd
Anna Kiley, University of Montana
Dave Jones, University of Montana
Josefina Tinajero, The University of Texas at El Paso
Chad Carrig, University of Maryland Eastern Shore
Amelia Lanier-Knarr, University of Nebraska at Omaha
Naomi Luban, Children's National Hospital

Friday, June 3, 2022 – 10:00 AM – 11:15 AM

Explore the National Science Teaching Association's (NSTA) High Quality Lesson Plans for Implementing the Next Generation Science Standards (NGSS)

Facilitators:

Erika Shugart, Ph.D., Executive Director, National Science Teaching Association

Wendy Binder, MS., Program Director, STEM Professional Learning, National Science Teaching Association

Reporter: Erika Shugart, Ph.D., Executive Director, National Science Teaching Association

This session focused on "Sensemaking" which is the National Science Teaching Association's (NSTA's) new vision of science classroom teaching and learning based on the *K-12 Framework for Science Education*. Session participants discussed why it is important for science educators to help their students prepare for a world in which they competencies in STEM in order to prepare them for citizenship. The group then watched an example of students using a sensemaking approach in a classroom. Sensemaking leverages the assets of experience, culture, curiosities and interests, which each learner bring. It is grounded in neuroscience, leveraging brain networks for knowledge (the what), skills (the how), and enthusiasm (the why).

When designing for sensemaking students:

- experience a phenomenon
- engage in science and engineering practices and
- share ideas to
- develop or apply the science ideas and crosscutting concepts needed to explain how or why the phenomenon occurs.

This is the opposite of the traditional approach with the teacher as the expert imparting information to a subset of receptive students.

The group then had an in-depth conversation about the merits of this approach and appropriate phenomena. The session ended with NSTA sharing additional resources, including:

- a free asynchronous professional learning on sensemaking – https://my.nsta.org/resource/124468
- example of sensemaking lessons and units (called Daily Dos) - https://www.nsta.org/daily-do

NSTA also partners with groups to codevelop lesson plans, advertise resources and provide professional learning.

DNA Barcoding in a Pandemic: Hands-on Techniques for Remote Learning

Presenter: Sharon Pepenella, Ph.D., Manager, Student and Public Research, Cold Spring Harbor Laboratory, DNA Learning Center

Citizen DNA Barcode Network (CDBN) equips visitors to science and nature centers to use DNA barcoding to inventory ant, beetle, and mosquito species as part of national campaigns. The COVID-19 pandemic limited participation in onsite CDBN events at collaborating facilities, as many were forced to close to the public. In response, the DNA Learning Center (DNALC) adapted our school-based DNA barcoding infrastructure to home-based citizen science, where nature enthusiasts received kits to extract and amplify specimen DNA. In this session, participants will perform simple, at-home versions of our Chelex DNA isolation and amplification procedures to help identify organisms collected during CDBN bioblitz events, demonstrating that authentic, hands-on scientific experiences can be conducted nearly anywhere.

Complementing this activity, participants will learn how DNA barcode sequences can identify a species using a LEGO® "sequencer" developed by collaborators at the Earlham Institute in Norwich, UK. This sequencer reads colored LEGO® blocks—representing DNA barcode sequences—which can be identified in live time using bioinformatics, making the concept accessible to a broad audience.

A follow-up virtual bioinformatics workshop will allow participants to identify their samples using online tools developed by the DNALC.

As a result of participating in this session, conference attendees will:

- isolate and amplify DNA from invertebrates using a rapid method that can be performed at home 48
- learn how DNA sequence can be used to identify a species using well known construction toys as a teaching tool for a challenging concept
- identify their specimen during follow-up virtual bioinformatics training
- observe how hands-on science experiences can be made accessible for at-home learning

STEM Storytelling Bootcamp: Meet Your Project Coach

Presenters: Leah Clapman, BA., Executive Director, PBS NewsHour
Mohanned Pasha, Youth Media Producer, PBS NewsHour Student Reporting Labs
Reporter: John Fraser, Ph.D., President, Knology

The session introduced participants to https://www.story-maker.org/ a platform for educators and students to build media through projects, lesson plans, storytelling resources, and tutorials. It highlighted the power of media literacy as central to the health STEM disciplines as a scaffold for clarity of thought, and ways to bring medical career or health sciences to public audiences. The presentation also provided summary reports on evaluation that demonstrated the impact of media production as a way to support the advancement of STEM identities and self-efficacy as a STEM learner, irrespective of the disciplinary topic.

Participants worked individually to create a two-page "story pitch sheet" to develop a compelling 2-minute media story for their current SEPA project or the work that students may be doing through a SEPA project. The pitch sheet covered how to describe a compelling story in one sentence, a one paragraph summary of that story, and the characters and images that would help support the visual storytelling. The final portion of the pitch sheet assessed the newsworthiness of that story, by focusing on "why:"

- who cares about the story
- who else would care
- what people would learn
- how it might be surprising or novel
- the urgency of this particular story

Two tables of six people then discussed their pitch, with each table facilitated by one of the Story-maker team members. These mentors helped delve into the challenges of youth media involving clarity of question, use and access to technology and tools within the capacity of youth, recommendations for software like Adobe Premier (a currently useful software) transcription softwares for story construction, and permissions and mentoring for interacting with career professionals. Part of the discussion explained technical terms such as A Roll (interviews or direct phenomena) and B Roll (context). There were discussions of how to create stories that are interviewer-present in the story and other techniques to support authenticity of the youth voice.

The program resulted in active discussion, high attention at the table, with good critical thinking about how to use these techniques to build efficacy and skills for the youth in their SEPA programs. A common question related to the time investment for students, but most felt the platform and techniques would be useful for advancing the work of their projects. One participant claimed, "I LOVE this SEPA because it's so useful to all the other SEPAs."

Authentic Research Experiences for Students and Teachers in Faculty Labs and Citizen Science

Facilitators:
Robin Fuchs-Young, Ph.D., Professor, College of Medicine, Texas A&M University
James Breeden, BBA, K-12 Outreach Program, Operations Manager, College of Medicine, Texas A&M University
Derrick Scott, Ph.D., Dean, college of Natural and Health Sciences, Virginia State University
Tony Ward, Ph.D., Professor and Chair, School of Public and Community Health Sciences, University of Montana
Reporter: Anna Kiley, University of Montana

Dave Jones – overview of REACH Program

- REACH origins
- Initial goal of getting students to think scientifically – incorporate science research
- Air quality monitoring – discussion of equipment, research design process

Robin Fuchs-Young and James Breeden

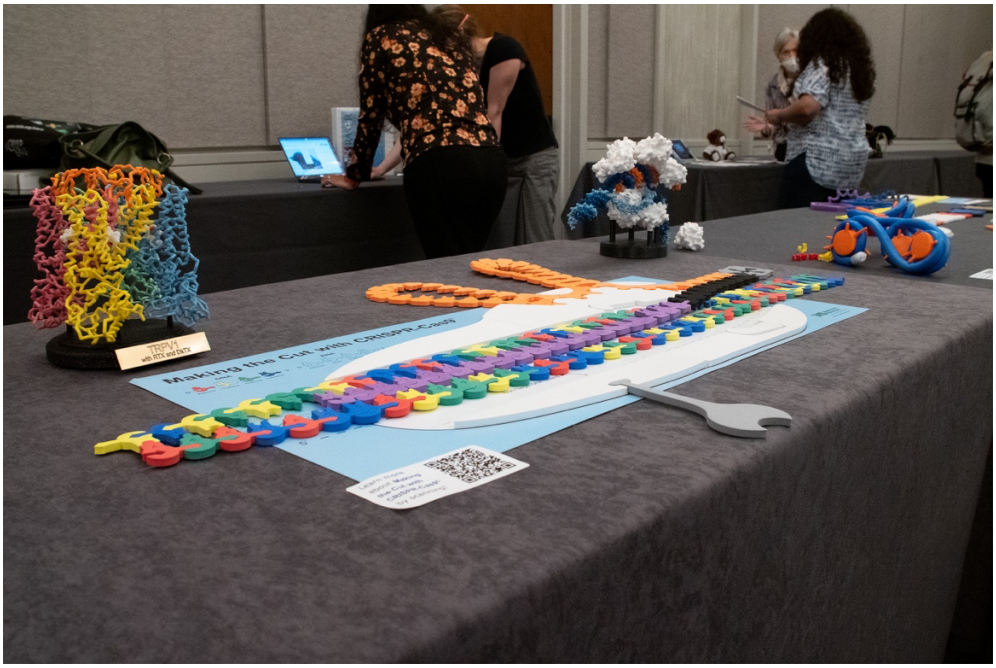
- MENTORS program overview
- Economically disadvantaged students; residential program on campus
- 5 weeks of working in a lab with various faculty members and graduate student mentors
- Pre/post re: self-efficacy

Whole group discussion:

- Question posed: Do you work with the same faculty year over year?
    - James – yes, many are from the same department, relationships formed over time
- Question posed: What is the educational theory behind the project?
    - Discussion followed
- Question posed: Is human subjects research design included?
    - Discussion followed re IRB components; students do not touch any component that is human subjects related. REACH does not collect the air quality data that students generate.
- Question posed: What constitutes 'citizen science' if scientists are involved?
    - Lengthy discussion followed. James provided examples of citizen science with his organization. Discussion re: "true" definition of citizen science vs. getting citizens involved in science.
- Question posed: Is there a concern with teacher turnover?
    - Some programs have a dedicated core of teachers, some have high turnover.
- Question posed: How do you get faculty buy-in for return on investment of time?
    - Discussion followed re: finding the right faculty who are motivated by student learning. Sales pitch is critical.

Participant List:
Linda Morell, University of California, Berkeley
Elizabeth Parker, University of Maryland, Baltimore
Berri Jacque, Tufts University

Marisa Pedulla, Montana Technological University
Reyka Jayasinghe, Washington University
James Breeden, Texas A&M University
Robin Fuchs-young, Texas A & M University
Anna Kiley, University of Montana
David Jones, University of Montana
Paul Denton, University of Nebraska at Omaha



Curriculum “Lemonade Stands”

The Mystery of the Monkeyflower: Explore a Biology High School Curriculum through a Comic Book and Real-World Research

Presenter: Renee Bayer, MA., Principal Investigator, CREATE for STEM Institute, College of Education, Michigan State University

The Mystery of the Monkeyflower is a high school NGSS-aligned, project-based learning unit that has a unique twist - an embedded comic and authentic field science research that guides students to figure out how gene-environment interactions affect living organisms. Comics and field science research in the classroom are not entirely unique on their own, but we believe combining these two experiences embedded in a high school unit provides a novel learning experience for students. In this session, participants will explore and experience parts of the monkeyflower unit and discuss how these different parts combine to take students on a journey of science discovery of gene-environment interactions using a driving question flow-chart, comics and real-world plant science. After experiencing parts of the unit, we’ll discuss partnering with an evolutionary biologist to develop the unit and introducing STEM careers to broaden student participation. We will discuss successes and challenges from this first-year pilot in high school classrooms. There will be an open discussion for all participants to share experiences with using comics and or real-world research in curriculum.

More PEAS Please! Engaging Preschool Head Start Children in the Process of Science

Presenter: Jocelyn Dixon, BS., More PEAS Please! Project Coordinator, East Carolina University

The NIH SEPA-funded project, More Preschool Education in Applied Sciences (PEAS) Please!, has developed an innovative multi-component professional development program focused on teaching preschool educators how to design and guide effective, practice-based learning experiences that teach science and develop language within the context of healthy living. Resources include: (1) a 1.5-day workshop, (2) 6 on-demand learning modules (online and paper-based); (3) 16 white-board training videos; (4) a PEAS Teaching Guide featuring 16 Model Science Learning activities; and (5) a Supplemental Professional Learning Community guide. Materials can be downloaded for free from www.morepeasplease.org.

The Adaptive Immunity Kit and Making the Cut,.. with CRISPR

Presenters:

Tim Herman, Ph.D., Director, MSOE Center for BioMolecular Modeling, Milwaukee School of Engineering

Heather Ryan, CEO 3D Molecular Designs

We have developed two hands-on kits that model different aspects of CRISPR-based genome editing. The Adaptive Immunity Kit introduces students to CRISPR as an adaptive immunity system in bacteria. The Making the Cut Kit explores the molecular mechanism whereby CRISPR Cas9 is able to recognize a 20-nucleotide long sequence …. and make a double-stranded cut.

Blood Sugar Balance

Presenters:

Atom Lesiak, Ph.D., Director of Education Outreach, Genome Sciences, University of Washington

Joan Griswold, MIT., Continuing Education Specialist, Genome Sciences Education Outreach, University of Washington

The Blood Sugar Balance web-game was developed as an extension of the GEMNet curriculum in partnership with Blank Space. The game began as a hands-on modeling activity, that no longer worked during the switch to online education. As we adapted the model activity, elements of volitional decision making was added to enhance learner engagement, eventually leading to full-on game development. In this game, players score points for maintaining a healthy blood glucose level, while making food and exercise choices. They must play the role of the pancreas releasing hormones (or use medical insulin if playing as a person with Type 2 Diabetes). It can be used for formal or informal education. Gameplay allows for acquisition of game data that

allows for players to reflect upon the interplay of diabetic status, life choices, and access to resources.

Discover SCIENCE with Dr. Bear

Presenters:
Naomi Luban MD., PI of Dr. Bear, Children's National Hospital
Rachel Smilow, MA., Program Lead, Children's National Hospital
Julia Miller, MS., Program Coordinator, Children's National Hospital
Annika Hvide, MA., Program Assistant, Children's National Hospital

Discover SCIENCE (a Scientific Creative Innovative Engaging New Cool Experience) with Dr. Bear engages children and families in the out-of-school time setting of community libraries and afterschool programs in hands-on, inquiry-based art, and science programs that help to improve the physical, cognitive, and social development of children and their families. SCIENCE explores and combines STEM with a focus on 51 health issues of concern to the community such as asthma, stress, cardiometabolic risk, sleep, genetics and genetic diseases, and injury prevention. In this session we will share the complete activity guidebook and related website links and animated videos.

The Scientist Spotlights Initiative: Teaching Science Content through Curricular Supplements that Feature Counter-stereotypical Scientists and Engage Students with Written Reflections

Presenters:
Dax Ovid, Ph.D., Postdoctoral Fellow, San Francisco State University
Lucy Luong, SEPAL Administrator, San Francisco State University
Kimberly Tanner, Professor, San Francisco State University, Co-PI
Jeff Schinske, Professor, Foothill College, Co-PI

The Scientist Spotlights Initiative aims to empower science instructors with inclusive science curricula as a means for students of all backgrounds to envision themselves in science. The Scientist Spotlight assignment links students to resources about counter-stereotypical scientists and their research as an alternative method of delivering course content. Studies have shown that Scientist Spotlight assignments enhance students' relatability to scientists and improves science learning. Visit us to learn more about Scientists Spotlights, search over 400 student-authored assignments on the newly launched website, and discover ways to integrate Scientist Spotlights in your educational context.

Biotinkering Activity Resources for Families, Educators, and Institutions

Presenters:
Anja Scholze, Ph.D., Program Director, Biology + Design, The Tech Interactive
James Wong, BA., Content Specialist, The Tech Interactive
Caitlin Nealon, Ph.D., Life Sciences Experience Developer, The Tech Interactive
Abbey Thompson, Ph.D., Director, Educational Outreach, Stanford University

Since 2016, we have been working to establish various systems and concepts that allow kids to explore, tinker, create, and problem solve with biology. Come explore the materials that we have created so far to help others do biotinkering in a variety of venues! These resources can help you replicate our biotinkering activities or be used as inspiration to design your own versions that leverage our foundational R&D. We will have finalized resources for at-home activities and classroom lesson plans as well as in-progress resources for facilitated science center experiences. Let's get biotinkering!

Frontiers in Cancer Research

Presenters:
Regina Wu, BA., Program Manager, Fred Hutchison Cancer Center
Jeanne Chowning, Ph.D., Senior Director
Kristen Bergsman, Ph.D., Science Education, Fred Hutchison Cancer Center Curriculum Design Project Lead, Fred Hutchison Cancer Center

Frontiers in Cancer Research, a program developed by the Science Education Partnership at Fred Hutchinson Cancer Research Center, increases understanding of molecular and cellular biology and how scientific practices such as argumentation and sensemaking are used in research.

We will be sharing the two cancer-focused units that we developed in partnership with teachers and scientists. These materials are NGSS-aligned and highlight the research at Fred Hutch including immunotherapy and stem cell transplantation. The Intro to Cancer: Leukemia and Hina's Story Unit investigates the case of Hina Marsey, an eleven-year-old girl, who is diagnosed with leukemia. By exploring Hina's case, students develop conceptual models on cell growth/development, cancer, and cancer treatments. In the more advanced Immunotherapy Unit, students are introduced to a case study featuring Kristin K., a woman diagnosed with a treatment-resistant form of leukemia and for whom a stem cell donor match could not be found. This unit focuses on the topic of cancer, leukemia, and immunotherapies and includes an in vitro CRISPR lab activity.

Friday, June 3, 2022 – 11:30 AM – 12:00 PM

Town Hall Discussion

Presenter: Tony Beck, Ph.D., Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH

Reporter: Julia McQuillan, Ph.D., Willa Cather Professor of Sociology, University of Nebraska, Linco

Dr. Beck welcomed the SEPA Classes of 2021 and 2022 to their first in-person meeting.

Dr. Beck expressed that he was grateful for a wonderful meeting and for all the work that the SEPA community is doing. He thanked Dr. Stark and her team for all their work conducting the meeting. He recognized the value of the plenary speakers. In addition, he thanked the organizing committee and all participants for creating an excellent meeting. He wanted to make sure that everyone knew about the new notices regarding SEPA applications:

1. Notice of Change to the number of awards allowed from one institution: https://grants.nih.gov/grants/guide/notice-files/NOT-GM-22-037.html
2. Notice of Participation of Additional NIH Institutes and Centers in PAR-20-153: Science Education Partnership Awards (SEPA) (R25-Clinical Trial Not Allowed) https://grants.nih.gov/grants/guide/notice-files/NOT-HG-22-017.html

Dr. Beck provided more details about the notices:

1. Multiple SEPAs per institution:
   - There is a need for more applications to meet the needs of the NIH ICOs who are interested in supporing SEPA projects.
   - NIGMS uses a holistic approach, not just priority scores.
   - How then should investigators decide if they should be part of more than one SEPA? The best approach is: if you feel that you have resources and time, it is okay to be a co-I on additional submissions from an applicant organization other than your own,
   - Another advantage of the new notice is allowing for more than one project and project team from an institution

2. Multiple NIH ICOs supporting SEPA grants:
   - SEPA has existed since 1991. SEPA is the only program with funding for health-related museum exhibits. SEPA has led the way for evaluation and accountability of pre-college workforce diversity programs.
   - In discussions with program staff at other NIH ICOs Dr. Beck learned that many of these POs found out about a SEPA project related to their ICO's focus through a SEPA PI.
   - With the new notice, each ICO can put in specific language into the SEPA Notice of Fundig Opportunity (NOFO) about what they are looking for in a SEPA award.
   - Dr. Beck recommends that applicants look at the list of ICs (https://www.nih.gov/institutes-nih/list-institutes-centers) and see if their grant idea could

be relevant to a single or multiple ICOs. He recommends contacting the program officer at that ICO direcly.

- Dr. Beck anticipates that there may be 5-6 extra SEPA grants funded through the Trans-NIH SEPA Initiative. Having more investment in SEPA grants from more ICOs will help with developing an early pipeline of researchers and through SEPA science center and museum projects, increased public health literacy.

Questions and Answers

"Should there be some indication on the application about fit with a particular IC?"

Dr. Beck said that the current submission (July 2022) is under the last year of the current funding announcement. He recommended looking at online examples of cover letters and indicating in the cover letter that their proposed project has a good fit with one of the ICs listed on the notification.

Dr. Beck said that the new funding announcement will have some indication about how to identify an IC in the application. More ICOs will be added as they find out and become interested.

Dr. Beck said that he had been asked about "regional SEPAs" and the concept of "regional SEPA activities" (e.g., Northeast, Midwest). Benefits would be sharing information, ideas, and resources as well as potential collaboration-related reduction in time, costs and energy. He wondered what could be done jointly and if there are benefits to interactive exchanges

There was also discussion about the listserv and how to use it. For example, the sustainability group wants a listserv and regional grant writing support for SEPAs. There is also interest in 1-1 mentors and/or small grant writing workshops. There was a discussion about how to use the listserv—particularly because "alumni" and retired SEPA PIs are still on it.

Dr. Beck proposed a mentoring concept for IDeA states. He has asked some SEPA PIs to help faculty in IDeA states. Mentors can contribute as much or as little time as they have available.

Poster Abstracts

Big Data

1. The Metagenomics Education Partnership: Harnessing the Power of Microbial Genome Sequencing and Big Data with High School Students and Teachers

Stephen Koury, Jacobs School of Medicine and Biomedical Sciences, University at Buffalo; Norma Nowak, Sandra Small, Jonathan Bard, and Natalie Lamb, Center of Excellence in Bioinformatics and Life Sciences, University at Buffalo, Khaled ElShorbagy, Xinyi Yu, and Zilin Lu, Jacobs School of Medicine and Biomedical Sciences, University at Buffalo

The Metagenomics Education Partnership will further an ongoing partnership between the Department of Biotechnical and Clinical Laboratory Sciences (BCLS) of the University at Buffalo Jacobs School of Medicine and Biomedical Sciences, the New York State Area Health Education Center System the Center of Excellence in Bioinformatics & Life Sciences at the University at Buffalo and the Buffalo Niagara Waterkeeper with underserved/disadvantaged schools across a 14-county region of Western New York. The proposal allows high school students and teachers to 1) utilize community-linked citizen science involving metagenomic analyses of water samples in Western New York, empowering them to assist in safeguarding local water resources for present and future generations and 2) sequence and analyze a microbial genome, supporting their explorations of Big Data, STEM and health-related careers related to genomics. Proposal participants will be among the first high school students and teachers to use third generation Oxford Nanopore MinION sequencing technology, giving them first-hand experience with the preparation of genomic DNA samples for sequencing, in school DNA sequencing, tools for determining the makeup of microbial communities from sequencing data, and the construction of a microbial genome through the compilation of a large number of overlapping long MinION sequence reads.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Citizen Science, Research Experiences for Students, Research Experiences for Teachers, Teacher Professional Development

2. Filtered – Discover Bioinformatics and Save the World!

Neil Lamb, Michele C. Morris and Madelene Loftin, HudsonAlpha Institute for Biotechnology

The demand for computational biology-related positions is high, yet student interest in bioinformatics is low to non-existent. As this field is often unfamiliar, educators struggle to confidently share the concepts with their students. A lack of foundational awareness prevents students from considering careers in bioinformatics, instead opting for more familiar paths such as medicine or engineering.

To engage high schoolers' attention and spark their interest, we developed Filtered, an online game that introduces the concepts and basic tools of bioinformatics as students attempt to

unlock the identity of a mysterious pathogen crisscrossing the globe. While the fictional pandemic setting was developed in 2016, the game's backdrop feels eerily familiar in light of the COVID-19 pandemic. The dramatic, graphic novel style of the activity has proven popular with pilot groups and sets a suspenseful tone. Now in its final stages, Filtered is being introduced to educator groups and assessments to measure student impact in the formal classroom setting and with informal STEM groups are underway.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Informal Science Education, Interactive Multimedia for STEM Learning, Students: Classroom Science Enrichment, Students: Out-of-School Programs

3. The Authentic Bioinformatics in the Classroom (ABC) Project: Integrating Bioinformatics in High School Biology

Jessica Siltberg-Liberles, Laird Kramer, Rocio Benabentos, Nicholas Oehm Jr, Ingelise Giles, Cassian D'Cunha, Florida International University

The Authentic Bioinformatics in the Classroom (ABC) Project will utilize the power of bioinformatics to bring context to biology by integrating bioinformatics in high school biology classes. ABC will establish evidence-based bioinformatics curricular materials for high school biology, in collaboration with high school biology teachers. The goal is to promote mastery of biological sciences while stimulating interest and awareness of bioinformatics among high school students, especially those from historically underrepresented groups. The project builds on the long-standing partnership between Florida International University (FIU) and Miami Dade County Public Schools, as well as pilot course implementations at FIU, to generate a Next Generation Science Standards (NGSS)-driven curriculum that will be tested, revised, and implemented by over 70 South Florida teachers over the course of the project. The project will use COVID-19 as a central theme to underscore the societal relevance of biomedical research to intentionally provide a mechanism for students to imagine themselves as future scientists, particularly apt for those historically underrepresented in the sciences. Further, bioinformatics provides a mechanism for equitable authentic lab access since, by providing centralized computing services for all users through the project, students will require no additional equipment beyond a networked computer.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Curriculum Development, Curriculum Testing, Research Experiences for Students, Teacher Professional Development

Broadening Participation

4. START Program for Underrepresented Populations

Luke Bradley, Rebecca Rudd, Molly McAndrew, University of Kentucky

As demand for STEM professionals across industries continues to grow, the University of Kentuckys START (STEM Through Authentic Research & Training) Program seeks to enhance and diversify the P-20 STEM pipeline and create more seamless transitions into STEM higher education and/or career paths, particularly for students currently underrepresented in STEM (first generation students, females, students with disabilities, students of color). START leverages University departmental relationships and community business partners to provide a combined approach of classroom outreach and year-round authentic research/lab apprenticeship opportunities, college student peer mentorship, and professional development for those STEM teachers within students support networks. After interruptions caused by COVID-19, necessitating an all-virtual delivery, this years program grew in capacity and scope, and was recently able to resume in-person classroom STEM outreach through a variety of STEM demonstrations and lab experiences. Additionally, START hosted the first on-campus apprentice cohort and is preparing for in-person, campus START summer apprenticeship cohorts.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research Experiences for Students,Research Experiences for Teachers,Students: Classroom Science Enrichment, Teacher Professional Development

5. Change as the Constant: The LEAH Knox Scholars Program Response to Two years of a Pandemic

Chloe Cheung, Lisa Aslan, Allyson Shifley, Paul Gregg, Health Resources in Action

The LEAH Knox Scholars (LKS) first year program is a five-week in-person molecular biology research experience for low-income high school youth of color in the Boston area who are underrepresented in the sciences. The program is implemented by Health Resources in Action, a nonprofit public health institute, where the LKS Project is seated, and Massachusetts Institute of Technology (MIT). This case study will describe how LKS successfully adapted to online programming and overcame challenges presented by the current pandemic to offer an innovative and engaging curriculum that provided an enriching, compensated summer research experience for youth for the past two years, 2020-2021.

In response to the pandemic, all LKS program activities shifted from in-person to virtual engagement using the Zoom platform. Key modifications to the program included designing and offering a hands-on research component that LKS youth could participate in from home while guided by instructors virtually. Program staff also led synchronous and asynchronous sessions that promoted college readiness, workforce development, and social emotional learning.

The poster presentation will highlight the changes made to the program during the past two summers. It will include some of the outcome data from the survey and performance evaluations of the students and staff.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Informal Science Education, Students: Out-of-School Programs

6. MYHealth: Training the Next Generation of Health Researchers

Sam Chuisano, University of Michigan Lisa Vaughn, Hospital Medical Center, University of Cincinnati
Daphne Watkins, Matt Diemer, Tammy Chang, Jane Rafferty, Melissa DeJonckheere, University of Michigan
Alison Allen, Kara Harris, Kristin Bass, Rockman Et Al

MYHealth is an out-of-school research training program for high school students from underrepresented groups in Southeast Michigan, designed to engage youth as co-researchers on a study of adolescent health. MYHealth is grounded in community-based participatory research principles to build interest and persistence toward science and research careers. We use an innovative text messaging platform so that MYHealth students design, collect, and analyze original open-ended data on the perspectives of youth across the country. Primarily virtual, the research training program provides an accessible and relevant research experience for high school students. Students will interact regularly with academic researchers and program faculty with expertise in health services research, social work, education, medicine, and evaluation. In this presentation, we share the overall MYHealth program design, implementation plans, and evaluation strategies.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Informal Science Education, Research Experiences for Students, Students: Out-of-School Programs

7. Instruction with Multimodal STEM Text Sets Significantly Strengthens Diverse Middle School Students' NGSS and CCSS-ELA Shared Practices in Argumentation

William Folk, Delinda van Garderen, Amy Lannin, Rachel Juergensen ,Cassandra Smith, Heba Abdelnaby, Tracey Milarsky, Torrey Palmer , University of Missouri; William Romine, Wright State University

The NGSS and the Common Core State Standards (CCSS-ELA) call for all students to engage in grade-level complex texts for rigorous science and rich language learning. However, grade-level complex texts present significant barriers for many learners, including students with disabilities. We are researching the benefit of instructional interventions with novel STEM

multimodal text sets, for middle school students' fulfillment of NGSS and CCSS-ELA shared practices in argumentation. Teachers participate in evidence-based professional development and help develop the STEM multimodal text sets for their learners. Recent qualitative data suggest (a) teachers enact the multimodal text sets in different ways, (b) the use of multimodal texts sets, while uncomfortable for some students initially, benefitted most students, and (c) scaffolds with diverse genre, media, inquiry, etc. help make instruction inclusive. Quantitative data from several cohorts of teachers implementation of multimodal STEM text sets indicate that students with and without Individualized Education Programs (IEPs) make significant gains in argumentation. Notably, improvement by students with disabilities (IEPs) is especially significant. Examples of multimodal STEM text sets and data are provided at: Scienceandliteracy.missouri.edu. These efforts are being expanded to include mathematics and teachers in other states.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research & Evaluation, Teacher Professional Development, Science Literacy

8. Encouraging Excellence: Health Science Education in Native American Communities

Maurice Godfrey, University of Nebraska Medical Center, University of Nebraska Medical Center

We will develop, implement, and evaluate science curriculum, outreach activities, and training experiences targeting Native American students and their teachers in grades K-12. The long-term goals of this project are to promote student interest in the sciences, foster a more science-literate public, and ultimately to increase the number of Native Americans entering health and science careers. Improving science and math instruction in the classrooms serving our Native American partners is key to this project. This objective will be accomplished by creating and adapting hands-on, age-appropriate lessons. Through summer workshops, mentoring, and in-service education, teacher support will facilitate the implementation of novel science and math education strategies for use in tribal schools. Student engagement will be enhanced through summer experiences from science camps for middle school to longer-term enrichment programs for select high school students. Reaching beyond the classroom to parents and communities is also critical to the success of this project. Community programs will be designed to give parents and elders the sense of excitement that students feel when doing science. Ancillary benefits will include promoting educational opportunities, healthy living, and improving health literacy. Professional evaluations will be made at all stages, with major emphasis being placed on evaluating the educational and community impact of the project.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Informal Science Education, Students: Out-of-School Programs, Teacher Professional Development

9. The Great Diseases: Bridging biomedical career exploration, competency building and mentoring

Berri Jacque, Karina Meiri, EmilyKate McDonough, Revati Masilamani, Valarie Solon, Russ Faux, Tufts University

This new SEPA builds on our enduring co-design partnership with Boston teachers to create a continuum of opportunities that integrate career awareness with building critical competencies like data-based collaborative problem solving. We will use an iterative design-based research approach to create: (1) BioScann - Classroom ready digital multi-role case studies in which students explore biomedical career roles and use data to solve problems. (2) Mini-Med-Honors - online dual-enrollment courses that incorporate college readiness skills with learning about cutting-edge biomedicine. (3) Mini-Med-Connect a summer residential program that combines biomedical learning, near-peer mentoring and internships to offer college experiences.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Curriculum Testing, Research Experiences for Students, Teacher Professional Development

10. Project ACE Teacher Experiences in Summer Research

Osvaldo Morera, Thomas Boland, Josefina Tinajero, University of Texas at El Paso

For Project ACE: A BUILDing CHOLARS Pipeline, five teachers participated in summer research experiences last summer. All five teachers completed lesson plans and three teachers presented their research at a local summer research conference. Of these five lesson plans, three have been submitted for publication at teachengineering.org and one has been conditionally accepted. The lesson plan that was accepted required the building and testing of an electronics laboratory. The purpose of the lesson plan was to allow high school students to perform an electronic circuit assignments at home or school using open source simulations and thus the experiments do not require materials to perform. After familiarizing themselves with the simulator, the students are asked respond to three engineering challenges, one toreate a circuit using 1 battery, 1 switch, two resistors, and 1 wire; two, Create a circuit using 1 battery, 1 switch, two resistors, and 3 wires so the electrons flow (electricity moves) through each resistor separately and continues to flow only if the switch is closed; and three Create a circuit using 1 battery, 1 switch, 1 resistors, 1 capacitor, 1 lightbulb and 2 wires. After the students construct circuits in response, they will analyze the responses they get from measuring outputs with a virtual voltmeter. They are to observe connections in series and parallel and chart their observations. Students are then walked through the creation of a specific parallel RC circuit. This circuit will have a square voltage response. Related concepts will be taught such as Coulombs Law and applications of this circuit will be discussed, for example in pacemakers.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research Experiences for Teachers, Teacher Professional Development

11. Teen Wellness Connection: Constructing a Community of Teen Health Science Leaders

Katherine Nielsen, Michelle Phillips, University of California San Francisco; Linda Morrell, University of California, Berkeley

Teen Wellness Connection (TWC), led by the Science & Health Education Partnership (SEP) at UC San Francisco, seeks to foster leadership and public health interest in high school students. Teen leaders collaborate with UCSF scientists and health researchers to learn about health issues facing teens, then create a one-day Health Summit for their peers. The Summit will highlight scientists and health professionals as guest speakers and panelists, host forum discussions, and present interactive and hands-on activities for San Francisco high school students. TWC is expected to increase URM student interest in post-secondary education in biomedical science fields and health science careers, ultimately broadening participation in the health science workforce. Also, in collaboration with learning researchers at UC Berkeley, we will develop a validated instrument to measure Belonging in Science, test the impact of TWC on students sense of belonging; and, publish the results of the learning research in peer-reviewed journals to inform and advance the science education communitys understanding of adolescent belonging in science.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research & Evaluation, Students: Out-of-School Programs

12. See Us-Be Us: Inspiring Future Veterinarians Using a Veterinary STEM Ecosystem

Sandra San Miguel, Lindley McDavid, Loran Parker, Purdue University

See Us-Be Us aims to establish a diverse veterinary workforce through an inclusive veterinary STEM ecosystem (The League of VetaHumanz) consisting of veterinarians in academia, practice, industry, and government who provide in-person and remote role modeling experiences to underserved youth. VetaHumanz improve health literacy and reduce health disparities in people and their animals by modeling and communicating the positive impact of veterinary medical research on public health and animal health, while facilitating career exploration and experiential learning for aspiring veterinarians. Additionally, SuperPower Packs, self-guided, STEM educational experiences for children lacking access to veterinary role models are in production.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Dissemination, Early STEM Learning (PK-3), Informal Science Education, Programs for Families & the Public

13. Increasing access to chemistry for high schoolers with blindness: a program to jump start Central Texas

Bryan Shaw, Baylor University

Students with blindness have historically faced systemic exclusion and implicit bias in the field of chemistry. This presentation will outline a new program at Baylor University that seeks to increase access to the field of chemistry for Texas high school students with blindness. Student participants are affiliated with the Texas School for the Blind and Visually Impaired. The program is building an accessible lab environment and providing short research experiences to students. Students will learn to utilize chemical robotics, 3D printing, and low tech lab hacks to make chemical procedures, data, and imagery accessible to them. Research experiences range from organic synthesis of small molecules, to electron microscopy of nanoscale assemblies. Students will learn that simple laboratory activities such as weighing solids, dissolving solids in liquids, stirring and heating reaction mixtures, and cooling and purifying reaction products, can be safely and rapidly performed with commercially available programmable robots (housed in airtight, blast-proof glove boxes). Students will experience how background information, imagery and data in chemistry can be made accessible with 3D printing. The central hypothesis of the project is that student exposure to accessible research experiences and accessible data and imagery will increase their sense of belonging, interest, and confidence in the subject of chemistry.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research Experiences for Students

Citizen Science

14. The public health impact of an NIH SEPA school-based citizen science effort to address arsenic contamination of drinking water in rural Maine and New Hampshire

Jane Disney, Ashley Taylor, Hannah Lust, Anna Farrell, MDI Biological Laboratory
Karen Bieluch, Kate Buckman, Bruce Stanton, Dartmouth College
Bill Zoellick,
Sarah Hall,

Exposure to arsenic in well water is a well-documented public health issue for Maine and New Hampshire. The most common source of arsenic contamination of well water in these states is the metasedimentary bedrock that leaches arsenic into groundwater. These groundwater reserves often exceed the EPA limit of 10 ppb. Arsenic exposure is known to cause cardiovascular disease, reduced resistance to infections, bladder cancer, and reduced IQ in children. Despite these known health impacts, many people still do not test and treat their wells. We approached this problem by developing the All About Arsenic project, that involves engaging secondary-school teachers and students in collecting well water samples for analysis

and providing support for outreach to their communities about their findings. We have assessed the public health impact of this project by analyzing the contribution of the student data relative to the existing well water quality data in both states. In addition, we have surveyed private well owners who contributed well water samples to the project to determine the actions taken to mitigate arsenic in well water. Preliminary results indicate that participation in the project is a significant factor in well owner decisions to mitigate arsenic in their drinking water.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Citizen Science, Research Experiences for Students, Research Experiences for Teachers, Teacher Professional Development

15. Emerging From the Storm HSTA students address health issues with sensitivity to COVID concerns

Catherine Morton, Misty Harris, Mary McMillion, Health Sciences & Technology Academy
Summer Kuhn

All WV schools were in session and HSTA clubs were able to conduct in person, after-school meetings again. Using lessons learned and taking best practices from the previous years virtual experience, clubs were poised to work with pre-school and elementary students to implement healthy eating, exercise, and prevention of obesity activities. This however did not occur as almost all facilities and schools did not allow outside or other groups to interact with their students due to COVID concerns. Instead, HSTA students used the HSTA WV Health and Wellness Survey to identify issues such as stress, depression, unhealthy diets, lack of exercise, vaccination hesitancy, etc., affecting their communities. Students worked with community members to identify resources, groups and or activities to address the local findings and disseminated the same to the targeted group(s) and communities via local and regional symposia, pamphlets and social media.

Funded By: NIGMS SEPA

Keywords: Citizen Science, Curriculum Development, Informal Science Education, Research Experiences for Students, Students: Out-of-School Programs

16. Citizen DNA Barcode Network: A Community-based Infrastructure for Monitoring Biodiversity and Disease Vectors.

Sharon Pepenella, Jasmine Maldonado, Sylvia Perez, New York Hall of Science
Bruce Nash, David Micklos, Cold Spring Harbor Laboratory DNA Learning Center

DNA barcoding allows an organism to be identified through analysis of a short DNA sequence, which produces a pattern of bars similar to a universal product code (UPC) that identifies each consumer product. Citizen DNA Barcode Network adapts methods from our previous SEPA program, Barcode Long Island, to establish DNA barcoding for use in informal settings. This program equips visitors to science and nature centers and members of community conservation

groups to inventory ants, beetles, and mosquitoes in local habitats as part of national campaigns. These groups of invertebrates include bioindicators of environmental change, vectors of human disease, and economically important species whose ranges are fragmented or are being altered by environmental pressures such as global climate change. Through hands-on experimentation, citizen scientists contribute new information to global biodiversity databases and improve range maps that show how species are responding to these changes. Evaluation of the effects of participation on citizen scientists including comparisons to other national STEM activities will be presented alongside program activities, products, and results.

Funded By: NIGMS SEPA

17. University of Puerto Rico STEM Asthma Awareness Program

Orestes Quesada, Michelle Borrero, Edjean Calderon, University of Puerto Rico San Juan University of Puerto Rico

Our Project aims to develop a program for the training and education in STEM of teachers from public and private schools in Puerto Rico. We propose an innovative combined approach that includes not only the traditional training of teachers in STEM fields, but one in which teachers and students are integrated and involved in researching a particular health problem that concerns everyone in the Puerto Rican society. Puerto Rico, due to its geographic location and its inherent climate, has one of the highest asthma rates per inhabitant worldwide (16.1%) and this situation increased after the passage of Hurricane MarÃ-a in 2017 and will be worsen by the actual COVID-19 pandemic. Our proposal reconciles the efforts and resources of the University of Puerto Rico (UPR) in San Juan, the Molecular Sciences and Research Center (MSRC), the Puerto Rico Department of Health, and the Puerto Rico Department of Education (PRDE). The main goal is to, while generating awareness of asthma, increase the number of STEM teachers engaged in science practices that will enable them to teach science through research and take on an active role in the preparation of students to be incorporated in knowledge-based societies as a highly educated labor force.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research Experiences for Students, Research Experiences for Teachers, Students: Classroom Science Enrichment, Teacher Professional Development

Curriculum Development

18. TSCORE LIFT: Teachers & Students for Community Oriented Research & Education, Linking Industry, Faculty, & Teachers

Dalton Allen, Maria Alonso Luaces, Megha Ramaswamy, University of Kansas
Karin Chang, University of Missouri - Kansas City

21st century changes in the healthcare sector have outpaced changes in science education. High school students who have the luxury of receiving high quality experiential education are least likely to be from racially, ethnically, or geographically diverse backgrounds. There is an urgent need to reach students least likely to be served with culturally responsive, localized science education partnerships, specifically minority and rural student populations. Without special programming, inequities in educational access will persist, and the healthcare sector will be ill-prepared for whom it is designed to serve. Underserved school districts are less likely to partner with universities and industry to provide students with opportunities for experiential learning outside the classroom. TSCORE LIFT will create community linkages among 5 health systems, 5 universities, and 5 school districts to develop and test 3 educational interventions along the KS Health and Biosciences Career Pathway. The community linkages will empower teachers to deliver educational content and real-life experiences in the healthcare industry for students. This novel health and bioscience program will create educational and workforce pathways for students underrepresented in the health care industry and address critical workforce shortages in the state in the immediate future.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Students: Classroom Science Enrichment, Teacher Professional Development

19. Health in Our Hands: Building and sustaining student engagement in genomic and environmental health sciences through a community-school partnership

Renee Bayer, Consuelo Morales, Michigan State University

Health in Our Hands (HiOH) is developing and assessing high quality curriculum materials, innovative professional development, and a community health/science education partnership to support and sustain HiOH in schools and communities. HiOH curriculum is NGSS-aligned and connects the science classroom to the community to give middle and high school youth and adults an understanding of modern concepts in genetics. Using project-based learning, middle school students investigate critical public health issues such as diabetes and addiction and use these real-world contexts to appreciate the importance of both genetic and environmental factors in their risk for disease. For their final project, students conduct an action research project to improve their school or neighborhood to help prevent or reduce disease. Students present the results and recommendations at a Youth Health Summit to their peers, family and community. Now in the 3rd year of our current project, we are piloting new NGSS, 3-dimensional embedded assessments and a new high school curriculum called, the Mystery of the Monkeyflower, which has a unique twist - an embedded comic and authentic field science

research that guides students to figure out how gene-environment interactions affect living organisms. Feedback from high school teachers and students has been very positive.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Curriculum Testing, Students: Classroom Science Enrichment, Sustainability, Teacher Professional Development

20. Building the capacity of STEM teachers to use an emerging environmental health issue (PFAS contamination of drinking water) to engage ALL learners

Dana Haine, Jenna Hartley, Kathleen Gray, Kelly Ryoo, Rebekah Davis, Shaun Kellogg, University of North Carolina at Chapel Hill

Using research on per- and polyfluoroalkyl substances (PFAS) as a foundation, the overarching goal of Iterative Design to Engage All (IDEA) Learners is to build the capacity of NC science teachers, especially those working in communities impacted by PFAS contaminated drinking water, to introduce current biomedical science and career opportunities to students. Led by educators and researchers at UNC-Chapel Hill, this teacher professional development program grounded in design thinking and centered on cutting-edge biomedical research, brings PFAS researchers and high school teachers together to co-develop inclusive and standards-aligned curricula.

In March 2022, eight teachers convened for part I of the IDEA Learners design institute. Design thinking experts from the School of Education guided teachers through the design thinking process to begin development of lesson prototypes that will be completed during part II of the institute in June. These lessons will be piloted during the 2022-2023 academic year. To support a broad audience of teachers in implementing the lessons, well model lessons during both long-duration PD (32 teachers) and regional one-day workshops (48 teachers). Well describe our mixed-methods research and evaluation approaches and share initial data from pre-program interviews and post-institute evaluations.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Curriculum Testing, Dissemination, Research & Evaluation, Teacher Professional Development

21. New Model to Teach Science Specific Disciplinary Literacy in Elementary School: The Authentic Literacy and Language (ALL) for Science Project

Nancy Moreno, Travis Kelleher, Dolores Garay, Alana Newell, Baylor College of Medicine
Misty Sailors, Molly Marek, University of North Texas

The Authentic Literacy and Language (ALL) for Science partnership is developing and evaluating curriculum materials to authentically engage elementary school students in how scientists use language, while building students science knowledge and skills.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Curriculum Testing, Early STEM Learning (PK-3)

22. Scientist Spotlight Assignments Shift Students' Relatability to and Descriptions of Scientists in a Multi-Institutional Study

Dax Ovid, Dax Ovid, Josh Luna, Lucy Luong, Carolina Quintero, Kimberly D. Tanner, San Francisco State University
Tess Carlson, Amber Lancaster, San Mateo High School
Mark Dieter, Wallenberg High School
Paulos Flores, Jolie Goolish, Hilary Simon, Jess Taylor, Eddie Zhang, Jeffrey N. Schinske, Foothill College
David Frischer, Julie Reis, Gianne Souza, Encinal Junior Senior High School
Michelle La-Fevre Brent, Abraham Lincoln High School
Chris Lipski, Allison Ross, Emily Witkop, San Marin High School
Marlene Mullin, Hillsdale High School
Mia Newman, Eastside College Preparatory School
Freja Robinson, K. International School Tokyo
Katie Ward, Lowell High School
Yvonne White, Aragon High School
Christine Yang, Hayward High School
Aliza Zenilman

With the rationale to challenge long-standing scientist stereotypes, the Scientist Spotlights Initiative (www.scientistspotlights.org) was launched to feature curricular supplements that teach science content through the biographies and research of counterstereotypical scientists (e.g. scientists of color, LGBTQIA+, disabled). Our research team high school teachers, 2-year and 4-year college students, and education researchers investigated two research questions: (RQ1) To what extent do Scientist Spotlights shift high school students relatability to scientists and (RQ2) descriptions of the types of people that do science? We collaborated with 18 science teachers to collect pre- and post-survey responses from students who completed at least 3 Scientist Spotlights over a term (n = 797). For RQ1, results revealed a significant increase in students agreement with the relatability prompt after receiving at least three Scientist Spotlights. For RQ2, compared to the pre-assessment, students used less stereotypical and more non-stereotypical descriptors in the post-assessment to describe the types of people that do science. Addressing a gap in the literature, we find that even at the high school level, assignments like Scientist Spotlights inviting students to write and reflect on their assumptions about scientists can shape students relatability to and descriptions of scientists.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research & Evaluation, Research Experiences for Teachers, Teacher Professional Development

23. Addressing vaccine hesitancy in Baltimore City through a youth engagement/health literacy STEM initiative

Elizabeth Parker, Bret Hassel, Greg Carey, Laundette Jones, Gia Grier-McGinnis, Erin Hager, University of Maryland School of Medicine

Hannah Lane, Duke University School of Medicine

This project describes the process of adapting and implementing a youth-engagement/health literacy strategy to address COVID-19 vaccine hesitancy. Wellness Champions for Change-Student (WCC-S) curriculum originally focused on obesity prevention and was developed and tested at UMB as a model for health promotion via youth advocacy/health literacy. Using this model, the new vaccine-focused curriculum aligned with Next Generation Science Standards to provide foundational knowledge required to understand and translate concepts related to vaccine science and teach skills focused on health literacy promotion, youth advocacy, and community engaged research that culminated with a scholar-driven community project to reduce vaccine hesitancy. This curriculum was implemented during our 6-week intensive summer programming with C2 high school scholars, where C2 scholars worked with CVD faculty/students to develop advocacy materials for their communities. This program demonstrates the feasibility of cross-sector partnerships while providing scholars with authentic experience in the development, dissemination and evaluation of their community-based educational resources that will excite them about biomedical/health-focused STEM subjects and inspire them to pursue these fields in college and their careers. Program adaptations to address vaccine uptake provided a model for its application to address future public health issues thereby creating a sustainable, community-focused infrastructure for public health promotion.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Curriculum Testing, Dissemination, Informal Science Education, Students: Out-of-School Programs

25. Hexacago Health Academy 2.0: A social justice science program to increase interest in STEM and health careers among youth of color

Ailea Stites, Brandon Dull, Vanya Manthena, Madeline Quasebarth, Crystal Tyler, Mason Arrington, Melissa Gilliam, University of Chicago

Hexacago Health Academy (HHA) 2.0 is a social justice-based educational intervention focused on increasing interest in STEM/health careers among youth of color. The HHA 2.0 curriculum emphasizes analyzing real data, mentorship, teamwork, and experiential learning. In summer 2021, we completed an evaluation of the curriculum with fifty-nine youth from the Chicagoland area. Participants were 73% female, 76% Black (mean age=16.45). Results demonstrated that the program had a positive impact on participantsâ€™ knowledge, interest, and goals related to STEM/health careers. Participants reported that the program increased their interest in

STEM/health (92.9%), increased their scientific skills (100%), augmented their ability to communicate scientific knowledge (92.8%), and helped them to clarify their academic (78.6%) and career interests (82.2%). Common focus group themes included: increased understanding of science and social justice, greater self-efficacy and outcome expectations around entering into STEM/health careers, peer mentors as a source of support, and how the program differed from traditional school settings. Overall, there was a positive impact of an engaging, justice-focused summer science program on increasing youthsâ€™ interests in STEM and health careers.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Curriculum Testing, Informal Science Education, Research & Evaluation

26. Frontiers in Cancer Research

Regina Wu, Kristen Bergsman, Shelley Stromholt, Fred Hutchinson Cancer Center
Kristin Bass, Megan Morrone, Rockman et al.

Frontiers in Cancer Research increases understanding of molecular and cellular biology and how scientific practices such as argumentation and sensemaking are used in research. Working with teachers and scientists, Frontiers in Cancer Research has produced two NGSS-aligned units that highlight the research at Fred Hutch and incorporate activities that encourage argumentation and discourse. Lessons within these units feature activities that explore complex social issues related to health and medicine and contain resources for career exploration. These units are featured in our 3-week summer professional development. During the workshop, teachers partner with scientists for short research experiences during which they observe and engage in scientific discourse within a lab. Afterward, they develop strategies and create lesson materials for implementing collaborative sense-making and argumentation within their classrooms.

Funded By: NIH - SEPA

Keywords: Curriculum Development, Curriculum Testing, Research & Evaluation, Research Experiences for Teachers, Teacher Professional Development

Early STEM

27. Seeds to STEM

Jacqueline Genovesi, Toni A. May, Jennifer Jovanovic, Drexel University

Seeds to STEM (S2S) is a bilingual program that educates urban children ages 3- 5, their families, and preschool teachers about the importance of childhood nutrition, early STEM and literacy, and kindergarten readiness in order to address national needs to diversify the STEM education pipeline and reduce disproportionate rates of poverty, hunger, ill health, and low educational achievement among families living in dense cityscapes. This SEPA project has an

innovative focus on food access and families enrolled in under-accredited early learning centers, including home-based childcare.

We hypothesize that a research- and asset-based approach to simultaneously educating preschool children, their teachers, and families will promote early STEM and literacy learning, encourage healthy eating habits, and increase kindergarten readiness among low-income families living in two major cities -- Philadelphia, PA, and Los Angeles, CA.

The project is in its beginning stages. We will present our new evaluation tools that have been piloted with teachers and examples of curriculum that is being developed.

Funded By: NIH

Keywords: Curriculum Development, Early STEM Learning (PK-3), Programs for Families & the Public, Teacher Professional Development

28. More PEAS Please! Lessons Learned on the Journey to Bridge the Gap Between Preschool and K-12 Science Learning Experiences

Virginia Stage, Jocelyn Dixon, Archana Hegde, Tammy Lee, East Carolina University
Lucia Mendez, Valerie J Mcmillan, L. Suzanne Goodell, University of North Carolina at Greensboro

Preschool is generally excluded from efforts to formally integrate science education into school settings. As a result, millions of children each year enter K-12 having limited exposure to quality science learning. This is particularly concerning for underrepresented children, who often start kindergarten lacking the foundation needed for academic success. If children do not engage in quality STEM experiences early, they lose interest and the lack the confidence that they can STEM. Unfortunately, preschool learning environments do not generally provide high-quality science education with a poorly prepared educator workforce, and a gap between preschool and elementary STEM teaching practices being cited as primary barriers. To bridge this gap, the NIH SEPA-funded project, More Preschool Education in Applied Sciences (PEAS) Please!, has developed an innovative multi-component professional development program focused on teaching preschool educators how to design and guide effective, practice-based learning experiences that teach science and develop language within the context of healthy living. The goal of this poster is to share resources developed for the PEAS Institute for Early Childhood Teachers and lessons learned from piloting materials in 5 Head Start centers over the 2021-2022 school year. Resources include: (1) a 1.5-day workshop, (2) 6 on-demand learning modules (online and paper-based); (3) 16 white-board training videos; (4) a PEAS Teaching Guide featuring 16 Model Science Learning activities; and (5) a Supplemental Professional Learning Community guide. Materials can be downloaded for free from www.morepeasplease.org.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Early STEM Learning (PK-3), Teacher Professional Development

Informal Science Education

29. Discover SCIENCE with Dr. Bear

Naomi Luban, Rachel Smilow, Julia Miller, Annika Hvide, Children's National Hospital

Discover SCIENCE (a Scientific Creative Innovative Engaging New Cool Experience) with Dr. Bear engages children and families in the out-of-school time setting of community libraries and other afterschool programs in hands-on, inquiry-based art and science programs that help to improve the physical, cognitive, and social development of children and their families. SCIENCE explores and combines STEM with a focus on health issues of concern to the community such as asthma, stress, cardiometabolic risk, sleep, genetics and genetic diseases, and injury prevention. The Discover SCIENCE with Dr. Bear team will present about the Discover SCIENCE with Dr. Bear program and the program guidebook.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Dissemination, Informal Science Education, Programs for Families & the Public, Students: Out-of-School Programs

30. Using animated video storytelling to scale health education across diverse populations

Maya Adam, Stanford University , Stanford University

To scale across diverse populations, health education media must capture its audience's attention and meet them where they source their information. Novel approaches are needed to convey science-based health concepts in ways that are accessible across languages, cultures and education and literacy levels. In addition, health education media must be rapidly spreadable. Delays in disseminating compelling, science-based health information leaves a vacuum that is quickly filled with misinformation. In recent years, the social media stratosphere has exploded with deceptive, anecdotal information that widens health disparities. When health education is packaged didactically, relying predominantly on technical explanations, we run the risk of missing the audiences that need this education the most.

We created a collection of animated storytelling videos between 2020-22 that embedded critical health messages within universal narratives, using culturally accessible characters and compelling soundtracks.

These videos were viewed more than 15 million times across the US, through viral spread on social media. We also documented significant increases in health-related knowledge and behavioral intent to practice recommended preventive health behaviors.

By leaning on best practices from health education, communication theory and the animated entertainment industry, health and science educators can rapidly and dramatically increase the reach of informal, science-based health education.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Dissemination, Informal Science Education, Interactive Multimedia for STEM Learning, Programs for Families & the Public

31. One Health Education: Promoting Environmental Health Literacy Through Virtual Field Trip Programs

Danielle Alcena-Stiner, Susan Holt, University of Rochester
Lisa Brosnick, Buffalo State College

University of Rochester scientists at the Life Sciences Learning Center (LSLC) created four virtual field trip programs for use in high schools (Ticks, Biodiversity, and Climate and Antibiotic-Resistant Bacteria) and middle schools (Mysterious Case of Brain Illness and Mosquito Invasion). These 23-hour LSLC Virtual Field Trip Program were adapted from existing classroom curriculum developed in collaboration with classroom teachers as part of our One Health Education project. The goal of our project is to increase adolescents understanding of the concept of One Health, which emphasizes the connection between human health, the health of animals, and the health of the environment with the goal of improving all health. Requests from teachers for remote learning activities provided an opportunity to broaden our LSLC informal science education programs nationally through the virtual field trips. Teachers (N=93) across the United States from public (N=81), private (N=7), and charter/other (N=5) schools registered 291 of their classes for the virtual field trips. The adolescent participants include 6,151 students from rural (n=26), suburban (N=40), and urban (N=27) school settings. Pilot testing of the virtual field trips is underway. Evaluation and feedback for virtual field trip sessions use online surveys. Data collection is ongoing.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Curriculum Testing, Informal Science Education, Interactive Multimedia for STEM Learning, Students: Out-of-School Programs

32. Project SCORE (Student Centered Outcomes Research Experience) – A Student-Developed Research Agenda

Marie Barnard, Caroline Compretta, Allison Ford-Wade, Erin Dehon, Murrell Godfrey, Melissa Presley, Saara Nasruddin, Samantha Cohen-Winans, Quest Whalen, Elizabeth Gordineer, Shanteria Brock, Candace Carter, Rob Rockhold, University of Mississippi

Project SCORE (Student Centered Outcomes Research Experience) is a youth participatory action research project engaging high school students (SCORE Scholars) and graduate health sciences students (SCORE Fellows) in an afterschool informal science education program

focused on health-related topics. SCORE Fellows lead the program and introduce the SCORE Scholars to topics related to public health, including health literacy, population health, and health disparities. An introduction to the scientific method and research methodology, including problem identification and the development of good research questions prepares the SCORE Scholars to develop a research agenda. The student-developed research agenda from the programs first cohort of SCORE Scholars will be presented.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Informal Science Education, Research Experiences for Students, Students: Out-of-School Programs

33. Adaptation of the FoodMASTER Middle Grades Curriculum for use in Georgia 4-H after-school programming

Alexa Burnett, Melani Duffrin, Northern Illinois University
Courtney Brown, Kasey Bozeman, Terri Black, Meridith Louanne Franks, Shawnie Sahadeo , Rebecca Hardeman, Sarah T. Henes, University of Georgia

The objective of this study was to adapt the FoodMASTER Middle Grades Curriculum to fit the needs of after-school programming. The FoodMASTER Middle Grades Curriculum teaches science and math concepts through food and nutrition and includes ten chapters with several labs in each chapter intended for use in a school classroom. While the curriculum is interactive and engaging, it is lengthy and may not fit the needs of after-school programming. FoodMASTER science labs and Try This at Home recipes were piloted in an after-school setting with middle school students and teens. This feedback, along with meetings with Georgia Extension 4-H Specialists and 4-H Agents at the University of Georgia (UGA), guided the development of a six-session adapted curriculum known as 4-H Science Chefs. Each lesson includes interactive icebreakers, a science or math lab, and a related healthy recipe. Feedback from UGA 4-H agents and from participants will continue to guide the delivery of this curriculum in informal learning environments, such as after-school programming

Funded By: NIGMS SEPA

34. Semilla: A Transdisciplinary Community Based STEM Program

Maribel Campos, Kamille Camacho, Janice Montero, Joel Acevedo Nieto, Mary Mays, University of Puerto Rico
Joanna Yang, Zachary Warejoncas, InSiEd Out
Christopher Pierret, Mayo Clinic

Toxic stress is associated to increased risk of diseases. Semilla aims to mitigate these effects by engaging a network of learners and stakeholders. Our collaboration of community-academic partners will accomplish the implementation of an interactive afterschool science education program that includes mindfulness sessions for children 9 to 12 yo at 3 locations of the Boys and Girls Clubs of Puerto Rico (BGCPR). Our curriculum is responsive to the health priorities as

perceived by parents documented during our Pilot and reassessed during Semilla registration. Our first program milestone was the launch of a fellowship program for trainees at different stages of training from clinical, basic sciences, social sciences and education. Fellows commit to a 1-year experience that includes learning about the STEM curriculum, science communication and the ethical use of animal models in science, and a mentoring program through the implementation of Dr. Soods SMART Resilience training. Our first workshop integrated virtual learning strategies to address the challenges imposed by the pandemic. We have achieved direct engagement of parents at the 3 locations with distinct participant profiles. The transdisciplinary and collaborative nature of our program supported the planning of a community-based STEM program that is responsive to their health needs.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Dissemination, Informal Science Education, Research Experiences for Students, Students: Out-of-School Programs

35. Health Literacy - PBS NewsHour & Student Reporting Labs

Leah Clapman, Patti Parson, WETA/PBS NewsHour
Jena Barchas-Lichenstein, Knology

Since 2016, NIH SEPA funding has supported PBS NewsHours work to increase the U.S. public's health literacy through a combination of detailed reporting and work with Student Reporting Labs. For students, reporting on health issues fostered a greater sense of investment in the health and wellbeing of those around them. The relevance adults attribute to a health news report contributes directly to their intentions to learn more and share the report. This has become increasingly important because of the challenges around coronavrius and misinformation.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Informal Science Education, Teacher Professional Development

37. Community Engagement and Learning with Graphic-Style Health Science Stories

Susan Gertz, Miami University
Shereen Elshaer, Seung-Yeon Lee, Melinda Butsch Kovacic, University of Cincinnati
Jackie Humphries, Lisa Martin, Cincinnati Childrens Hospital Medical Center
Luwana Pettus Oglesby, Vonnie Tawwab, 7 Hills Neighborhood House and West End Community Research Advisory Board
Susan Hershberger, Miami University

We Engage 4 Health (WE4H) is a community health project with the goals to improve health and science knowledge in the Cincinnati metro area, increase citizens involvement in their own

and their communitys health, and increase interest in health science and public health careers. The project features community co-designed graphic style stories for middle school through adult ages that focus on health science, research, and citizen science. An important experience for our high school and college interns is taking a lead in planning, co-creating, and testing new stories. WE4H stories are read out loud with participants taking the parts of characters to create engagement, ownership, and common ground for the discussions and activities that follow. The stories take various forms to meet outreach needs. Some stories are used by community advocates in discussions, such as the COVID-19 vaccination story Take Your Best Shot. Some stories are created as a series for multi-session outreach programs, such as Citizen Science RAP. Other stories are extremely short so they can be displayed as large panels in health fairs. Preliminary research results on the impact of graphic style stories on health and science learning and engagement versus other information modes are positive.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Citizen Science, Informal Science Education, Students: Out-of-School Programs, Science and Health Science Literacy

38. In-School Enrichment Programs in Underserved Schools Using the Near-Peer Mentor Model

Emonie Hall, Laura Tenebaum, Holly Brown, Nico Ekanem, Kathleen Umayam, Brittany Swift, R. Jerome Anderson, Walter Reed Army Institute of Research

This in-school enrichment program partners undergraduate STEM majors from HBCUs, called near-peer mentors (NPMs), with ninth grade biology classrooms at local public high schools. NPMs implement NGSS aligned hands-on activities and experiments in their partnered high school(s) every other week over one academic year with the goal of improving science attitudes, interest, and engagement within underserved and underrepresented communities. Preliminary outcomes from year one of implementation have demonstrated that this enrichment results in positive feedback from student and teacher participants. Specifically, students built a strong rapport with their NPMs, learned better with NPM guidance, loved learning with the enrichment program, and wanted increased program frequency and duration. Teachers cited increased classroom support, novel opportunities for students, and the unique perspective of NPMs. Science attitudes, mindset, and program evaluation surveys are utilized to gather feedback from students in the beginning, middle, and end of the academic year and will be analyzed at the conclusion of year one in June of 2022. This year one poster will review preliminary findings and discuss successes, challenges, and future directions.

Funded By: NIH

Keywords: Informal Science Education, Students: Classroom Science Enrichment

39. The Deep South Network: Take-home Food-Based STEM Education Program in rural Appalachian Mississippi

David Holben, The University of Mississippi

Melani Duffrin, Northern Illinois University

Food-based STEM education increases multidisciplinary science knowledge. Youth living in rural, Appalachian Mississippi have very limited access to STEM education during the summer months. COVID-19 restrictions present unique challenges to informal learning environments in summer. Therefore, a 4-lesson backpack program was developed and implemented for youth in grades K-8 living in rural Appalachian Mississippi. The program utilized a constructivist theoretical framework. One year prior to implementation, each of the four lessons were piloted and evaluated, with 98.7% of youth reporting high satisfaction with the program. In summer 2021, using a drive-through distribution due to COVID-19, backpacks were provided at a rural library. Packets included all STEM materials/supplies/books, postage-paid evaluation postcards, and shelf-stable lunches and snacks. Books highlighted diverse food-based scientists to expand diversity, equity, and inclusion in food-based STEM education. An 8-item satisfaction postcard for each lesson and a 7-item pre-post program evaluation were conducted, with 23/100 youth participants (23% response rate) returning at least 1 evaluation. Participants were female (65%), Non-Hispanic (90%), White (90%), and in 4th grade (32%). Over 94% â€œagreed or super-agreedâ€ that they â€œwould recommend the activities to others. Youth were highly satisfied with a food-based STEM education program, warranting implementation in this and other communities.

Funded By: NCI YES

Keywords: Curriculum Development, Informal Science Education, Students: Out-of-School Programs, Rural STEM

40. BioBridge: A novel near-peer mentoring experience increases learning in undergraduate students

Michelle Johnson, Lalita Shevde-Samant, J. Michael Wyss, University of Alabama at Birmingham;

Roadmap for Americas Cancer Explorers for the 21st Century is aimed at developing diverse undergraduate students to become leaders in cancer research. BioBridge is a near-peer experience that the RACE21 undergraduate students developed as a one-week summer course for rising 9th-grade students.

The 2021 RACE21 students and Program Director designed BioBridge as an inquiry-based course with 5 days of interactive curriculum. RACE21 students developed short lectures on cancer and related aspects of cell biology and genetics. RACE21 students worked with the BioBridge students to create short videos that BioBridge students shared with their families/friends.

BioBridge attendees increased their understanding of both biology and cancer in their pre- vs. post-assessments. More importantly, RACE21 students indicated that they had not only learned about cancer and biology from the experience but also gained increased confidence in communicating scientific content and increased confidence in teaching students about concepts

related to cancer. Finally, the BioBridge students indicated that the experience had given them the confidence to talk about cancer with their families, something few of them had done previously.
Biomedical programs teach high school students biology knowledge and skills, but undergraduate facilitators/mentors may learn even more from mentoring the students. Near-peer mentoring effectively achieves both.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Dissemination, Informal Science Education, Students: Out-of-School Programs

41. Exploring Evidence of Adolescent Science Interest Development

Sharon Locke, Ben Greenfield, Georgia Bracey, Carol Colaninno, Carolyne Banks, Southern Illinois University Edwardsville
Donte McGuire, Tashera Bolds, Higher Ed Insight, LLC

The SEPA project Environmental Health Investigators has created an informal learning curriculum on the relationships among air quality, noise, and soil pollution and human health and personal exposure. The design principles for the learning activities incorporate elements of Hidi & Renninger's (2006) four-phase model of interest development, with the goal of building adolescent situational interest in environmental health sciences and STEM more broadly. We have tested the learning activities in several middle-school out-of-school environments, including virtual learning during the pandemic and in a variety of after-school programs. During student interviews, learners expressed program enjoyment for activities where they were learning more about their community, working with a mentor, conducting field work outside, and preparing posters to communicate their findings. Because enjoyment is linked to interest development over time, the project team is completing a second design cycle to amplify those curricular elements most likely to trigger situational interest in environmental health sciences.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Testing, Informal Science Education, Research & Evaluation, Students: Out-of-School Programs

43. Worlds of Connections SEPA: Spreading knowledge and excitement about network science for health

McQuillan Julia, Meghan Leadabrand, Patricia Wonch Hill, Christine Cutucache, Amy Spiegel, Michelle Phillips, Nikolaus Stevenson, University of Nebraska - Lincoln

The specific aims of the Worlds of Connections SEPA are to 1) enhance the diversity of the bio-behavioral and biomedical workforce by increasing interest in network science among members of underrepresented minority communities and 2) to promote public understanding of the benefits of NIH-funded research for public health. We will illustrate deliverables, long-term

partnerships with communities, school districts, and university partners,, and learning research publications that help us reach our project goals. Deliverables include innovative and engaging activity guides in a new book and free on a web page, a district wide science connector with k-12 teachers and university researchers, a graduate course on the cross-cutting concept of systems and systems models enhanced by network science, an exhibit of posters encouraging vaccination that were created by a wide range of artists, and a publication describing the creation of weekly Rona Comix that included network science for health themes that was done in collaboration with an NSF Rapid award.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Dissemination, Informal Science Education, Research & Evaluation

44. AlegreMENTE: Celebrando Conexiones Tempranas / Happy Brain: Celebrating Early Connections

Cecilia Nguyen, Victoria Coats, Oregon Museum of Science & Industry

AlegreMENTE | Happy Brain is a bilingual (Spanish/English), nationally traveling museum exhibition that invites families with young children (ages 0-5) to learn how simple, everyday interactions support healthy brain development for lifelong benefits. Exhibits are designed to engage both children and adults in play-based learning. Caregivers explore alongside their children and discover how playful everyday activities support early brain development and build healthy connections.

The projects focus on Latino families serves a significant audience for local and national museums. In Oregon and nationally, Latinos are the fastest growing and the youngest demographic group, now comprising more than a quarter of the child population. To understand and collaborate with this family audience, we engaged local caregivers in focus groups and in iterative testing of exhibit ideas. OMSI visitors and Spanish-speaking families from a local culturally-responsive preschool program shared their concerns, interests, and reactions. Design was shaped by observing caregiver and child behavior and considering both caregiver and child comfort and accessibility. Recognizing, affirming, and encouraging caregivers in their everyday lives was a guiding principle. Experiences were designed to delight and engage both adults and children and inspire further playful interaction beyond the museum.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Early STEM Learning (PK-3), Informal Science Education, Programs for Families & the Public

45. Creativity as an Engine for Understanding Infectious Disease – HEAL Project Curriculum Overview and Hands-On Activity

Jeb Owen, Kellen Pautzke, Robert William Danielson, AnaMaria Martinez, David Hugo Garcia, Kristin Lynn Fisher, Elizabeth Grace, Washington State University

Health Education through Arts-based Learning (HEAL): A Partnership to Investigate Interdisciplinary Science Programs in Rural Communities is a project funded by NIH SEPA that utilizes creative, visual learning about complex zoonotic disease systems to engage students from underrepresented communities in biomedical education. There is a need for educational programs and rural capacity building initiatives that will help children see themselves and their rural communities as a genuine part of the biomedical enterprise. We review curricula developed for grades 3-5 that explore the biology, epidemiology and social impacts of COVID virus, West Nile virus, and Toxoplasma gondii. In addition, we provide a hands-on activity from the HEAL project that illustrates the intersection between artistic creativity and active learning about biomedicine.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Informal Science Education, Programs for Families & the Public, Students: Out-of-School Programs

46. ArkanSONO Response to the Pandemic: Using Virtual Outreach to Broaden Participation and Build New Partnerships

Kevin D. Phelan, Mohsin Syed, Tonya R. Cook, Tiffany W. Huitt, Noor Akhter, Billy R. Thomas, Gregory R. Snead, Karen L. Yanowitz, University of Arkansas for Medical Sciences

The pandemic forced the transformation of the ArkanSONO hands-on technology focused STEM outreach program to a virtual format. This change offered an opportunity to broaden participation and build new partnerships. Our virtual summer activities included weekly STEM Career webinars and an Anatomy & Technology webinar series targeted to 6-12th grade students, an Anatomy & Histopathology: Focus on Cancer webinar series for upper level high school and college students, and teacher workshops for science teachers in Arkansas and Texas though a partnership with the K-12 Summer Institute. Virtual classroom presentations were provided to students locally and across the state and beyond. We continue to offer a hybrid virtual and hands-on approach as we slowly return to in person activities.

Funded By: NIGMS SEPA

Keywords: Informal Science Education, Students: Classroom Science Enrichment, Teacher Professional Development

47. Biohealth Learning Lab and Makerspace for the Community

Anja Scholze, Caitlin Nealon, James Wong, Abbey Thompson, Stanford University

In recent decades, biology has become a powerful and dynamic tool for innovation and change. Knowledge of and access to these advances, however, is still very limited for most students and the general public. To help bridge this gap, we created an experimental museum space to develop and test a new approach to biology education: biotinkering. Our unique approach blends traditional scientific inquiry with the engineering-focused practices of making, tinkering,

and design challenge learning and applies them to biology. We are creating a repertoire of novel and accessible biotinkering activities that empower people of all ages to use biology as a creative and problem-solving medium. Participants can turn pigment harvested from bacteria into color-changing paint, explore and illustrate ancient DNA stories, design microbe cultures to manufacture custom biomaterial, make colorful markers with a secret DNA message, use ingredients from algae to create string, and more! These activities all aim to authentically engage young people with biology as a personally relevant process by supporting learner agency, creativity, and choice. We will share an overview of our biotinkering activities and resources as well as results from the evaluations completed to date.

Funded By: NIGMS SEPA

Keywords: Dissemination, Informal Science Education, Programs for Families & the Public, Research & Evaluation

48. Learning from our community about the racially inequitable impacts of COVID-19

Laycca Umer, Priya Mohabir, New York Hall of Science

The New York Hall of Science and Elmcor Youth and Adult Activity Inc. conducted four focus groups with community members from Corona, Elmhurst, East Elmhurst, Jackson Heights, and LeFrak City in Queens, New York to learn more about community members lived experiences during the pandemic, and the kinds of culturally responsive public health interventions needed to better serve our community. These focus groups were conducted as part of our Year 1 community needs assessment which will contribute to youth workshops and exhibit development during years 2-4. This poster shares some of the themes that arose during those focus group conversations.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Informal Science Education, Programs for Families & the Public

49. VENOM-venture/A-VENENO-tura: Early results and design strategies from an immersive, serious game for families

Lisa White, Anna Thanukos, University of California, Berkeley
Teresa MacDonald, University of Kansas

VENOM-venture/A-VENENO-tura is a pop-up, educational, bilingual escape room about evolution and medicine. Teams of 2-5 players (usually family groups) work together to solve puzzles, identify an antivenom, and save the world. In the process, players jointly interpret evolutionary trees and what they represent, making connections among multiple representations of evolutionary processes and relationships. Early results from formative testing suggest that the game is fun, motivating, intense, teaches about evolutionary relationships, and helps learners

make connections between these ideas and medical applications. We will also share design strategies and lessons learned from more than 30 rounds of playtests.

Funded By: NIGMS SEPA

Keywords: Informal Science Education, Programs for Families & the Public, Educational games

Interactive Multimedia

50. Utilizing Interactive Technologies and Gamification to Improve Students' Mental Health and Learning Qualities in STEM Education.

Amir Attia, California State University, Monterey Bay

Technology has become an essential part of our daily routine; we are surrounded by tech tools and gadgets that address and facilitate almost every aspect of human needs, communication, healthcare, education, security, shopping, entertainment, etc.

Artificial intelligence (AI), automation, and integrated technologies allow people to achieve their tasks remotely, faster, and easier and manage them in connection with each other. For example, a diet app can integrate with a grocery shopping app and a medical app to set diet plans, order food, and allow doctors to monitor the health vital analytics remotely.

Mental health is one of the most significant challenges in education today. A study conducted in 2019 showed that at least one in six U.S. youth (age 6 to 17) experience a mental health disorder such as depression, hyperactivity disorder, anxiety, etc.

Video games help establish a sense of community and stimulate engagement, thus providing mood regulation and mitigating symptoms of depression and anxiety. Curriculums with gamified components and incorporating technologies such as augmented reality (AR), virtual reality (VR), and haptic devices can help improve both mental health and the learning process.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Informal Science Education, Interactive Multimedia for STEM Learning, Students: Classroom Science Enrichment, Sustainability, Gamification in STEM Education

51. The Making of the Web Game: Blood Sugar Balance

Atom Lesiak, Helene Starks, Joan Griswold, University of Washington

During the adaptation of the GEMNet Diabetes Curriculum from in-person classroom actities into a distance learning format presented numerous challenges. Notably, many of the hands-on diabetes modeling activities were lacking in student engagement. The evolution of the model board activity went through multiple iterations, as we identified platforms for increased student engagement. Each iteration, online videos, interactive powerpoint-based model boards, and

interactive quizzes had a degree of success and challenges. Ulitmately we identified the inclusion of volitional decision making in the model would lead to the maximal learner engagement. Thus we embarked on developing the web-game Blood Sugar Balance in partnership with Blank Space. In this game, players score points for maintaining a healthy blood glucose level, while making food and exercise choices. They must play the role of the pancreas releasing hormones (or use medical insulin if playing as a person with Type 2 Diabetes). It can be used for formal or informal education. Gameplay allows for acquisition of game data that allows for players to reflect upon the interplay of diabetic status, life choices, and access to resources.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Interactive Multimedia for STEM Learning, Students: Classroom Science Enrichment

52. Health Quest: Engaging Adolescents in Health Careers with Technology-rich Personalized Learning

James Lester, Randall Spain, North Carolina State University
Elizabeth Ozer, Carlos Penilla, University of California - San Francisco

Health Quest is an immersive career adventure game that deeply engages adolescents interest in health science careers. Health Quest delivers online interactions that enable adolescents to virtually explore health research careers in action. The project is investigating the impact of Health Quest on adolescents knowledge of, interest in, and self-efficacy to pursue health science careers and examine the effect of Health Quest on diverse adolescents by gender and racial/ethnicity.

Funded By: NIGMS SEPA

Keywords: Interactive Multimedia for STEM Learning

53. Mindfulness, Meditation, and Multimedia

John A. Pollock, Brinley Kantorski, Duquesne University

Stress, anxiety, and pain are incidental to everyones daily life. For children and teens, learning how to navigate these challenges is critical to establishing a sustained healthy lifestyle. The creation of various multimedia products to address these challenges is the main goal of Partnerships for Prevention. The development of animated videos, web resources, mobile apps, and games about the physical, mental, and emotional aspects of stress, anxiety, and pain is underway. These multimedia resources highlight research-backed, non-pharmacological-based coping strategies and pain relief (e.g., mindfulness, meditation, relaxation, etc.) to help individuals manage and understand everyday stress, anxiety, and pain.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Informal Science Education, Interactive Multimedia for STEM Learning, SEPA Project Collaboration, Gaming

54. Developing and Testing Click-through vs. Work-through Versions of a PCR Virtual Lab

Louisa Stark, Kevin Pompei, Rochelle Cassells, Sheila Homburger, Kristin Fenker, Ryan Perkins, Nathan Holland, Jason Harris, Kagan Breitenbach, University of Utah

We developed and tested two versions of a virtual lab designed to educate users about the PCR process: (1) click-through, in which users advance through the lab using the button only, and (2) work-through which includes 5 steps with meaningful interactivity as well as some button advancement. The visuals and content in both versions are the same. We used three research instruments/methods. Pre and posttests measured knowledge of four learning objectives, with different items on the two tests. Users were asked to respond to two surveys: the pretest asked about their level of experience with PCR and the posttest asked about their level of enjoyment of the lab and their age (within ranges) and provided the opportunity for open-response feedback. Google Analytics was used to record location, browser, click path, and time spent on the lab as well as when and where users left the lab. Study participants were recruited via the PCR and home pages on our Learn.Genetics website. Participants were randomly assigned to one of the two versions and assigned a unique User ID for matching pre/post and analytics data. We collected data over 25 days (15,000 pretests and 5,000 posttests). The poster will report on our preliminary study findings.

Funded By:

Keywords: Curriculum Development, Curriculum Testing, Interactive Multimedia for STEM Learning, Research & Evaluation, Students: Classroom Science Enrichment

55. Natural Disasters & Health in the Midst of Covid

Charles Wood, Manetta Calinger, Debbie Tyrrell, Jackie Shia, Lori Kudlak, Laura Ondeck, Wheeling University

Natural Disasters & Health aims to use the drama, excitement - and sadly, personal experiences of many students - to teach (1) 6th to 8th graders about the injuries and illnesses commonly associated with eruptions, floods, earthquakes, tornados and hurricanes, (2) the body systems involved, and (3) the atmospheric and geological processes causing the disasters. Learning will occur during a live, role-planning simulation, in reviewing pre-mission prep lessons and in following up with PBL, career and family disaster preparation modules. Because our grant so far has largely overlapped with the Covid pandemic, most of our plans have been delayed and modified repeatedly, with work that we could do from home racing ahead of schedule. Half of our team was laid off for 6 months due to Covid. Additionally, the contractor hired to create the simulation software was delayed by Covid and also found the coding of the sim to be more challenging than expected. We continue to devise work-arounds

and reposition activities so that we still expect to complete all field testing, evaluation and writing of an academic paper by the end of our grant in Spring 2024.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Interactive Multimedia for STEM Learning, Sustainability

Research and Evaluation

56. Launching one-health research on home shores

Ellen Chenoweth, Jan Straley, Paul Cottter, University of Alaska

Rural Alaska Students in One-Health Research (RASOR) is an innovative partnership between a regional university and a tribal organizations offering students community-based research opportunities. The University of Alaska Southeast provides administrative and academic components and the Sitka Tribe of Alaska provides research expertise and lab testing. Students and mentors are engaged in place-based culturally relevant research focused on preventing paralytic shellfish poisoning, monitoring harmful algal blooms, and assessing ocean plastics. These research topics emphasize the interconnectedness of human, animal, and environmental health, a prominent feature of indigenous worldviews, known academically as the One Health concept. The Sitka Tribe of Alaskas mentor coordinator provides support to mentors. Mentors provide local cultural and geographic knowledge and serve as science role models. Students continue their learning through a distance-delivered college credit course structured with asynchronous content and twice-weekly small group work sessions with the professor. This multi-tiered and highly individualized approach has been shown to be effective in engagement and persistence of rural Alaska and Alaska Native students. With students working in their own communities, they become de facto science and RASOR ambassadors building recognition that science is accessible and relevant in rural communities.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research & Evaluation, Research Experiences for Students

57. From Modeling Glucose to the Microbiome: Making connections through Type 2 Diabetes

Joan Griswold, Atom Lesiak, University of Washington

Genes, the Environment, and Me: A Health and STEM Network (GEMNet) shares outcomes on how using Type 2 Diabetes as model system engages students in content across disciplines, creates awareness of this complex condition, and builds self-efficacy so that students can make a difference in their own lives. We also report on continued teacher professional development (in-person and on-line), and how we have expanded our interdisciplinary modules that connect T2D to diverse topics such as the microbiome, sugar and the sense of taste, issues of social justice and access to resources, and game development.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Curriculum Testing, Dissemination, Teacher Professional Development, Social Justice

58. Findings of a Pilot Program Focused on Building Vaccine Knowledge and Positive Attitudes using Podcasts in a Small Sample of Youth and Families from Diverse Backgrounds

Lindley McDavid, Loran Parker, Sandy SandMiguel, Purdue University

Youth (N = 17) who attended an afterschool program and their families (N = 17) attended three educational sessions where they listened to pre-recorded podcast interviews that featured expert discussion on vaccines. Youth completed post-surveys and family members completed pre and post surveys that included their perceptions of pod-cast engagement, vaccine knowledge, and attitudes, and the pod-cast guest. Findings will be presented coupled with a discussion on approaches to evaluation with small sample sizes that highlight voices from underserved and diverse individuals.

Funded By: NIGMS SEPA

Keywords: Informal Science Education, Research & Evaluation, Students: Out-of-School Programs

59. Gender Preference in Motivation and Learning

Chaojie Shang, Alex Moss, University of North Carolina at Greensboro
Anqi Deng, University of South Carolina

Gender preference is manifested as what students decide to engage based on their perception of gender appropriateness. Based on the Expectancy-Value (EBTV) motivation theory, the study explores the gender preference in high school students in learning scientific knowledge of caloric balance in a physical education setting. EBTV motivation and learning achievement data were collected from 207 students. A 12 item EBTV scale was used to measure the Expectancy-Belief and Task-Value motivation and two open-ended questions measured perceived cost of learning. Learning achievement was measured using a standardized knowledge test with strong evidence of validity and reliability. A MANOVA revealed that girls preference on knowledge learning elevated their knowledge test scores, mean gain score=.40 for females vs .35 for males, although both females and males were equally motivated on the EBTV basis. In addition, 2 analyses showed that more females perceived cost associated with learning than males.

Funded By: NCI YES

Keywords: Curriculum Testing, Research & Evaluation, Research Experiences for Students

Research Experiences for Students and Teachers

61. Making BrainWaves: Engaging Students in Neuroscience Investigations with Portable Brain Technologies

Ido Davidesco, Eric Loken, University of Connecticut
Steven Azeka, Teachers College - Columbia University
Jimmy Couzens, University of Worcester
Steven Carter, Fordham University
Emma Laurent, Harvard University
Henry Valk, Pison Technology
Suzanne Dikker, Wendy Suzuki, New York University

Neuroscience is a fast-growing STEM field, yet its presence in K-12 biology education is very limited. Here, we describe a new high school neuroscience curriculum (â€œBrainWavesâ€), where students utilize low-cost, portable Electroencephalography (EEG) technology to investigate their own brain activity. This semester-long curriculum is supported by science mentors and a computer application that guides students through the process of recording and analyzing data. Survey data collected in 21 public high school classrooms revealed significant positive shifts in studentsâ€™ content knowledge and science self-efficacy, but not in general science interest. The quantitative data was supplemented by semi-structured interviews, where students and teachers described both the benefits and challenges they experienced. These findings suggest that wearable brain technologies can be an effective way to engage students in authentic research that is also personally relevant, an approach that could be extended to undergraduate biology education.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Research Experiences for Students, Students: Classroom Science Enrichment

62. Making Connections: The University of Nebraska Medical Center Youth Enjoy Science Program

Regina Idoate, Aislinn Rookwood, Hannah Butler Robbins, Kiana Borengasser, Brittany Strong, Misty Pocwierz-Gaines, Liliana Bronner, Maurice Godfrey, University of Nebraska Medical Center

The University of Nebraska Medical Center Youth Enjoy Science Program (UNMC-YES) provides culture-based cancer research experiences to middle school, high school and undergraduate American Indian/Alaska Native students and educators. This poster presents a brief overview of UNMC-YES programming for students in middle school through undergraduate degree completion, mapping the various pathways of participation and highlighting the path of one UNMC-YES participant who advanced from summer camps to a research internship to work as a Public Health Scientist. The poster will report overall program evaluation data and discuss

the challenges and facilitators to longitudinal connections across all dimensions of this multi-level program.

Funded By: SEPA

Keywords: Citizen Science, Research & Evaluation, Research Experiences for Students, Students: Out-of-School Programs, Mentorship

63. NeuroLab: adopting a storyline-based approach to translate an ISE experience for high school course integration

Ralph Imondi, Linda Santschi, Integrative Biosciences Program at Coastal Marine Biolabs
Kristin Bass, Rockman et al Cooperative

NeuroLab builds upon the foundation of a prior ISE project. To expand project impacts, our focus shifted to the high school science classroom and developing a pathway for teachers to pursue a new vision of science instruction articulated in the NRC Framework and the NGSS. NeuroLab is a multi-lesson, storyline-based instructional unit that links student questions about a rare movement disorder to interconnected science concepts, ideas, and data that span a diversity of life science disciplines. In partnership with high school science teachers, we developed resources and strategies to help students build“ in stepwise fashion“ an explanatory model of the movement disorder as they pursue their questions in a collaborative classroom environment. To develop their models, students explore converging lines of behavioral, electrophysiological, neuroanatomical, molecular genetic, cellular, developmental, and neuroimaging data obtained from studies of human subjects and model organisms over the last several decades. The discoveries made by students through the analysis and interpretation of authentic data“ which includes big data presented in authoritative biomedical databases“ are assimilated into working models that form a major focus of classroom discourse. These models undergo periodic revision and increase in complexity and explanatory power as students navigate through the NeuroLab sense-making trajectory.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Curriculum Development, Students: Classroom Science Enrichment, Teacher Professional Development

65. PHAGES: Phages Helping Acquire Genuine Experiences in Science

Marisa L. Pedulla, Montana Technological University
Kate Mattern, Anaconda High School

Bacteriophages (viruses that infect bacteria) dominate the microbiological world. Phage discovery is amenable to classroom lab experiences, allowing students to directly contribute to the scientific body of knowledge as citizen scientists. Phage discovery and characterization provide information on the diversity of the biological world. Surprisingly simple phage protocols allow students to envision and experience success in scientific research. Phages also offer

alternative treatments for antibiotic-resistant bacterial infections, further motivating students to pursue phage research. Teacher leaders drawn from a previous SEPA phage program partner with mentee teachers to disseminate phage discovery beyond their classrooms. Students who participated in classroom phage discovery while in 7th-12th grades are eligible thereafter to apply for annual summer pipeline programs. High school and undergraduate students engage in full-time, paid, laboratory phage research, culminating in poster presentations and publication of annotated phage genomes in GenBank. Annual summer teacher research academies provide opportunities for scientific mentorship, collaborative research and curriculum design. A multi-year continuum of engaged learners from middle school through university scientists fosters progression of increasing research sophistication from phage discovery to genome annotation. A teacher leader will present scientific findings, student outcomes and share the programs impacts on her educational approach and school community.

Funded By: NIGMS SEPA

Keywords: Citizen Science, Research Experiences for Students, Research Experiences for Teachers, Students: Classroom Science Enrichment, Bacteriophage Discovery and Characterization

66. A Hands-on Biomedical Research Training Summer Camp with a Focus on COVID-19 for Underserved Minority High School Students

Anjan Nan, Adel Karara, Yen Dang, Barbara Goldberg, Rekha Shukla, University of Maryland EasternShore

The Maryland Action for Drug Discovery and Pharmaceutical Research Program provides hands-on lab experience and mentoring to underserved minority high school students. Despite the COVID-19 pandemic environment, we proactively planned and safely implemented a 100% in-person robust summer biomedical program with a focus on COVID-19 in addition to training in drug discovery and biomedical research. Forty-five high school students learned about the COVID-19 genomic features, mutations, infection mechanism, testing and vaccine design strategies. Students participated in hands-on COVID-19 testing using RT-PCR assays, rapid antigen and anti-body methods. Students visited a COVID-19 vaccination site, practiced how to draw the vaccine from a vial into a syringe before injecting into a simulation pad and produced educational vaccine videos addressing vaccine hesitancy. Student responses shifted significantly pre-and-post the program indicating that they had acquired better knowledge about COVID-19 disease and vaccine. Students demonstrated strong commitment and enthusiasm with near 100 % attendance. Survey data indicated that the majority of students appreciated the in-person hands-on sessions and the mentorship by the graduate students. Survey data showed that the program allowed students to explore their education and career path options and that they remained interested in health professions education and careers in life sciences.

Funded By: NIGMS SEPA

Keywords: Research Experiences for Students, COVID-19, Biomedical Research , Vaccine Hesitancy , Drug Discovery

67. Learning and Discovery in Experimental Environmental Health Science: On the Path from Data to Knowledge

David Petering, Craig Berg, Renee Hesselbach, University of Wisconsin-Milwaukee

The goal of the UW-Milwaukee SEPA program is to offer large numbers of high school students from diverse backgrounds opportunities to conduct a full range of scientific activities from research to scientific communication. We deliver the program in collaboration with in-service teachers, early career teachers emerging from our pre-service teacher emphasis, and mentor teachers. The novel underlying theme running through our program is data - the nature, acquisition, and analysis of data. Students will be able to analyze their aggregated data with the lens of introductory data science and a fully developed big data portal. Complementing this emphasis, student experimentation will be placed within a context of science and society, called environmental health civics" a history of environmental chemicals in relation to governmental regulation and chemical toxicity research. Attention will be directed toward environmental justice, particularly issues which effect Milwaukee and regional youth. The SEPA poster describes each of our experiment modules, as well as various components of the program such as current science standards that drive the program, the in-depth pre-service/in- teacher training, various student learning opportunities (e.g., research activities, Student Research Conference, data portal, etc.), and program evaluation. Supported by NIH-NIGMS grant 1R25GM142031.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Research Experiences for Students, Students: Classroom Science Enrichment, Teacher Professional Development, Pre-service teachers and fostering scientific research

68. The CIRCLE Program: A distance research opportunity for students underrepresented in science and health careers

Teresa Schiff-Elfalan, Kelley Withy, Erica Davis, University of Hawaii

Hawaii and the Pacific region face profound health and educational disparities as well as critical shortages of healthcare providers. There are not enough research mentors and opportunities to support young people with an interest in science and health careers, an essential part of ones career pathway in these fields. The Consortium for Increasing Research and Collaborative Learning Experiences (CIRCLE) program is a distance learning network to facilitate authentic scientific research experiences and mentoring between students in Hawaii & the Pacific region and distance researchers in labs across the country.

Funded By: NIGMS SEPA

Keywords: Informal Science Education, Research & Evaluation, Research Experiences for Students, Students: Out-of-School Programs

69. High School Research Initiative Expansion Project: University Research-based Inquires for Rural Classrooms

Gwendolyn Stovall, Deanna Buckley, University of Texas at Austin

Rural students and teachers are far from universities, have fewer resources, and most students are not attending college, and at the same time, there is a well-recognized need for more K-12 students to pursue STEM careers. Beginning in the Summer of 2022, the University of Texas at Austin High School Research Initiative (HRI) Expansion Project seeks to address this need by broadening the audience and reach of the original program, leveraging the infrastructure of the HRI, including the partnerships with regional high schools and partnerships with two nationally recognized models for STEM education: The Freshman Research Initiative and UTeach. To promote a diverse workforce to meet the growing health science needs of the country, the HRI Expansion Project will (1) develop and disseminate inquiry-driven science modules, which translate R1 University research, to rural high schools in the state of Texas, (2) develop a robust yearlong professional development organization for high school teachers, (3) develop a network of UT faculty scientists, undergraduate mentors, and high school teachers, and (4) determine the impact of the HRI Expansion Project activities on student knowledge and skills, attitudes towards science, enrollment in higher education, teachers abilities to mentor, and UT scientists communication and mentoring skills.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research Experiences for Students, Research Experiences for Teachers, Teacher Professional Development

70. The Appalachian Career Training In ONcology (ACTION) Program

Nathan Vanderford, University of Kentucky

Kentucky has the highest cancer incidence and mortality rates in the US with the highest burden of the disease being localized to the Appalachian region of the state. Residents of Appalachian Kentucky also experience high rates of poverty, low education attainment as well as other disparities. Through funding from the National Cancer Institutes Youth Enjoy Science R25 program, the Appalachian Career Training In ONcology (ACTION) Program at the University of Kentucky Markey Cancer Center provides enhanced cancer-focused training for high school and undergraduate students from rural Appalachian Kentucky and works to develop a better understanding of cancer through community outreach and engagement. The overarching goal of the program is to enhance the diversity of the biomedical workforce by preparing Appalachian Kentucky students for biomedical careers, increase the communitys understanding of cancer, and thereby address the cancer and education disparities in Appalachian Kentucky and beyond.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research & Evaluation, Research Experiences for Students

71. Improving Population Health Through Air Quality and Cardiovascular Health Education in Rural Communities

Tony Ward, Carolyn Hester, Anna Kiley, Dave Jones, Michael Coe, University of Montana

Children growing up in rural and medically underserved communities face unique challenges, and may not always have easy access to educational opportunities that provide experiences that cultivate biomedical knowledge and interest in scientific careers. To address this issue, we expanded upon an inquiry-based science education program. Our new program is the Research Education on Air and Cardiovascular Health (REACH) program. Through four Aims, we leverage our network of 37 teachers in 31 schools located in rural and American Indian/Alaska Native communities throughout Montana, Idaho, Alaska, Hawaii, and New Zealand. We are testing the overall hypothesis that REACH, with a focus on airborne particulate matter (PM2.5), cardiovascular and population health, can be successfully utilized in rural, underserved areas to increase middle/high students interest in careers in basic and clinical medical research.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research & Evaluation,Research Experiences for Students, Students: Classroom Science Enrichment, Teacher Professional Development

72. Learning Science Through Research

Chery Whipple, Colby-Sawyer College

The New Hampshire Academy of Science SEPA provides secondary school students access to scientific research experiences. In year two, we expanded research programs for middle and high school students at our main lab and satellite labs. We also launched our Mentor Library to link students to peers, near-peers, and scientists. Our first professional development course was implemented in May 2021 at Colby-Sawyer College (CSC) with five pre-service and three in-service teachers. In-person training focused on the evolution of science education, phenomena-based scientific instruction, the creation of engaging, inquiry-based, learning experiences, and the development of novel curricula. The class developed a mini-science lesson and 18 elementary students from area schools were brought in allowing the CSC students to practice guiding student exploration and inquiry. At the end of the in-person component, pre-service and in-service teachers were paired in teams based on research interests to develop research-based curricula together over the summer. Students implemented their novel curricula in the cooperating teachers classrooms over the fall 2021 semester and presented their results to CSC and the local education community. By the end of the course, participants planned to incorporate elements of inquiry-based teaching into their classes, and felt confident doing so.

Funded By: NIGMS SEPA

73. Bioinformatics research using existing data sets: remote programs for high school students during the pandemic

Kristine Wylie, Lauren Johnson, Reyka Jayasinghe, James Skeath, Washington University

The Washington University SEPA program partners with Saint Louis high schools to increase exposure to bioinformatics/genomics research, with the goal of increasing participation of historically excluded groups in STEM careers. During the pandemic, we created a remote classroom learning module (Research Fridays, 6 students) and a remote month-long summer research program (15 students). Both provided the opportunity for students to learn about an ongoing research project and to analyze existing genomics data sets using bioinformatics tools. Topics discussed included: considerations for human subjects research, health disparities, viral infection, inflammation, genes/genomes, and transcription. Bioinformatics concepts and hands-on activities included: sequence alignment, assembly, motif identification, comparative genomics, and statistical methods. Program evaluators found that both the high school students and their graduate student mentors were satisfied with the program; all students indicated the program met or exceeded expectations, and all mentors indicated they would like to participate in the program again. Students reported that they were provided good role models, developed competence in data analysis, and were encouraged to contribute independent, original thought. We will host another research program this summer that focuses on bioinformatics analysis of existing data sets, incorporating feedback from the students and mentors to improve the program.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Big Data/Bioinformatics, Research Experiences for Students

Rural STEM

74. Dartmouth Rural STEM Educator Partnership

Roger Sloboda, Michele Tine, Vicki May, Amanda Skinner, Lynn Foster-Johnson, Mike Fenzel, and Katherine Price, Vicki V. May, Michele T. Tine, Dartmouth College

We are addressing the challenges of teaching STEM in low-income rural areas and thus help students maintain an interest in science. Often, in such school systems students perceive that STEM has little relevance to their lives; there is minimal STEM-related infrastructure; and STEM teachers might be teaching outside the area in which they were trained. In addition, teachers have little support in the preparation of science units and lack a network of easily available STEM teachers with whom to interact. To address these issues our project design involves a collaboration between teachers as full partners with Dartmouth faculty and Montshire science educators to develop and implement NGSS aligned, active learning instructional units in the classrooms of four under-resourced middle schools in NH and VT. We are introducing engineering principles to rural STEM education as the foundational component of these units, and we are creating an online network to help promote teacher interaction in a rural environment. Finally, to enhance these activities, we enlist interested graduate students as near

peer mentors who visit our target classrooms to interact with the middle school students while the students are learning the units.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Dissemination, Students: Classroom Science Enrichment, Teacher Professional Development

75. A Model for INBRE to Reach Underserved Youth

Jamie Cornish, Robert Peterson, Montana State University
Kim Paul, Piikani Lodge Institute

MHMH will partner with three tribal colleges and 30 researchers of the NIH Montana IDeA Network of Biomedical Research Excellence (INBRE) to build a model for how INBRE networks can train their researchers to reach underserved youth. This project will design activity kits and science lessons drawing from the research of INBRE-investigators. Targeted at middle school youth, the kits will contain place-based, regionally relevant hands-on activities that will help attract underserved audiences to STEM, immerse students in ongoing research projects relevant to bioscience professions, and develop INBRE researchers and informal educators understanding of how to engage students in place-based disease ecology investigations.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Informal Science Education, Students: Classroom Science Enrichment, Students: Out-of-School Programs, Teacher Professional Development

76. Health Science & Technology Academy - Alabama

Robin Bartlett, Paige Johnson, Michele Montgomery, Mercy Mumba, Brandi Lester, The University of Alabama
Betty Key, Samford University
Bethany Hornbeck, Ann Chester, Apis Creative

The Health Science & Technology Academy - Alabama (HSTA-AL) is the first replication of the successful West Virginia HSTA program. SEPA funded in 2021, HSTA-AL has already recruited two local governing boards in the targeted counties. These boards are taking the lead in student recruitment and community representation. A robust public relations blitz by HSTA-AL and Apis Creative to announce the collaboration resulted in at least 14 radio, television, social media and professional organization newsletter stories. Apis Creative staff have provided three training events for HSTA-AL staff and community leaders, and weekly calls for brainstorming and troubleshooting between HSTA-AL leaders and Apis Creative staff members are ongoing. HSTA-AL is poised to successfully implement the student camps and clubs in the coming months as we seek to meet the goal of HSTA-AL - to build a pipeline for underrepresented students to the field of nursing and other biomedical sciences, teaching them to become change agents in their communities. This poster will highlight early HSTA-AL successes.

Funded By: NIGMS SEPA

Keywords: Citizen Science, Research & Evaluation, Research Experiences for Students, Teacher Professional Development

77. Imagining Possibilities - Year 2

Melinda Gibbons, Erin Hardin, University of Tennessee, Knoxville

Imagining Possibilities provides postsecondary and STEMM awareness programming for rural Appalachian high school students in Tennessee. Our multipronged approach includes multi-week programming for all 9th and 10th graders, optional summer camp experiences, near peer role models, professional development opportunities for science teachers, and an optional college-prep course for 12th graders. We will share how we pivoted during COVID and returned to in-class experiences this year and provide an overview of our curriculum. Feedback from staff and students plus next steps in our programming will also be provided.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research & Evaluation, Teacher Professional Development

78. Assessing Cancer Literacy and Risk Behaviors among Appalachian Kentuckians through an Oral History Approach

Courtney Martin, Nathan Vanderford, University of Kentucky

Kentucky ranks first in the nation in cancer incidence and mortality with the greatest of these disparities being found in the Appalachian region of the state. Using an oral history approach, we aimed to better understand cancer in the region through individual perspectives. This study aimed to assess cancer literacy and health behaviors and examine how these factors may be contributing to the cancer epidemic. Using convenience sampling, we recruited individuals from within the community that identified as currently residing in or having strong ties to the Appalachian region. Participants exhibited varying experiences with cancer, including a personal diagnosis, personal experience outside of their own such as that of a family member and/or working in a cancer-related field. Interview responses were analyzed using qualitative content analysis and categorized into themes, subthemes, and subtopics, respectively. Themes that emerged include cancer literacy; experiences with cancer; impressions of the healthcare system; cancer risk behaviors and influences thereof; factors that influence healthcare-seeking behaviors; potential solutions; and Appalachian characteristics. Our findings demonstrate the need for educational interventions, healthcare outreach, increased access, the development of recreational infrastructure, social support systems, and the need to address the cancer problem from within the region itself. These changes can take on various forms, such as integrating cancer education into the curriculum of schools, creating policies focused on expanded access to healthcare facilities and/or recreational activities for community members, and using

Appalachian voices as part of the solution. Overall, if acted upon, these changes have the potential to reduce the cancer burden in this area.

Funded By: NIGMS SEPA

Keywords: Citizen Science, Dissemination, Informal Science Education, Research & Evaluation

Student Science Enrichment

79. ESTA: Environmental Science Through the Arts project rollout

Daniel Fernandez, Enid Ryce, Corin Slown, Amir Attia, Viviana Vigil, Kenneth Tran, Eros Gonzalez-Lopez, Kariya Hunter, Brenda Eskenazi, Beth Callaghan, California State University Monterey Bay
Asa Bradman, University of California, Merced

Over the past two years, our NIGMS/SEPA project has been gathering STEAM as we pull together arts-based content activities, relevant science and human health content, and engaged regional teachers to generate and roll out content and activities related to our yearly themes. This year our theme has been on the human health dimensions of plastic pollution in the environment. Over the course of the past year, despite the pandemic, we have engaged over 30 regional teachers in four online and three in-person workshop on these themes. Alongside our partners, the Monterey Bay Aquarium and Artists Ink, our teachers have developed relevant curriculum that successfully integrates many dimensions of art and human health within their classes. We have also partnered with an organization called Litterati to work with not only our teachers, but teachers in a campaign on Earth Day across the entire state of California, to engage their students on a platform at Litterati.org that allows participants to collect, digitally photograph, identify and track litter that they find. This allows a visceral connection between the activity of litter collection, artistic renderings of it to expand awareness, and the implications for how human health is impacted by dispersal of plastics.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Research Experiences for Students, Research Experiences for Teachers, Sustainability

80. Hk Maker Lab Virtual Summer Design Camp

Aaron Kyle, Michael Carapezza, Columbia University

Like many outreach activities throughout the country, the Hk Maker Lab at Columbia University has had to adapt its programs in response to the constraints of the COVID-19 pandemic. Our summer design camp usually entails having high school students from throughout New York City come to Columbias campus for an immersive six-week program in which they are introduced to the engineering design process (EDP) and apply the process to the development of prototype solutions to biomedical problems. The pandemic prohibited in-person instruction in

the 2020 and 21 summers, so we converted the Hk Maker Lab program into a Summer Design Camp. Through a combination of virtual workshops and laboratory sessions, home circuits kits, and computer assisted-drafting tutorials, we were able to convert our in-person instruction into a remote program. Furthermore, students were still able to collaboratively work with their classmates to solve real-world problems. Pre- and post- virtual program assessments indicated that students exhibited (a) the gains in engineering identity that we have traditionally observed and (b) post-program positive attitudes comparable to our in-person program. These outcomes indicate that, despite the requisite instructional sacrifices, we have successfully translated our EDP Summer Design camp into a virtual format.

Funded By: NIGMS SEPA

Keywords: Students: Out-of-School Programs, Students: Engineering Enrichment

81. University of Puerto Rico STEM Asthma Awareness Program

Orestes Quesada, Michelle Borrero, Edjean Calderon, University of Puerto Rico San Juan

Our Project aims to develop a program for the training and education in STEM of teachers from public and private schools in Puerto Rico. We propose an innovative combined approach that includes not only the traditional training of teachers in STEM fields, but one in which teachers and students are integrated and involved in researching a particular health problem that concerns everyone in the Puerto Rican society. Puerto Rico, due to its geographic location and its inherent climate, has one of the highest asthma rates per inhabitant worldwide (16.1%) and this situation increased after the passage of Hurricane MarÃ-a in 2017 and will be worsen by the actual COVID-19 pandemic. Our proposal reconciles the efforts and resources of the University of Puerto Rico (UPR) in San Juan, the Molecular Sciences and Research Center (MSRC), the Puerto Rico Department of Health, and the Puerto Rico Department of Education (PRDE). The main goal is to, while generating awareness of asthma, increase the number of STEM teachers engaged in science practices that will enable them to teach science through research and take on an active role in the preparation of students to be incorporated in knowledge-based societies as a highly educated labor force.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Research Experiences for Students, Research Experiences for Teachers, Students: Classroom Science Enrichment, Teacher Professional Development

82. UQUEST: Questioning, Understanding, Experiencing, and Scientific Thinking

Patrice Saab, Maria M. Llabre, Rafael Leite, Manuela Jaramillo, William Pacetti, Veronica Fernandez University of Miami

Fabiola Jean Pierre, Jeanine Houston, Diana Santangelo, Overtown Youth Center

UQUEST (Questioning, Understanding, Experiencing, and Scientific Thinking) is a science methods research education project for 2nd-5th graders, to motivate interest and competence in

science through health research activities. The curriculum includes lessons delivered by trained near peer mentors (93% from ethnic minority backgrounds). Each lesson covers a science methods concept, engaging activity, and health message. UQUEST is implemented in the Overtown Youth Center afterschool program, which serves underrepresented children. During the first year of implementation, the consent/assent process was completed for a total of 78 children (i.e., UQUEST scientists). Over 90% attended 1 or more lessons. The research project compares teaching strategies differing in emphasis on training the UQUEST scientists to ask questions. Evaluation includes observations, questionnaires, test scores, and grades to document the feasibility and efficacy of the program.

Funded By: NCI YES

Keywords: Curriculum Development, Informal Science Education, Research & Evaluation, Students: Out-of-School Programs

83. Xavier University of Louisiana's-Mobile Outreach for Laboratory Enrichment (XULA-MOLE)

Abha Verma, Rachel Wallace, Nelson Brown, Xavier University of Louisiana

This project is a collaboration between Xavier University of Louisiana (XULA) and New Orleans high schools. The project focus is on providing Mobile Outreach for Laboratory Enrichment (MOLE) as a mechanism to enhance student interest and learning in science activities and directly increase student career interest for the biomedical sciences and STEM fields. The XULA-MOLE project will augment science teaching for high school teachers and provide training in designing a research project to extend their scientific research skills and applied STEM knowledge base in the classroom.

The strategy for attaining the projects objectives is a four-prong teacher-student-undergraduates approach that includes (i) an inquiry-based research experience for high school students, (ii) professional development opportunities for high school teachers in classroom pedagogy as well as training in research project design during the summer, (iii) a near-peer mentoring program for training XULA undergraduate students to serve as effective mentors for high school students and (iv) field trips to Xavier research labs to expose high school students to research in the biomedical sciences and health disparities.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Research Experiences for Students, Students: Classroom Science Enrichment, Teacher Professional Development

Teacher Professional Development

84. The NH Collaborative for Regenerative Medicine Education and Training for Engineers and Scientists of the Future

Carmela Amato-Wierda, Amy Booth, University of New Hampshire
Alison Allen, Rockman et al
Eleanor Jaffee, Insights Evaluation LLC

The NH Collaborative for Regenerative Medicine Education and Training for Engineers and Scientists of the Future (NH CREATES) is taking a three-pronged approach to establish a robust pipeline for the regenerative manufacturing industry: a teacher professional development institute for middle/high school teachers around the foundational topics of regenerative medicine (RM&B) (aim 1); summer youth programs for middle/high school students (aim 2); and development of an education-industry ecosystem (aim 3).

Our first-year cohort included four teachers and 30 youth. Teachers designed projects around the concepts of RM&B that they implemented in their classrooms during academic year 2021-22. We will share results from surveys that explored the use of PBL in teaching RM&B content.

Zoom or in-person meetings were conducted introducing NH CREATES to schools, community organizations that serve under-represented youth in NH schools, NH INBRE (IDeA Networks of Biomedical Research Excellence), and ARMI (Advanced Regenerative Manufacturing Institute), a consortium of world-wide companies setting the roadmap for this industry. We also interviewed 17 key informants from multiple sectors to evaluate theRM&B ecosystem at baseline. Social network analysis will identify assets, capacities, connections, and growth opportunities to inform the development of an inclusive and sustainable ecosystem over the next five years.

Funded By: NIGMS SEPA

Keywords: Broadening Participation, Curriculum Development, Students: Out-of-School Programs, Teacher Professional Development

85. Virtual compared to in-person inquiry based education of teachers

Katie Busch Chandran, J. Michael Wyss, University of Alabama at Birmingham

Pre-pandemic, Science Education Enabling Careers (SEEC) offered successful, in-person, one-week, 4th-6th grade, summer professional development programs with strong hands-on training and learning. COVID restriction in 2020 required transition to a fully online professional development program, with hands-on kits sent to participating teachers. The 2020 and 2021 virtual programs received very favorable participant feedback (n=40) for workshop quality, usefulness, and ability to improve self-confidence and self-efficacy. >90% of participants agreed or strongly agreed with 10 positive statements about the workshops effectiveness. Pre-workshop, only 25% of participants rated their skills in facilitating inquiry-based science as very

good to excellent, but after the workshop 95% rated themselves as very good to excellent in these skills. Comparison of the virtual vs. in-person versions showed no significant differences in satisfaction or learning outcomes. For the summer of 2022, we designed two sessions of this professional development workshop (virtual vs. in-person) to head-to-head test the potential benefits and drawbacks of a virtual vs. in-person training, specifically when the training has a major hands-on component. In-person training is favored by many, largely due to personal networking gained, but the virtual framework provides an excellent alternative for providing PD to rural and other locations distant from PD sites.

Funded By: Bill and Melinda Gates Foundation

Keywords: Broadening Participation, Curriculum Testing, Dissemination, Sustainability, Teacher Professional Development

86. Teachers' Design of Molecular Stories: Outcomes of a Two-Week Long Protein Modeling Professional Development Workshop

Kathleen Hill, Amber Cesare, Neela Yennawar, Tiffany Lewis, Hemant Yennawar, Amie Boal, Ira Ropson, Pennsylvania State University

The Shaping Authentic Practices by Engaging in Modeling of Topic with Teachers to Explore Research in Science (SHAPE MATTERS) hosted a ten-day professional development workshop in the Summer of 2021 that leveraged the work of molecular biology and chemistry researchers at Penn State in order to engage teachers in exploring and modeling molecules of interest. As an outcome of the workshop, the teachers designed a molecular story based on their host mentors research for classroom implementation. Of the four teachers who implemented their classroom research projects, three of the four teachers chose to implement a molecular story that was not related to their host labs work. For our upcoming workshop, we have taken steps to further support teachers in designing molecular stories related to their research hosts lab.

Funded By: NIGMS SEPA

Keywords: Curriculum Development, Teacher Professional Development

87. The Phenomenal Genome: Evolving Public Understanding of Genetics in the Post-Mendelian Era

Hilleary Osheroff, Kristina Yu, Exploratorium

In an age of personalized medicine, gene-based therapies, and direct-to-consumer personal genetic testing, foundational public understanding of genomics is a necessity. Much of the teaching and learning of the science of inheritance and biological variation is stuck in a historical Mendelian framework, in which traits ostensibly controlled by a single gene are the primary focus. Todayâ€™s students and the general public are being taught a simplified model of inheritance and biological variation that is out-of-sync with contemporary research and knowledge. The Phenomenal Genome will address this gap in understanding by providing

teachers and informal science educators with guidance on teaching genetics in a post-Mendelian framework, and will disseminate these findings to the field.

Funded By: NIGMS SEPA

Keywords: Informal Science Education, Teacher Professional Development

88. Science Teaching Excites Medical Interest (STEMI) – Trajectory and Impact

Rob Rockhold, Marie Barnard, Caroline Compretta, Erin Dehon, Janet Donaldson, Judy Gordy, Edgar R. Meyer, Andrew Notebaert, Stephen Stray, Donna Sullivan, Juanyce Taylor, The University of Mississippi

The Science Teaching Excites Medical Interest (STEMI) was developed to increase awareness of and competency in delivery of flipped classroom instructional methods by Mississippi high school teachers. STEMI has directly interacted with 25 high school STEM educators from 16 schools across central Mississippi, impacted education at public/private, large/small, urban/rural, and secular/ecumenical schools. The nature of the flipped classroom training that was provided by STEMI emphasized familiarity with remote teaching technology and virtual learning. When Mississippi schools were forced to implement virtual learning during the COVID pandemic, STEMI-trained teachers already were fluent in the use of a variety of technology software and implementation of flipped classroom techniques and reported this made them better prepared for the transition than their teaching peers who had not participated in this kind of professional development. This afforded teachers with opportunities to adopt different technology in teaching and foresee the need for technology integration in order to better prepare for the unexpected in future.

Funded By: NIGMS SEPA

Keywords: Teacher Professional Development

89. Teaching the Genome Generation: Cultivating High School Genomics Through Teacher Education

Christina Vallianatos, Emaly Piecuch, Alexa Wnorowski, Erica Gerace, Alison Kieffer, Sarah Wojiski, Charlie Wray, The Jackson Laboratory

Teaching the Genome Generation (TtGG) provides pre-service and current high school teachers the content knowledge, teaching strategies, and resources needed to enhance student learning in genomics, bioethics, and bioinformatics, with an emphasis on math and data literacy. Our program provides instruction in the molecular genetics of personalized medicine, the use of bioinformatics tools that incorporate statistics and data analysis, and the discussion of the ethical, legal, and social implications surrounding genetics research. In collaboration with partners in higher education, TtGG provides pre-service teachers with the opportunity to participate in our hands-on short course and engage with and practice teaching our curriculum through instructional methods coursework and student teaching experiences. Our innovative

approach weaves three learning strandsâ€”molecular genetics, bioinformatics, and bioethicsâ€”together within the context of the Next Generation Science Standards and Common Core Math Standards. Current evaluation efforts are examining the impact of the TtGG materials on studentsâ€™: a) content knowledge of genetics and genomics; b) confidence engaging in genomics concepts and lab activities; c) and interest in engaging in additional genomics-related opportunities, including academic and career pursuits. By training pre-service educators, TtGG executes NIHs goal of strengthening the future STEM workforce through increasing genomic and health literacy.

Funded By: NIGMS SEPA

Keywords: Big Data/Bioinformatics, Curriculum Development, Research & Evaluation, Teacher Professional Development

90. The Science and Ethics of Genome Engineering

Tim Herman, Mark Hoelzer, Diane Munzenmaier, Center for BioMolecular Modeling

This poster highlights several components of our current SEPA project including: (i) our pivot in the past two years to generate instructional materials and videos related to the Science of Coronaviruses, (ii) the development of two hands-on kits useful in teaching CRISPR-based genome editing and (ii) lessons learned in converting our 5-day in-person summer workshops into an interactive 5-session virtual experience.

Funded By: NIGMS SEPA

Keywords: Interactive Multimedia for STEM Learning, Students: Classroom Science Enrichment, Sustainability, Teacher Professional Development

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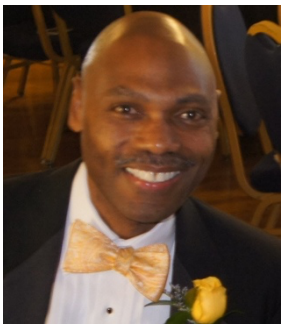

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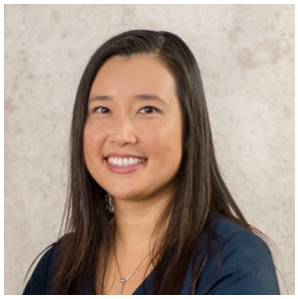

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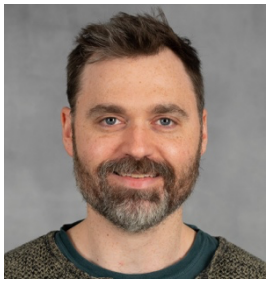

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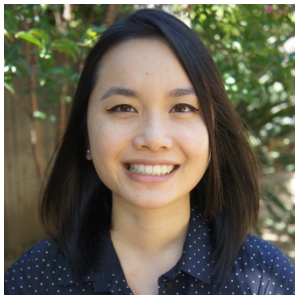

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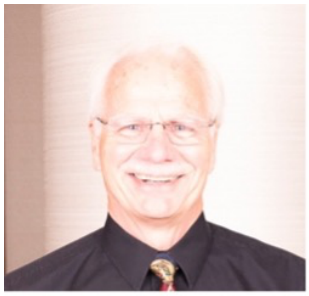

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Common Acronyms and Abbreviations

HHS	U.S. Department of Health & Human Services
AHRQ	Agency for Healthcare Research and Quality
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare & Medicaid Services
FDA	U.S. Food and Drug Administration
HRSA	Health Resources & Services Administration
IHS	Indian Health Service
NIH	National Institutes of Health
PHS	Public Health Service • SAMHSA - Substance Abuse and Mental Health Services Administration
NIH	National Institutes of Health ICs – NIH Institutes and Centers

Abbreviation	CODE	NIH Institutes
NCI	CA	National Cancer Institute • YES – Youth Enjoy Science Research Education Program
NEI	EY	National Eye Institute
NHLBI	HL	National Heart, Lung, and Blood Institute
NHGRI	HG	National Human Genome Research Institute • Genome – commonly used name for NHGRI
NIA	AG	National Institute on Aging
NIAAA	AA	National Institute on Alcohol Abuse and Alcoholism
NIAID	AI	National Institute of Allergy and Infectious Diseases
NIAMS	AR	National Institute of Arthritis and Musculosketal and Skin diseases
NIBIB	EB	National Institute of Biomedical Imaging and Bioengineering
NICHD	HD	Eunice Kennedy Shriver National Institute of Child health and Human Development
NIDCD	DC	National Institute on Deafness and Other Communication Disorders
NIDCR	DE	National Institute of Dental and Craniofacial Research
NIDDK	DK	National Institute of Diabetes and Digestive and Kidney Diseases
NIDA	DA	National Institute on Drug Abuse
NIEHS	ES	National Institute of Environmental Health Sciences
NIGMS	GM	National Institute of General Medical Sciences
NIMH	MH	National Institute of Mental Health

NIMHD	MD	National Institute on Minority Health and health Disparities
NINDS	NS	National Institute of Neurological Disorders and Stroke
NINR	NR	National Institute of Nursing Research
NLM	LM	National Library of Medicine
CC		NIH Clinical Center
CIT		Center for Information Technology
CSR		Center for Scientific Review • CSR manages for annual SEPA and SEPA SBIR/STTR STEM Games reviews
FIC		Fogarty International Center
NCATS	TR	National Center for Advancing Translational Sciences • CTSA – Clinical and Translational Science Awards
NICCIH		National Center for Complementary and Integrative Health

NIGMS – National Institute of General Medical Sciences

DRCB	Division for Research Capacity Building Dr. Ming Lei, Director
IDeA	Institutional Development Awards • INBRE – IDeA Networks of Biomedical Research Excellence • COBRE – Centers of Biomedical Research Excellence • IDeA Program Infrastructure for Clinical and Translational Research (IDeACTR) • STTR Regional Technology Transfer Accelerator Hubs for IDeA States
NARCH	Native American Research Centers for Health
SCORE	Support of Competitive Research Program
SEPA	Science Education Partnership Award Program
TWD	Division of Training, Workforce Development, and Diversity Dr. Alison Gammie, Director
Bridges	Bridges to the Baccalaureate Bridges to the Doctorate
BUILD	Building Infrastructure Leading to Diversity Career Development Awards
IMSD	Initiative for Maximizing Student Development
IRACDA	Institutional Research and Academic Career Development Awards
K99 □ R00	Pathway to Independence Award
MARC U*STAR	Undergraduate Student Training in Academic Research
NRMN	National Research Mentoring Network
NRSA-Fs	Individual Predoctoral National Research Service Award Fellowships
NRSA-F32	Individual Postdoctoral National Research Service Award
NRSA-T32	Institutional Predoctoral National Research Service Award
PREP	Postbaccalaureate Research Education Program

RISE	Research Initiative for Scientific Enhancement

NIH Grant-Associated Terms

AOR	Authorized Organization Representative
ASSIST	Application Submission System & Interface for Submission Tracking
COI	Conflict of Interest
DUNS	Data Universal Numbering System
EIN	Entity Identification Number
F & A	Facilities and Administrative Costs (also referred to as Indirect Costs)
FOA	Funding Opportunity Announcement
FOIA	Freedom of Information Act
FSR	Financial Status Report (SF-269 or 269A
FTE	Full-Time Equivalent
GMO	Grants Management Officer
GMS	Grants Management Specialist
NoA	Notice of Award
PA	Program Announcement
PAR	Program Announcement Reviewed in a Institute
PO	Program Official
RFA	Request For Applications (Grants)
RPPR	Research Performance Progress Report
SBIR	Small Business Innovation Research
SRG	Scientific Review Group
SRO	Scientific Review Officer
STTR	Small Business Technology Transfer

NSF – National Science Foundation

EHR	Education and Human Resources
DRL	Research on Learning in Formal and Informal Settings
AISL	Advancing Informal STEM Learning
ATE	Advanced Technological Education
CSforAll:RPP	Computer Science for All
DR-K12	Discovery Research PreK-12
ECR	EHIR Core Research
ITEST	Innovative Technology Experiences for Students and Teachers
S&CC	Smart and Connected Communities
STEM+C	STEM + Computing K-12 Education

EA	Educational Technologies and Applications • STEM Games SBIR/STTR

America's Seed Fund
Other Federal Agencies Involved in STEM Education

ED	U.S. Department of Education • IES – Institute of Education Sciences • STEM Games SBIR/STTR
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
USDA	Unites States Department of Agriculture • NIFA – National Institute of Food and Agriculture