

NIH SciEd²³



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 behavior 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 or Kristin Bass, SciEd 2023 Conference Organizing Committee Chairs, either in-person or via email at louisa.stark@utah.edu or kristin@rockman.com. Unacceptable behaviors may also be reported to any member of the Conference Organizing Committee (see next page).

Conference Organizing Committee

Conference Co-Chairs

- 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
- Kristin M. Bass, PhD, Director of Research Development, Rockman et al Cooperative

Broadening Participation Strand

- Luke Bradley, PhD, Professor of Neuroscience and of Molecular and Cellular Biochemistry, University of Kentucky
- Sunita Chaudhary, PhD, Associate Professor of Surgery, Rutgers Robert Wood Johnson Medical School
- Virginia Stage, PhD, RDN, LDN, Associate Professor of Nutrition Science, East Carolina University;

Curriculum Development Strand

- Jeanne Chowning, PhD, Senior Director, Science Education, Fred Hutchinson Cancer Research Center
- Carla Romney, DSc, MBA, Boston University School of Medicine

Informal Science Education Strand

- Jacquie Genovesi, PhD, Executive Director, Center for STEAM Equity, Research Professor, School of Education, Drexel University
- Laycca Umer, MS, Manager, Research, Exhibits & Programs, New York Hall of Science
- Nathan Vanderford, PhD, Associate Professor, University of Kentucky

Interactive Multimedia for STEM Learning Strand

- Amir Attia, PhD, Assistant Professor, Communication Design, The School of Computing and Design, California State University, Monterey Bay
- Brinley Kantorski, PhD, Director of Education and Multimedia Development at The Partnership in Education, Duquesne University
- Ailea Stites, Community and Youth Engagement Director, Ci3 at the University of Chicago

Project Administration Strand

- Maurice Godfrey, PhD, Professor, Munroe-Meyer Institute, University of Nebraska Medical Center
- Bethany Hornbeck, President, Apis Creative

Research and Evaluation Strand

- Alison Allen, MEd, Senior Research Associate/ Research Manager, Rockman et al Cooperative, Inc.
- Lindley McDavid, PhD, Senior Evaluation and Research Associate, Purdue University
- Alana Newell, PhD, Assistant Professor of Education, Innovation and Technology, and Center for Educational Outreach, Baylor College of Medicine

Research Experiences for Students and Teachers Strand

- James Breeden, Operations Director: K-12 and Community Programs, Texas A&M University

- Carolyn Cannon, PhD, Associate Director, Texas A&M School of Medicine MD/PhD Program, Texas A&M University
- Bruce Nash, PhD, Assistant Director for Science, DNA Learning Center, Cold Spring Harbor Laboratory

Science Teaching and Learning Strand

- Melani Duffrin, PhD, RDN, Professor of Health Sciences, Northern Illinois University
- Debra Yourick, PhD, Director, Science Education and Fellowship Programs, Walter Reed Army Institute of Research

Teacher Professional Development Strand

- Sarah Wojiski, PhD, Director of Education, The Jackson Laboratory
- Rosemary Riggs, PhD, Education Outreach Programs Manager, Texas Biomed

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 Sciences
- 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 Map

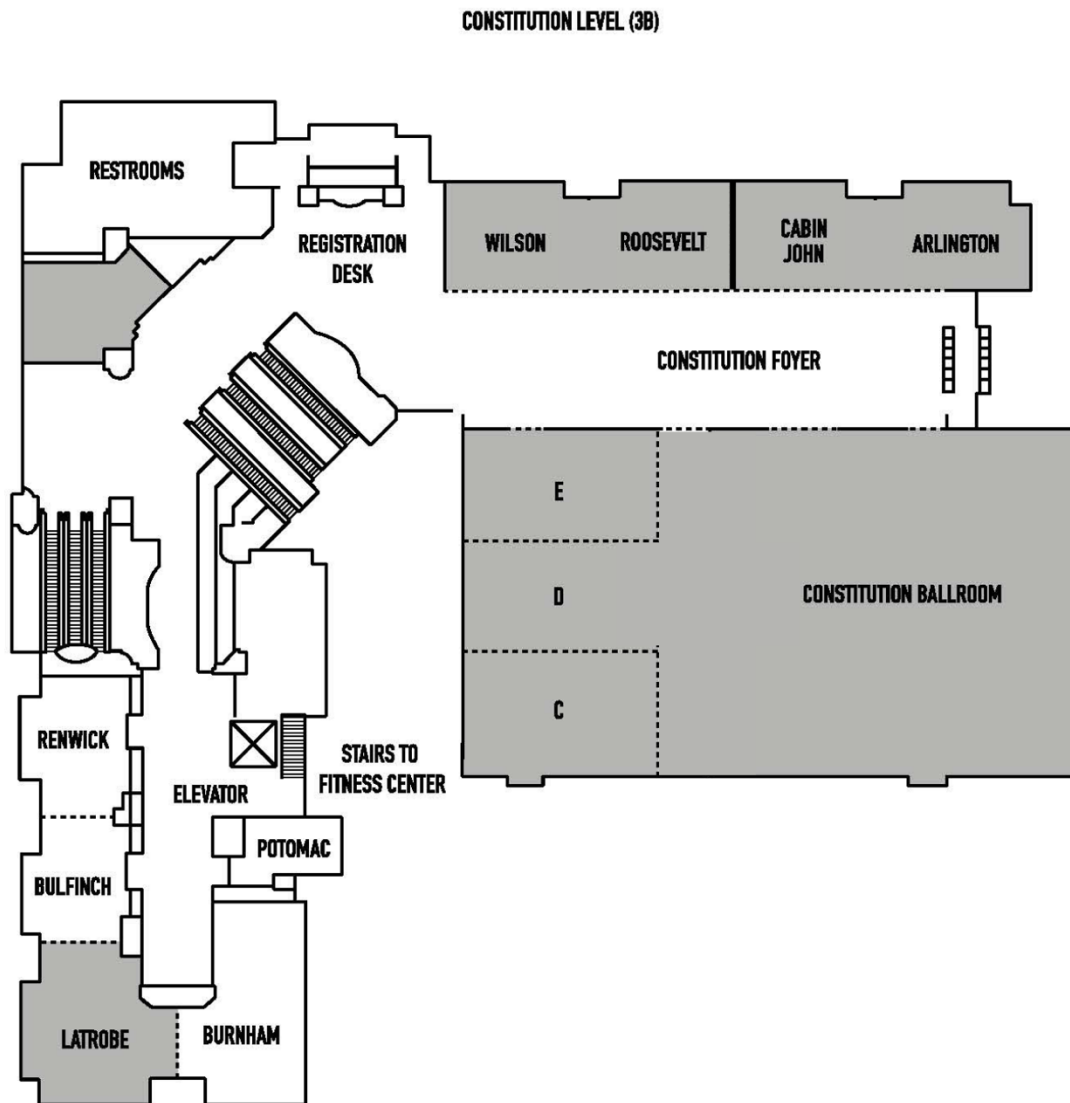


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Schedule

SciEd 2023: Annual Conference for NIH Science Education Projects

Grand Hyatt Washington at Metro Center
1000 H Street NW, Washington, DC
May 30 – June 2, 2023

Twitter: #SCIED2023

Live Stream for plenary sessions: SEPA YouTube channel: <https://nihsepa.org/annual-meeting/nih-scied-2023-annual-conference-for-nih-science-education-projects/>

Health Matters:

- Masks and Covid-19 test kits are available on request at the conference registration desk

On-Your-Own Evening Activities during the Conference:

- See page 20 of the conference schedule

Tuesday, May 30

5:00-7:00 **Conference Check-in**
Grand Foyer (Declaration Level, 1B)

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

Wednesday, May 31

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

7:15-8:30 Breakfast and Poster Set-up

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

8:30-8:45 **Welcome**
NIH SciEd 2023 Conference Co-Chairs:
Louisa A. Stark, PhD, Professor of Human Genetics and Director, Genetic
Science Learning Center, University of Utah
Kristin Bass, PhD, Director of Research Development, Rockman et al
Cooperative Inc.

- 8:45-9:15 **Networking Activity:** Begin making connections!
Facilitator: James Breeden, Operations Director: K-12 and Community Programs, Texas A&M University
- 9:15-10:30 **Keynote Panel: Near-peer Mentoring: Reflections from Experience**
Facilitator: Debra L. Yourick, PhD, Director, Science Education and Fellowship Programs, Walter Reed Army Institute of Research
Panelists: Lynijah Russell, Jackline Joy Martin Lasola, Himali Gujrati, Alassane Twille, Trevor Laffin, Emonie Hall, Brea Chew
- 10:30-10:45 Break
- 10:45-12:00 **Concurrent Breakout Sessions**
- Approaches for Integrating Peer Mentors into Biomedical Training Programs**
Lisa Marriott, Oregon Health & Science University; Dave Vannier, Fred Hutchinson Cancer Center; Regina Idoate, University of Nebraska Medical Center; M. Eileen Dolan, University of Chicago Medicine Comprehensive Cancer Center; Renee Boney-Jett, University of Minnesota; Nathan Vanderford, University of Kentucky; Christopher Sistrunk, City of Hope; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center
Strand: Research Experiences for Students and Teachers
Room: Constitution C
- Brain-Based Learning Principles: A Theoretical Framework for Guiding Teaching Practice**
Melani Duffrin and Trevor Laffin, Northern Illinois University, and Debra Yourick, Walter Reed Army Institute of Research
Strand: Science Teaching and Learning
Room: Constitution E
- Career Awareness in SciEd Projects: Supporting Middle and High School Students' Awareness of Biomedical, Behavioral and Clinical Research Career Options**
Irene S. Bayer, Michigan State University; Melinda M. Gibbons, University of Tennessee; Tania Jarosewich, Censeo Group; Consuelo Morales, Michigan State University; Maria Salinas, Michigan State University; and Andreia F. Dexheimer, Sharon M. Locke, Georgia Bracey, Ben K. Greenfield, Jennifer L. Zuercher, Carol E. Colaninno, Candice L. Johnson, and Charlie Blake, Southern Illinois University, Edwardsville
Strand: Broadening Participation
Room: Roosevelt/Wilson
- FILTERED: An Online Game to Introduce Bioinformatics Conceptually**
Michele Morris and Madelene Loftin, HudsonAlpha Institute for Biotechnology
Strand: Interactive Multimedia
Room: Latrobe

Tried and True Measures - What Do You Use?

Lindley McDavid, Purdue University; Alana Newell, Baylor College of Medicine; Alison Allen, Rockman et al; Sam Chuisano, Bianca Barraza, Hannah Knoll, Hasan Khan, and Morenikeji Ojubanire, University of Michigan; Blessing Fanegan, University of Cincinnati; Melissa DeJonckheere, University of Michigan

Strand: Research and Evaluation

Room: Arlington/Cabin John

“Lemonade Stands” – Curricula and Multimedia Materials

Strands: Curriculum Development & Interactive Multimedia

Room: Constitution Ballroom A/B

TABLE	TITLE	AUTHORS	GRADE LEVEL
1.	Co-Creating Rural Biomedical & STEM Curriculum	Matt Queen, Montana State University Billings; Amanda Obery, Central Washington University	5 th grade
2.	PLANT ON A RAMPAGE! Evolutionary scientists to the rescue!	Anna Thanukos and Lisa D. White, University of California Museum of Paleontology; Teresa MacDonald, University of Kansas Natural History Museum	Upper elementary & middle school
3.	Worlds of Connections - VR	Julia McQuillan, Meghan Leadabrand, Trish Wonch Hill, and Sam Bendix, University of Nebraska; William Freudenheim, Game Developer	Grades 5-10; older youth & adults
4.	<i>Cells in Context</i> Middle School Curriculum Unit	Molly Malone, Sheila Homburger, Kristin Fenker, Jen Taylor, Kaile Akina, Pete Anderson, Kagan Breitenbach, Jonathan Conger, Dina Drita, Jason Harris, Jonny Holmgren, Max Kelly, Ann Lambert, Ryan Perkins, Julia Peterson, Kevin Pompei, Brooklee Watters, and Louisa Stark, University of Utah	Middle school
5.	The Scientist Spotlights Initiative: Teaching Science Content through Curricular Supplements that Feature Counter-stereotypical Scientists and Engage Students with Written Reflections	Lucy Luong and Kimberly Tanner, San Francisco State University	Grades 6-12; college
6.	3DMD AR App - Augmenting Physical Materials	Heather Ryan and Tim Herman, 3D Molecular Designs	Middle & high school

7.	Mystery of the Monkeyflowers	Consuelo Morales and Irene S. Bayer, Michigan State University	High school
8.	Multimedia Tutorials and Resources for Educators and Students to Build 3-Dimensional Models of Molecules	Kathleen M. Hill, Amber Cesare, and Tiffany Lewis, Pennsylvania State University	High school
9.	Frontiers in Cancer Research Curriculum Showcase	Kristen Bergsman, Regina Wu, and Jeanne Chowning, Fred Hutchinson Cancer Research Center	Grades 9-12; PD providers for high school science teachers
10.	Facilitating High School Work-Based Experiences to Improve Health Equity	Julia Boge, Megha Ramaswamy, Maria Alonso Luaces, and Lisa Sanderson Cox, University of Kansas School of Medicine; Karin Chang, University of Missouri-Kansas City	High school
11.	Teaching the Genome Generation: Human Genetic Variation Virtual Lab Experience	Christina Vallianatos, Alexa Wnorowski, Charlie Wray, and Sarah Wojiski, The Jackson Laboratory	Grades 9-12; undergraduate
12.	Hexacago Health Academy 2.0: Game Design for Public Health	Jessica Wilks, Mason Arrington, Ailea Stites, and Patrick Jagoda, Ci3 at the University of Chicago	

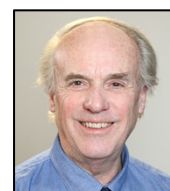
12:00-1:15 Lunch

- *Closed lunch session for NCI R25 Youth Enjoy Science program*
 - *Room: Constitution C*
- *SEPA Mentor-Mentee meetings over lunch: Group 1*
 - *See table and room assignments in the conference program*

NIH Updates

1:15-1:35 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



1:35-1:50 SEPA Grant Proposal Review

[Thomas Cho](#), PhD, Health Science Administrator (Scientific Review Officer), Science Education Partnership Award (SEPA), Cell and Developmental Biology Review Branch, Division of Basic and Integrative Biological Sciences, Center for Scientific Review, NIH



1:50-2:10 **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



2:10-2:30 Break

2:30-3:45 **Concurrent Breakout Sessions**

Benefits, Burdens, and Badges: Navigating the NGSS EQuIP Review Process for Your Curriculum

Kristen Bergsman, Regina Wu, and Jeanne Chowning, Fred Hutchinson Cancer Center

Strand: Curriculum Development

Room: Roosevelt/Wilson

Harnessing Empathy as a Tool for Promoting Inclusive STEM Learning

Kathleen M. Gray, Jenna Hartley, Dana Haine, and Kelly Ryoo, University of North Carolina at Chapel Hill

Strand: Broadening Participation

Room: Constitution E

Longitudinal Tracking of Program Participants

Priya Mohabir, New York Hall of Science; Catherine Morton, West Virginia University

Strand: Program Administration

Room: Constitution C

Obstacles in Implementation and Evaluation of COVID Vaccine Hesitancy Educational Materials

Katie Busch, University of Alabama at Birmingham; Brinley Kantorski, Duquesne University; Dina Markowitz, University of Rochester; Julia McQuillan, University of Nebraska-Lincoln; Elizabeth Parker, University of Maryland

Strand: Curriculum Development

Room: Arlington/Cabin John

Teacher Recruitment, Retention, and Engagement: Overcoming Challenges in Teacher Professional Development

Sarah Wojiski, The Jackson Laboratory; Alana Newell, Baylor College of Medicine; Virginia Stage, North Carolina State University; Paul Wright, Northern Illinois University

Strand: Teacher Professional Development

Room: Latrobe

Perspectives and Lessons Learned from National Cancer Institute Youth Enjoy Science (YES) Programs

Nathan L. Vanderford, University of Kentucky, Markey Cancer Center; David Boone, University of Pittsburgh Medical Center, Hillman Cancer Center; Michael Wyss, University of Alabama, Birmingham; Regina Idoate, University of Nebraska Medical Center; Eileen Dolan, University of Chicago Comprehensive Cancer Center; Anna Marsden, University of Utah, Huntsman Cancer Institute; Belem G. López and Sangeeta Ghosh, National Cancer Institute, Center to Reduce Cancer Health Disparities, Diversity Training Branch

Strand: Informal Science Education

Room: Constitution Ballroom A/B

3:45-4:00 Break

4:00-5:00 **Poster Session 1** – even numbered posters
See poster list on pages 21-28 of the conference schedule

Thursday, June 1

7:15-8:30 Breakfast

Meeting for New SEPA Pls

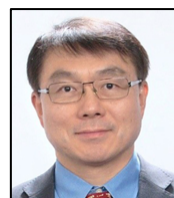
Tony Beck, PhD, Program Director, Science Education Partnership Award (SEPA), Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH
Room: Constitution E

8:30-9:00 **Introduction to Day 2**

Networking Activity: Continue making connections!

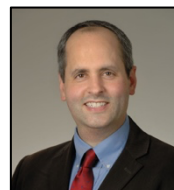
Facilitator: James Breeden, Operations Director: K-12 and Community Programs, Texas A&M University

9:00-9:45 **Introduce Dr. Lorsch**
[Ming Lei, PhD](#), Director, Division for Research Capacity Building, National Institute of General Medical Sciences (NIGMS), NIH



NIGMS Update

[Jon R. Lorsch](#), PhD, Director, National Institute of General Medical Sciences (NIGMS), NIH



9:45-10:00 Break

10:00-11:30 **Short Talks & Roundtables**

Short Talks: 12 minutes/talk followed by 3 minutes Q&A

TITLE	AUTHORS
Innovations in Evaluation and Project-Based Learning <i>Facilitator: Alana Newell, Baylor College of Medicine</i> <i>Room: Constitution C</i>	
STEM Assessment and Reporting Tracker (START)	Stephanie Paris, Brandy Lentz, Shanthia Espinosa, Angie Setthavongsack, and Lisa Marriott, Oregon Health & Science University
Matching High School Students using Propensity-Score Matching in R Studio	Perla Perez, University of Texas at El Paso, Nicholas Evans, University of Manitoba, et al.
“Invoking Wonder Through Science”: Connecting education students and K-12 teachers to build inquiry-based pedagogy	Chery A. Whipple, and Amy Lyon, Colby Sawyer College
Metagenomic and Whole Genome Sequencing Findings from the Metagenomics Education Partnership	Stephen Koury, Sandra Small, Jonathan Bard, Sunha Kim, Norma Nowak, Janvi Manish Shah, and Tanishka Khurana, University at Buffalo
Themes in Informal Science Education <i>Facilitator: Jacquie Genovesi, Drexel University</i> <i>Room: Constitution E</i>	
Building Family STEM Capital at a Children's Museum	Hardin Engelhardt, Marbles Kids Museum
Citizen DNA Barcode Network: From new species to expanding ranges, citizen scientist findings contribute to the larger scientific community	Jeffry Petracca, Sharon Peppenella, Bruce Nash, and David Micklos, Cold Spring Harbor Laboratory DNA Learning Center
Exploring Cancer in Appalachian Kentucky Through Youth-Told Stories	Nathan L. Vanderford and Holly Burke, Markey Cancer Center, University of Kentucky
Leveraging Photovoice to Understand Youth's Perspectives of Cancer in Appalachian Kentucky	Nathan L. Vanderford, Markey Cancer Center, University of Kentucky
Curriculum Materials and Data Science Research Experiences <i>Facilitator: James Breeden, Texas A&M University</i> <i>Room: Roosevelt/Wilson</i>	
Bringing Pandemic Science to the Classroom: Wastewater Testing and Environmental Health in Three-Dimensional Science Lessons	Sahar Alameh, Jeffrey Chalfant, Savannah Tucker, and Scott Berry, University of Kentucky; James Keck, University of Alaska Anchorage; Anna Hoover, University of Kentucky; Donna McNeil, Kentucky Water Research Institute; Lindell Ormsbee, University of Kentucky
Careers in Cancer - Career Profiles	Kristen Bergsman, Regina Wu, and Jeanne Chowning, Fred Hutchinson Cancer Research Center
Data Detectives: Science Education Using Real Data to Solve Real Community Health Problems	Theresa W. Gillespie, and Adam Marcus, Emory University

Development and Piloting a Data Literacy and Data Science Curriculum in Middle School: The Arkansas Big Data Science Approach	Kevin D. Phelan and Tiffany W. Huitt, University of Arkansas for Medical Sciences; Annice Steadman (retired K12 educator)
Themes in Teacher Training: Reaching New Populations, Sharing New Content <i>Facilitator, Sarah Wojiski, The Jackson Laboratory</i> <i>Room: Latrobe</i>	
Teachers Bring Regenerative Medicine and Biofabrication to the Classroom	Carmela Amato-Wierda, W. Kelley Thomas, and Amy Booth, University of New Hampshire; Alison Allen and Kristin Bass, Rockman et al.; Eleanor Jaffee, Insights Evaluation LLC
PHAGES Year 4: The Teachers Take Over!	Marisa Pedulla, Montana Technological University
Engaging Trainees to Enhance Relevance and Promote Awareness of Biomedical Research Careers: Strategies from the Iterative Design to Engage All Learners Program	Jenna Hartley, Dana Haine, and Kathleen Gray, University of North Carolina at Chapel Hill
Scaling Up: How do We Broaden the Reach of Our SciEd Programs?	Charlie Wray, The Jackson Laboratory
Research and Evaluation on Vaccine Education Supplements <i>Facilitator: Luke Bradley, University of Kentucky</i> <i>Room: Arlington/Cabin John</i>	
Research and Evaluation of a COVID-19 Vaccine Hesitancy Program Using Underserved Students as Ambassadors	Yen Dang and Anjan Nan, University of Maryland Eastern Shore
Vetahumanz Need Vaccines Too!: Findings of an at-home educational program focused on vaccine education and attitudes	Lindley McDavid and Sandra San Miguel, Purdue University
The Impact of an mRNA Vaccines Mini-unit on Students' Vaccination Attitudes and Behaviors	Rochelle C. Cassells, University of Utah

Roundtables: 25-minute presentations, repeated 3 times, with 5 minutes between repetitions
Facilitator: Bethany Hornbeck, Apis Creative
Room: Constitution Ballroom A/B

TABLE	ROUNDTABLE TITLE	AUTHORS	STRAND(S)
1.	Belonging in Science: Boundaries and Contexts of the Construct	Katherine Nielsen and Rachel Harris, UC San Francisco; Linda Morrell, UC Berkeley	Broadening Participation Research & Evaluation
2.	Socioscientific Reasoning as a Conduit to Biomedical Science and Health Literacy	Carla Romney, Donald DeRosa and Carl Franzblau, Boston University	Curriculum Development Science Teaching & Learning
3.	Tree Twisssssster, Drug Discovery, and Flu vs.	Teresa MacDonald, University of Kansas Natural History Museum;	Informal Science Education

	Vaccine: Minimal facilitation activities about evolutionary trees and human health for informal learning settings	Lisa D. White, and Anna Thanukos, University of California Museum of Paleontology	
4.	Overcoming Limitations and Pitfalls with Teaching and Learning in Informal Learning Environments	David H. Holben, University of Mississippi; Melani W. Duffrin, Northern Illinois University	Informal Science Education
5.	Design Principles for Usability and Accessibility	Amir Attia, California State University, Monterey Bay	Interactive Multimedia
6.	Conducting Research in U.S. Public Schools: Evolving Practices and Strategies	Rochelle C. Cassells, and Harini Krishnan, University of Utah	Research & Evaluation
7.	Career Opportunities: Learning About Being a Scientist Awareness, Exploration, Preparation, Training	Craig Berg, Michael Carvan, Renee Hesselbach, and David H. Petering, University of Wisconsin-Milwaukee	Research Experiences for Students & Teachers
8.	“Creative vibes:” Using a comic in science curriculum and teaching to promote student engagement	Consuelo J. Morales; Michigan State University; Tania Jarosewich, Censeo Group; Maria G. Salinas and Irene S. Bayer, Michigan State University	Science Teaching & Learning
9.	Getting Out of a Rut: Exploring Different Formats for Teacher Professional Development	Rosemary Riggs and Beatriz Guajardo, Texas Biomedical Research Institute	Teacher Professional Development
10.	Teacher Professional Development and Argumentation: SEPA Science Education Research Publications from Fred Hutch	Jeanne Chowning, Fred Hutchinson Cancer Center	Teacher Professional Development Research Experiences for Students & Teachers

11:30-12:45 Lunch

- *SEPA Mentor-Mentee meetings over lunch: Group 2*
 - *See table and room assignments in the conference program*

12:45-2:00 **Concurrent Breakout Sessions**

Considerations for Inclusive Demographic Data Practices in STEM Training Programs

Stephanie Paris, Brandy Lentz, Shanthia Espinosa, Angie Setthavongsack, and Lisa Marriott, Oregon Health & Science University

Strand: Research and Evaluation

Room: Roosevelt/Wilson

Institutionalizing SciEd Projects: Building on Big Ideas and Integrating New Practices

Naomi Lubin, Children's Research Institute; David Micklos, Cold Spring Harbor Lab; Kristina Yu, Exploratorium; Katie Culp, New York Hall of Science; Laycca Umer, New York Hall of Science

Strand: Informal Science Education

Room: Constitution E

Neurolab 2.0: Educator-Researcher Co-Design of a STEM+M Storyline Unit Anchored to a Rare Movement Disorder

Ralph Imondi, and Linda Santschi, Coastal Marine Biolabs; Kristin Bass, Rockman et al Cooperative, Inc.

Strand: Curriculum Development

Room: Latrobe

SHE In Oncology: A Virtual Multi-University Collaboration to Engage Underrepresented High School Students in Cancer Research and Care

Eileen Dolan, University of Chicago Medicine Comprehensive Cancer Center; Ebony Dyson, eCLOSE Institute; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center; Cauleen Noel, University of Pennsylvania Abramson Cancer Center; Elise Pfaltzgraff, University of Michigan Rogel Cancer Center; Dara Ruiz-Whalen, eCLOSE Institute; Nathan Vanderford, University of Kentucky Markey Cancer Center; Kristen Wynn, University of Texas at Austin Livestrong Cancer Institutes

Strand: Broadening Participation

Room: Constitution C

STEM+M Educational Opportunities: Highlighting Contributions of the SciEd Community to Support Health and Biomedical Sciences Education as Part of STEM

Nancy Moreno, and Alana Newell, Baylor College of Medicine

Strand: Science Teaching and Learning

Room: Arlington/Cabin John

Video Showcase

Facilitator: Brinley Kantorski, Duquesne University

URLs for videos available in session abstracts

Strand: Interactive Multimedia

Room: Constitution Ballroom A/B

VIDEO TITLE	AUTHORS
Videos Funded by SEPA Vaccine Hesitancy Supplements	
How do mRNA vaccines work?	Jeanne Chowning, Regina Wu, and Kristen Bergsman, Fred Hutchinson Cancer Center

Vaccine Hesitancy - Vaccines and You	Julie Harlin, Texas A&M University; Bette Bittner, Whitaker et al.
How the mRNA Vaccine Works	Arthur Veenema, Kristin Fenker, Kagan Breitenbach, Mo Starr, and Louisa Stark, University of Utah
How mRNA Vaccines Were Engineered	Arthur Veenema, Kristin Fenker, Kagan Breitenbach, Mo Starr, and Louisa Stark, University of Utah
Immunology and You	Kim Soper, Terri Gulick, Ben Ehlers, and Maurice Godfrey, University of Nebraska Medical Center
Using High School Students as COVID-19 Vaccine Ambassadors in a Medically Underserved Area	Yen Dang, Anjan Nan, and Adel Karara, University of Maryland Eastern Shore
Videos Produced for Other SciEd Projects	
The 5-4-3-2-1 Method: A Grounding Exercise to Manage Anxiety	Brinley Kantorski, Sarah Will, and John Pollock, Duquesne University
Flint Youth Take Charge of Their Well-Being	Maria G. Salinas, Michigan State University; Matthew Oberdier, Genesee County Prevention Coalition; Irene S. Bayer, Michigan State University
The Atomic Circus Experience	Matt Queen, Montana State University Billings; Amanda Obery, Central Washington University.
PEAS Whiteboard Training Video Series	Virginia C. Stage, North Carolina State University; Jocelyn Dixon, East Carolina University
M-ASCEND Summer Research Poster Symposium	Renee Boney-Jett and Cathleen Drilling, University of Minnesota
Heartbeat: A Mindfulness Exercise to Calm Your Emotions	Brinley Kantorski, Sarah Will, and John Pollock, Duquesne University

2:00-2:15 Break

2:15-3:30 **Concurrent Breakout Sessions**

Adapting Scientist Spotlights for Your Context: Teaching Science Content Through Curricular Supplements That Feature Counter-Stereotypical Scientists and Engage Students with Written Reflections

Lucy Luong, and Kimberly Tanner, San Francisco State University

Strand: Broadening Participation

Room: Latrobe

Challenges, Opportunities and Strategies for Expansion of a Curriculum Development Framework: An Experience with Science and Literacy

Nancy Moreno, Alana Newell, and Jimmie Thomas, Baylor College of Medicine

Strand: Curriculum Development

Room: Arlington/Cabin John

Empowering Teachers and Students to “eCLOSE” as Citizen Scientists Through Access to Authentic Research Programming

Ebony Dyson, and Dara Ruiz-Whalen, eCLOSE Institute

Strand: Informal Science Education

Room: Constitution C

Engaging Students in Research with *All of Us* Big Data

Rubin Baskir, NIH *All of Us* Research Program; Kathryn McDougal, Towson University; Louisa Stark, University of Utah

Strand: Research Experiences for Students and Teachers

Room: Constitution E

Semilla: A Multilevel STEM+M Approach to Promote and Support Health Agency

Maribel Campos Rivera, Ingrid V. Rodríguez Rivera, Víctor Mulero, Namir Jordán, Karen Martínez, University of Puerto Rico; Alicia Rodríguez, Boys and Girls Clubs of Puerto Rico; Karen Weavers, Christopher Pierret, Mayo Clinic

Strand: Science Teaching and Learning

Room: Roosevelt/Wilson

Utilizing Partnerships for Multimedia Production

Brinley Kantorski, Duquesne University

Strand: Interactive Multimedia

Room: Constitution A/B

3:30-3:45 Break

3:45-4:45 **Poster Session 2** – odd numbered posters
See poster list on pages 21-28 of the conference schedule

Friday, June 2

7:15-8:30 Breakfast

Meeting for 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: Constitution E

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

Meet the Trans-NIH SEPA Scientific/Research Contacts

Facilitator: Louisa Stark

Panelists: Tony Beck, NIGMS; Jennifer Baumgartner, NCCIH; Neeraj Agarwal, NEI; Maria Carranza, NIA; Diane Adger-Johnson, NIAID; Tina Gatlin, NIBIB; Kristopher Bough and Hristina Denic-Roberts, NINR; Bryan Kim, ODSS; others may join, if available

See list of Common Acronyms and Abbreviations at the end of the conference program for NIH Institute and Center abbreviations

Strand: Project Administration

Room: Constitution Ballroom A/B

Exploring Genetics through Genetic Disorders

Molly Malone, University of Utah

Strand: Curriculum Development

Room: Constitution E

Game Design for Systems Thinking: Paper Prototypes

Ailea Stites, Ci3 at the University of Chicago; Mason Arrington, Resilient Games Studios

Strand: Interactive Multimedia

Room: Constitution C

Including Students with Disabilities in Science Instruction with Complex Text

Delinda van Garderen, University of Missouri; William Folk, University of Missouri

Strand: Broadening Participation

Room: Roosevelt/Wilson

Intentionally Teaching Social and Emotional Learning Competencies with Science and Numeracy Education

Paul M. Wright, Alassane Twillie, and Melani Duffrin, Northern Illinois University

Strand: Science Teaching and Learning

Room: Arlington/Cabin John

SciEd Cross-Pollination: Replication of Program Elements

Bethany Hornbeck, Apis Creative; Robin Bartlett, University of Alabama; Cathy Morton, West Virginia University; Michael Kennedy, Northwestern University; Jane Disney, MDI Biological Laboratory; David Micklos, Cold Spring Harbor Laboratory

Strand: Broadening Participation

Room: Latrobe

9:45-10:00 Break

10:00-11:00 **Keynote speaker**

*Jason E. Glenn, PhD, Associate Professor of History and
Philosophy of Medicine, University of Kansas Medical Center*



11:00-11:30 **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*

On-Your-Own Evening Activities during the Conference

Museums

- [National Portrait Gallery](#), 8th and F Streets
 - Open until 7:00pm on Thursdays
- [Archives of American Art](#) Lawrence A. Fleischman Gallery, 8th and F Streets
 - Open until 7:00pm on Thursdays
- [Smithsonian American Art Museum](#), 8th and F Streets
 - Open until 7:00pm on Thursdays
- [International Spy Museum](#), 700 L'Enfant Plaza, SW
 - Open until 8:00pm every day
- [The Phillips Collection](#), 1600 21st Street, NW
 - Open until 6pm every day
 - 1st Thursday, Phillips After 5, 5:00-8:30pm art, music, refreshments

Outdoor Activities

- [African American Walking Trails](#)
 - Downloadable guides are available for many DC neighborhoods
- [Smithsonian Gardens](#)
 - Open 24 hours
- [Smithsonian Zoo](#), 3001 Connecticut Avenue, NW
 - Open until 6:00pm every day

Poster Numbers and Presentation Times

Even numbered poster presentations: Wednesday, 4:00-5:00pm

Odd numbered poster presentations: Thursday, 3:45-4:45pm

No.	POSTER TITLE	AUTHORS
Big Data		
1.	An interactive protein centered bioinformatics curriculum for high school biology	Jessica Siltberg-Liberles, Laird Kramer, and Janelle Nunez-Castilla, Florida International University
2.	Brain Healthy: Engaging Students in Brain Health and Wellness Data Investigations	Ido Davidesco, Gregory Boldt, and Eric Loken, University of Connecticut; Scott Justus, New York City Department of Education; Sandra M. Chafouleas, and Oscar E. Ruiz, University of Connecticut; Wendy Suzuki, New York University
3.	Filtered – Discover Bioinformatics and Save the World!	Michele C. Morris, and Madelene Loftin, HudsonAlpha Institute for Biotechnology
Broadening Participation		
4.	Encouraging Excellence: Health Science Education in Native American Communities	Maurice Godfrey, Liliana Bronner, Kim Soper, Shrawan Kumar, Jolene Johnson, University of Nebraska Medical Center; Robert Pawloski, 2EDLLC
5.	Facilitating sustainable partnerships for STEM education and accessible pathways for STEM students using an evidence-based model	Kathleen Umayam, Emonie Hall, Laura Tenenbaum, Brittany Swift, Holly Brown, Adaeze Ekwuatu, Swati Ramadorai, and Debra Yourick, Walter Reed Army Institute of Research
6.	Broadening Participation in an Environmental Health Sciences Out-of-School Program for Middle School Students	Candice Johnson, and Georgia Bracey, Southern Illinois University Edwardsville; Ben K. Greenfield, University of Southern Maine; Charlie Blake, Carol E. Colaninno, Andreia F. Dexheimer, Jen Zuercher, and Sharon M. Locke, Southern Illinois University Edwardsville
7.	The Great Diseases: Bridging Biomedical Career Exploration, Competency Building and Mentoring	Berri Jacque, Karina Meiri, Elizabeth Genne-Bacon, Revati Masilamani, Valarie Solon, and EmilyKate McDonough, Tufts University School of Medicine; Russ Faux, Davis Square Associates; Carl Reid, Kelly Gordon, Denise Puopolo, and Amanda Dillingham, Boston Public Schools
8.	Weaving a Social Capital Network for Child Whole-person Health: The Semilla Experience	Ingrid V. Rodríguez Rivera, and Maribel Campos Rivera, University of Puerto Rico
9.	Teen Wellness Connection	Katherine Nielsen, Rachel Harris, Sabine Jeske, and Mishael Marcelo, UC San Francisco; Linda Morrell, Mark Wilson, and Mingfeng Xue, UC Berkeley; Michelle Phillips, Phillips & Associates

10.	START Program - Broadening Participation Through Campus and Community Partnerships	Luke H. Bradley, Molly McAndrew, Julie A. Bradley, Anthony Sinai, and Margaret Mohr-Schroeder, University of Kentucky
11.	A model for INBRE to reach underserved youth	Jamie Cornish, Nora Smith, and Tugba Boz, Montana State University
12.	From Sense of Belonging in Science to Health Advocates in the Community – Student Action in the Fred Hutch Pathways to Cancer Research Programs	Dave Vannier, Beverly Torok-Storb, and Jeanne Ting Chowning, Fred Hutchinson Cancer Center
13.	Race-21: Exciting and preparing diverse undergraduate students to pursue cancer research careers.	Michelle S. Johnson, and Lalita Shevde-Samant, University of Alabama at Birmingham; Kathleen C. Haynie, Haynie Research and Evaluation; and J. Michael Wyss, University of Alabama at Birmingham
14.	Recruiting High School Students to Engage in the High School Teen Science Ambassador Program	Ren Rountree, Alicia Parson, Rodrick Bellamy, and Lindsay M. Squeglia, Medical University of South Carolina
15.	Visio-tactile Graphics Help Teenagers with Blindness Visualize Nanoscopic Systems	Emily A. Alonzo, Travis J. Lato, Mayte Gonzalez, Morgan T. Green, Jordan C. Koone, Chad M. Dashnaw, and John L. Wood, Baylor University; Lisa S. Garbrecht, Madeline L. Haynes, and Miriam R. Jacobson, The University of Texas at Austin; Matthew J. Guberman-Pfeffer, Baylor University; Mona S. Minkara, Northeastern University; Hoby B. Wedler, Wedland Group LLC; Bernd Zechmann, and Bryan F. Shaw, Baylor University
16.	The University of Pittsburgh Medical Center Hillman Cancer Center Youth Enjoy Science (YES) Academy	Joseph Ayoob, and Steven Jones, University of Pittsburgh; David Boone, University of Pittsburgh and the Hillman Cancer Center
17.	League of VetaHumanz	Sandra San Miguel, Lindley McDavid, Loran Carleton Parker, Wilella Burgess, Grace Craig G, Michelle Overman, Purdue University
18.	Evaluation of the Impact of Summer Immersion for 9-12th Students in STEM at the University of Puerto Rico	Orestes Quesada, and Michelle Borrero, University of Puerto Rico, San Juan; Benjamín Bolaños, University of Puerto Rico Medical Sciences Campus; Edjean Calderón, Evaluation and Research Services Cooperative
19.	Scientist Spotlight Assignments Shift High School Students' Relatability to and Descriptions about the Types of People that Do Science	Dax Ovid, University of Georgia; Lucy Luong, San Francisco State University;Eddie Zhang, and Jeffrey Schinske, Foothill College; Kimberly Tanner, San Francisco State University
Citizen Science		
20.	Climate Change Solutions: Environmental Science through Art (ESTA)	Amir Attia, California State University Monterey Bay; Asa Bradman, University of California Merced; Brenda Eskenazi, University of California Berkeley;

		Eros Gonzalez-Lopez, Kariya Hunter, April Lillard, Enid Ryce, Juliana Schuster, Kenneth Tran, Jose Valdovinos, and Corin Slown, California State University Monterey Bay
21.	Health Sciences & Technology Academy - Alabama: Report from Year 1 of Camp and Clubs	Robin Bartlett, Paige Johnson, Michele Montgomery, and Mercy Mumba, University of Alabama; Betty Key, Shelton State Community College; Brandi Lester, University of Alabama; Bethany Hornbeck, Apis Creative
22.	Citizen DNA Barcode Network: A Community-based Infrastructure for Monitoring Biodiversity and Disease Vectors	Sharon Pepenella, Jeffry Petracca, Bruce Nash, and David Micklos, Cold Spring Harbor Laboratory DNA Learning Center
23.	All About Arsenic: Addressing drinking water contamination in Maine and New Hampshire through a school-based citizen science project	Jane Disney, Ashley Taylor, Alexis Garretson, Kat Taylor, MDI Biological Laboratory; Karen Bieluch, Dartmouth College; Sarah Hall, College of the Atlantic; Sarah Dunbar, Mt. Desert Elementary School; Bruce Stanton, Geisel School of Medicine at Dartmouth
24.	Project Pill Tracker: An Advanced and Automated Pill Tracking & Dispenser	Archishma Marrapu, Thomas Jefferson High School for Science and Technology
Curriculum Development		
25.	Co-creating with Teachers Reveals the Need for Flexible Curriculum	Louisa Stark, Molly Malone, Kristin Fenker, Steve Ortiz, Kagan Breitenbach, Rochelle Cassells, Jen Takylor, and Arthur Veenema, University of Utah
26.	Students take charge of their well-being through student-led research connected curriculum	Irene S. Bayer, and Consuelo Morales, Michigan State University; Tania Jarosewich, Censeo Group; Maria G. Salinas, Michigan State University
27.	NeuroLab 2.0: Utilizing a Storyline Approach to Adapt an ISE Experience for High School Course Integration	Ralph Imondi, and Linda Santschi, Integrative Biosciences Program at Coastal Marine Biolabs Kristin Bass, Rockman et al Cooperative
28.	Authentic Language and Literacy (ALL) for Science: Teaching Resources to Develop Young Children's Literacy within the Discipline of Science	Nancy Moreno, Alana Newell, Dolores Garay, Jimmie Thomas, Travis Kelleher, Michelle Moore, Baylor College of Medicine; Misty Sailors, Colorado State University - Pueblo; Molly Marek, University of Texas at Austin
29.	Mystery of the Crooked Cell 2.0: CityLab's Next Generation Socioscientific Approach to Gene Editing	Carla Romney, Boston University; Donald DeRosa, Boston University; Carl Franzblau, Boston University
30.	Development of Acid-Base instructional materials: By the students, for the students.	Abha Verma, Xavier University of Louisiana; Mehnaaz Ali, Xavier University of Louisiana
31.	Student-Centered One-Health Modules: Digital Middle School Science Curriculum Addresses	Julie Harlin, Texas A&M University; Torri Whitaker, Bittner et al.

	Complex Interdisciplinary Issues	
32.	KUMC TSCORE LIFT: A STEM CTE Intervention Linking Industry, Faculty and Teachers	Karin Chang, University of Missouri - Kansas City; Maya Baugh, University of Kansas Medical Center
33.	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, and Kelly Ryoo, University of North Carolina at Chapel Hill; Rebekah Davis, NC State University
Early STEM		
34.	More PEAS Please! Teaching Head Start Teachers How to Integrate the Practices of Science into the Preschool Classroom	Virginia C. Stage, North Carolina State University; Jocelyn Dixon, Archana V. Hegde, and Tammy D. Lee, East Carolina University; Lucia I. Mendez, University of North Carolina at Greensboro; L. Suzanne Goodell, North Carolina State University; Jessica Resor, and Valerie V. McMillen, North Carolina State A&T University
Informal Science Education		
35.	Project SCORE (Student Centered Outcomes Research Experience) – A Student-Developed Research Agenda	Marie Barnard, Caroline Compretta, Allison Ford-Wade, Erin Dehon, M Godfrey, M Presley, S Nasruddin, S Cohen-Winans, B Wade, Q Whalen, and E Gordineer, University of Mississippi
36.	Boosting adolescent mental health literacy through animated video storytelling on social media	Maya Adam, Stanford University; Kristin Bass, Rockman et al.
37.	siSTEMas Creating Translanguaging Learning Environments to Increase Access and Interest in Science for Middle Grades Learners	Georgia W. Hodges, University of Georgia
38.	St. Jude Afterschool STEM Club	Kate Ayers, St. Jude Children's Research Hospital; Krisderlawn Motley, Robyn Pennella, Anika Britton et al.
39.	Blending Arts and Biomedical Science to Facilitate Systems Thinking	RW Danielson, ML Kelton, J Owen, AJ White, & A Diaz Martinez, D Garcia, E Grace, K Saba Fisher, and K Pautzke, Washington State University; E Stacey, Georgia State University; B Young, West Virginia University
40.	Positioning Biology as a Creative Medium for Young Learners in a Museum Setting	Anja Scholze, James Wong, and Caitlin Nealon, The Tech Interactive; Abbey Thompson, Stanford University; Prinda Wanakule, The Tech Interactive; Jeff Hayward, and Jolene Hart, People, Places & Design Research
41.	VENOMventure/aVENENOTura: Formative testing results and deployment plans from an	Lisa D. White, and Anna Thanukos, University of California Museum of Paleontology; Teresa MacDonald, University of Kansas Natural History Museum

	immersive serious game for bilingual families	
42.	Making Meaning Through Co-Design with Youth	Katherine McMillan Culp, Priya Mohabir, and Dana Schloss, New York Hall of Science
43.	NH CREATES Year 2 Overview	Carmela Amato-Wierda, W. Kelley Thomas, and Amy Booth, University of New Hampshire; Alison Allen, and Kristin Bass, Rockman et al.; Eleanor Jaffee, Insights Evaluation LLC
44.	The Appalachian Career Training In ONcology (ACTION) Program: An NCI-Funded Youth Enjoy Science Program	Nathan L. Vanderford and Holly Burke, Markey Cancer Center, University of Kentucky
45.	A Mindful Minute: Introducing Mindfulness to Project SCORE Students	Tess Johnson, Caroline Compretta, Allison Ford-Wade, Erin Dehon, Murrell Godfrey, Melissa Presley, Saara Nasruddin, Samantha Cohen-Winans, Breanna Wade, Quest Whalen, Elizabeth Gordineer, and Marie Barnard, University of Mississippi
46.	UQUEST: Questioning, Understanding, Experiencing, and Scientific Thinking	Patrice G. Saab, Maria M. Llabre, Manuela Jaramillo, Rafael Leite, Nickelle Decius, and Carolina Carvajalino, University of Miami; Maria I. Panizo, Panizo Evaluation; Clinique Smith, Jeanine Houston, Raenika James, Fabiola Jean Pierre, Dannielle Teamor, and Brittany Lambert, Overtown Youth Center
47.	WE ENGAGE: Data and Stories to Improve Science Literacy and Community Health	Melinda Butsch Kovacic, University of Cincinnati, Cincinnati Children's Hospital Medical Center; Susan Hersherberger, and Susan Gertz, Miami University
Interactive Multimedia		
48.	Multimedia and Mental Health-How games can help to reduce stress and anxiety	John A. Pollock, Brinley Kantorski, and Kelly Bruzdewicz; Duquesne University
49.	Hexacago Health Academy	Vanya Manthena, Madeline Quasebarth, Ailea Stites, Jessica Wilks, and Patrick Jagoda, Ci3 at the University of Chicago
50.	Worlds of Connections	Julia McQuillan, Patricia Wonch Hill, Meghan Leadabrand, and Amy N. Spiegel, University of Nebraska–Lincoln (UNL); Michelle Phillips, Phillips & Associates; Ash Eliza Smith, UNL; Sam Bendix, UNL; Will Freudenheim, independent game designer and researcher
51.	Natural Disasters & Health Survives a Global Disaster	Charles A. Wood, Jackie Shia, Manetta Calinger, Lori Kudlak, Debbie Tyrrell and Laura Ondeck, Wheeling University
Research & Evaluation		
52.	STEM Assessment and Reporting Tracker (START)	Stephanie Paris, Brandy Lentz, Shanthia Espinosa, Angie Setthavongsack, Medina Lamkin, and Lisa Marriott, Oregon Health & Science University
53.	Evaluating Researcher Identity and Science Motivation in High	Sam Chuisano, Bianca Barraza, Hannah Knoll, Hasan Khan, and Morenikeji Ojubanire, University of

	School Student Co-Researchers of the MYHealth Program	Michigan; Blessing Fanegan, University of Cincinnati; Lisa Vaughn, Cincinnati Children's Hospital; Matt Diemer, and Tammy Chang, University of Michigan; Alison Allen, and Jaime Flores, Rockman et al, Melissa DeJonckheere, University of Michigan
54.	Adapting the YPAR Process Template to an Out-of-School and Virtual Research Training Program with High School Students	Sam Chuisano, MPH, Bianca Barraza, Hannah Knoll, Hasan Khan, and Morenikeji Ojbanire, University of Michigan; Blessing Fanegan, University of Cincinnati; Melissa DeJonckheere, University of Michigan
55.	Outcomes of Rural Research Education: Igniting Interest in Science via Air Quality Research Experiences	Anna Kiley, Carolyn Hester, and David Jones, University of Montana; Michael Coe, Cedar Lake Research Group LLC; Tony Ward, University of Montana
Research Experiences for Students and Teachers		
56.	Metagenomic and Whole Genome Sequencing by High School Teachers and Students in Western New York	Stephen Koury, Sandra Small, Jonathan Bard, Sunha Kim, Norma Nowak, Janvi Manish Shah, and Tanishka Khurana, University at Buffalo
57.	Knight Scholars Program: A statewide approach for building STEM interest and capacity for cancer research careers among underrepresented high school and undergraduate students	Lisa K. Marriott, Amanda Braley, Susan Shugerman, Lynda Crocker Daniel, Azalea Martinez, Sadie McIver, Kaitlin Greene, Raul Oviedo, Brian J. Druker, and Jackilen Shannon, Oregon Health & Science University
58.	Bringing Data Science to Underrepresented Boston Youth: the LEAH Knox Scholars Program	Lara Bethke and Paul Gregg, LEAH Knox Scholars Program, Massachusetts Institute of Technology
59.	On Campus Summer Immersion and Student Outcomes: From Research Projects to Program Retention	Catherine Morton, Merge McMillion, Summer Kuhn, and Misty Harris, West Virginia University; Health Sciences and Technology Academy
60.	Examining Teacher and Student Involvement in Summer Research for Project ACE	Perla Perez, University of Texas at El Paso; Donna Gray, Canutillo Independent School District et al.
61.	Lab on Wheels: Bringing Pandemic Science into the Classroom in Adair County, KY Schools	Savannah Tucker, Jeffrey Chalfant, Sahar Alameh, and Scott Berry, University of Kentucky; James Keck, WWAMI School of Medicine, University of Alaska Anchorage; Anna Hoover, University of Kentucky; Donna McNeil, Kentucky Water Research Institute; Lindell Ormsbee, University of Kentucky
62.	UMB RAMP: UMB Research And Mentoring Program to develop skills and promote interest in STEM fields through hands-on exposure to	Elizabeth A Parker, Anna Pudder, Linda Horn, Cara Felter, Bret Hassel, University of Maryland School of Medicine

	academic research among West Baltimore Youth	
63.	Learning and Discovery in Experimental Environmental Health Science: On the Path from Data to Knowledge	David Petering, Craig Berg, Michael Carvan, and Renee Hesselbach, University of Wisconsin-Milwaukee
64.	A Hands-on Biomedical Research Training Summer Camp for Underserved Minority High School Students.	Anjan Nan, Yen Dang, Adel H. Karara, University of Maryland Eastern Shore; Barbara Goldberg, and Rekha Shukla, Barbara Goldberg & Associates, LLC
65.	Expanding a Phage Discovery SEPA Program into Montana Tribal K-12 Schools	Robin Hehn, Montana Technological University; Rayelynn Brandl, Clark Fork Watershed Education Program; Marisa Pedulla, Montana Technological University
66.	Harnessing Artificial Intelligence to Diagnose Mental Health Disorders	Anisha Marrapu, Fairfax County Public Schools
Rural STEM		
67.	High School to Health Care-Bringing Lab and Data Science Careers to Rural West Tennessee High Schools	Jacen Moore, and Rebecca Reynolds, University of Tennessee Health Science Center; Simpfronia Taylor, University of Tennessee at Martin-Ripley Center, Keisha Burnett, University of Tennessee Health Science Center
68.	High School Research Initiative Expansion Project: Providing Inquiry-driven Experiences in Rural Texas Classrooms, Training Teachers, and Building a Supportive Network	Gwendolyn Stovall, Deanna Buckley, and Bailey Williams, University of Texas
69.	Hands-On Science Education Projects Address Vaccine Hesitancy in Rural Populations	Katie Busch Chandran and Michael Wyss, University of Alabama at Birmingham
70.	Authentic Community Engagement in Science	Matt Queen, Montana State University Billings; Amanda Obery, Central Washington University
71.	Imagining Possibilities in Postsecondary Education and Science, Year 3	Melinda Gibbons, and Erin Hardin, University of Tennessee
Science Teaching & Learning		
72.	Adaptation and Mitigation: Beetles and Climate Change	Juliana Schuster, Amir Attia, and Corin Slown, California State University Monterey Bay
73.	Development of a tool to measure participants' perceptions of teaching on affective domains of learning	Trevor Laffin and Melani Duffrin, Northern Illinois University
74.	FoodMASTER provides a unique on campus afterschool experience for high-risk youth	Allassane Twillie, Paul Wright, and Melani Duffrin, Northern Illinois University
75.	Outreach Design Education Program: Hackathon for Middle School Students	Aaron Kyle, Duke University

	Teacher Professional Development	
76.	Learning Science Through Research - In the Classroom	Alyson Michael, New Hampshire Academy of Science; Chery Whipple, Colby Sawyer College
77.	Leveraging educator networks and social media for recruiting teachers to the SHAPE MATTERS program	Kathleen M. Hill, and Amber Cesare, Pennsylvania State University
78.	Pathways to Health Professions: The role of Social Determinants of Health, Precision Health, and Culturally Relevant Teaching Practices	Elizabeth Edmondson, Lisa Abrams, Hillary Parkhouse, and Yonella Demars, Virginia Commonwealth University
79.	Teaching the Genome Generation: Cultivating High School Genomics Through Teacher Education	Christina Vallianatos, Alexa Wnorowski, Erica Gerace, Emaly Piecuch, Sarah Wojiski, Charlie Wray, The Jackson Laboratory
80.	It's Contagious! Promoting the Biomedical Workforce Pipeline through Infectious Diseases.	Rosemary Riggs, and Beatriz Guajardo, Texas Biomedical Research Institute
81.	Effectiveness of a virtual workshop on high school teacher knowledge and confidence in integrating ultrasound and CT imaging in the classroom	Kevin D. Phelan, Tiffany W. Huitt, Gregory R. Snead, Tonya Cook, Brittany Wilkerson, and Billy R. Thomas, University of Arkansas for Medical Sciences; Karen L. Yanowitz, Arkansas State University
82.	Frontiers in Cancer Research: Teacher Professional Learning and Curriculum Resources	Jeanne Chowning, Regina Wu, and Kristen Bergsman, Fred Hutchinson Cancer Center
83.	EMPOWER: Enacting Materials to Promote OWnership, Engagement and Relevance	Mon-Lin Monica Ko, University of Colorado Boulder; Barbara Hug, University of Illinois at Urbana-Champaign; Christina (Stina) Krist, University of Illinois at Urbana-Champaign; Kerri Wingert, University of Colorado Boulder; Enrique Suárez, University of Massachusetts Amherst
84.	Moving Beyond Mendel's Peas	Sara Porter, UNC Greensboro; Kristina Yu, and Hilleary Osheroff, Exploratorium
85.	ESTELE: A Practicum-Based Approach for training K-5 NGSS Teacher Leaders	Michael Kennedy, Northwestern University; Maranda Don, Northwestern University

Breakout Session Abstracts

Concurrent Breakout Sessions: Wednesday, 10:45-12:00

Approaches for Integrating Peer Mentors into Biomedical Training Programs

Lisa Marriott, Oregon Health & Science University; Dave Vannier, Fred Hutchinson Cancer Center; Regina Idoate, University of Nebraska Medical Center; M. Eileen Dolan, University of Chicago Medicine Comprehensive Cancer Center; Renee Boney-Jett, University of Minnesota; Nathan Vanderford, University of Kentucky; Christopher Sistrunk, City of Hope; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center

Mentorship is frequently included in biomedical research training programs, typically involving a combination of faculty, staff, and/or near-peers. This session expands on positive outcomes reported for peer mentorship by describing considerations for peer mentor inclusion in training programs, such as onboarding, training, specific roles, and impacts across stakeholder groups. Programs representing Youth Enjoy Science (YES) cancer research training programs share perspectives, challenges and advice, leading attendees in an interactive approach for capturing the range of peer mentor experiences and roles. Discussion prompts include peer mentor structures (1:1, small group, teams), funding approaches for inclusion, peer mentor duties, onboarding and training, as well as observed strengths and areas for growth for including peer mentors. Attendees will collaborate to share concrete approaches used in their programs as well as contacts and resources that can help other programs integrate peer mentors into their own training programs.

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

- Identify benefits of engaging peer mentors in youth-focused training programs across scientific disciplines and educational levels.
- Understand advantages to different mentoring approaches (1:1, small group, team)
- Consider onboarding, training, and evaluation approaches important for involving peer mentors in youth-focused training programs (i.e., hiring as staff, volunteers, training program participants, etc.).
- Reflect how peer mentoring could enhance historically underrepresented students' interpersonal and academic growth essential for professional development and scientific identity.
- Consider opportunities for peer mentor-driven feedback loops that enhance recruitment and retention of historically underrepresented students.

Strand: Research Experiences for Students and Teachers

Room: Constitution C

Brain-Based Learning Principles: A Theoretical Framework for Guiding Teaching Practice

Melani Duffrin, Trevor Laffin, Northern Illinois University, and Debra Yourick, Walter Reed Army Institute of Research

This interactive session will explore a few basic concepts around brain-based learning that can serve as a starting point for any educator. Participants will align current teaching and learning practices to brain-based learning principles and discussion the value of brain-based learning theory as a driver of educational practices.

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

- Be more knowledgeable about brain-based learning and challenged to consider taking a deeper dive into topics on brain breaks, neuroplasticity, neurotransmitters, mirror neurons, and other brain-based learning subject matter.

Strand: Science Teaching and Learning

Room: Constitution E

Career Awareness in SciEd Projects: Supporting Middle and High School Students' Awareness of Biomedical, Behavioral and Clinical Research Career Options

Irene S. Bayer, Michigan State University; Melinda M. Gibbons, University of Tennessee, Imagining Possibilities; Tania Jarosewich, Censeo Group; Consuelo Morales, Michigan State University; Maria Salinas, Michigan State University; Andreia F. Dexheimer, Sharon M. Locke, Georgia Bracey, Ben K. Greenfield, Jennifer L. Zuercher, Carol E. Colaninno, Candice L. Johnson, Charlie Blake, Southern Illinois University Edwardsville

The Michigan State Health in our Hands (HiOH) and University of Tennessee Imagining Possibilities SEPA grants include activities to support middle and high school career and postsecondary awareness. This session will include presentations from each team about activities and methods that each team has found helpful in embedding career awareness. The session will also include a summary of research findings about the outcomes of the activities as well as discussion of research tools to measure effects of career and postsecondary activities on student awareness and interest. The session is planned with high interaction to include plenty of time for discussion to allow audience members to share information about career awareness efforts in their programs, discuss successes and challenges, and identify commonly used practices that support robust career awareness in K12science education efforts.

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

- Understand how to integrate and promote career and postsecondary awareness programming into SciEd projects.
- Explore concrete examples of career and postsecondary activities to embed in SciEd projects and programming.
- Examine research tools to measure effects of career and postsecondary activities on student awareness and interest.

Strand: Broadening Participation

Room: Roosevelt/Wilson

FILTERED: An Online Game to Introduce Bioinformatics Conceptually

Michele Morris, HudsonAlpha Institute for Biotechnology; Madelene Loftin, HudsonAlpha Institute for Biotechnology

Join us to experience a new tool to introduce bioinformatics to high school students! The demand for computational biology-related positions is high, yet student interest in bioinformatics is low to nonexistent. As this field is often unfamiliar, educators need help to share the concepts with their students confidently. Filtered is an online game that can be played in an hour and builds students' foundational awareness of bioinformatics. To engage high schoolers' attention and spark their interest, we developed Filtered to use a series of puzzle games to build conceptual understanding of several essential tools of bioinformatics. 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 considering the COVID-19 pandemic. The activity's dramatic, graphic novel style has proven popular with students and sets a suspenseful tone. The browser-based Filtered is freely available and being implemented in classrooms. This summer, assessments will be finalized to measure student impact in the formal classroom setting and with informal STEM groups. Play FILTERED and share your thoughts on FILTERED's ability to hit stated learning outcomes for students. Bring your laptop and be ready to enter the world of FILTERED.

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

- Examine the black box problem of computational tool use in classrooms.
- Experience the FILTERED game module as a student.
- Create a free teacher account and be equipped to share FILTERED with others or implement in their own classrooms.
- Examine initial FILTERED evaluation data and contribute to the ongoing discussion of FILTERED's ability to hit stated learning outcomes for students.

Strand: Interactive Multimedia

Room: Latrobe

Tried and True Measures - What Do You Use?

Lindley McDavid, Purdue University; Alana Newell, Baylor College of Medicine Alison Allen, Rockman et al; Sam Chuisano, University of Michigan Department of Family Medicine, Bianca Barraza, University of Michigan; Hannah Knoll, University of Michigan; Hasan Khan, University of Michigan, Morenikeji Ojubanire, University of Michigan; Blessing Fanegan, University of Cincinnati, Melissa DeJonckheere, University of Michigan

Join us for this interactive session to develop your inventory of practical and rigorous measurement tools! Together we will build on previous collaborative efforts to foster shared research and evaluation measure knowledge across funded projects with an enhanced focus on equity and inclusion. This session provides opportunities for new and experienced researchers and evaluators to discuss their measurement related challenges and successes. We encourage participants to come with an informal list of their tried and true measures to share with the group. Our collaborative efforts will be distributed to participants after the session.

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

- Develop an index of evaluation indicators and measures.
- Develop their researcher and evaluator interpersonal resource network.

Strand: Research and Evaluation

Room: Arlington/Cabin John

Concurrent Breakout Sessions: Wednesday, 2:30-3:45

Benefits, Burdens, and Badges: Navigating the NGSS EQuIP Review Process for Your Curriculum

Kristen Bergsman, Fred Hutchinson Cancer Center; Regina Wu, Fred Hutchinson Cancer Center; Jeanne Chowning, Fred Hutchinson Cancer Center

The Next Generation Science Standards (NGSS) or NGSS-based standards have been adopted in 44 states and are built on research of how students learn. Creating instructional

materials that are deeply designed for NGSS ensures equitable science learning for all students and that students authentically engage in scientific practices and sense-making. The EQuIP review process presents an opportunity for curriculum developers to submit their science units for rigorous review, third-party feedback, and rating of how well they were designed for the NGSS. A high rating results in the awarding of a NGSS digital badge and/or posting of the unit on the official NGSS website. The EQuIP Rubric for Science guides the curriculum review process conducted by NextGenScience and the Science Peer Review Panel. In this session, learn from a cancer center's recent journey through the rigorous review of a high school biology unit, including the benefits, challenges, and lessons learned. Participants will examine the rubric to understand how it is used in the review process, analyze reports for curricula awarded top ratings, and consider if this process would be beneficial for their own curricula. Curriculum developers, program managers, and science educators can benefit from learning about this process.

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

- Gain an understanding of the NGSS EQuIP review process, rubric, and NGSS digital badge.
- Learn how the review process could benefit your own curricula.
- Discuss the challenges and strategies for pursuing a NGSS badge.
- Identify tools and resources for designing and assessing NGSS-aligned curriculum.

Strand: Curriculum Development

Room: Roosevelt/Wilson

Harnessing Empathy as a Tool for Promoting Inclusive STEM Learning

Kathleen M. Gray, University of North Carolina at Chapel Hill (UNC-Chapel Hill); Jenna Hartley, UNC-Chapel Hill; Dana Haine, UNC-Chapel Hill; Kelly Ryoo, UNC-Chapel Hill

In Iterative Design to Engage All Learners (IDEA Learners), grades 9-12 science teachers and university scientists/educators are co-creating standards-aligned, STEM-based activities designed to engage diverse learners in timely and relevant environmental health issues. A key focus is increasing interest in and awareness of biomedical research careers among people who identify as female and as members of racial/ethnic groups that are underrepresented in the STEM workforce. Using design-thinking practices, teachers conducted empathy exercises with their students to: (a) better understand the learning experiences of students with diverse identities and (b) tailor instructional materials to these students during lesson development. In this session, we will describe the use of design-thinking, model empathy-based approaches to developing lessons, and discuss preliminary evaluation of this process all while featuring teacher voices and experiences. By deepening secondary STEM teachers' understanding of the needs of diverse learners and prompting them to utilize pedagogical strategies to meet those needs, this approach has the potential to promote a sense of belonging in STEM learning environments, which ultimately may inspire more students to pursue biomedical research careers. IDEA Learners is housed in the UNC Center for Environmental Health and Susceptibility.

Strand: Broadening Participation

Room: Constitution E

Longitudinal Tracking of Program Participants

Priya Mohabir, New York Hall of Science; Catherine Morton, West Virginia University

Many programs have robust strategies and tools for tracking the impact on participants while they are in the program, but how do we learn more once they leave our programs? Join us to learn more about the Health Sciences Technology Academy (HSTA) program at West Virginia University is using and developing and what the Road Taken project (NSF #1906396) is learning through their retrospective study that can help develop more robust organizational practices for tracking and engaging participants. This session will allow you to explore successful data collection strategies, data organization and upkeep, learn what we are learning, and dive into the data collection tools. We hope that you'll walk away with strategies you can take back to your work to enhance your longitudinal tracking efforts.

- As a result of participating in this session, Conference attendees will:
 - Learn data collection strategies for longitudinal tracking
- Review data collection tools for tracking

Strand: Program Administration
Room: Constitution C

Obstacles in Implementation and Evaluation of COVID Vaccine Hesitancy Educational Materials

Katie Busch, University of Alabama at Birmingham; Brinley Kantorski, Duquesne University; Dina Markowitz, University of Rochester; Julia McQuillan, University of Nebraska-Lincoln; Elizabeth Parker, University of Maryland

This interactive session will present and discuss challenges with implementing and evaluating educational materials created by the COVID vaccine hesitancy supplement projects (“Administrative Supplements to SEPA Awards to Develop Innovative Educational Resources to Address SARS-CoV-2 Vaccine Hesitancy”). Each panelist will present an overview of their project’s challenges, how they addressed the problems, and the effectiveness of the interventions. Session participants will then brainstorm and discuss possible alternatives for addressing and preventing these challenges.

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

- Become aware of challenges with implementing and evaluating COVID vaccine hesitancy educational materials, and how to address and prevent these challenges.

Strand: Curriculum Development
Room: Arlington/Cabin John

Teacher Recruitment, Retention, and Engagement: Overcoming Challenges in Teacher Professional Development

Sarah Wojiski, The Jackson Laboratory; Alana Newell, Baylor College of Medicine; Virginia Stage, North Carolina State University; Paul Wright, Northern Illinois University

For many SEPA programs, teachers are the conduit through which we connect with, and impact, students. Through teacher professional development, SEPA programs seek to empower teachers to grow in their practice and to develop tools to enhance student learning. Barriers to running effective teacher professional development (PD) programs often stem from lack of time in teachers’ already demanding schedules, making recruitment, retention, and engagement ongoing challenges. Further, impact on student learning, attitudes, and behavior can often be challenging to evaluate, due to the variability in ways that teachers implement curricula in their classrooms. In this panel discussion, SEPA leaders who have had successes (and learned from

failures) in delivering teacher professional development will discuss strategies that they have used to overcome common challenges in teacher professional development. Participants will engage in discussion with each other and the panelist to brainstorm approaches they can use in their own programs to enhance teacher recruitment, retention and engagement, in order to positively impact student learning.

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

- Develop strategies for effective recruitment and retention of teachers.
- Discover ways to maintain long-term engagement of teachers.
- Learn about challenges that SEPA leaders have faced with teacher professional development programs and approaches that were used to overcome those challenges.
- Engage and build community with other SEPA leaders who are dedicated to teacher professional development.

Strand: Teacher Professional Development

Room: Latrobe

Perspectives and Lessons Learned from National Cancer Institute Youth Enjoy Science (YES) Programs

Nathan L. Vanderford, University of Kentucky, Markey Cancer Center; David Boone, University of Pittsburgh Medical Center, Hillman Cancer Center; Michael Wyss, University of Alabama, Birmingham; Regina Idoate, University of Nebraska Medical Center; Eileen Dolan, University of Chicago Comprehensive Cancer Center; Anna Marsden, University of Utah, Huntsman Cancer Institute; Belem G. López National Cancer Institute, Center to Reduce Cancer Health Disparities, Diversity Training Branch; Sangeeta Ghosh, National Cancer Institute, Center to Reduce Cancer Health Disparities, Diversity Training Branch

In 2016, the National Cancer Institute's (NCI) Center to Reduce Cancer Health Disparities created the Youth Enjoy Science (YES) R25 Research Education Program. YES aims to enhance the diversity of the biomedical workforce by funding institutional programs that create innovative interventions that engage students in grades 6-12 and/or undergraduates from diverse backgrounds as well as teachers and faculty members in cancer research experiences. Programs must incorporate three components including research experiences, curriculum or methods development, and outreach in ways that enhance participants' knowledge about cancer and generate interest in pursuing cancer-related careers. This session brings together six of the funded YES programs and NCI YES program staff to share program perspectives and lessons learned including programmatic challenges and potential solutions and accomplishments.

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

- Learn about the goals of the NCI YES Program.
- Explore the breadth and depth of funded YES Programs.
- Share best practices in program conception, implementation, and management.
- Discuss program challenges, potential solutions, and accomplishments.

Strand: Informal Science Education

Room: Constitution Ballroom A/B

Concurrent Breakout Sessions, Thursday, 12:45-2:00

Considerations For Inclusive Demographic Data Practices In STEM Training Programs

Stephanie Paris, Oregon Health & Science University; Brandy Lentz, Oregon Health & Science University; Shanthia Espinosa, Oregon Health & Science University; Angie Setthavongsack, Oregon Health & Science University; Lisa Marriott, Oregon Health & Science University

Science, Technology, Engineering, and Mathematics (STEM) programs often conduct evaluation of students to understand their program's impact. Federal funding agencies describe populations who are historically underrepresented, though demographic questions are rarely operationalized to permit consistent demographic data collection. Without guidance around specific metrics and expanded reporting requirements, STEM training programs remain challenged to measure demographics and evaluate diversity accurately. While a desire to improve demographic practices exists across surveyed training programs (Mekinda et al., 2022), the operationalization of demographic variables remains unclear. This session shares lessons learned over a three-year period examining inclusive approaches for measuring demographic variables and encourages group discussion about considerations and potential pitfalls when implementing demographic data practices within STEM training programs. Inclusive demographic data practices can support characterization of historically underrepresented populations in STEM (i.e., disaggregated racial/ethnic groups, disability, language, disadvantaged background, gender identity and sexual orientation identity). We offer modular approaches designed to support student autonomy and privacy when implemented by programs across geopolitical settings. We share recommendations and approaches consistent with recent White House Executive Orders (EO #13985) and a new NIH-commissioned report calling for routine collection of gender, sex, and sexual orientation information using standardized language.

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

- Identify challenges that STEM training programs face when attempting to measure and evaluate diversity.
- Recognize resources that can be used to measure expanded demographic categories important to the inclusion of underrepresented students, including categories for race/ethnicity, disability, disadvantaged background, as well as gender and sexual minorities.
- Source language that enables stakeholders to advocate for inclusive demographic measures in their STEM training programs. Identify opportunities for using inclusive demographic data to improve STEM training environments

Strand: Research and Evaluation

Room: Roosevelt/Wilson

Institutionalizing SciEd Projects: Building on Big Ideas and Integrating New Practices

Naomi Lubin, Children's Research Institute; David Micklos, Cold Spring Harbor Lab; Kristina Yu, Exploratorium; Katie Culp, New York Hall of Science; Laycca Umer, New York Hall of Science; Laycca Umer, New York Hall of Science

Informal STEM learning institutions are critical contributors to the ecosystem of actors supporting interest in and engagement with STEM for diverse learners. Federal investment in informal STEM learning provides necessary support and recognition of the promising practices and approaches being developed by these institutions. But what happens when the grant ends? How are grantees institutionalizing the innovations that came out of federally supported initiatives? Join this panel session comprised of contributors from Children's Research Institute, Cold Spring Harbor Lab, Exploratorium, and New York Hall of Science, four NIH-SEPA grantees

with a demonstrated history of receiving SEPA awards. Panelists will discuss leveraging promising strategies resulting from SEPA projects, the broader influence of SEPA projects at their institutions over time, and the capacity SEPA projects have allowed them to build toward approaching their mission in new ways. Attendees will be invited to join the discussion by sharing their experiences around the topics discussed and a culminating problem and solution Q&A with panelists.

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

- Acquire promising practices for how best to leverage federal support to build institutional capacity
- Learn about how to build on bodies of knowledge to iterate across multiple grants over time
- Gain a better understanding of how to approach integrating innovative strategies to promote broad institutional change

Strand: Informal Science Education

Room: Constitution E

Neurolab 2.0: Educator-Researcher Co-Design of a STEM+M Storyline Unit Anchored to a Rare Movement Disorder

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

Our efforts to adapt an informal science experience into a more inclusive, replicable, and scalable experience for high school course integration converged on a storylines design approach. A storyline is a curriculum model that engages students in the application of investigative practices (science and engineering practices) to incrementally build conceptual models that explain a particular phenomenon (an anchoring phenomenon). Our initial design cycle unfolded during a series of workshop-style meetings hosted in our lab over a 3-year period with a small team of scientists and high school science teachers. This effort culminated in the creation of a multi-lesson instructional unit that is now undergoing implementation trials in high school science classrooms. This workshop is intended for NIH-funded researchers who are interested in working collaboratively with high school science teachers on the practical design of storyline units that emulate how collective biomedical knowledge in their research area of interest is built over time and across multiple research groups. In this workshop, participants will apply several of the tools and processes that our team utilized during the initial co-design cycle and examine how they work together to create a storyline unit. These include: 1) selecting an anchoring phenomenon; 2) examining the ideas and questions that emerge after exposure to the anchoring phenomenon; 3) identifying the key discoveries required to incrementally build a multi-dimensional explanatory model for the anchoring phenomenon (discovery mapping); 4) selecting and adapting data for student analysis and interpretation; 5) identifying foundational knowledge required to analyze and interpret various forms of data; and 6) constructing a lesson flow that is rooted in student questions.

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

- Gain practical knowledge on how to align SEPA projects and biomedical phenomena with the NRC Framework and the NGSS

Strand: Curriculum Development

Room: Latrobe

SHE In Oncology: A Virtual Multi-University Collaboration to Engage Underrepresented High School Students in Cancer Research and Care

Eileen Dolan, University of Chicago Medicine Comprehensive Cancer Center; Ebony Dyson, eCLOSE Institute; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center; Cauleen Noel, University of Pennsylvania Abramson Cancer Center; Elise Pfaltzgraff, University of Michigan Rogel Cancer Center; Dara Ruiz-Whalen, eCLOSE Institute; Nathan Vanderford, University of Kentucky Markey Cancer Center; Kristen Wynn, University of Texas at Austin Livestrong Cancer Institutes

At the height of the COVID-19 pandemic and the national shift to virtual education for grades K-16, faculty and staff from five of the nation's cancer centers and a science education startup collaborated on a shared mission: to inspire young people from diverse communities, who identify as women, to pursue careers in cancer research and clinical care. The result was SHE (Summer Healthcare Experience) in Oncology, a fully virtual, two-week enrichment program for female-identifying high school students from the centers' respective catchment areas. Now in its third year, SHE offers hands-on research experience, career exploration, mentorship, and leadership training, drawing strategically from the unique strengths and resources of the collaborating institutions. SHE participants report gains in cancer and career knowledge, research self-efficacy, and belonging over the course of the program. Long term, we anticipate the program will empower young people who identify as women to achieve career success in cancer research and medicine, addressing the critical need for greater diversity, equity, and inclusion within the biomedical workforce. This session will focus on SHE as a model for virtual science learning and career exploration, with particular emphasis on broadening participation among women and other underrepresented groups.

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

- Learn about SHE in Oncology as a model for virtual, multi-institutional STEM enrichment programming
- Engage in a hybrid mini-training module to highlight the research and accessibility of using eCLOSE Institute lab@home systems
- Discuss the future of virtual STEM programming (vs. in person), given tradeoffs experienced by the SHE in Oncology team and session participants
- Discuss best practices for broadening participation of specific underrepresented groups in science, particularly given the Supreme Court's anticipated ruling on affirmative action

Strand: Broadening Participation

Room: Constitution C

STEM+M Educational Opportunities: Highlighting Contributions of the SciEd Community to Support Health and Biomedical Sciences Education as Part of STEM

Nancy Moreno, Baylor College of Medicine; Alana Newell, Baylor College of Medicine

This session builds on a collaborative plenary session held last year at SciEd 2022 aimed at increasing integration of health and biomedical science into STEM education locally and nationally. While STEM education, in general, is receiving increased national attention, health and biomedical sciences still are not fully incorporated into K-12 STEM education standards, curricula, practices and funding opportunities. In this session, we will summarize themes from the brainstorming session, use a collaborative approach to gather strategies for addressing a subset of the themes, and provide recommendations to enhance communications related to

STEM+M on the SEPA website (<https://nihsepa.org/>). Participants will work in small groups throughout the session.

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

- Describe strategies to incorporate health and biomedical science into STEM education using resources developed by the SciEd community
- Identify new ways in which STEM+M resources and programs can be highlighted and disseminated on the SEPA website
- Connect their own SciEd-funded activities to those developed by at least one other SciEd project

Strand: Science Teaching and Learning

Room: Arlington/Cabin John

Concurrent Breakout Sessions, Thursday, 2:15-3:30

Adapting Scientist Spotlights for Your Context: Teaching Science Content Through Curricular Supplements That Feature Counter-Stereotypical Scientists and Engage Students with Written Reflections

Lucy Luong, San Francisco State University; Kimberly Tanner, San Francisco State University

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 improve science learning. Join this session to learn more about Scientists Spotlights, search over 650 student-authored assignments on the newly launched website, and discover ways to integrate Scientist Spotlights in your educational context.

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

- Be given the tools to meaningfully integrate Scientist Spotlights in their curricula
- Be able to revise their course calendar and/or syllabus to support inclusive science curriculum by using Scientist Spotlights to teach course content, challenge scientist stereotypes, and support students' relatability to scientists through metacognitive written reflections.

Strand: Broadening Participation

Room: Latrobe

Challenges, Opportunities and Strategies for Expansion of a Curriculum Development Framework: An Experience with Science and Literacy

Nancy Moreno, Baylor College of Medicine; Alana Newell, Baylor College of Medicine; Jimmie Thomas, Baylor College of Medicine

Building upon a curriculum development project through expansion to other grades, contexts, subjects etc. comes with challenges as well as opportunities. In this breakout session, we will share our framework for developing curriculum materials that provide authentic instruction in science and science-specific disciplinary literacies that we developed in our previous SEPA and discuss both challenges and opportunities for innovation when building upon the project during

our current SEPA. Participants will have the opportunity to discuss and share their own challenges and strategies for program expansion and sustainability.

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

- Describe a curriculum development framework to develop science curriculum with intentionally incorporated disciplinary literacy development
- Articulate strategies for opportunities to innovate through program expansion

Strand: Curriculum Development

Room: Arlington/Cabin John

Empowering Teachers and Students to “eCLOSE” as Citizen Scientists Through Access to Authentic Research Programming

Ebony Dyson, eCLOSE Institute; Dara Ruiz-Whalen, eCLOSE Institute

At the core of eCLOSE Institute is the belief that students should have equitable access to the biomedical research community and join our community laboratory space as citizen scientists. Since our public launch, at the height of the COVID crisis, eCLOSE has gained traction through the development of virtual, hybrid, and now live authentic research programs in and out of formal classroom settings. Our collaborative curriculum is focused on the intersection of diet and disease with projects driven by teacher and student inquiry. By working with science teachers, eCLOSE can support student scientists to address health concerns that impact their self-identified communities and provide a platform for sharing what they have learned. Our dynamic training modules allow teachers to seamlessly integrate research protocols, techniques, and methodology into standardized curriculum while staying within daily time allowances. As schools, teachers, and students join the eCLOSE community, they find themselves part of a network that is open to sharing lessons, writing collaborative grants, and engaging in large scale citizen science projects, spanning the city, state, and country. Participants will take on the role of citizen scientist during this interactive session. Welcome to eCLOSE! Pull up a pipette! Your bench is waiting for you!

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

- Analyze citizen science data sets in a real-time research experience using tools from eCLOSE@school programs.
- Propose collaborative research opportunities to develop citizen science projects that can be integrated into classroom projects.
- Learn about eCLOSE Institute programming as a platform for collaborating with other researchers, teachers, and students.
- Brainstorm ways to engage teachers local to participant research institutes.
- Discuss how to connect citizen science research projects to Next Generation Science Standards (NGSS) standards.

Strand: Informal Science Education

Room: Constitution C

Engaging Students in Research with All of Us Big Data

Rubin Baskir, NIH All of Us Research Program; Kathryn McDougal, Towson University; Louisa Stark, University of Utah

The NIH's All of Us Research Program is building one of the largest biomedical data resources of its kind. The Program's Research Hub currently includes data from almost 450,000 participants. These data include electronic health records (EHRs), genomics (short and long-read whole genome sequences and genotyping arrays), health-related surveys, physical measurements, and Fitbit data. Over 80% of participants are from groups that are underrepresented in biomedical research with over 50% from underrepresented racial and ethnic groups.

The All of Us Research Program's anonymized data are freely available and thus represent an outstanding opportunity for students to engage in research using "big data." The Data Browser provides interactive views of aggregate-level participant data and is available to anyone. Those who register to use the Researcher Workbench gain access to more fine-grained data.

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

- Learn about the NIH's All of Us Research Program and the available data
- Hear how one instructor has engaged her students in research projects on the Researcher Workbench
- Discuss supports and challenges for engaging teachers and students in conducting research using All of Us data
- Learn of a mini-grant opportunity for pilot projects to engage students in conducting research with All of Us data

Strand: Research Experiences for Students and Teachers

Room: Constitution E

Semilla: A Multilevel STEM+M Approach to Promote and Support Health Agency

Maribel Campos Rivera, University of Puerto Rico; Ingrid V. Rodríguez Rivera, University of Puerto Rico; Víctor Mulero, University of Puerto Rico; Namir Jordán, University of Puerto Rico; Karen Martínez, University of Puerto Rico; Alicia Rodríguez, Boys and Girls Clubs of Puerto Rico; Karen Weavers, Mayo Clinic; Christopher Pierret, Mayo Clinic

Semilla is a community-based program that integrates science education strategies from Mayo Clinic's InSciEd Out methodology with the framework of the Eco-Bio-Developmental model, to engage children at high risk of chronic toxic stress in the science of their own well-being. The purpose of this session is to share Semilla's approach to health promotion and support through the accrual of social capital and synergistic community building following a STEM+M multi-level approach. Level 1 are the Semilla participants aged 9 to 12 years old. The participants are at the core of the Semilla experience. They engage with all other levels of the community as learners first, then evolving into agents of health change in their families and communities. Semilla Fellows comprise Level 2 of the approach. Together with the Community Educator they establish a community support hub from where the health agency actions emerge. Level 3 is the serviced community which includes the families and the clubs of the Boys and Girls Clubs of Puerto Rico where Semilla is offered. A responsive Clinical Health and Wellness network makes up Level 4 where Pediatrics residents support the community's health agency while broadening their skills regarding trauma-informed care, care coordination and advocacy.

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

- Identify how the key components of the Eco-Bio-Developmental Model are embedded into a science teaching and learning experience.
- Define the members of a community that provide safe, stable, and nourishing relationships.
- Engage with community stakeholders at distinct levels.
- Explore how to use applied science education to accrue social capital in a community setting.
- Self-reflect on how multi-level community engagement approaches may impact their endeavors.

Strand: Science Teaching and Learning

Room: Roosevelt/Wilson

Utilizing Partnerships for Multimedia Production

Georgia Hodges, University of Georgia; Amir Attia, California State University Monterey Bay; Kelly Bruzdewicz, Duquesne University; Brinley Kantorski, Duquesne University

Multimedia is a great way to reach a wide range of audiences and there are many different ways to produce it. In this session you'll learn about different strategies you can use to produce various types of multimedia. We'll discuss the pros and cons of each, and hear about panelists' real world experiences. We'll finish with a Q&A session. Armed with this information, you'll be on the fast track to designing something awesome!

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

- Be able to understand and evaluate different multimedia development strategies to determine which fits their needs best.

Strand: Interactive Multimedia

Room: Constitution A/B

Concurrent Breakout Sessions, Friday, 8:30-9:45

Meet the Trans-NIH SEPA Scientific/Research Contacts

Facilitator: Louisa Stark

Panelists: Tony Beck, NIGMS; Jennifer Baumgartner, NCCIH; Neeraj Agarwal, NEI; Maria Carranza, NIA; Diane Adger-Johnson, NIAID; Tina Gatlin, NIBIB; Kristopher Bough and Hristina Denic-Roberts, NINR; Bryan Kim, ODSS; others may join, if available

Learn about the funding interests of NIH Institutes, Centers and Offices (ICOs) who are partners in the NIH Science Education Partnership Award (SEPA) funding opportunity (PAR-23-137). Program officers will briefly share their ICO's interests followed by time for session attendees to meet with them informally at "roundtables."

The following individuals have confirmed participation; others may also join

NIH Institute, Center or Office	Scientific/Research Contact
National Center for Complimentary and Integrative Health (NCCIH)	Jennifer Baumgartner, MD, PhD
National Eye Institute (NEI)	Neeraj Agarwal, PhD

National Institute on Aging (NIA)	Maria Carranza, PhD
National Institute of Allergy and Infectious Diseases (NIAID)	Diane Adger-Johnson, Project Scientist
National Institute of Biomedical Imaging and Bioengineering (NIBIB)	Tina Gatlin, PhD
National Institute of General Medical Sciences (NIGMS)	Tony Beck, PhD
National Institute of Nursing Research (NINR)	Kristopher Bough, PhD Hristina Denic-Roberts, PhD
Office of Data Science Strategy (ODSS)	Bryan Kim, PhD

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

- Learn about the funding interests of NIH ICOs who are participating in the SEPA funding opportunity

Strand: Project Administration

Room: Constitution Ballroom A/B

Exploring Genetics through Genetic Disorders

Molly Malone, University of Utah

Embark on a molecular cause-and-effect exploration of disorder-causing genes using real data. This SEPA-funded NGSS-designed curriculum unit explores genes, inheritance, environmental factors and protein-level interactions, and makes connections to effects at the cellular, tissue, and organism levels. Students embark on a data-driven exploration to acquire foundational molecular genetics concepts and apply them to understand the mechanisms behind a specific genetic disorder-causing allele. The unit is comprised of multimedia, interactive and paper-based activities, data packets for 25 different alleles (five alleles each for 5 different single-gene disorders) and a guiding framework for students. Throughout the unit students explore cause and effect, systems and system models, and construct explanations while learning core ideas in genetics and heredity.

During this workshop we will provide an overview of the unit's learning goals and materials, view select multimedia pieces, and engage in sample data-interpretation activities. We will discuss implementation strategies and ways that an in-depth understanding of a specific disorder-causing allele highlights the trait-building function of protein-level interactions.

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

- Become familiar with a free unit on genetics that illuminates the mechanisms through which differences in DNA lead to different phenotypes
- Engage in an example of how to integrate an in-depth investigation of a specific disorder-causing allele with foundational genetics content
- Learn that there is variation at the DNA, protein, cell and tissue levels among alleles of the same genetic disorder

Strand: Curriculum Development

Room: Constitution E

Game Design for Systems Thinking: Paper Prototypes

Ailea Stites, Ci3 at the University of Chicago; Mason Arrington, Resilient Games Studios

Would you like to incorporate game design, playing & making approaches, or systems modeling into your programming? In this workshop, we will move through the process of iteratively prototyping and playtesting educational board games. Attendees will select a topic, develop paper prototypes of their own original designs based on 're-skinning' a base game of their choice, and work together to test their game mechanics. Come ready to play and create!

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

- Understand how games can be used to model a variety of systems
- Develop a board game prototype on a topic of their choice

Strand: Interactive Multimedia

Room: Constitution C

Including Students with Disabilities in Science Instruction with Complex Text

Delinda van Garderen, University of Missouri; William Folk, University of Missouri

Nationwide educational measures document substantial deficits in students' science, mathematics and reading. For students with diverse learning needs, such as those with disabilities (SWDs), this lack of achievement correlates with low participation in the STEM workforce. Evidence supports the need for all students to use grade-band level complex texts for learning science, but most textbooks are insufficiently complex, and few supplementary complex texts exist for science and engineering. Recent studies indicate that restricting diverse learners' access to complex texts may serve to isolate students from their social peers and have serious consequences for their self-esteem and self-efficacy. During this session we share findings and examples of how instruction via multimodal STEM text sets increase middle school SWDs engagement and outcomes with complex text and argumentation skills.

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

- Develop an understanding of multimodal STEM text sets as instruction to scaffold learning to engage SWDs in complex text
- Learn about the positive impact on SWDs learning and engagement with complex and improved outcomes in argumentation skills
- Engage in activities to promote SWD interaction to engage in complex text

Strand: Broadening Participation

Room: Roosevelt/Wilson

Intentionally Teaching Social and Emotional Learning Competencies with Science and Numeracy Education

Paul M. Wright, Northern Illinois University; Alassane Twillie, Northern Illinois University; and Melani Duffrin, Northern Illinois University

In this highly interactive session, participants will engage in a number of activities that demonstrate how social and emotional learning (SEL) competencies can be integrated with science and numeracy education. These competencies include self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Light physical activity, social interaction, reciprocal teaching, peer leadership, and problem solving are a few of the pedagogical strategies we will use to show how SEL can be taught explicitly and experientially alongside STEM content. Discussion and debriefing sessions will highlight transfer of learning. Specifically, we will highlight the SEL skills required by various activities, reflect on their importance to being successful in the task and hand as well as their importance to those working in STEM fields.

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

- Understand an evidence-based framework for promoting social and emotional learning (SEL)
- Learn and experience explicit pedagogical strategies for integrating SEL instruction with STEM education
- Appreciate ways that authentic SEL instruction engages students in the immediate learning task
- Develop new strategies to teach students about the range of SEL skills needed in STEM fields

Strand: Science Teaching and Learning
Room: Arlington/Cabin John

SciEd Cross-Pollination: Replication of Program Elements

Bethany Hornbeck, Apis Creative; Robin Bartlett, University of Alabama; Cathy Morton, West Virginia University; Michael Kennedy, Northwestern University; Jane Disney, MDI Biological Laboratory; David Micklos, Cold Spring Harbor Laboratory

This session will gather a panel of veteran SEPA Principal Investigators (PIs) whose programs have been successfully replicated by other SEPA grantees. PIs will share elements of their projects that have been adopted or adapted, best practices and lessons learned for program replication, and opportunities for future replication efforts.

The panel discussion will benefit PIs interested in further building their programs using tested curricula and strategies. Participants will have the opportunity to ask questions of the panelists and begin considering how these or other SEPA program structures may fit into a future SEPA grant application.

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

- Explore a variety of SEPA program elements replicated in different SEPA settings
- Assess the potential for partnering with other programs within the SEPA family
- Identify best practices used among SEPA replication partners

Strand: Broadening Participation
Room: Latrobe

Short Talk Abstracts

Innovations in Evaluation and Project-Based Learning

*Facilitator: Alana Newell, Baylor College of Medicine
Room: Constitution C*

STEM Assessment and Reporting Tracker (START)

Stephanie Paris, Brandy Lentz, Shanthia Espinosa, Angie Setthavongsack, and Lisa Marriott, Oregon Health & Science University

We will share the STEM Assessment and Reporting Tracker (START; <https://www.startinstem.org/>), a robust online evaluation tool for engaging students about their own professional development in STEM (science, technology, engineering, and mathematics). It provides students with immediate, tailored e-feedback based on their results aimed at supporting their STEM development. It also returns summary data to STEM programs and schools in real time, with de-identifiable data filterable based on student demographics. START supports inclusive demographic data collection on a spectrum of variables (i.e., disaggregated racial/ethnic groups, disability, language, disadvantaged background, gender identity and sexual orientation identity), with modular approaches designed to support student autonomy and privacy when implemented across geopolitical settings. Finally, the tool can be used for cross-sectional or longitudinal data collection, with anonymous and identifiable approaches governed by an overarching Institutional Review Board (OHSU IRB #22889) that supports data collection by STEM programs and schools nationwide to support biomedical workforce development.

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

- Identify data collection opportunities available through the STEM Assessment and Reporting Tracker.
- Play with available modules in demo mode to support understanding of the tool's functionality.
- Locate resources for learning more about the tool or connecting with the research team about their program's use of the tool, if desired.

Matching High School Students using Propensity-Score Matching in R Studio

Perla Perez, University of Texas at El Paso, Nicholas Evans, University of Manitoba, et al.

Programs funded by the Science Education Partnership Award do not allow for randomized control trials, hence other methods are needed to compare intervention conditions to a control condition. Propensity-Score Matching (PSM) is a statistical analysis that involves the matching of participants in a treatment group to individuals who were unexposed to the intervention yet are similar to participants in the treatment group on several key variables. In this presentation, we illustrate how propensity score matching can be done in R Studio. We present the results of two intervention efforts that are designed to promote biomedical careers among historically underrepresented students. In one example, we demonstrate how PSM can be used to evaluate Year 1 efforts in one high school of Project ACE (Action for Equity) that works with the University of Texas at El Paso (UTEP). There were no significant differences between students that received ACE tutoring and matched-control students in terms of GPA. In a second example, we examine the effects of participation in the BUILDing SCHOLARS program among entering freshmen at UTEP. BUILDing SCHOLARS freshmen earned more college credit over time and were more likely to graduate than matched-control non-BUILD freshmen.

“Invoking Wonder Through Science”: Connecting Education Students and K-12 Teachers to Build Inquiry-based Pedagogy

Chery A. Whipple, Colby Sawyer College; Amy Lyon, Colby Sawyer College

One goal of the New Hampshire Academy of Science’s SEPA, Learning Science through Research, is to work with K-12 teachers and support them in developing inquiry-based, research-supported, science curricula that is curiosity (and student) driven. As such, I partnered with Dr. Amy Lyon, Assistant Professor of Education at Colby-Sawyer College, to design a completely novel course, “Invoking Wonder through Science”. This course matches CSC education and science students with current in-service K-12 teachers and guides them through the methodology and rationale of teaching science through student-driven inquiry, research, and wonder. During our classroom (and laboratory) component of the course, we first demonstrate phenomenon-based pedagogy and then ask our students (as part of their student-teacher pair) to develop mini-lessons that they teach to children from the community. Over the summer, CSC students, with the support of Amy, myself, and their in-service teacher mentor, develop novel curricula that they implement in their mentor’s classroom in the fall. After running this course two consecutive summers, we have found that our CSC students not only feel less anxious and more excited about teaching science, but both our students and mentors are dramatically more likely to utilize inquiry-based curricula when teaching in future science courses.

Metagenomic and Whole Genome Sequencing Findings from the Metagenomics Education Partnership

Stephen Koury, University at Buffalo; Sandra Small, University at Buffalo; Jonathan Bard, University at Buffalo; Sunha Kim, University at Buffalo; Norma Nowak, University at Buffalo; Janvi Manish Shah, University at Buffalo; Tanishka Khurana, University at Buffalo

The Metagenomics Education Partnership immerses students and teachers within a citizen science research project focusing on assessing waterway health within the Western New York region. The project aims to promote the role of genomics and DNA sequencing in workforce development by informing high school students, educators and other relevant organizations how these fields integrate into future STEM jobs and careers. In addition, it aims to directly link scientific exploration to the local environment in which students reside. It involves Oxford Nanopore MinION sequencing to determine the microbial community compositions of waterways of relevance to students and teachers, and to perform complete sequencing of one of the microbial genomes in the sample. The metagenomics study allows students to differentiate between the normal microbial flora of water and flora resulting from human intervention, while the whole genome sequencing study introduces students to big data manipulations involved in assembling a microbial genome from tens of thousands to hundreds of thousands of DNA reads. We will present the results obtained by students and teachers in 10 Western New York high schools participating in the project during the current academic year.

Themes in Informal Science Education

Facilitator: Jacquie Genovesi, Drexel University
Room: Constitution E

Building Family STEM Capital at a Children’s Museum

Hardin Engelhardt, Marbles Kids Museum, Raleigh, NC

Learn about a multi-generation approach to building family STEM capital through informal science education at a children’s museum.

Citizen DNA Barcode Network: From New Species to Expanding Ranges, Citizen Scientist Findings Contribute to the Larger Scientific Community

Jeffry Petracca, Sharon Pepenella, Bruce Nash, and David Micklos, Cold Spring Harbor Laboratory DNA Learning Center

Since 2014, the DNA Learning Center (DNALC) has conducted SEPA-funded citizen science DNA barcoding programs. These programs have exposed hundreds of educators, students, and members of the public to molecular biology, taxonomy, and ecology, culminating in the current national program, Citizen DNA Barcode Network (CDBN). Since the program's inception, CDBN participants have successfully collected and processed barcodes of over 1,000 arthropod specimens, leading to the publication of 278 barcode records to GenBank, with many more that await curation. Among these specimens, citizen scientists contributed over 100 sequence variants and 50 novel sequence records, with as many as eight U.S. specimens that are either undescribed or unknown to science. Furthermore, with CDBN's focus on the collection of ants, beetles, and mosquitoes, the data collected helps to complete range maps for ecologically, agriculturally, or medically relevant species. Several specimens were collected from outside their known ranges, suggesting the spread of potential agricultural pests due to human activities or climate change. These findings highlight the efficacy of CDBN and the use of barcoding as an important tool of citizen science.

Exploring Cancer in Appalachian Kentucky Through Youth-Told Stories

Nathan L. Vanderford and Holly Burke, Markey Cancer Center, University of Kentucky

Kentucky has the highest cancer incidence and mortality rates in the US with the greatest cancer burden being in the Appalachian region of the state. These disparities are driven by social determinants of health and health behaviors. We engage participants in the University of Kentucky Markey Cancer Center's Appalachian Career Training in Oncology (ACTION) Program, an NCI-funded Youth Enjoy Science R25 program, in writing and storytelling activities that give them opportunities to discuss their experiences and understanding of cancer through their own lived experiences. Through these activities, we have published two books containing 58 essays written by ACTION participants and another book is in process now. Ultimately, using storytelling, we empower youth in Appalachian Kentucky to understand cancer through their personal experiences and their cultural framework while connecting those perspectives to the behavioral and epidemiological facts about how the disease impacts the region. This session will discuss our process for developing participants' stories and provide some insight into the stories' topics.

Leveraging Photovoice to Understand Youth's Perspectives of Cancer in Appalachian Kentucky

Nathan L. Vanderford, Markey Cancer Center, University of Kentucky

Kentucky has the highest cancer incidence and mortality rates in the US with the greatest cancer burden being localized to the Appalachian region of the state. These cancer disparities are driven by social determinants of health and health behaviors. In the context of the Appalachian Career Training In ONcology (ACTION) Program at the University of Kentucky Markey Cancer Center, an NCI-funded Youth Enjoy Science R25 program, we engaged youth participants in a photovoice project designed to explore participants' perspectives of cancer. This session will explore lessons learned from the project including how content analysis was conducted on the photographs to identify themes. Photographs aligned with cultural, environmental and situational factors in Appalachian Kentucky that relate to the high rates of

cancer in the area. A set of the photographs were displayed in galleries to engage the public. Ultimately, photovoice was successfully used to understand Appalachian Kentucky youth's perspectives of cancer and to visually engage the community with the causes and consequences of the disease.

Curriculum Materials and Data Science Research Experiences

Facilitator: James Breeden, Texas A&M University

Room: Roosevelt/Wilson

Bringing Pandemic Science to the Classroom: Wastewater Testing and Environmental Health in Three-Dimensional Science Lessons

Sahar Alameh, University of Kentucky; Jeffrey Chalfant, University of Kentucky; Savannah Tucker, University of Kentucky; Scott Berry, University of Kentucky; James Keck, WWAMI School of Medicine, University of Alaska Anchorage; Anna Hoover, University of Kentucky; Donna McNeil, Kentucky Water Research Institute; Lindell Ormsbee, University of Kentucky

Part of an NIH RADx-rad Initiative, a multi-disciplinary research team from the University of Kentucky will engage participants in middle and high school environmental STEM unit composed of six lessons. Aligned with the Kentucky Academic Standards for Science and the Next Generation Science Standards (NGSS), the lessons focus on viruses, wastewater, and environmental health. In each lesson we use a student-centered, inquiry based, 5E Learning Cycle that consists of five main stages: Engage - Explore - Explain - Extend - Evaluate. The unit begins with a lesson about living and nonliving things and goes in-depth on viral structure and function. In the second lesson, students learn about coronaviruses and COVID-19 tackling the misconception of "COVID-19 is just the flu". In the third lesson, students go in-depth into exploring viral spread (through a mathematical model for high school and online simulations for middle school). In the fourth lesson, students learn about water quality and wastewater management and surveillance. In the fifth lesson, students get to see wastewater testing in action through our Ford Mobile Lab/Van. Finally, the last lesson connects with public health awareness. This lesson offers students a chance to write a report/proposal connecting wastewater surveillance to public health decisions making.

Careers in Cancer – Career Profiles

Kristen Bergsman, Fred Hutchinson Cancer Research Center; Regina Wu, Fred Hutchinson Cancer Research Center; Jeanne Chowning, Fred Hutchinson Cancer Research Center

The Frontiers in Cancer Research - Career Profiles Website has been developed as a tool for high school students to accompany the Frontiers in Cancer Research curriculum units. The site features profiles of real professionals working in fields related to cancer research, cancer treatment, and patient care. These people work across many disciplines of science, social sciences, medicine, and healthcare. Their stories represent a variety of career and educational pathways, diverse backgrounds, and various career stages. Some work with adult patients, others work with pediatric patients and their families. In addition, a Becoming the Next Cancer Researcher or Clinician section provides college and career information for students planning for a career in STEM, healthcare, or medicine. Teachers can use the Supplementary Info: College & Career Connections document to plan how to incorporate the study of careers in the science classroom.

Data Detectives: Science Education Using Real Data to Solve Real Community Health Problems

Theresa W. Gillespie, Emory University; Adam Marcus, Emory University

Data sciences are vital for advances in science and health; however, females and under-represented minority students are less likely to pursue STEM careers and study data sciences. This experiential, informal science education curriculum focuses on using population-level Big Data for community health needs assessment, analysis, and application to enhance students' understanding of the importance of science and Big Data beyond the laboratory or classroom. Our program, Data Detectives: Using Real Data to Solve Real Community Health Problems, employs problem-based learning, targeting Title I middle school students to use Big Data to generate Action Plans designed to solve actual problems impacting the health of communities. Students engage with community organizations, local governments, and community stakeholders to share their research findings and plans to improve health outcomes.

Development and Piloting a Data Literacy and Data Science Curriculum in Middle School: The Arkansas Big Data Science Approach

Kevin D. Phelan and Tiffany W. Huitt, University of Arkansas for Medical Sciences

There is an urgent need to develop a data-literate workforce for the 21st century using a long-term strategy targeting education across the K-12 spectrum. Currently, there is a challenge in providing sufficient and accessible resources for K12 educators to deliver high quality instruction in data science. We developed a data science focused curriculum for middle school schools to improve data literacy, student interest and knowledge of data science, as well as increase teacher knowledge and confidence in using large data sets in the classroom. Our lesson plan utilizes a 5E curriculum model based partly on the NOAA "data in the classroom" modules and modified to extend data analysis and visualization skills using the Common Online Data Analysis Platform (CODAP) and Orange data mining programs. The modules were designed to promote skills in collecting large datasets, cleaning data, exploring data summary statistics, graphing numerical vs categorical data, making and testing predictions, and data science visualization. Classroom observations and positive teacher and student evaluations indicate that the program is engaging students and improving data literacy skills and knowledge of data science careers. Supported by a seed grant from the National Science Foundation (NSF) under Award No. OIA-1946391.

Themes in Teacher Training: Reaching New Populations, Sharing New Content

*Facilitator, Sarah Wojiski, The Jackson Laboratory
Room: Latrobe*

Teachers Bring Regenerative Medicine and Biofabrication to the Classroom

Carmela Amato-Wierda, W. Kelley Thomas, and Amy Booth, University of New Hampshire; Alison Allen and Kristin Bass, Rockman et al.; Eleanor Jaffee, Insights Evaluation LLC

The NH CREATES Summer Institute is a PD program that provides training to middle/high school STEM teachers to help them develop classroom projects related to regenerative medicine and biofabrication (RM&B) utilizing a project-based learning (PBL) format. During the Institute, teachers interact with ongoing RM&B youth projects happening concurrently to determine areas of interest. Participants work over the two-week institute to design classroom projects and then implement them during the school year. Thirteen middle and high school teachers, representing the areas of biology, physical science, STEAM, engineering, and more

have participated in the program since its inception in 2021. Projects developed by the teachers have included the topics of cryopreservation, regrowing organs, genetics, RM&B innovation, and more. We will discuss the transition from developing these projects at the Institute, to implementing these projects in the classroom. We will highlight a few of the projects implemented and share results from teacher surveys exploring the successes, benefits, and challenges of the implementation of the RM&B PBL projects in their classrooms and schools. We will also share findings around administrative support as teachers implement their projects.

PHAGES Year 4: The Teachers Take Over!

Marisa Pedulla, Montana Technological University

Year 4 of the PHAGES project involved teacher participants independently leading classrooms of students through the scientific discovery process. How did that go?!! New extensions of the program to Montana's Flathead Valley within the Confederated Salish-Kootenai Tribe (CSKT) Reservation will also be discussed! 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 on the diversity of the biological world as citizen scientists. Surprisingly simple phage protocols allow students to envision and experience success in scientific research. Phages 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 develop the skills for program sustainability. Students who participated in classroom phage discovery while in 7th-12th grades are eligible thereafter to apply for annual summer pipeline programs, culminating in poster presentations and publication of annotated phage genomes in GenBank. Annual summer teacher research academies provide 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.

Engaging Trainees to Enhance Relevance and Promote Awareness of Biomedical Research Careers: Strategies from the Iterative Design to Engage All Learners Program

Jenna Hartley, University of North Carolina at Chapel Hill; Dana Haine, University of North Carolina at Chapel Hill; and Kathleen Gray, University of North Carolina at Chapel Hill

The Iterative Design to Engage All (IDEA) Learners program is designed to build the capacity of NC science teachers to introduce current biomedical science and career opportunities to students. Using research on per- and polyfluoroalkyl substances (PFAS) as a foundation, in year I the program brought together researchers, including trainees, and 8 secondary science teachers to co-develop standards-aligned curricula. This presentation will describe the strategies used to recruit, prepare, and engage trainees in a suite of program activities, ranging from teacher professional development to curriculum development, to support the program in broadening participation in STEM. Specific activities included 1) conducting a speed networking session to foster dialogue between trainees with diverse identities and teachers about how to make biomedical research careers more diverse, equitable, and open to all, 2) involving trainees in process of developing curriculum featuring PFAS data and science practices, 3) creating a speakers bureau for teachers to invite trainees to speak with students either virtually or in person, and 4) creating short researcher videos highlighting stories of student and early-career researchers. Benefits of these initiatives for both teachers and trainees will be highlighted in effort to prompt discussion about

best practices for not only engaging trainees in science education efforts, but also sustaining these efforts over the course of long-duration programming.

Scaling Up: How do We Broaden the Reach of Our SciEd Programs?

Charlie Wray, The Jackson Laboratory

Many SciEd programs often start by engaging with students, teachers, and families in the local community. Working within the local community has the benefit of direct engagement with participants and can have lasting and impactful positive outcomes. Yet many SciEd programs often have the goal of broadening their reach from the regional to the national stage, particularly as digital tools and technologies make curricular resources more broadly accessible and engagement with distant program participants possible. How does a SciEd program effectively move from the local to the more global audience? The goal of this discussion will be to discuss challenges in making this transition and to learn from one another ways to effectively disseminate resources, engage with participants, evaluate program impact, and manage larger programs.

Research and Evaluation on Vaccine Education

*Facilitator: Luke Bradley, University of Kentucky
Room: Arlington/Cabin John*

Research and Evaluation of a COVID-19 Vaccine Hesitancy Program Using Underserved Students as Ambassadors

Yen Dang, University of Maryland Eastern Shore, Anjan Nan, University of Maryland Eastern Shore

A pharmacy-led curriculum comprised of evidence-based practices on overcoming SARS-CoV-2 vaccine hesitancy was developed among Somerset County high school students. An interdisciplinary team implemented an interactive SARS-CoV-2 vaccine curriculum for underrepresented high school students based on the WHO SAGE Vaccine Hesitancy Matrix. Afterwards, students helped design two videos to improve vaccine confidence. Students also applied the principles learned at a COVID-19 vaccination clinic. The McNemar test was used to evaluate survey changes among matched respondents with an alpha of 0.05. Forty-five students participated in the 4-month program and significantly more students agreed in post-tests that “I have adequate knowledge about SARS-CoV-2 disease” ($p = 0.0412$), and “I have adequate knowledge about the SARS-CoV-2 vaccine” ($p = 0.0094$). Overall, 85% of students agreed that the program was well organized; 82% would recommend the program to others. Twenty students (51%) agreed that “I am comfortable serving as a vaccine ambassador where I can promote the SARS-CoV-2 vaccine.” This program is innovative by combining the expertise of pharmacists with influential community leaders to educate students from a medically underserved population. Ultimately, this program allowed for students to become vaccine champions and serve as SARS-CoV-2 vaccines ambassadors to empower their community to get vaccinated.

Vetahumanz Need Vaccines Too!: Findings of an At-home Educational Program Focused on Vaccine Education and Attitudes

Lindley McDavid, Purdue University; Sandra San Miguel, Purdue University

Under the umbrella of the League of Vetahumanz educational program, nearly 6,000 young children from diverse racial, ethnic and socioeconomic backgrounds received the Vaccines!

Super Power Pack (SPP). This SPP focused on educating children and their families on how vaccines give people and their animals superpowers to fight germs through the perspective of a role model (i.e., veterinary superhero) and an educational book. Mail-in surveys ($n = 199$) indicated that young people (age range = 6-12 years, $M = 8.8$ years) consistently reported positive levels of SPP engagement and perceptions of the role model, and diverse but generally positive attitudes towards vaccines. These findings, grounded in social cognitive theory, indicate that the SPP lays the groundwork for young people's continued interest and learning about vaccines, and that young people have wide ranging but desirable perceptions of vaccine safety, efficacy and advocacy.

The Impact of an mRNA Vaccines Mini-unit on Students' Vaccination Attitudes and Behaviors

Rochelle C. Cassells, University of Utah

Vaccine hesitancy was a mounting public health concern before the COVID-19 pandemic (Petrelli et al., 2018) but increased with inaccurate scientific information about COVID-19 vaccines. The Genetic Science Learning Center (GSLC) at the University of Utah developed three lessons to educate high school biology students about how mRNA vaccines are made, how they work, and the risks and benefits of use. A within-subjects, mixed-methods research study evaluated the efficacy of these lessons and explored whether students demonstrated more favorable vaccine attitudes and behaviors after exposure to the mini-unit. The results revealed greater student knowledge of mRNA vaccines after experiencing the lessons, $t(142) = 9.85$, $p < .001$. Students reported less mistrust in the benefits of vaccines, $t(135) = -6.70$, $p < .001$, and less preference for natural immunity, $t(135) = -4.74$, $p < .001$, after the lessons. Students endorsed high levels of pro-vaccination behavior across common diseases before exposure to the lessons, yet modest increases were observed. Roughly half of the students indicated they would “definitely” or “probably” share what they learned about mRNA vaccines with others. The talk will include qualitative data on students' reasons for or against sharing the information.

Roundtable Abstracts

1. Belonging in Science: Boundaries and Contexts of the Construct

Katherine Nielsen, UC San Francisco; Rachel Harris, UC San Francisco; Linda Morrell, UC Berkeley

“Belonging in science” as a construct is challenging to define, especially when focusing on adolescents’ sense of belonging. Through the SEPA project, Constructing a Community of Teen Health Science Leaders, we are exploring what belonging in science is and means to high school students. We have arrived at a tentative definition: The extent to which students feel personally accepted, respected, represented, included, and supported in science. We are interested in input from the SEPA community to explore the bounds of the definition and seek to discuss contexts where students’ sense of belonging might develop. For the presentation, we plan to introduce the construct (5 minutes). The remainder of the time will be a back-and-forth conversation where we will discuss our current research and solicit ideas and experiences from SEPA participants. Finally, we will summarize our presentation and discussion to close the session.

Strands: Broadening Participation; Research and Evaluation

2. Socioscientific Reasoning as a Conduit to Biomedical Science and Health Literacy

Carla Romney, Boston University; Donald DeRosa, Boston University; Carl Franzblau, Boston University

Developing learners’ proficiency in socioscientific reasoning, the critical analysis of issues that have both social and scientific underpinnings, is emerging as an effective strategy to engage learners in personally-meaningful and socially-impactful investigations. The use of socioscientific approaches can foster active/engaged learning and the development of scientific literacy that supports informed decision making. Share your experiences and learn from the experiences of others about the challenges and benefits of incorporating this approach in biomedically-focused experiences for diverse populations of learners.

Strands: Curriculum Development; Science Teaching and Learning

3. Tree Twisssssster, Drug Discovery, and Flu vs. Vaccine: Minimal Facilitation Activities About Evolutionary Trees and Human Health for Informal Learning Settings

Teresa MacDonald, University of Kansas Natural History Museum; Lisa D. White, University of California Museum of Paleontology; Anna Thanukos, University of California Museum of Paleontology

We needed fun, friendly, packable activities to engage families waiting to play our immersive evolution-themed escape game and to allow teams who just finished playing to build on knowledge gained during the game. Furthermore, because some of the rural sites hosting the game are likely to be understaffed, the activities largely needed to run themselves and require minimal facilitation. We developed three activities to fit these constraints and make explicit connections between evolution and medical applications. Tree Twisssssster gets families moving and laughing, while introducing them to basic phylogenetic topology and concepts. In Drug Discovery, learners twist pipe cleaners into tactile models of evolutionary trees and use these to answer questions about plants containing biologically active compounds. In Flu vs.

Vaccine, learners use blocks to model the evolution of a virus on an evolutionary tree and test its changing shape against an antibody.

Strand: Informal Science Education

4. Overcoming Limitations and Pitfalls with Teaching and Learning in Informal Learning Environments

David H. Holben, University of Mississippi; Melani W. Duffrin, Northern Illinois University

Informal learning environments support science teaching and learning, yet, regardless of setting, limitations and pitfalls may arise. This session will provide an opportunity for attendees to discuss a diverse array of informal learning environments used for science teaching and learning; potential limitations and pitfalls that may arise when teaching science in diverse settings and associated learning challenges; and solutions for overcoming pitfalls and limitations in a wide variety of settings.

Strand: Informal Science Education

5. Design Principles for Usability and Accessibility

Amir Attia, California State University, Monterey Bay

Great products, tools, and devices cannot fulfill their intended purpose to serve and satisfy their users' needs without a well-crafted and accessible visual interface that allows the intended users to easily navigate them to successfully achieve the intended goals of their journey and experience. The intention of this roundtable is to highlight some of the basic design principles that must be considered when designing any multimedia to ensure successful usability and accessibility for all users.

Strand: Interactive Multimedia

6. Conducting Research in U.S. Public Schools: Evolving Practices and Strategies

Rochelle C. Cassells, University of Utah; Harini Krishnan, University of Utah

Kindergarten to grade 12 is a rich context in which much science education research occurs. There are many known considerations to conducting research in this setting, chief among them being the protection of children as research participants. However, with its increased scrutiny of science curricula, the changing sociopolitical climate in the United States introduces additional considerations and challenges for working with schools and student populations. This roundtable discussion will share insights from a nationwide mixed-methods curriculum study. The discussion will involve attendees in an open dialogue about successful approaches to recruitment and obtaining permissions, as well as lessons learned for future studies.

Strand: Research and Evaluation

7. Career Opportunities: Learning About Being a Scientist Awareness, Exploration, Preparation, Training

Craig Berg, University of Wisconsin-Milwaukee; Michael Carvan, University of Wisconsin-Milwaukee; Renee Hesselbach, University of Wisconsin-Milwaukee; and David H. Petering, University of Wisconsin-Milwaukee

We propose to use our program, “Learning and Discovery in Experimental Environmental Health Science: On the Path from Data to Knowledge,” to spark discussions about helping students learn about careers in science. Previously, our project has not focused explicitly on providing students with career information as they are doing authentic research in the classroom and then communicating their results to peers at a Student Research Conference. That is changing. Recently, a presenter at a teacher professional development conference described the pathway into a specific career as a sequence of AWARENESS → EXPLORATION → PREPARATION → TRAINING. We realized that our program naturally makes students aware of scientific research as the foundation of many careers. As they do their scientific experimentation, they are naturally exploring the process of doing research. In an introductory way, they are beginning to prepare for research careers by developing fundamental competences, such as critical thinking, leadership and teamwork, formal communication, and laboratory and computational skills. Because of the area of student experimentation – the toxicity of environmental and lifestyle chemicals – there is also opportunity to alert students to the societal relevance of research careers. Having received many reports that our program stimulated students to pursue science majors in college, we are in the process of adding discussions of research career opportunities to our SEPA program. We hope our experience will encourage other SciEd programs to infuse information about careers in science as a natural extension of their programs.

Strand: Research Experiences for Students and Teachers

8. “Creative vibes:” Using a Comic in Science Curriculum and Teaching to Promote Student Engagement

Consuelo J. Morales, Michigan State University; Tania Jarosewich, Censeo Group; Maria G. Salinas, Michigan State University; and Irene S. Bayer, Michigan State University

Engaging curriculum that invites all students to learn science has long been a goal in science education, and gets at the heart of equity in science learning. Comics that have accurate science content, interactive features, and characters with whom students can relate could offer students accessible and interesting learning materials. Our project studied a comic embedded in a high-school biology curriculum to answer the questions: What are students' and teachers' perceptions of an embedded comic? How did teachers use the comic in instruction? How did students engage with the comic? This mixed-method study found student engagement at behavioral, emotional, cognitive and agentic levels (Sintara, 2015). Students actively participated in learning by exploring the comic, generating robust classroom discussion around science and issues related to race and racism in science. Teachers, and the majority of surveyed students, agreed that the comic helped them to learn the science in the unit and to better understand the role of field research. In this short talk we will discuss the use of an embedded comic in science education as a means to broadening participation, increasing literacy in content learning, connecting to careers in STEM, and measuring science learning.

Strand: Science Teaching and Learning

9. Getting Out of a Rut: Exploring Different Formats for Teacher Professional Development

Rosemary Riggs, Texas Biomedical Research Institute; and Beatriz Guajardo, Texas Biomedical Research Institute

There is no “one size fits all” approach to effective teacher professional development. However, once a format is adopted, programs can easily stay with the format for years. In other words – get in a rut. Yet, teaching is a dynamic profession, constantly changing to meet the needs of students. How do SciEd programs adapt existing teacher professional development formats to address the needs of teachers? What input do teachers have and how are their perspectives considered when designing professional development? What institutional constraints impact formats? How has the pandemic influenced, modified, or just plain changed what teachers need and want for professional development?

Strand: Teacher Professional Development

10. Teacher Professional Development and Argumentation: SEPA Science Education Research Publications from Fred Hutch

Jeanne Chowning, Fred Hutchinson Cancer Center

How can research institutions support science educators in learning more about scientific practices? This talk will highlight two recent publications from Fred Hutch highlighting teacher professional development focused on argumentation: Science teachers in research labs: Expanding conceptions of social dialogic dimensions of scientific argumentation (Journal of Research in Science Teaching) and “We All Sort of Jump to That Relationship Piece”: Science Teachers’ Collaborative Professional Learning about the Role of Relationships in Argumentation (Cognition and Instruction). In addition, we will touch on publishing SEPA findings in science education research journals.

Strands: Teacher Professional Development; Research Experiences for Students and Teachers

Video Showcase Abstracts

Facilitator: Brinley Kantorski, Duquesne University

Strand: Interactive Multimedia

Room: Constitution Ballroom A/B

Videos Funded by SEPA Vaccine Hesitancy Supplements

How do mRNA vaccines work?

Jeanne Chowning, Regina Wu, and Kristen Bergsman, Fred Hutchinson Cancer Center

For this project, the Science Education Partnership at Fred Hutch partnered with Arkitek Scientific to create a high-quality scientific animation of how the mRNA vaccine works. This short (4:10) video, which is narrated by student intern Yusuf H., is targeted to youth and the public. Teachers can use it to introduce or reinforce the relationship between DNA, RNA, and protein (the "central dogma") within biology classrooms. It can also be used by health educators to describe mRNA and the creation of this new type of vaccine.

Available at: <https://www.youtube.com/watch?v=Be4GLTiawrQ>

Vaccine Hesitancy – Vaccines and You

Julie Harlin, Texas A&M University; Bette Bittner, Whitaker et al.

An interdisciplinary team created five middle-school-level videos entitled, "Vaccines & You". Each video focuses on an informal interview between a layperson and an immunology/epidemiology expert addressing biology, hesitancy, and misconceptions.

Available at: <https://vimeo.com/829502008?share=copy>

All videos developed for this project are available at:

<https://vimeo.com/user/9471571/folder/9141707>

<https://tx.ag/vaxitancy>

How the mRNA Vaccine Works

Arthur Veenema, University of Utah; Kristin Fenker, University of Utah; Kagan Breitenbach, University of Utah; Louisa Stark, University of Utah

This video explains how mRNA vaccines harness the power of a person's own cells to help their body learn to recognize and destroy the virus. It uses an eye-catching stop motion approach that includes custom built, scientifically accurate models. The models balance the key features needed to understand virus biology without being overly complicated. The video was produced with high school students in mind, though it's also appropriate for the public. To encourage classroom use, the video connects molecular and general biology concepts that many teachers are required to cover to a relevant real-world example.

The video is a part of a 5-piece curriculum module on mRNA vaccines

(<https://teach.genetics.utah.edu/content/vaccines/>) that led to significant, positive changes in student's attitudes toward the safety and efficacy of these vaccines. For example, after experiencing the curriculum, the percentage of students who felt vaccines were 'highly' safe nearly doubled—from 30% to 58%. In addition, 21% of students reported on the pre-survey that

mRNA vaccines were effective and 54% of students reported them as such on the post survey (n = 143 for both). The four teachers who tested the video also shared positive feedback and indicated they plan to use it again.

Available at: <https://learn.genetics.utah.edu/content/vaccines/mrnavax>

How mRNA Vaccines Were Engineered

Arthur Veenema, University of Utah; Kagan Breitenbach, University of Utah; Kristin Fenker, University of Utah; Louisa Stark, University of Utah

This video demonstrates how decades of research set scientists up to deliver safe and effective vaccines for COVID-19. Visuals, like a tower of scientific papers, emphasize that there was already a strong base of research for having vaccines ready quickly. Additional visuals, such as a model lipid nanoparticle manipulated by the video host, are an accurate yet accessible way to demystify how mRNA vaccines are packaged and delivered.

This video is part of a 5-piece curriculum module on mRNA Vaccines (<https://teach.genetics.utah.edu/content/vaccines/>) designed for high school classrooms. After experiencing the module, student survey responses revealed significant, positive change in their attitudes toward the safety and efficacy of mRNA vaccines. In fact, students reported greater trust in the benefits of mRNA vaccines and less preference for natural immunity after using the modules (n = 136 for matched pre-post surveys). As a proxy for the potential reach of the materials, students were asked if they would share what they learned with others. Fifty-seven percent of students (n=156) responded they will 'definitely' or 'probably' share what they learned.

Available at: <https://learn.genetics.utah.edu/content/vaccines/mrnahistory>

Immunology and You

Kim Soper, Terri Gulick, Ben Ehlers, Maurice Godfrey, University of Nebraska Medical Center

We developed a self-paced module to introduce students to basic aspects of the human immune system. Sections include: Chemical and Mechanical Barriers, the Innate Immune System, Adaptive Immunity, Viruses and Parasites, and Immunizations. There are assessments after each section and a final summative assessment to help participants gauge learning.

Available at: <https://vimeo.com/829607485/772350facc>

Using High School Students as COVID-19 Vaccine Ambassadors in a Medically Underserved Area

Yen Dang, University of Maryland Eastern Shore; Anjan Nan, University of Maryland Eastern Shore; Adel Karara, University of Maryland Eastern Shore

A best-practice curriculum on overcoming COVID-19 vaccine hesitancy was developed for 50 underserved high school students. The program focused on discussions from multi-disciplinary leaders in the community about the importance of getting vaccinated, a tour of a COVID-19 clinic, and simulations of vaccine administration. Students applied what they learned to make a

PSA about getting COVID-19 vaccinated to their community. The video productions are shown here.

Available at: https://drive.google.com/file/d/1LI_Ja1lcFR82VqQmz-vp6BP_BjHWUmJe/view?usp=sharing

Videos Produced for Other SciEd Projects

The 5-4-3-2-1 Method: A Grounding Exercise to Manage Anxiety

Brinley Kantorski, Sarah Will, and John Pollock, Duquesne University

Feeling anxious? Grounding exercises can help to calm anxious thoughts and keep you focused and mindful in your environment. The 5-4-3-2-1 method is a grounding exercise that can be done almost anywhere and it doesn't require any equipment or materials- just your brain! Take a few minutes to learn how to complete the exercise and then try it for yourself.

Available at: <https://www.youtube.com/watch?v=30VMIEmA114&t=5s>

Flint Youth Take Charge of Their Well-Being

Maria G. Salinas, Michigan State University; Matthew Oberdier, Genesee County Prevention Coalition; Irene S. Bayer, Michigan State University

This video intends to lift youth voices by spotlighting the findings of student-led research conducted by 8th graders in Flint, Michigan. After studying substance use disorder in science class through the Health in Our Hands (HiOH) curriculum: "How can looking for thrills make me miserable?", they conducted original research to answer their question "How does the use of technology affect my well-being?". HiOH partnered with the Genesee County Prevention Council and Genesee Health System to create this video for the National Drug and Alcohol Facts Week, which took place in March 2022.

Available at: <https://drive.google.com/file/d/1I6urR-H0VEd3fQ7ljtP-TOuTSaR2ASTS/view?usp=sharing>

The Atomic Circus Experience

Matt Queen, Montana State University Billings; Amanda Obery, Central Washington University.

This video gives behind-the-scenes access to The Atomic Circus Experience a multi-media biochemistry stage show by Authentic Community Engagement in Science.

Available at: <https://youtu.be/rj--pjKAt4o>

PEAS Whiteboard Training Video Series

Virginia C. Stage, North Carolina State University; Jocelyn Dixon, East Carolina University

The More PEAS Please! Practice Science training video series is a set of four ~5-minute videos that introduce early childhood teachers to key strategies for engaging young children in the practices of science. Additional video series focuses on engaging children's senses, encouraging science talk, and supporting children's learning using culturally sensitive approaches.

Available at: <https://youtube.com/playlist?list=PLols2jrsiTjVF8tkfNef3Zz6eio6BfEL->

M-ASCEND Summer Research Poster Symposium

Renee Boney-Jett, University of Minnesota; Cathleen Drilling, University of Minnesota

Supporting youth to achieve the knowledge, skills, and self-efficacy required for success within the biomedical and behavioral sciences starts with encouraging students to develop individual identities as researchers. This video highlights the work and positive outcomes of M-ASCEND's Summer Internship component for high school and undergraduate students during our 2021 poster symposium. This video describes M-ASCEND's best practices with education and research through the lens of our students and principal investigators.

Available at: <https://drive.google.com/file/d/1I6urR-H0VEd3fQ7ljtP-TOuTSaR2ASTS/view?usp=sharing>

Heartbeat: A Mindfulness Exercise to Calm Your Emotions

Brinley Kantorski, Sarah Will, and John Pollock, Duquesne University

Sometimes feelings of fear, excitement, or anxiety can cause your heart to race. If these feelings become overwhelming, this quick mindfulness exercise can help to calm your emotions and connect your emotions to your heartbeat. This exercise doesn't require any materials and can be done in just a few minutes. Take a seat, get comfortable, and give it a try!

Available at: <https://www.youtube.com/watch?v=3iUf73v92II>

Lemonade Stand Abstracts

Room: Constitution Ballroom A/B

1. Co-Creating Rural Biomedical & STEM Curriculum

Matt Queen, Montana State University; Amanda Obery, Central Washington University

Working with teachers in rural and American Indian schools, the Authentic Community Engagement in Science Project co-created culturally relevant curriculum focusing on local STEM phenomena over the course of three years. By centering local biomedical issues, each curriculum is unique but features common elements: places and problems familiar to students, STEM content knowledge and practices through the Next Generation Science Standards, and essential community role models.

Grade level: 5th grade

2. PLANT ON A RAMPAGE! Evolutionary scientists to the rescue!

Anna Thanukos, University of California; Lisa D. White, University of California Museum; Teresa MacDonald, University of Kansas

Our project involves an intense – but short – learning experience for families: an evolution-themed escape game. We wanted to provide families with a take-home component to extend the learning experience into the home, introduce families to diverse scientists in biomedical careers, and spark conversations about the game after the fact. To meet these needs, we developed a comic-laden activity book. The book extends the narrative introduced in the game, introduces families to biomedical careers, invites youth to envision themselves in a similar career through an art activity, and offers puzzles, a metapuzzle, and a thematic craft that reinforce key concepts from the game.

Grade levels: Upper elementary and middle school

3. Worlds of Connections – VR

Julia McQuillan, University of Nebraska; Meghan Leadabrand, University of Nebraska; Trish Wonch Hill, University of Nebraska; Sam Bendix, University of Nebraska; William Freudenheim

We will provide headsets and invite people to play a new game that will be released in July 2023: Worlds of Connections - VR. This first chapter of the game is designed to engage youth with a futuristic robotic farm to explore systems and health through connections among prairie dogs, plants, soil sensors, and robots. The game emphasizes One Health concepts such as relationships among human, animal, plant, and environmental health. The game is based in sociological theories of identities, emphasizes fun, will eventually allow for multiple players at once, and will be the basis for future chapters on new topics.

Grade levels: Grades 5-10, older youth, and adults

4. Cells in Context Curriculum Unit

Molly Malone, Sheila Homburger, Kristin Fenker, Jen Taylor, Kaile Akina, Pete Anderson, Kagan Breitenbach, Jonathan Conger, Dina Drita, Jason Harris, Jonny Holmgren, Max Kelly, Ann Lambert, Ryan Perkins, Julia Peterson, Kevin Pompei, Brooklee Watters, Louisa Stark, University of Utah

Browse multimedia materials from a SEPA-funded, NGSS-friendly middle school curriculum unit that explores cells, cells systems, and how pathogens disrupt cell and tissue function. Through artwork that mimics reality, the unit's dynamic multimedia and modeling resources seamlessly integrate with one another, highlighting how cell structures contribute to function. The unit includes three paper-based modeling activities that build on one another to explain how the symptoms of an illness are caused by disrupted cell and tissue function.

Grade level: Middle school

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

Lucy Luong, San Francisco State University; Kimberly Tanner, San Francisco State University

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 improve science learning. Visit us to learn more about Scientists Spotlights, search over 650 student-authored assignments on the newly launched website, and discover ways to integrate Scientist Spotlights in your educational context.

Grade levels: Grades 6-12 and college

6. 3DMD AR App – Augmenting Physical Materials

Heather Ryan, 3D Molecular Designs; Tim Heman, 3D Molecular Designs

Experience 3D Molecular Designs' augmented reality smartphone app and web-based augmented reality tools in development. 3D Molecular Designs' 3d printed proteins, injection-molded water and DNA kits, foam nucleotides, and printed posters can all be tracked – and augmented – without additional tracking points or QR codes. 3DMD AR will be field tested and assessed for usability and learning gains over the 2023- 24 school year.

Grade levels: Middle and high school

7. Mystery of the Monkeyflowers

Consuelo Morales, Michigan State University; Irene S. Bayer, Michigan State University

"Mystery of the Monkeyflowers" is comic book that draws students along the storyline of an NGSS-designed, project-based learning unit for high school life science. Students use a monkeyflower plant experiment and the comic book to learn how traits evolve over time through natural selection. The experiment is based on the research of Dr. David Lowry, plant biologist at Michigan State University, who is studying how different environments affect the development of

different traits in the population of one species of monkeyflowers (*Mimulus*). The comic was developed in collaboration with Dr. Lowry's research team.

Grade level: High school

8. Multimedia Tutorials and Resources for Educators and Students to build 3-Dimensional Models of Molecules

Kathleen M. Hill, Pennsylvania State University; Amber Cesare, Pennsylvania State University; Tiffany Lewis, Pennsylvania State University

Many schools are providing devices to students that serve as terminals to the internet, such as Chromebooks and iPads. The Jmol program generates 3-d models of molecules, but it is software that requires being downloaded and installed. The Jmol User Design Environment (JUDE) is a web-based version of Jmol. To utilize JUDE to create 3-d molecular models, we have created multimedia tutorials for educators and students. The tutorials step users through the process of modeling insulin to explore the protein structure. These tutorials will be presented along with their benefits and challenges.

Grade level: High school

9. Frontiers in Cancer Research Curriculum Showcase

Kristen Bergsman, Fred Hutchinson Cancer Research Center; Regina Wu, Fred Hutchinson Cancer Research Center; Jeanne Chowning, Fred Hutchinson Cancer Research Center

Check out a variety of open-access curriculum materials for secondary science educators created as part of the Frontiers in Cancer Research program, an NIH SEPA funded program at Fred Hutchinson Cancer Center. We will showcase materials from: Intro to Cancer: Leukemia & Hina's Story for high school biology (recently awarded a high-quality rating from NextGenScience); Immunotherapy for high school advanced biology and biotechnology; SARS-CoV-2 Vaccine Confidence Project; and more. Interested in bringing the topics of cancer, COVID, mRNA vaccines, health inequities, genetics, and more into your classrooms and programs in rigorous and justice-oriented ways? Join us!

Grade levels: Grades 9-12 and professional development providers for high school science teachers

10. Facilitating High School Work-Based Experiences to Improve Health Equity

Julia Boge, University of Kansas; Megha Ramaswamy, University of Kansas; Maria Alonso Luaces, University of Kansas; Lisa Sanderson Cox, University of Kansas; Karin Chang, University of Missouri-Kansas City

Health science programs that engage high school students in real-world learning create a more diverse pipeline of future healthcare workers. A diverse healthcare workforce improves health equity in a community, however, there are very few resources to assist instructors in facilitating meaningful work experiences. TSCORE-LIFT has developed two guidebooks to address this gap. The instructor guidebook includes how to connect with industry, address common roadblocks, and develop students' professional skills. The industry partner guidebook helps healthcare professionals understand program objectives, including ideas for engaging and supporting students. These guidebooks are meant to be broad and easily adapted to all communities.

Grade level: High school

11. Teaching the Genome Generation: Human Genetic Variation Virtual Lab Experience

Christina Vallianatos, Alexa Wnorowski, Charlie Wray, Sarah Wojiski, The Jackson Laboratory

Teaching the Genome Generation provides a modern way to teach human genomics through the lens of personalized medicine. We recently released a new, virtual lab simulation for gel electrophoresis in collaboration with LabXchange. Designed for high school biology students, learners work in a virtual laboratory and examine natural variants in the human ACE gene by visualizing PCR-amplified DNA molecules via gel electrophoresis. Additional digital assets under development include DNA extraction, PCR, DNA sequence analysis, and more! Educators can combine our JAX resources in the LabXchange library, and build customizable pathways aligned to specific learning goals for their students.

Grade levels: Grade 9-12 and undergraduate

12. Hexacago Health Academy 2.0: Game Design for Public Health

Jessica Wilks, University of Chicago; Mason Arrington, University of Chicago; Ailea Stites, University of Chicago; Patrick Jagoda, University of Chicago

Hexacago Health Academy 2022 is a summer intervention designed to increase STEM interest in Chicago high school students through the lens of public health and game design. Developed using principles of social-cognitive career theory, experiential learning, playing & making, storytelling, and peer mentorship, the three-week curriculum engages students in board game design for deep learning, collaborative science, and systems modeling. Through the lens of the two public health topic areas, food insecurity and community violence, students will gain an understanding of experimental design, explore the Ecological Systems model and begin to prototype a board game around the topic of their choice.

Poster Abstracts

Even numbered poster presentations: Wednesday, 4:00-5:00pm

Odd numbered poster presentations: Thursday, 3:45-4:45pm

Big Data

1. An interactive protein centered bioinformatics curriculum for high school biology

Jessica Siltberg-Liberles, Florida International University; Laird Kramer, Florida International University; Janelle Nunez-Castilla, Florida International University

The Authentic Bioinformatics in the Classroom (ABC) Project utilizes the power of bioinformatics to bring context to biology and integrate bioinformatics in high school biology. The ABC project is currently focused on curriculum design and pilot implementation, including supporting the first cohort of teachers through professional development and other support structures. We are also establishing an undergraduate Bioinformatics Ambassador program to incorporate near-peer mentors for students and support teachers during implementation. The first cohort of seven Miami-Dade high school biology teachers participated in professional development that included a bioinformatics research experience followed by co-design and evaluation of bioinformatics curricular materials. The curriculum is integrated into high school biology by strategically aligning with topics covered throughout the school year. For year one, core units in the pilot implementation focused on biochemistry, genetics, evolution, and infectious diseases. The hallmark of our core curriculum is that it is interactive, and protein centered. From year two on, a bioinformatics research experience in the classroom will be added to the curriculum in the last quarter of the school year. We present our approach and lessons learned in engaging teachers and students in the ABC curriculum.

Project: The Authentic Bioinformatics in the Classroom (ABC) Project

Funder: SEPA

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

2. Brain Healthy: Engaging Students in Brain Health and Wellness Data Investigations

Ido Davidesco, University of Connecticut; Gregory Boldt, University of Connecticut; Eric Loken, University of Connecticut; Scott Justus, New York City Department of Education; Sandra M. Chafouleas, University of Connecticut; Oscar E. Ruiz, University of Connecticut; Wendy Suzuki, New York University

Brain Healthy engages high school students from diverse backgrounds in citizen science investigations of their own brain health and wellness. This new in-school program exposes students to data science and topics such as brain plasticity and stress management. With support from their teachers, near-peer mentors, and a web-based data analysis application, students collect data using fitness trackers and explore the relations between healthy lifestyle practices (e.g., physical exercise) and cognitive/affective measures. Through this experience, students are expected not only to increase their conceptual understanding of the brain basis of healthy lifestyle choices, but also acquire important and widely applicable data analytic and communication practices.

Project: Brain Healthy: Engaging Students in Citizen Science Brain Health and Wellness Investigations to Promote Data Science Literacy
Funder: SEPA

Keywords: Citizen Science, Curriculum Development, Research Experiences for Students, Students – Classroom Science Enrichment, Big Data/Data Science/Bioinformatics

3. Filtered – Discover Bioinformatics and Save the World!

Michele C. Morris, HudsonAlpha Institute for Biotechnology; Madelene Loftin, HudsonAlpha Institute for Biotechnology

The surge in computational biology-related positions is evident by a simple search on any job posting site, yet student interest in bioinformatics needs to be higher. This new field is often unfamiliar to educators who need help finding comfort with the material that will allow them to share the concepts with their students confidently. A lack of awareness and introduction to bioinformatics reduces the number of students interested in considering a career in this field, instead opting to study familiar paths such as medicine or engineering. In search of an avenue to engage high schoolers' attention and spark their interest in bioinformatics, we developed an online game that is challenging and intriguing and introduces the concepts and essential tools of bioinformatics. While the fictional global pandemic setting for Filtered was created in 2016, the game's backdrop feels eerily familiar in light of the subsequent COVID-19 pandemic. The activity's dramatic, graphic novel style has proven popular with students and sets a suspenseful tone. The browser-based Filtered is freely available and being implemented in classrooms. This summer, assessments will be finalized to measure student impact in the formal classroom setting and with informal STEM groups.

Project: Filtered: a story-driven digital learning platform for bioinformatics and infectious disease
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Interactive Multimedia for STEM Learning, Students – Classroom Science Enrichment, Big Data/Data Science/Bioinformatics

Broadening Participation

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

Maurice Godfrey, Liliana Bronner, Kim Soper, Shrawan Kumar, Jolene Johnson, University of Nebraska Medical Center; Robert Pawloski, 2EDLLC

The University of Nebraska Medical Center will continue to leverage the trust and cooperative spirit that we have garnered working with tribal schools and communities in Nebraska and South Dakota to develop, implement, and evaluate science curriculum, outreach activities, and training experiences targeting Native American students in grades K-12 and their teachers. 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. Teacher support through summer workshops, mentoring, and in-service education will facilitate 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 enriching 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. Research techniques will include baseline and post measures of attitudes and subject content, participant evaluation questionnaires, and student retrospective pretests. Advancing the health of Native American communities is the ultimate aim of every aspect of this project. Improved science teaching and heightened awareness of health careers will encourage students to enter these careers and hopefully to bring these skills back to their communities. Public outreach that increases health literacy and healthy living will promote better personal health decisions.

Project: Encouraging Excellence: Health Science Education in Native American Communities

Funder: SEPA

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

5. Facilitating sustainable partnerships for STEM education and accessible pathways for STEM students using an evidence-based model

Kathleen Umayam, Walter Reed Army Institute of Research; Emonie Hall, WRAIR Laura Tenenbaum, WRAIR Brittany Swift, WRAIR Holly Brown, WRAIR Adaeze Egwuatu, WRAIR Swati Ramadorai, WRAIR Debra Yourick, WRAIR

This in-school enrichment program partners HBCUs and their undergraduate STEM majors, trained as near-peer mentors (NPMs), with high school biology classrooms at local public high schools. NPMs implement NGSS-aligned hands-on activities 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. The program is currently completing the second year of implementation and data analysis for year two will be conducted during summer 2023. Year one outcomes demonstrated that participants reported significantly higher positive science attitudes in relation to matched comparison following the completion of the program. Qualitative findings included 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. The ultimate goal of our project is to foster longer term partnerships between these HBCUs and their local secondary schools. Challenges, successes, and future directions will also be discussed.

Project: Facilitating sustainable partnerships for STEM education and accessible pathways for STEM students using an evidence-based model

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Research & Evaluation, Students – Classroom Science Enrichment, Sustainability

6. Broadening Participation in an Environmental Health Sciences Out-of-School Program for Middle School Students

Candice Johnson, Southern Illinois University Edwardsville; Georgia Bracey, Southern Illinois University Edwardsville; Ben K. Greenfield, University of Southern Maine; Charlie Blake, Southern Illinois University Edwardsville; Carol E. Colaninno, Southern Illinois University Edwardsville; Andreia F. Dexheimer, Southern Illinois University Edwardsville; Jen Zuercher, Southern Illinois University Edwardsville; Sharon M. Locke, Southern Illinois University Edwardsville

The Environmental Health Investigators program offers middle school students from traditionally underserved communities in STEM fields the opportunity to use authentic scientific methods to investigate the connection between environment and human health. Students do this by first using Photovoice and exposure to monitoring tools to explore environmental concerns of interest, and then completing a summer research project on a topic related to air quality, noise exposure, or soil lead concentrations. The project goal is to increase participant interest in science and ultimately to diversify the health sciences workforce. The original plan was to reach 120 total participants of low-income or racial minority backgrounds through a one-year combined after-school and summer program. The pandemic disrupted in-person programs and required the team to adapt by providing more flexible programming options. Additionally, the project team recruited new school districts as partners and more closely involved teachers within those districts through professional development. The program is currently in year four of five and has surpassed the initial goal for participant numbers, having served 213 middle school students, with 90% of those students being from high needs school districts.

Project: Environmental Health Investigators: Building STEM Interest to Promote Careers in the Health Sciences

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Students – Out-of-School Programs

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

Berri Jacque, Tufts University School of Medicine; Karina Meiri, Tufts University School of Medicine; Elizabeth Genne-Bacon, Tufts University School of Medicine; Revati Masilamani, Tufts University School of Medicine; Valarie Solon, Tufts University School of Medicine; EmilyKate McDonough, PhD, Tufts University School of Medicine; Russ Faux, Davis Square Associates; Carl Reid, Boston Public Schools; Kelly Gordon, Boston Public Schools; Denise Puopolo, Boston Public Schools; Amanda Dillingham, Boston Public Schools

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.

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

Funder: SEPA

Keywords: Curriculum Development, Research & Evaluation, Students – Classroom Science Enrichment, Teacher Professional Development

8. Weaving a Social Capital Network for Child Whole-person Health: The Semilla Experience

Ingrid V. Rodríguez Rivera, Center for Community Outreach for Health Across the Lifespan, University of Puerto Rico; Maribel Campos Rivera, Center for Community Outreach for Health Across the Lifespan, University of Puerto

The Semilla program uses a STEM+M multi-level approach which integrates a public health strategy with a science education strategy to engage children in the science of their own well-being. We aim to navigate through the experience of implementation through the milestones attained, the challenges confronted, and the accomplishments achieved during the second year of implementation of the Semilla Program from the standpoint of each of the levels approached in the program. The Semilla Program 3-phased curriculum was implemented in the Aguas Buenas, Arecibo, and Las Margaritas clubs of the Boys and Girls Clubs of Puerto Rico during the academic year 2022-23. The results show that the Semilla Program met its goals in terms of quantity of participants, populations and communities served. It has established an expansive network of educators, scientists, clinicians, students, and parents that favor the evolution towards self-efficacy and self-agency of its participants at various levels. In conclusion, the participants of the Semilla Program, at any of its levels, are positioned to grow in resiliency and self-advocacy for the betterment of their personal, familial, and community health, wellness, and well-being. This results in the accrual of social capital and synergistic community building for health promotion and support.

Project: Semilla: Planting the Seeds of Change for Puerto Rico

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Dissemination, Programs for Families & the Public, Students – Out-of-School Programs

9. Teen Wellness Connection

Katherine Nielsen, UC San Francisco; Rachel Harris, UC San Francisco; Sabine Jeske, UC San Francisco; Mishael Marcelo, UC San Francisco; Linda Morrell, UC Berkeley; Mark Wilson, UC Berkeley; Mingfeng Xue, UC Berkeley; Michelle Phillips, Phillips & Associates

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, and then work together to create a one-day Teen Wellness Summit for their peers. The Summit highlights scientists and health professionals as guest speakers and facilitators of interactive and hands-on activities for San Francisco high school students. The 2023 Summit focused on adolescent mental health and drew 120 attendees. 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 are developing a validated instrument to measure “Belonging in Science,” will test the impact of

TWC on students' sense of belonging; and will publish the results of the learning research in peer-reviewed journals to inform and advance the science education community's understanding of adolescent belonging in science.

Project: Constructing a Community of Teen Health Science Leader
Funder: SEPA

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

10. START Program - Broadening Participation Through Campus and Community Partnerships

Luke H. Bradley, University of Kentucky; Molly McAndrew, University of Kentucky; Julie A. Bradley, University of Kentucky; Anthony Sinai, University of Kentucky; Margaret Mohr-Schroeder, University of Kentucky

Despite increased demand for Americans to pursue STEM occupations, individuals from underrepresented groups lack access to the key experiences necessary to consider long-term careers in STEM. The University of Kentucky's STEM Through Authentic Research and Training (START) Program seeks to strengthen and diversify the STEM community by supporting a pathway to higher education for underrepresented, historically marginalized students, from elementary to high school, through authentic learning and research experiences. Programmatic goals exist around outcomes for individuals participating in the START Program and the development of a cohesive ecosystem of support among school districts, academic and student service departments at the University of Kentucky, as well as STEM-based organizations in the Fayette County area. Given the often-siloed nature of institutions of education, the START program identified gaps in experiential offerings due to structural barriers and explored previously undeveloped pathways of collaboration among stakeholders. This poster presents the creation of the START pipeline, chronicling the partnerships that have emerged from the START Program both on-campus and across the Lexington community.

Project: STEM Through Authentic Research and Training (START) Program for Underrepresented Populations
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Research Experiences for Teachers

11. A model for INBRE to reach underserved youth

Jamie Cornish, Montana State University; Nora Smith, Montana State University; Tugba Boz, Montana State University

Finishing its first year of implementation, "My Home, My Health" has provided training in science communication, community outreach, and place-based education to twenty-five college students from four institutions (Montana State University, Blackfeet Community College, Montana Tech, and Salish Kootenai College). Our project's specific goals include increasing youth interest in bioscience careers among middle schoolers who are underrepresented in health-related sciences (rural, Native American, low-income, female), and to that end, our undergraduate researchers are creating place-based lessons and activities for middle school youth with particular focus on disease ecology. Through their participation in the project, these students have experienced gains in confidence levels in key areas:

integrating traditional knowledge and indigenous science with “Western” approaches to lesson planning and objectives, close examination and adaptation of the Next Generation Science Standards, extensive training in and understanding of human subject’s research, ethical outreach practices, and indigenous data sovereignty. The next phases of the project include testing activities during workshops in summer science camps on the MSU campus, honing kit contents and alignment with indigenous values and NGSS objectives, and training Montana classroom teachers to use these activities and lesson plans.

Project: My Home, My Health: Place-Based Public Health Resources for Rural Educator
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Informal Science Education, Students – Classroom Science Enrichment, Teacher Professional Development

12. From Sense of Belonging in Science to Health Advocates in the Community – Student Action in the Fred Hutch Pathways to Cancer Research Programs

Dave Vannier, Beverly Torok-Storb, and Jeanne Ting Chowning, Fred Hutchinson Cancer Center

Pathways to Cancer Research is a suite of programs that engage underrepresented high school and undergraduate students in authentic research at the Fred Hutchinson Cancer Center. We place a strong emphasis on developing a scientific identity, fostering a sense of belonging in science, and preparing students to communicate science to their families and communities. This poster describes our strategies and results in focusing students on research practices, health inequities and community action. We also present data on an unexpected finding during the COVID pandemic – the summer internship prepared undergraduate students to become respected health advocates in their communities. In this sense, the students have moved from developing a sense of belonging in science to becoming representatives of the biomedical research enterprise.

Project: Pathways to Cancer Research Renewal
Funder: NCI YES

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Students – Out-of-School Programs

13. Race-21: Exciting and preparing diverse undergraduate students to pursue cancer research careers.

Michelle S. Johnson, University of Alabama at Birmingham; Lalita Shevde-Samant, University of Alabama at Birmingham; Kathleen C. Haynie, Haynie Research and Evaluation; and J. Michael Wyss, University of Alabama at Birmingham

Roadmap for America’s Cancer Explorers for the 21st Century (RACE-21) focuses on developing a diverse cadre of undergraduate students to become future leaders in cancer research and medicine. Now in its 3rd year, RACE-21 has supported 52 undergrads in their studies and research and will have graduated 17 students by May 2023 (six of which are among the first cancer biology majors to graduate from this the only Undergraduate Cancer Biology Major in the nation). The RACE21 students are very diverse in terms of race (47.1% URM), disadvantaged background (65%), gender (52.9% F), undergraduate major (10 Majors), and research, however, they all have in common that they are graduating with the

skills and a desire to advance knowledge of, and reduction in, cancer. All RACE-21 students annually present their findings at the UAB Summer Science Expo. The RACE-21 students also develop and facilitate the 5- day BioBridge course that annually gives ~30 rising 9th-grade students an introduction to high school biology, focused on lessons in cancer biology. Interestingly, all the RACE-21 students facilitating the summer BioBridge outreach have remarked about how the experience teaches them better communication skills and how they enjoyed being able to “translate the information of cancer to students.”

Project: Roadmap for America’s Cancer Explorers for the 21st Century (RACE-21)

Funder: NCI YES

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students

14. Recruiting high school students to engage in the High School Teen Science Ambassador Program

Ren Rountree, Medical University of South Carolina
Alicia Parson, Medical University of South Carolina
Rodrick Bellamy, Medical University of South Carolina
Lindsay M. Squeglia, Medical University of South Carolina

There is an influx of careers in science, technology, engineering, math and medicine (STEM). Recruiting and retaining talent from diverse backgrounds is critical to ensure representation and innovation in biomedical research. High school is crucial to shaping students' career development and building job-ready skills. Students with identities that are underrepresented in STEM often have limited access to early STEM programs, development opportunities, and mentors. Similarly, schools often need more resources and community partnerships to provide robust STEM experiences. To address these disparities, the Medical University of South Carolina High School Teen Science Ambassador program (TSAP) aims to increase accessibility to STEM opportunities for students with identities that are underrepresented in STEM. The TSAP team encourages participation in early STEM pathway programs through annual recruitment events. These events coincide with other holidays and observances, such as Black History, Women's History, and STEM Education months, which provide an opportunity to highlight diverse representation in biomedical research. This presentation will outline the TSAP recruitment techniques for recruiting diverse and engaged high school students: (1) identifying and partnering with STEM champions (2) and engaging in STEM and youth-focused events within the community. Through these efforts, the TSAP team engaged in 19 community events over 13 weeks and recruited 18 participants in the program thus far. By sharing these recruitment strategies, we hope to help other groups increase diversity and representation in their STEM programs.

Project: MUSC High School Teen Science Ambassador Program

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research & Evaluation, Research Experiences for Students, Students – Out-of-School Programs

15. Visio-tactile Graphics Help Teenagers with Blindness Visualize Nanoscopic Systems

Emily A. Alonzo, Travis J. Lato, Mayte Gonzalez, Morgan T. Green, Jordan C. Koone, Chad M. Dashnaw, and John L. Wood, Baylor University; Lisa S. Garbrecht, Madeline L. Haynes, and Miriam R. Jacobson, Texas Advanced Computing Center, The University of Texas at Austin; Matthew J. Guberman-Pfeffer, Department of Chemistry and Biochemistry, Baylor University;

Mona S. Minkara, Department of Bioengineering, Northeastern University; Hoby B. Wedler, Wedland Group LLC, Petaluma, CA; Bernd Zechmann, Center for Microscopy and Imaging, Baylor University; Bryan F. Shaw, Department of Chemistry and Biochemistry, Baylor University

The imagery of science is inaccessible to people with blindness and low vision. Inaccessibility in the “central” science, chemistry, is especially problematic. Data that are made accessible by tactile graphics are typically low-resolution, oversimplified, color-illogic, and non-shareable with sighted peers. Here, we 3D-printed translucent chemical graphics that display both tactile and video-like imagery via light scattering (i.e., the “lithophane” effect). Graphics—visualizable by touch or eyesight—included bond-line structures, reactions, electron and fluorescence micrographs, and instrument diagrams. Three-dimensional graphics of allosteric proteins were formed into millimeter-scale micro-models, visualizable by hand, eyesight, or mouth. These graphics were used by students from the Texas School for the Blind and Visually Impaired to learn chemistry and visualize nanoscale systems—for the first time—at the same resolution as sighted peers (accuracy = 88.1%; n =320). A solution to the problem of tactile color is also presented.

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

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Testing

16. The University of Pittsburgh Medical Center Hillman Cancer Center Youth Enjoy Science (YES) Academy

Joseph Ayoob, University of Pittsburgh; Steven Jones, University of Pittsburgh; David Boone, University of Pittsburgh and the Hillman Cancer Center

The University of Pittsburgh Medical Center Hillman Cancer Center Academy (Hillman Academy) has the primary goal of reaching high school students from underrepresented and disadvantaged backgrounds and guiding them through a cutting-edge research and professional development experience that positions them for success in STEM. With this focus, the Hillman Academy has provided 676 authentic mentored research internship opportunities to 556 students from diverse backgrounds over the past 14 years most of whom matriculated into STEM majors in higher education. These efforts have helped shape a more diverse generation of future scientists and clinicians, who will enrich these fields with their unique perspectives and lived experiences. In this poster, we describe our program and the strategies that led to its growth into a National Institutes of Health Youth Enjoy Science-funded program including our unique multi-site structure, tiered mentoring platform, multifaceted recruitment approach, professional and academic development activities, and a special highlight of a set of projects with Deaf and Hard of Hearing students. We also share student survey data from the past six years that indicate satisfaction with the program, self-perceived gains in key areas of scientific development, awareness of careers in STEM, and an increased desire to pursue advanced degrees in STEM.

Project: The University of Pittsburgh Medical Center Hillman Cancer Center Youth Enjoy Science (YES) Academy

Funder: NCI YES

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Research Experiences for Students, Students – Out-of-School Programs, Big Data/Data Science/Bioinformatics

17. League of VetaHumanz

Sandra San Miguel, Lindley McDavid, Loran Carleton Parker, Wilella Burgess, Grace Craig G, Michelle Overman, Purdue University

The League of VetaHumanz consists of veterinarians in academia, practice, industry, and government who provide in-person and remote role modeling experiences to under-resourced 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. To reach children lacking access to in-person program experiences, SuperPower Packs, self-guided, veterinary STEM learning experiences, were developed. Leveraging social cognitive career theory and the “Batman Effect,” SuperPower Packs engage children in the veterinary profession, build self-efficacy, and seed career aspirations through fun learning activities. Over 19,000 SuperPower Packs have been distributed to children. Results of evaluation surveys measuring participant activity engagement, likelihood of role model identification, and demographics are presented. Together, our role model-led and self-guided experiences set the stage to encourage youth to pursue similar learning opportunities in the future.

Project: See Us-Be Us: Inspiring Future Veterinarians Using a Veterinary STEM Ecosystem
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Early STEM Learning (PK-3), Informal Science Education

18. Evaluation of the Impact of Summer Immersion for 9-12th Students in STEM at the University of Puerto Rico

Orestes Quesada, University of Puerto Rico, San Juan; Michelle Borrero, University of Puerto Rico, San Juan; Benjamín Bolaños, University of Puerto Rico Medical Sciences Campus; Edjean Calderón, Evaluation and Research Services Cooperative

The summer immersion activity of the UPR SEPA Asthma Awareness program for students in grades 9-12 of high schools in Puerto Rico is designed to offer direct exposure to an authentic experience of the university environment for one week. Many of Puerto Rico's public school students do not take all of the basic sciences before graduating from their fourth year. This limits them when it comes to being able to choose an area with which they feel comfortable and motivated to continue their university careers. The summer immersion for students in grades 9-12 of high schools in Puerto Rico offers them direct exposure to an authentic experience of the university environment for a week. Students choose their area of preference among Biology, Chemistry, Physics, Engineering, Mathematics, and Computer Science. The summer immersion has the purpose of increasing professional motivation towards the different STEM branches, making students confident in themselves to improve the transition from high school to university. 92 students received training in general concepts of Biology, Physics, Computer Science, and Chemistry. To measure changes in scientific identity, students completed a self-administered questionnaire before and after participating in the immersion workshops. In addition, students completed another self-administered questionnaire at the end of the Immersion Program to examine their attitudes toward science.

Project: University of Puerto Rico STEM Asthma Awareness Program
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity

19. Scientist Spotlight Assignments Shift High School Students' Relatability to and Descriptions about the Types of People that Do Science

Dax Ovid, University of Georgia; Lucy Luong, San Francisco State University; L'vannah Abrams, San Mateo High School; Tess Carlson, Wallenberg High School; Mark Dieter, Encinal Junior Senior High School; Paulos Flores, Foothill College; David Frischer, Abraham Lincoln High School; Jolie Goolish, Saint Mary's University of Minnesota; Michelle La-Fevre Brent, San Marin High School; Amber Lancaster, Wallenberg High School; Christopher Lipski, Hillsdale High School; Joshua Vargas Luna, San Francisco State University; Marlene Mullin, Eastside College Preparatory School; Mia Janelle Newman, K. International School Tokyo; Carolina Quintero, San Francisco State University; Julie Reis, Abraham Lincoln High School; Freja Robinson, Lowell High School; Allison James Ross, Hillsdale High School; Hilary Simon, Foothill College; Gianne Souza, Abraham Lincoln High School; Jess Taylor, Cornell University; Katherine E. Ward, Aragon High School; Yvonne Lever White, Hayward High School; Emily Witkop, Hillsdale High School; Christine Yang, Chaffey High School; Aliza Zenilman, San Mateo High School; Eddie Zhang, Foothill College; Jeffrey Schinske, Foothill College; Kimberly Tanner, San Francisco State University

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 counter-stereotypical 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.

Project: The Scientist Spotlights Initiative: Promoting Diversity and Inclusion through Development, Assessment, and Dissemination
Funder: SEPA

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

20. Climate Change Solutions: Environmental Science through Art (ESTA)

Amir Attia, California State University Monterey Bay; Asa Bradman, University of California Merced; Brenda Eskenazi, University of California Berkeley; Eros Gonzalez-Lopez, California State University Monterey Bay; Kariya Hunter, California State University Monterey Bay; April Lillard, California State University Monterey Bay; Enid Ryce, California State University Monterey Bay; Juliana Schuster, California State University Monterey Bay; Kenneth Tran, California State University Monterey Bay; Jose Valdovinos, California State University Monterey Bay; Corin Slown, California State University Monterey Bay

Climate change impacts the health of both human and aquatic communities. Climate change is likely to result in lower rainfall, higher sea levels, toxic algal blooms resulting in higher levels of the potent neurotoxin domoic acid in the food chain, salt-water intrusion into local aquifers, lower crop yields, and increases in particulate matter, pollens and other allergens. Increased temperature extremes will expose communities, especially vulnerable communities to heat stress and also reduce crop productivity. With increased climate extremes, the economy of the Salinas Valley will suffer, as well as the food supply to the US. Already, there has been an increase in fires in Monterey County, which creates respiratory hazards and exacerbates floods and landslides, with destruction of crops, jobs, and homes. This project aims to connect climate change impacts to natural hazards, which impact human health through air quality. Comparisons between air quality in the Salinas Valley and the Central Valley help students understand both the consequences of climate change and explore potential solutions.

Project: Environmental Science through Art (ESTA)

Funder: SEPA

Keywords: Citizen Science, Research Experiences for Students, Research Experiences for Teachers, Sustainability, Teacher Professional Development, Ocean and Human Health, Environmental Principles and Concepts (EPCs), Next Generation Science Standards (NGSS)

21. Health Sciences & Technology Academy - Alabama: Report from Year 1 of Camp and Clubs

Robin Bartlett, University of Alabama; Paige Johnson, University of Alabama; Michele Montgomery, University of Alabama; Mercy Mumba, University of Alabama; Betty Key, Shelton State Community College; Brandi Lester, University of Alabama; Bethany Hornbeck, Apis Creative

The Health Sciences & Technology Academy - Alabama (HSTA-AL) is the first replication of West Virginia's HSTA program. The goal of HSTA-AL is to build a more diverse nursing, nurse faculty, nurse scientist and other biomedical professions workforce among rural, underserved high school students in Alabama. With the support of Apis Creative, in two counties in Alabama, community led leadership teams were established to guide the program. The first HSTA-AL students were recruited in spring 2022 and 31 of those attended the first summer camp on The University of Alabama's campus. In fall 2022 afterschool clubs started in each of 5 high schools, led by local teachers. This poster will provide baseline information about HSTA-AL participants and provide insights from our first camp and club experiences.

Project: The Health Sciences & Technology Academy - Alabama (HSTA-AL)

Funder: Rural STEM

Keywords: Broadening Participation, Diversity & Equity, Citizen Science, Research Experiences for Students

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

Sharon Peppenella, Cold Spring Harbor Laboratory DNA Learning Center; Jeffry Petracca, Cold Spring Harbor Laboratory DNA Learning Center, Bruce Nash, Cold Spring Harbor Laboratory DNA Learning Center, David Micklos, Cold Spring Harbor Laboratory DNA Learning Center

In partnership with national science museums, Citizen DNA Barcode Network (CDBN) adapts methods from the Cold Spring Harbor Laboratory DNA Learning Center's previous SEPA funded projects, Barcode Long Island and Barcoding U.S. Ants, to establish DNA barcoding for use in informal settings. 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. CDBN 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 highlighted on our poster alongside program activities, products, and results.

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

Funder: SEPA

Keywords: Citizen Science, Informal Science Education, Programs for Families & the Public, Big Data/Data Science/Bioinformatics, Exhibits at Museums & Science Centers

23. All About Arsenic: Addressing drinking water contamination in Maine and New Hampshire through a school-based citizen science project

Jane Disney, Ashley Taylor, Alexis Garretson, Kat Taylor, MDI Biological Laboratory; Karen Bieluch, Dartmouth College; Sarah Hall, College of the Atlantic; Sarah Dunbar, Mt. Desert Elementary School; Bruce Stanton, Geisel School of Medicine at Dartmouth

Exposure to arsenic in well water is a well-documented public health issue for Maine and New Hampshire. Approximately half of the households in these states rely on private wells for drinking water, many of which have elevated levels of arsenic and other toxic metals. Arsenic exposure causes cancer, cardiovascular disease, reduced infection resistance, and lower IQ in children. Despite the reliance on well water and known health impacts, well water testing rates remain low. We approached this problem by developing the "All About Arsenic" project, which engages secondary-school teachers and students as citizen scientists in collecting well water samples for analysis of arsenic and other toxic metals and supports their data analysis and outreach efforts in their communities.

Students have collected over 3,500 well water samples, in some municipalities, more than doubling the amount of information available to the public about well water quality. In

addition, survey results show that the program has influenced household decision-making regarding mitigation of contaminants in drinking water. Finally, students have moved “data to action” by speaking at public meetings and providing testimony at public hearings, influencing decision-making of policymakers at both local and state levels.

Project: Data to Action: A Secondary School-based Citizen Science Project to Address Arsenic Contamination of Well Water
Funder: SEPA

Keywords: Citizen Science, Research Experiences for Students, Research Experiences for Teachers, Data Literacy Scientific Communication

24. Project Pill Tracker: An Advanced and Automated Pill Tracking & Dispenser Archishma Marrapu, Thomas Jefferson High School for Science and Technology

Background: Prescription drugs are used on a daily basis by over one hundred thirty one million people in the United States of America, 80% of which have claimed to skip a dose at some point in their lives. Importance: Medication adherence can prevent intensified medical conditions and over 125,000 deaths per year. Purpose: The purpose of this study was to create an automated medication tracker and dispenser to reduce the human errors that can impact someone’s life in a negative manner. Methods: The current prototype utilizes microelectronic technology, such as the Arduino Board and servo motors, and uses Android Studios to provide the user interface. Results: This prototype has a high accuracy rate for the pill tracking component and for the pill dispensing component. Conclusion: Although there are products in the current market that target this problem in our society, they lack the accuracy, fast speed, and convenience of this product. This product allows the user to track the pills they are consuming, store their pills, receive reminders about pills when the user must take them, notify them about skipped doses, upcoming refills, or upcoming appointments, dispense the right number of pills at the right time, and even connect to another account to either track them as a caregiver or be tracked as a care recipient.

Project: Project Pill Tracker: An Advanced and Automated Pill Tracking & Dispenser
Funder: None listed

Keywords: Research Experiences for Students

Curriculum Development

25. Co-creating with Teachers Reveals the Need for Flexible Curriculum

Louisa Stark, Molly Malone, Kristing Fenker, Steve Ortiz, Kagan Breitenbach, Rochelle Cassells, Jen Taylor, Arthur Veenema, University of Utah

Curriculum materials are more likely to meet teachers' and students' needs when teachers are involved in co-creating them from the beginning. Over the past 20+ years we have developed processes for engaging teachers in learning about a topic from experts and then collaborating to draft learning objectives and learning experiences. We held a summer institute with 23 teachers from 12 states to co-create lessons for a new curriculum module on genetic technologies. Through talks and a tour of relevant Health Science Center Core Labs, teachers learned about three genetic disorders and the technologies used to diagnose and treat them.

They then divided into three working groups that were tasked with drafting ways to engage students in learning about the technologies and using critical thinking skills to identify the technologies that could be used to diagnose and/or treat the disorders. All three groups of teachers created similar ideas for an interface with links to materials, which would enable teachers and students to use the materials flexibly with multiple types of classes.

Project: Engineering Solutions for Better Health: Genetic Technology and Biomedical Engineering for Secondary Classrooms
Funder: SEPA

Keywords: Curriculum Development, Teacher Professional Development

26. Students take charge of their well-being through student-led research connected curriculum

Irene S. Bayer, Michigan State University Consuelo Morales, Michigan State University Tania Jarosewich, Censeo Group Maria G. Salinas, Michigan State University

Description. Health in Our Hands (HiOH) connects the community to the science classroom. Students investigate critical public health concerns (diabetes and addiction) and use these real-world contexts to appreciate the importance of genetic and environmental factors in their risk for diseases. They conduct a culminating research project to improve community health and present their findings at a “Health Summit” to peers, family, and community. *Methods.* Six teachers enacted the curriculum in 2 urban districts with about 400 7th-8th graders. During two health summits organized with community partners, 207 students presented to peers and about 50 adults. Following the summits, data were collected through surveys of students (207), teachers (6), and adults (42); and student (18) and teacher/administrator (7) interviews. *Results.* A majority of respondents strongly agreed in surveys and interviews that students were engaged and learned about their health. 92% of students indicated that adults were definitely/somewhat interested in their findings. Students who attended a health summit agreed more strongly than those who did not, that the community action research project helped them learn about their health. *Conclusion.* Teacher professional development and a health summit handbook are important to supporting and sustaining student-led research connected with the community.

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

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Research Experiences for Students, Sustainability, Teacher Professional Development

27. NeuroLab 2.0: Utilizing a Storyline Approach to Adapt an ISE Experience for High School Course Integration

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

A storyline is a curriculum development approach aimed at engaging students in a wide array of investigative practices (science and engineering practices) associated with the creation, evaluation, and revision of explanatory models that form a cornerstone of science inquiry. Storyline units, which emulate how collective scientific knowledge is built over time, begin by

exposing students to an observable (anchoring) phenomenon that introduces a question or problem. Each step in a storyline lesson sequence is then driven, in large part, by students' ideas and questions about the phenomenon. Our efforts to adapt an authentic, collaborative, and multidisciplinary ISE experience into a more inclusive, NGSS-aligned learning experience for high school course integration have culminated in the creation of a multi-lesson, storyline-based instructional unit that is now undergoing implementation trials in high school classrooms. This unit is anchored to a rare genetic movement disorder (congenital mirror movement disorder; OMIM:157600) in which voluntary movements performed on one side of the body axis are mirrored, to varying extents, by involuntary movements on the contralateral side. In this poster session, we will highlight the tools and processes used during the initial design cycle with teacher co-developers and summarize our approach to professional development with early adopters. We will also introduce the suite of initial resources developed to support teachers and students in the gradual construction of a multidimensional model that assimilates behavioral, electrophysiological, neuroanatomical, molecular genetics, cellular, developmental, and neuroimaging data obtained from studies of human subjects and model organisms over the last several decades. Finally, we will summarize preliminary data associated with resource efficacy and direct program impacts on teacher co-developers and early adopters.

Project: NeuroLab

Funder: SEPA

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

28. Authentic Language and Literacy (ALL) for Science: Teaching Resources to Develop Young Children's Literacy within the Discipline of Science

Nancy Moreno, Alana Newell, Dolores Garay, Jimmie Thomas, Travis Kelleher, Michelle Moore, Baylor College of Medicine; Misty Sailors, Colorado State University - Pueblo; Molly Marek, University of Texas at Austin

ALL for Science is an elementary curriculum framework that connects English language arts to firsthand science investigations. Hands-on science investigations are aligned with literature-based research on related science questions. The framework has been evaluated with children in grades 1–3 using life science topics, and now is being expanded to grades 4–5. Two new grade 4 units are being piloted during spring 2023. Overall, in unit pilots and comparison studies, students demonstrated statistically significant gains in content knowledge, science vocabulary and science-specific disciplinary literacies. In a three-treatment study, children in second grade who participated in the ALL for Science framework demonstrated pre/post gains that were significantly higher than students without the literature-based research or in comparison classrooms.

Project: Authentic Literacy and Language (ALL) for Science

Funder: SEPA

Keywords: Curriculum Development, Curriculum Testing, Early STEM Learning (PK-3), Research & Evaluation, Students – Classroom Science Enrichment

29. Mystery of the Crooked Cell 2.0: CityLab's Next Generation Socioscientific Approach to Gene Editing

Carla Romney, Boston University; Donald DeRosa, Boston University; Carl Franzblau, Boston University

The Mystery of the Crooked Cell 2.0 project is expanding CityLab's "Mystery of the Crooked Cell" hands-on, inquiry-based curriculum supplement that focuses on the molecular basis of sickle cell disease by incorporating state-of-the-art gene editing content. This new curriculum supplement employs a socioscientific reasoning (SSR) approach that places science content in a meaningful social context and motivates students to take ownership of their learning. Essential SSR skills include realizing the complexity of the content and context of an issue, analyzing an issue from multiple perspectives, seeking out sources of bias in data, and considering how and whether scientific investigations can advance understanding of an issue. We are still in Year 1 of this project, so we will share our plans for the new unit since it will not have been pilot-tested yet.

Project: CityLab's Next Generation Socioscientific Approach to Gene Editing
Funder: SEPA

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

30. Development of Acid-Base instructional materials: By the students, for the students.

Abha Verma, Xavier University of Louisiana; Mehnaaz Ali, Xavier University of Louisiana

The current study describes preliminary findings from the Xavier University of Louisiana Mobile Outreach for Laboratory Enrichment (XULA-MOLE) project which is a collaboration between Xavier University of Louisiana (XULA), a historically black and catholic university, and participating 9th-12th grade classrooms in the central New Orleans area with a historically underserved student population.

This presentation focuses on providing laboratory enrichment as a mechanism to enhance student learning and impact student career interest in the STEM fields. The curriculum provides classrooms with a much-needed 'hands-on' laboratory experience which is unavailable due to a lack of resources in the partner schools.

Our work discusses the inquiry-based laboratory modules developed during the second year of the XULA-MOLE project, for the acid- base topic. The materials and experiments were created with careful thought and discussion by the XULA undergraduate students with STEM backgrounds. The experimental modules were based on what the participating teachers were discussing in the high school curriculum during the semester. Since most of the XULA student volunteers were from underrepresented groups there was a strong sense of camaraderie and shared interests between them and the mostly minority students at the high schools. Along with increasing student exposure to the sciences, XULA-MOLE aims to foster interest and appreciation for future careers in STEM while facilitating a strong mentorship component for high school students with the XULA undergraduate students.

Project: Xavier University of Louisiana Mobile Outreach for Laboratory Enrichment (XULA-MOLE)
Funder: SEPA

Keywords: Curriculum Development, Informal Science Education, Students – Classroom Science Enrichment

31. Student-Centered One-Health Modules: Digital Middle School Science Curriculum Addresses Complex Interdisciplinary Issues

Julie Harlin, Texas A&M University; Torri Whitaker, Bittner et al.

This five-year project is part of a NIH-SEPA funded grant (<https://nihsepa.org>) which has developed student-centered online modules to explore complex, real-world One-Health topics that are engaging and focused on topics that are interesting to students. The One-Health modules provide rural middle school teachers with student-centered instructional strategies and resources for teaching life science in the motivating context of One-Health (the integration of human, animal, and environmental health). This project focuses on rural schools because they have large, educationally underserved populations, have fewer teaching resources due to under-funding, and have difficulty in recruiting highly trained science teachers (ERS, 2020). This project also addresses student motivation by incorporating relevant problem-based learning, a technologically appealing format, and by using a student-centered design, allowing them control over what and how they learn. The One Health curriculum is available on our website: <https://vetmed.tamu.edu/peer/one-health/>

Project: A Computer-based, Student-Centered Middle-School Approach to One Health Learning
Funder: SEPA

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

32. KUMC TSCORE LIFT: A STEM CTE Intervention Linking Industry, Faculty and Teachers

Karin Chang, University of Missouri - Kansas City; Maya Baugh, University of Kansas Medical Center

Career and Technical Education (CTE) has been identified as a promising strategy to meet the healthcare workforce demand and expand the pipeline of professionals of color (DeLuca et al., 2006). Approximately 12 million U.S. high school students enroll in one or more CTE courses during high school (Advance CTE, 2022). Yet, students in under-resourced school districts often lack access to advanced STEM CTE courses and authentic work-based learning experiences (Bridwell-Mitchell, 2017).

The T-SCORE LIFT project works with five under-resourced school districts in Kansas (4 urban and 1 rural) to develop robust CTE health science pathways. The project engages health system, university, and state partners to provide curriculum development, teacher professional development, and connections with healthcare professionals. To date, approximately 500 students and 9 teachers have participated in the project. Students have engaged in curricular units co-developed by educators and health professionals from 12 different professions. Additionally, students have interacted with professionals in the classroom and participated in full-day visits to the KU Medical Center campus. In total, T-SCORE LIFT hosted eight field trips to KUMC and scheduled over 40 professionals to visit classrooms. Survey and academic data from participating students and teachers are being collected to assess project impact.

Project: Teachers and Students for Community Oriented Research and Education: Linking Industry, Faculty, and Teachers (TSCORE LIFT)
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Teacher Professional Development

33. 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, and Kelly Ryoo, University of North Carolina at Chapel Hill; Rebekah Davis, NC State University

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 2022, eight NC science teachers from communities impacted by PFAS contamination applied design thinking practices to co-create and pilot PFAS-focused lessons tailored to a specific science course and target learner (e.g., students who identify members of a racial/ethnic groups that are underrepresented in biomedical research careers). In June 2023 design team teachers will model these lessons during a three-day summer institute for 16 life science teachers; all 24 teachers will pilot lessons and administer student surveys in 2023-2024.

This poster presentation will include a description of each lesson, all of which incorporate published PFAS data and promote biomedical research careers, as well as a description of our mixed-methods research and evaluation approaches and summary of findings from year 1 of the design team activities.

Project: Iterative Design to Engage All Learners
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Curriculum Testing, Dissemination, Teacher Professional Development

Early STEM

34. More PEAS Please! Teaching Head Start Teachers How to Integrate the Practices of Science into the Preschool Classroom

Virginia C. Stage, North Carolina State University; Jocelyn Dixon, East Carolina University; Archana V. Hegde, East Carolina University; Tammy D. Lee, East Carolina University; Lucia I. Mendez, University of North Carolina at Greensboro; L. Suzanne Goodell, North Carolina State University; Jessica Resor; and Valerie V. McMillen, North Carolina State A&T University

More PEAS Please! is a multi-level intervention designed to improve preschooler's early science learning experiences, language development, and exposure to healthy foods. This study aimed to assess teachers' perceptions of programmatic barriers, supports, and impact

on science teaching after implementing the program. PEAS consisted of a 1-day pre-service workshop, followed by 6 learning modules (online or paper-based) completed over 6-months. Each module featured training videos, goal setting, 4 science learning activities featuring fresh vegetables (16 total), and a reflection. The research team provided technical support and guided professional learning communities. Twenty-four Head Start teachers across three North Carolina counties participated in PEAS. Teachers completed formative evaluations at the end of each module and a final summative evaluation after implementing the activities to assess barriers, supports, and impact on their science teaching. All tools were evaluated for face and content validity and cognitively evaluated among teachers. Evaluation results revealed time and technological difficulties were barriers. Children's interest in the topic and PEAS administration were teachers' biggest support. Module videos and PEAS Teaching Guide were the most helpful resources. All teachers felt the program positively impacted their ability to provide engaging science learning using healthy foods. Addressing teachers' needs during the intervention was critical, such as on-the-ground assistance from our team and converting online modules to paper-based to address time and technological barriers.

Project: More PEAS Please! Bridging the Gap Between Preschool and K-12 Science Learning Environments
Funder: SEPA

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

Informal Science Education

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

Marie Barnard, University of Mississippi; Caroline Compretta, University of Mississippi Medical Center; Allison Ford-Wade, University of Mississippi; Erin Dehon, University of Mississippi Medical Center; M Godfrey, University of Mississippi; M Presley, University of Mississippi; S Nasruddin, University of Mississippi; S Cohen-Winans, University of Mississippi; B Wade, University of Mississippi Medical Center; Q Whalen, University of Mississippi Medical Center; E Gordineer, University of Mississippi Medical Center

Project SCORE engages Mississippi adolescents in a youth participatory action research (YPAR) effort designed to engage students, promote health literacy, increase awareness of health disparities, and diversify the health sciences pipeline. Health sciences graduate students lead the program and introduce 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. YPAR offers an approach to engage youth to develop a health behavior and promotion research agenda that is directly responsive to their needs, increasing the likelihood that research efforts will result in effective interventions. The students developed research questions that were related to sleep and mental health, vaping initiation, trends in teen pregnancy, peer-pressure and substance use, the impact of cell phones on health, and the impact of school schedules on student health. Students developed research projects and health communication products related to the topics they identified. Pre- and post-program assessments found that health literacy, sense of belonging, scientific self-efficacy, and interest in STEM careers increased for participating students.

Project: Project SCORE (Student-Centered Outcomes Research Experience)
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Research Experiences for Students

36. Boosting adolescent mental health literacy through animated video storytelling on social media

Maya Adam, Stanford University; Kristin Bass, Rockman et al.

Recent CDC reports underscore an alarming rise in the number of adolescents struggling with mental health problems. Promoting mental health literacy in teens is an urgent public health priority, but emerging school-based programs often miss the most vulnerable minority populations in the US. Data suggests that almost all US adolescents seek information on social media. Our proposal aims to develop, test and disseminate a short, animated video series focused on promoting mental health literacy. The primary dissemination route will be social media, but the content can also be repurposed for use in school-based MHL programs.

Project: Boosting adolescent mental health literacy through animated video storytelling on social media
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Research & Evaluation

37. siSTEMas Creating Translanguaging Learning Environments to Increase Access and Interest in Science for Middle Grades Learners

Georgia W. Hodges, University of Georgia

The purpose of this project is to increase access to STEM learning by creating, testing, and refining novel learning experiences, both digital and face-to-face, to engage multilingual learners with science phenomena. During year 1, we have created a weeklong summer camp that targets middle grade multilingual learners. We will share our curriculum design model and partnership model during this poster session, and we will discuss the obstacles we have encountered as well.

Project: siSTEMas: Stimulating Immersive Science through Engaging, Motivating, and Authentic Scenarios

Funder: SEPA

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

38. St. Jude Afterschool STEM Club

Kate Ayers, St. Jude Children's Research Hospital; Krisderlawn Motley, Robyn Pennella, Anika Britton et al.

Informal science, technology, engineering, and mathematics (STEM) education programming is essential for broadening participation in STEM careers, particularly among

underrepresented youth. For example, the St. Jude Afterschool STEM Club (SJSC) is a 10-week club where students use a case-based approach to solve real-world problems related to catastrophic pediatric diseases. College interns facilitate the club under the direction of the St. Jude Cancer Education and Outreach (CEO) Manager and Coordinator. The overall goal of the SJSC is to form sustainable partnerships with local schools and surrounding districts to provide students with authentic STEM experiences. The SJSC has been running for five years and is ongoing in 24 elementary schools within the Memphis Shelby County Schools district during the 2022-23 school year. CEO has utilized various best practices for working with our partner schools to ensure we meet the needs of students and Tennessee science standards. These include but are not limited to partnering with schools rather than individual educators, utilizing local college interns to facilitate the club, and weekly communication with parents. Informal STEM programs seeking sustainable programming should consider incorporating these best practices when implementing new or existing programs.

Project: St. Jude Afterschool STEM Clubs

Funder: NCI Cancer Center Grant and ALSAC

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Students – Classroom Science Enrichment, Students – Out-of-School Programs

39. Blending Arts and Biomedical Science to Facilitate Systems Thinking

Danielson, R. W., Kelton, M. L., Owen, J., White, A. J., & Diaz Martinez, A., Garcia, D, Grace, E., Saba Fisher, K., Pautzke, K., Stacey, E., & Young, B. All authors are at Washington State University, except: Stacey, E. (Georgia State University) Young, B. (West Virginia University)

Health Education through Arts-based Learning (HEAL) is a SEPA-funded health education project. The present investigation seeks to understand how arts integration into STEM curriculum could support systems thinking around socio-scientific issues, specifically around the issue of pathogen transmission in rural-agricultural communities. Our after-school program, which works with 3rd – 5th grade students in rural-agricultural communities, leverages the arts to promote systems-level understanding of zoonotic diseases and ecosystem dynamics. In this poster, we report on findings from multiple iterations of our learning modules "Buzzing for Blood", "Zoom!", and "Care and Covid". We discuss both successes and challenges across implementations and measurements.

Project: Health Education through Arts-based Learning (HEAL)

Funder: SEPA

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

40. Positioning Biology as a Creative Medium for Young Learners in a Museum Setting

Anja Scholze, The Tech Interactive; James Wong, The Tech Interactive; Caitlin Nealon, The Tech Interactive; Abbey Thompson, Stanford University; Prinda Wanakule, The Tech Interactive; Jeff Hayward, People, Places & Design Research; Jolene Hart, People, Places & Design Research

In recent decades, biology has become a powerful tool for innovation and change. Emerging fields that blur traditional disciplines have begun to leverage biological systems and for a variety of design, engineering, construction, and manufacturing purposes. Knowledge of and access to these advances, however, is still very limited for most students and the general

public. To help bridge this gap and explore new ways to inspire young people from diverse backgrounds to participate in the landscape of modern biology, we created The Biotinkering Lab. Over the last 7 years, we have used this museum-embedded bio-makerspace to develop and test a new approach that blends scientific inquiry with the engineering-focused practices of making, tinkering, and design challenge learning and applies them to biology. We have created a repertoire of novel and accessible biotinkering activities that authentically engage young people with biology as a personally relevant process by supporting learner creativity, agency, confidence, and choice in a museum setting. This poster synthesizes evaluation data from across multiple activities to share key findings about how short-engagement activities that position biology as a creative and problem-solving medium can impact young learner engagement, attitudes, interest and perceptions of science.

Project: Biohealth Learning Lab and Makerspace for the Community
Funder: SEPA

Keywords: Informal Science Education, Programs for Families & the Public, Exhibits at Museums & Science Centers

41. VENOMventure/aVENENOtura: Formative testing results and deployment plans from an immersive serious game for bilingual families

Lisa D. White, University of California Museum of Paleontology; Anna Thanukos, University of California Museum of Paleontology Teresa MacDonald, University of Kansas Natural History Museum

VENOMventure/aVENENOtura is a pop-educational escape room about evolution and medicine for English-speaking and English/Spanish bilingual families. Teams of 2-5 players with youth ages 8 and up 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 visualizations of evolutionary processes and relationships. Here, we summarize the results of our formative testing, which suggest that the game is fun, motivating, intense, teaches about evolutionary relationships, and helps learners make connections between these ideas and medical applications. We also share plans for deployment and summative evaluation.

Project: STEM Escape: Immersing urban and rural families in a biomedical mystery
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Interactive Multimedia for STEM Learning, Programs for Families & the Public, Exhibits at Museums & Science Centers

42. Making Meaning Through Co-Design with Youth

Katherine McMillan Culp, Priya Mohabir, and Dana Schloss, New York Hall of Science

High school and college students are becoming more involved in conversations and activities that challenge policies surrounding the health of their communities. These young people are often the target audience of interventions-programs and activities-aimed to increase their engagement with STEM learning and affect their STEM career pathways. How can we recognize the critical role of youth participation in the design and development of these very interventions? Hear from the New York Hall of Science about our ongoing co- design process with yearly cohorts of high school and college Explainer SEPA Fellows. Learn about how our

current Fellows are exploring the intersection of STEM and public health, their relationship to the public health ecosystem, and co-designing a youth public health career workshop through mindful facilitation and access to experts in the field. Check out the visual artifacts they have created as part of their learnings!

Project: Preventable Differences: Exploring Public Health Careers with Black and Latino Youth
Funder: SEPA

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

43. NH CREATES Year 2 Overview

Carmela Amato-Wierda, University of New Hampshire; W. Kelley Thomas, University of New Hampshire; Amy Booth, University of New Hampshire; Alison Allen, Rockman et al.; Kristin Bass, Rockman et al.; Eleanor Jaffee, Insights Evaluation LLC

NH CREATES is establishing a pipeline for the regenerative medicine and bio fabrication (RM&B) industry with three aims: teacher professional development for middle/high school teachers; summer youth programs for middle/high school students; and establishing an ecosystem among stakeholders.

The second-year youth cohort included sixty middle/high school students who participated in one-week programs about topics including bioinformatics, biomanufacturing entrepreneurship, cryopreservation, molecular visualization, regenerative planaria, and 3D bioprinting.

Our second-year teacher cohort included nine middle/high school teachers who participated in a two-week institute designing projects about RM&B to be implemented in their classrooms. We will share results from pre/post surveys that share what teachers learned about RM&B and the resources teachers plan to use when implementing RM&B projects in their classrooms.

In addition to the teachers and youth, our emerging STEM ecosystem consists of NH INBRE and industry in Manchester, NH. There have been frequent interactions among our stakeholders. In our post-Institute survey, nearly all second-year cohort teachers rated their awareness of RM&B resources within NH as 'none' prior to the Institute and as 'quite a bit' or 'a lot' after the Institute, and rated the information provided by NH CREATES about RM&B resources as 'excellent.'

Project: NH CREATES the Future
Funder: SEPA

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

44. The Appalachian Career Training In ONcology (ACTION) Program: An NCI-Funded Youth Enjoy Science Program

Nathan L. Vanderford and Holly Burke, Markey Cancer Center, 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 Institute's 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 in the community through community outreach and engagement activities. 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 community's understanding of cancer, and thereby address the cancer and education disparities in Appalachian Kentucky and beyond.

Project: The Appalachian Career Training In ONcology (ACTION) Program

Funder: NCI YES

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Research Experiences for Students

45. A Mindful Minute: Introducing Mindfulness to Project SCORE Students

Tess Johnson, School of Pharmacy University of Mississippi; Caroline Compretta, University of Mississippi; Allison Ford-Wade, University of Mississippi; Erin Dehon, University of Mississippi; Murrell Godfrey, University of Mississippi; Melissa Presley, School of Pharmacy University of Mississippi; Saara Nasruddin, School of Pharmacy University of Mississippi; Samantha Cohen-Winans, Center for Research Evaluation University of Mississippi; Breanna Wade, University of Mississippi Medical Center, Quest Whalen, University of Mississippi Medical Center, Elizabeth Gordineer, University of Mississippi Medical Center, Marie Barnard, School of Pharmacy University of Mississippi

Project SCORE engages Mississippi adolescents in a youth participatory action research (YPAR) effort designed to engage students, promote health literacy, increase awareness of health disparities, and diversify the health sciences pipeline. 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. In addition, the project introduced a mindful minute as part of the daily schedule to allow youth to decompress from their school day and transition into a different learning environment. The benefits of mindfulness may lead to reduced stress and anxiety, improved emotional regulation, enhanced cognitive functioning, and boosted mental health and self-awareness. The mindful introduction in the project provided a tool for the youth, their breath, to manage their emotions and thoughts better and to improve their overall well-being. While the project focuses on exposing and educating students to health sciences, it is vital to promote mental and emotional wellness. Pre- and post-program assessments found that students could see the benefits of using mindfulness to prepare for sports and manage emotions.

Key words: youth participatory action research, mindfulness, mental wellness

Project: Project SCORE

Funder: SEPA

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

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

Patrice G. Saab, University of Miami; Maria M. Llabre, University of Miami; Manuela Jaramillo, University of Miami; Rafael Leite, University of Miami; Nickelle Decius, University of Miami;

Carolina Carvajalino, University of Miami; Maria I. Panizo, Panizo Evaluation; Clinique Smith; Overtown Youth Center; Jeanine Houston, Overtown Youth Center; Raenika James, Overtown Youth Center; Fabiola Jean Pierre, Overtown Youth Center; Dannielle Teamor, Overtown Youth Center; Brittany Lambert, 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-related activities. The curriculum includes lessons delivered by trained near peer mentors (~ 90% 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. 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. During the first 2 years of implementation, the consent/assent process was completed for a total of 108 children (i.e., student scientists). Of the student scientists who completed the baseline fall assessments, 90% attended 1 or more lessons in the 2021-2022 school year and 93% attended 1 or more lessons in the 2022-2023 school year. After each lesson, student scientists rate their liking of the lesson and record what they learned in the lesson. 96.8% agreed or strongly agreed that they liked the lessons. Further, there is evidence of student scientists' understanding of science and health concepts.

Project: UQUEST (Questioning, Understanding, Experiencing, and Scientific Thinking)
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Testing, Informal Science Education, Students – Out-of-School Programs

47. We ENGAGE: Data and Stories to improve Science Literacy and Community Health

Melinda Butsch Kovacic, University of Cincinnati, Cincinnati Children's Hospital Medical Center; Susan Hershberger, and Susan Gertz, Miami University

WE ENGAGE: Data and Stories to Improve Science Literacy and Community Health (WE4H) is 20+ member community-academic partnership with the goal to improve the health and science literacy and promote health of individuals living in underserved communities in the greater Cincinnati area.

Specifically, the project aims to use graphic-style stories and related hands-on activities and discussions to 1) build science and health literacy required for the active asking and answering of complex health questions necessary for better health and 2) promote greater interest/confidence in pursuing formal STEM education and health/STEM careers.

Over 60 graphic style stories and related materials for grade 5 through adults have been co-designed by community members and science and health researchers/educators from University of Cincinnati, Miami University, and Cincinnati Children's Hospital Medical Center. Outreach settings include community centers, summer camps, clubs, and health fairs.

As community and academic participants have viewed the stories and witnessed their obvious usefulness firsthand at events, some have been inspired to share story ideas with the WE4H team. This sharing has led to new partnerships and co-design collaborations to develop

outreach stories and materials. Thus, the making and sharing of stories has created a structure for initiating and sustaining community-academic partnerships.

Project: WE ENGAGE: Data and Stories to Improve Science Literacy and Community Health (WE4H)

Funder: SEPA

Keywords: Citizen Science, Informal Science Education, Programs for Families & The Public, Students – Classroom Science Enrichment, Students – Out of-School Programs

Interactive Multimedia

48. Multimedia and Mental Health- How games can help to reduce stress and anxiety

John A. Pollock, Duquesne University; Brinley Kantorski, Duquesne University; Kelly Bruzdewicz, Duquesne University

Students today experience stress and anxiety from many different sources. By creating a suite of multimedia materials, we work to teach students how to reduce and manage their stress and anxiety. These multimedia products range from a cooperative board game, to animated videos, to interactive choose-your-own-adventure stories. Partnerships with community organizations and K-12 schools help to facilitate evaluation opportunities, planned for summer 2023.

Project: Partnerships for Prevention: A plan for managing student stress, anxiety, and pain through interactive media.

Funder: SEPA

Keywords: Curriculum Development, Curriculum Testing, Informal Science Education, Interactive Multimedia for STEM Learning, STEM Game

49. Hexacago Health Academy

Vanya Manthena, Ci3 at the University of Chicago; Madeline Quasebarth, Ci3 at the University of Chicago; Ailea Stites, Ci3 at the University of Chicago; Jessica Wilks, Ci3 at the University of Chicago; Patrick Jagoda, Ci3 at the University of Chicago

Hexacago Health Academy 2022 is a summer intervention designed to increase STEM interest in Chicago high school students through the lens of public health and game design. Developed using principles of social-cognitive career theory, experiential learning, playing & making, storytelling, and peer mentorship, the three-week curriculum engages students in board game design for deep learning, collaborative science, and systems modeling. The curriculum was piloted in July 2022 with 19 Chicago high school students. Data was collected across two timepoints - baseline (T0) data was collected on day 1 of the program, and immediately post three-week summer program (T1). Overall, the results showed an academically engaged and STEM/health career interest group. Post-test scores increased across the following measures: HHA Knowledge Questions, Critical Thinking in Everyday Life, Career Interest Questionnaire, Academic Self Efficacy, STEM/Health Career Semantic Scale.

Project: Hexacago Health Academy

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Curriculum Testing, Informal Science Education, Interactive Multimedia for STEM Learning

50. Worlds of Connections

Julia McQuillan, University of Nebraska–Lincoln; Patricia Wonch Hill, University of Nebraska–Lincoln; Meghan Leadabrand, University of Nebraska–Lincoln; Amy N. Spiegel, University of Nebraska–Lincoln; Michelle Phillips, Phillips & Associates; Ash Eliza Smith, University of Nebraska–Lincoln; Sam Bendix, University of Nebraska–Lincoln; Will Freudenheim, independent game designer and researcher

The Worlds of Connections SEPA team seeks to spread knowledge and excitement about network science, an approach to studying complex systems to answer difficult questions in many fields, including social science, economics, biology, mathematics, and computer science, and health. Our poster will highlight activities and accomplishments from the fifth year of the project, including the Worlds of Connections virtual reality (VR) deliverable. The game immerses players in a VR world—the multispecies multiplex—in which they explore systems and health from the perspectives of prairie dogs, plants, soil sensors, and robots. The game employs concepts from One Health, which connects the health of humans, plants, animals, and shared environments; sociological theories of identities; and engages youth on the topic of network science for health through play.

Project: Worlds of Connections

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Interactive Multimedia for STEM Learning, Research & Evaluation

51. Natural Disasters & Health Survives a Global Disaster

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

What do you do when a multi-year, global health disaster hits as you develop a major natural disasters and health project? Almost everyone, from our core team to software developers, contracted COVID, & half our team was laid off for 18 months. So, we frequently rearranged timelines with tasks done when personnel, schools and students were available. Various tasks planned for later years were done earlier and enhanced because the team members necessary to do them were available. Pilot testing of the simulation was delayed until teachers began to recover from Zoom fatigue. Many still have not, and recruiting for final field testing is slow, even with teachers who have long used our previous live simulations. Despite stress of continuing uncertainty, we have completed tasks, have presented and published two studies of the socio-scientific aspects of our work, and are optimistic that field testing, evaluation and preparing of final publications will succeed, albeit with stretching into a no-cost extension.

Project: Natural Disasters & Health

Funder: SEPA

Keywords: Interactive Multimedia for STEM Learning, Sustainability

52. STEM Assessment and Reporting Tracker (START)

Stephanie Paris, Oregon Health & Science University; Brandy Lentz, Oregon Health & Science University; Shanthia Espinosa, Oregon Health & Science University; Angie Setthavongsack, Oregon Health & Science University; Medina Lamkin, Oregon Health & Science University; Lisa Marriott, Oregon Health & Science University

This project built the STEM Assessment and Reporting Tracker (START) (www.startinstem.org), a robust online evaluation tool for engaging students about their own professional development in STEM (science, technology, engineering, and mathematics). It provides students with immediate, tailored e-feedback based on their results aimed at supporting their STEM development. It also provides STEM programs and schools with summary data in real time, with de-identifiable data filterable based on student demographics. Now in Year 5, the project identified common needs for assessment and defined informatics architecture to support reporting outputs, data security, governance structures, and linkage with other projects and data sources. This poster shares recommendations for inclusive demographic data practices that can support characterization of historically underrepresented populations in STEM (i.e., disaggregated racial/ethnic groups, disability, language, disadvantaged background, gender identity and sexual orientation identity) using modular approaches designed to support student autonomy and privacy when implemented by programs across geopolitical settings. Finally, the tool can be used for cross-sectional or longitudinal data collection, with anonymous and identifiable approaches governed by an overarching Institutional Review Board (OHSU IRB #22889) that supports data collection by STEM programs and schools nationwide to support biomedical workforce development.

Project: STEM Assessment and Reporting Tracker (START)

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Citizen Science, Research & Evaluation, Big Data/Data Science/Bioinformatics

53. Evaluating Researcher Identity and Science Motivation in High School Student Co-Researchers of the MYHealth Program

Sam Chuisano, University of Michigan Department of Family Medicine, Bianca Barraza, University of Michigan; Hannah Knoll, University of Michigan; Hasan Khan, University of Michigan, Morenikeji Ojubanire, University of Michigan; Blessing Fanegan, University of Cincinnati, Lisa Vaughn, Cincinnati Children's Hospital, Matt Diemer, University of Michigan School of Education, Tammy Chang, University of Michigan Department of Family Medicine, Alison Allen, Rockman et al; Jaime Flores, Rockman et al; Melissa DeJonckheere, University of Michigan Department of Family Medicine

MYHealth engages high school students from Southeast Michigan in "Impact Projects" from September through mid-May where students design and complete an adolescent health-focused research project. We aim to increase researcher identity and science motivation in high school students.

Students complete surveys pre-, mid-, and post- Impact Projects. "Researcher identity" evaluates how much a person feels they are a researcher and belong in research. The Science Motivation Questionnaire II (SMQ-II) measures intrinsic motivation, self-efficacy, and self-determination, and

extrinsic (grade and career motivation) factors contributing to the pursuit of science programs and careers.

Twenty high school students enrolled in Impact Projects and completed at least one survey. The majority of participants identified as female (95%), Arab American (50%), African American/Black (20%), or South Asian (20%). Most students (57%) had not previously participated in a STEM program or science camp.

Mean researcher identity and SMQ-II scores will be used to evaluate participant changes throughout the program.

We anticipate participants will experience an increase in researcher identity and science motivation as a result of participating in Impact Projects. Future iterations of the program will increase our statistical power and ability to detect differences between and within participants.

Project: MYHealth: Training the Next Generation of Health Scientists through Participatory Research in Adolescent Health

Funder: SEPA

Keywords: Curriculum Testing, Research & Evaluation

54. Adapting the YPAR Process Template to an Out-of-School and Virtual Research Training Program with High School Students

Sam Chuisano, University of Michigan Department of Family Medicine, Bianca Barraza, University of Michigan; Hannah Knoll, University of Michigan; Hasan Khan, University of Michigan, Morenikeji Ojubanire, University of Michigan; Blessing Fanegan, University of Cincinnati, Melissa DeJonckheere, University of Michigan Department of Family Medicine

In MYHealth, high school students engage in an out-of-school, online program and are guided by Youth Participatory Action Research (YPAR) principles to develop and complete a research project. The existing YPAR Process Template (YPT), from Ozer and colleagues, evaluates the use of YPAR processes in classroom settings. The objective of this pilot study was to adapt the YPT for use in MYHealth.

Four MYHealth team members independently applied the updated YPT (in pairs) using recorded sessions from the MYHealth program. The intraclass correlation coefficient (ICC) was used to evaluate interrater agreement. An ICC ≥ 0.6 was established a priori as an acceptable level of agreement.

The YPT language surrounding classrooms and teachers was adapted to an out-of-school, virtual experience with facilitators at various training levels. The ICC achieved across all five sections of the updated YPT was 0.71 (95% CI: 0.604 - 0.788).

The YPT can be adapted for use in virtual, out-of-school programs with high school students and used to better understand the application and utilization of YPAR principles. Based on this preliminary work, the adapted YPT has a high level of interrater agreement and is appropriate for use in this setting.

Project: MYHealth: Training the Next Generation of Health Scientists through Participatory Research in Adolescent Health

Funder: SEPA

Keywords: Curriculum Development, Curriculum Testing, Research & Evaluation, Research Experiences for Students, Students – Out-of-School Programs

55. Outcomes of Rural Research Education: Igniting Interest in Science via Air Quality Research Experiences

Anna Kiley, University of Montana; Carolyn Hester, University of Montana; David Jones, University of Montana; Michael Coe, Cedar Lake Research Group LLC; Tony Ward, University of Montana

The University of Montana's Research Education on Air and Cardiovascular Health (REACH) Program has four Aims related to citizen science, science communication, student mentoring, and teacher professional development. The external evaluation of our REACH program has resulted in four published manuscripts that have explored teacher's perspective of the impacts of REACH participation, teacher and student reported value of the REACH symposium, REACH student engagement in science and environmental health, student and teacher feedback on the REACH program COVID-19 accommodations, and the overall impact of REACH participation on students' interest in science and science careers. Our poster will summarize the overall findings.

Project: Research Education on Air and Cardiovascular Health

Funder: SEPA

Keywords: Citizen Science, Dissemination, Research & Evaluation, Research Experiences for Students

Research Experiences for Students and Teachers

56. Metagenomic and Whole Genome Sequencing by High School Teachers and Students in Western New York

Stephen Koury, University at Buffalo; Sandra Small, University at Buffalo; Jonathan Bard, University at Buffalo; Sunha Kim, University at Buffalo; Norma Nowak, University at Buffalo; Janvi Manish Shah, University at Buffalo; Tanishka Khurana, University at Buffalo

The Metagenomics Education Partnership immerses students and teachers within a citizen science research project focusing on assessing waterway health within the Western New York region. The project aims to promote the role of genomics and DNA sequencing in workforce development by informing high school students, educators and other relevant organizations how these fields integrate into future STEM jobs and careers. In addition, it aims to directly link scientific exploration to the local environment in which students reside. It involves Oxford Nanopore MinION sequencing to determine the microbial community compositions of waterways of relevance to students and teachers, and to perform complete sequencing of one of the microbial genomes in the sample. The metagenomics study allows students to differentiate between the normal microbial flora of water and flora resulting from human intervention, while the whole genome sequencing study introduces students to big data manipulations involved in assembling a microbial genome from tens of thousands to hundreds of thousands of DNA reads. We will present the results obtained by students and teachers in 10 Western New York high schools participating in the project during the current academic year.

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

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

57. Knight Scholars Program: A statewide approach for building STEM interest and capacity for cancer research careers among underrepresented high school and undergraduate students

Lisa K. Marriott, Amanda Braley, Susan Shugerman, Lynda Crocker Daniel, Azalea Martinez, Sadie McIver, Kaitlin Greene, Raul Oviedo, Brian J. Druker, and Jackilen Shannon, Oregon Health & Science University

The Knight Scholars Program provides mentored training in cancer research for underrepresented high school and undergraduate students in Oregon. Scholars receive training over three successive summers that build in duration and intensity. Scholars learn about interprofessional settings where cancer research occurs through shadowing experiences in their home communities (i.e., clinical, public health, and outreach). They also receive residential research experiences at a comprehensive cancer center (Oregon Health & Science University in Portland) that help scholars identify areas of interest for research placements the following summer (i.e., across laboratory, data science, clinical research, and community settings). Scholars are supported by an interprofessional near-peer mentoring team participating in our “Leadership Training Program in Cancer Research Mentoring,” which provides full-time (10 week) and part-time training in youth-focused research mentorship. The program has been tested across virtual, in person, and hybrid settings, with increased interest and research self-efficacy across all program settings. Evaluation includes surveys, reflections, focus groups, and photovoice to understand gains for students and peer mentors. Trainee products include community research projects, research posters, professional development (e.g., resume, CV, online presence), and individual development plans that identify next steps for enhancing the training of a diverse cancer workforce.

Project: Knight Scholars Program - Building STEM Interest and Capacity for Cancer Research Careers among Underrepresented and Rural High School Students
Funder: NCI YES

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Students – Out-of-School Programs, Peer Mentorship

58. Bringing Data Science to Underrepresented Boston Youth: the LEAH Knox Scholars Program

Lara Bethke, LEAH Knox Scholars Program, Massachusetts Institute of Technology; Paul Gregg, LEAH Knox Scholars Program, Massachusetts Institute of Technology

The LEAH Knox Scholars program (LKS) is a two-year program for Boston-area high schoolers underrepresented in the sciences (low- income, first-gen college, and/or youth of color). It consists of two paid summer data science internships, college access and persistence programming, professional mentorship, and social-emotional learning programming. The program is implemented by Health Resources in Action, the nonprofit public health organization where the LKS project is seated, and Massachusetts Institute of Technology (MIT). The project

just completed its first 5-year SEPA grant, focusing on biomedical research, and this year will be the first year in a new SEPA grant focusing on data science.

This poster will discuss successes and challenges from the first SEPA cycle. Successes include increased confidence, self-efficacy, and passion for research among participants; challenges include reaching more students in a cost-effective way and measuring long-term outcomes.

Project: Knox Scholars Data Science Research Program
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Students – Out-of-School Programs, Big Data/Data Science/Bioinformatics

59. On Campus Summer Immersion and Student Outcomes: From Research Projects to Program Retention

Catherine Morton, West Virginia University; Health Sciences and Technology Academy Merge McMillion, West Virginia University; Health Sciences and Technology Academy Summer Kuhn, West Virginia University; Health Sciences and Technology Academy Misty Harris, West Virginia University; Health Sciences and Technology Academy

The Health Sciences & Technology Academy (HSTA) housed at West Virginia University (WVU) is a unique mentoring program that helps underrepresented high school students enter and succeed in STEM-based undergraduate and graduate degree programs in West Virginia. In this study we investigate how the first cohort of HSTA students returning to summer college campus programming following the COVID-19 pandemic fair compared to students from the same cohort of rising juniors who did not attend the Biomedical Summer Institute. We will first consider program retention and ask if students who attended the 2022 Summer Institute for rising juniors at WVU were more likely to continue in the HSTA program, controlling for program eligibility criteria, region, prior summer attendance, and entering GPA. We will then review students' research projects for the 2022/2023 academic year and ask if the research projects of Summer Institute attendees were more likely to be community-based and/or working with a pre-school, elementary, or middle school. We hypothesize that HSTA rising juniors who attended the Summer Institute will be more likely to continue in the HSTA program their junior year, and to select community-based projects, compared to those who did not attend the Summer Institute.

Projects: HSTA Citizen Science: Adolescents Engaged in Citizen Science with Early Childcare Facilities to Address Childhood Obesity
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Students – Out-of-School Programs

60. Examining Teacher and Student Involvement in Summer Research for Project ACE

Perla Perez, University of Texas at El Paso; Donna Gray, Canutillo Independent School District et al.

Project ACE (Action for Equity): A BUILDing SCHOLARS pipeline is designed to help students from three high schools in Southern New Mexico and Far West Texas apply to biomedical university training programs like UTEP's BUILDing SCHOLARS program and become increasingly interested in biomedical careers. For the last two summers, nine

teachers from these high schools participated in a 5-week summer research experience. Last summer, a student from each high school also participated in a summer research experience. A mixed methods approach was adopted to examine teacher and student involvement in summer research. Students of teachers who did and did not participate were surveyed about their interest and their self-efficacy in pursuing in biomedical careers. Summer research participants were also interviewed about their summer research experiences. Results from the interviews suggest that students have increased self-efficacy in their academics and in pursuing biomedical careers. Teachers also report that they are using their research experiences to inform classroom instruction. Other quantitative results will also be presented.

Projects: Project ACE (Action for Equity): A BUILDing SCHOLARS pipeline
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Research Experiences for Teachers

61. Lab on Wheels: Bringing Pandemic Science into the Classroom in Adair County, KY Schools

Savannah Tucker, Department of Mechanical and Aerospace Engineering, University of Kentucky; Jeffrey Chalfant, STEM Education, University of Kentucky; Sahar Alameh, STEM Education, University of Kentucky; Scott Berry, Department of Mechanical and Aerospace Engineering, University of Kentucky; James Keck, WWAMI School of Medicine, University of Alaska Anchorage; Anna Hoover, Department of Epidemiology & Environmental Health, University of Kentucky; Donna McNeil, Kentucky Water Research Institute; Lindell Ormsbee, Environmental Engineering and Water Resources, University of Kentucky

As the use of Wastewater Based Epidemiology (WBE) to track diseases in communities increases, a multi-disciplinary team of researchers has developed an inquiry-based, hands-on lesson aligned with the Next Generation Science Standards (NGSS) showcasing relevant experiments on water quality in a mobile lab - Ford Transit van outfitted as a mobile wastewater testing facility. The poster will highlight the implementation of this lesson in Adair County, Kentucky high schools. The goal is to make students aware of up-and-coming WBE technology and methods. This lesson provides students and teachers an engaging learning experience designed and taught by a multidisciplinary team that specializes in WBE. Pre- and post-tests will allow us to track the progress of students and explore their views about science and scientific research. This experience highlights the importance that public health plays in people's everyday life and gives an accurate depiction of what the work looks like. Utilizing the WACKIEST Mobile Lab that is used regularly in the field, field trips to real wastewater treatment plants, and classroom lessons students will have the opportunity to learn about cutting-edge technology, scientific practices, and the basics of WBE.

Project: WACKIEST: Wastewater Assessment for Coronavirus in Kentucky: Implementing Enhanced Surveillance Technology
Funder: NIH RADx-rad Initiative grant U01 DA053903-01

Keywords: Broadening Participation, Diversity & Equity, Citizen Science, Curriculum Development, Dissemination, Informal Science Education

62. UMB RAMP: UMB Research and Mentoring Program to develop skills and promote interest in STEM fields through hands-on exposure to academic research among West Baltimore Youth

Elizabeth A Parker, Anna Pudder, Linda Horn, Cara Felter, Bret Hassel, University of Maryland School of Medicine

Individuals from underrepresented backgrounds comprise the fastest growing segments of the US population but make up only a small percentage of the biomedical research and healthcare workforce. Workforce diversification is essential to engage this underutilized resource and meet growing US demands in biomedical science and broader STEM fields. This project describes the development of a curriculum that introduces basic, clinical and translational research that incorporates hands on training components for high school students. This curriculum provides foundational knowledge required to understand concepts across the translational research continuum while providing the skills to perform basic lab techniques and clinical skills. Additionally, this program will allow students to build their resume with skills and experiences to make them more competitive for future research programs while gaining confidence and self-efficacy that they belong in an academic research environment and ultimately in a biomedical science and/or broader STEM career. The long-term goal of this project is to develop and implement a scalable protocol that can be disseminated to other academic institutions providing a path to research for high school students.

Project: UMB CURE Connections: an integral link in a Baltimore minority STEM education pipeline

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Research Experiences for Students, Students – Out-of-School Programs

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

David Petering, University of Wisconsin-Milwaukee; Craig Berg, University of Wisconsin-Milwaukee; Michael Carvan, University of Wisconsin-Milwaukee; 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 is 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 is 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.

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

Funder: SEPA

Keywords: Research Experiences for Students, Students – Classroom Science Enrichment, Teacher Professional Development, Big Data/Data Science/Bioinformatics, Pre-service Teachers and Fostering Scientific Research

64. A Hands-on Biomedical Research Training Summer Camp for Underserved Minority High School Students.

Anjan Nan, Yen Dang, Adel H. Karara, University of Maryland Eastern Shore School of Pharmacy, Princess Anne, MD; Barbara Goldberg, Rekha Shukla, Barbara Goldberg & Associates, LLC, Wilmington, DE

The Maryland Action for Drug Discovery and Pharmaceutical Research (MADDPR) Program provides hands-on lab experience and mentoring to underserved minority high school students in Somerset County which is the most rural and underserved county in MD. Over 4 years, 146 high school students and 4 teachers/year participated in the two-week summer camp program which was led by 14 faculty from the School of Pharmacy. The program offered hands-on lab exercises dealing with diverse set of topics: drug design & synthesis, biomarkers, pharmaceutical compounding opioid abuse and prevention, pharmacy operations, promoting healthy behavior, cancer research, antimicrobials. Graduate student mentors facilitated the exercises by working with the students in small groups. Following the camp, the MADDPR program continued to receive high marks from participating students and their teachers. Matched pre- vs. post survey data showed that the participating students reported higher levels of interest to pursue post-secondary education and careers in STEM/pharmacy/other health professions. Overall, based on qualitative and quantitative project evaluation, the MADDPR program has continued a strong collaboration with Somerset County School District in supporting the educational and STEM career exploration of local minority underserved high school students.

Project: Drug discovery and biomedical research training (DDBRT) program for underserved minority youth

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research & Evaluation, Research Experiences for Students, Students – Out-of-School Programs

65. Expanding a Phage Discovery SEPA Program into Montana Tribal K-12 Schools

Robin Hehn, Montana Technological University; Rayelynn Brandl, Clark Fork Watershed Education Program; Marisa Pedulla, Montana Technological University

Montana Technological University's SEPA PHAGES program in Butte, Montana, engages thousands of students across Montana in phage (viruses that infect bacteria) discovery microbiology experiences. PHAGES project leaders have longstanding collaborations with educators in the Flathead Valley within the Confederated Salish-Kootenai Tribe (CSKT) Reservation. To expand the PHAGES program to additional teachers and schools, a PHAGES program teacher-liaison developed and conducted a phage-centered microbiology teacher workshop in the summer of 2022 at SKC, invited by the PI of a former SEPA project. Eight local high school and middle school teachers participated, and during the weeklong

training, teachers requested that PHAGES program provide classroom phage discovery to their students. In the Spring of 2023, three-day outreach phage discovery was delivered to 248 students at each of four rural schools, where Native American student populations ranged from 30-66%. Students collected soil and water samples from their local environment and tested them to identify undiscovered phages (viruses that infect the target bacteria). Teacher and student interest was high. Teachers requested additional workshops to prepare themselves to continue the phage discovery with students in subsequent years. SEPA-fostered collaborations between SKC and Montana Tech, along with supplemental funding were critical to success.

Project: PHAGES (Phages Helping Acquire Genuine Experiences in Science)

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Students, Research Experiences for Teachers, Teacher Professional Development, Genuine Citizen Science Microbiology Discovery Classroom Experiences

66. Harnessing Artificial Intelligence to diagnose Mental Health Disorders

Anisha Marrapu, Fairfax County Public Schools

Background: Approximately 970 million people worldwide live with a mental disorder, losing ten to twenty years of their lives. Importance: The current diagnosis process for mental disorders have many flaws such as the long diagnosis time, low accuracy, and high cost. Purpose: This study addresses this issue by developing an ML-based model for identifying major psychiatric disorders using resting-state EEG. This approach will facilitate the early detection and treatment of psychiatric disorders and improve the quality of life for affected individuals. Methods: The fast Fourier transformation (FFT) was used to convert the continuous EEG data into frequency domains. Results: The Artificial Intelligence model has a high accuracy of 89%. Conclusion: This AI model offers great potential for detecting mental health disorders, and can provide valuable insights into early detection, and diagnosis.

Project: Harnessing Artificial Intelligence to Diagnose Mental Health Disorders

Funder: No Funder

Keywords: Research and Evaluation, Research Experiences for Students & Teachers

Rural STEM

67. High School to Health Care-Bringing Lab and Data Science Careers to Rural West Tennessee High Schools

Jacen Moore, University of Tennessee Health Science Center; Rebecca Reynolds, University of Tennessee Health Science Center; Simpfronia Taylor, University of Tennessee at Martin-Ripley Center, Keisha Burnett, University of Tennessee Health Science Center

The High School to Health Care program (HS2HC) promotes Lab and Data Science professions and training in Rural West Tennessee counties. The program is a collaboration between three State Universities. Focused on the allied health professions in Medical Laboratory Science (MLS) and Public Health Information Technology (PHIT), the program provides a dual enrollment course and a one- week summer program for high school students, and a teacher professional development training program. Using project-based

learning strategies, the program will increase knowledge and awareness of these lesser-known health professions by allowing high school students the opportunity to explore real-life lab and data science content involving hands-on activities. Students who participate in the dual enrollment course will earn college credit. Teachers will be provided with lab and data science curricular content and offered sessions regarding how to teach content in alignment with current NGSS standards. The students and teachers will be utilizing real community health data while participating in the program, which will seek to improve overall health literacy of participants relevant to the communities where they live. The program will create educational pipelines for student professional training in lab and data sciences to address professional shortages nationwide.

Project: High School to Health Care: Lab and Data Science Pathways for Success
Funder: SEPA

Keywords: Curriculum Development, Students – Classroom Science Enrichment, Students – Out-of-School Programs, Teacher Professional Development, Big Data/Data Science/Bioinformatics, Laboratory and Data Science; Workforce Development

68. High School Research Initiative Expansion Project: Providing Inquiry-driven Experiences in Rural Texas Classrooms, Training Teachers, and Building a Supportive Network

Gwendolyn Stovall, University of Texas; Deanna Buckley, University of Texas; Bailey Williams, University of Texas

Rural Texas students and teachers are far from universities, have fewer resources, and most students are not attending college - only 29%. The High School Research Initiative (HRI) Expansion Project seeks to change that by providing research-based curricula, and teacher training, and developing a supportive network of high school teachers, students, UT faculty, and undergraduate mentors! Now at the beginning of year 2, the HRI has already developed four inquiry-driven science modules, which translate R1 University of Texas research to 4- to 5-week research experiences for rural high schools, and more modules are on their way. This week we will disseminate to teachers these science modules: Fish Behavior, Virtual Drug Screening, Caffeinated coli, and Urban Ecosystems. Plus, our multi-week, paid teacher training is rolling out for 8+ teachers as we are here today at this fantastic event! All of this is in preparation for Texas students, many from rural districts, to be on the receiving-end of research-based experiences in their classrooms for the 2023-24 school year. Please stop by our poster to hear additional details, to offer guidance on teacher recruitment, distance training, or other features of our program, or just stop by to cheer us along!

Project: High School Research Initiative Expansion Project
Funder: SEPA

Keywords: Curriculum Development, Research Experiences for Students, Teacher Professional Development, Distance mentoring and training

69. Hands-On Science Education Projects Address Vaccine Hesitancy in Rural Populations

Katie Busch Chandran and Michael Wyss, University of Alabama at Birmingham

Vaccine uptake rates for many childhood vaccines and annual vaccines (Flu, potentially COVID) remain low in many parts of rural Alabama. We hypothesized that this hesitancy is likely due to

well-documented, historic medical mistrust. To reduce such mistrust of vaccines, we developed a hands-on, easy-to-implement science education experience for use during or out of classroom hours. We piloted this module in rural Perry County Alabama in the summer of 2022 with students in elementary and middle grades. Emerging results showed that students had many misconceptions about pathogens, spread of disease, strategies to get and stay well, and the importance of vaccines. Students enjoyed working to model spread of disease, build model viruses, and engineer mock antiviral agents. Participating in the module also increased their understanding of pathogens and expanded vaccine content knowledge.

Project: Funded by SEPA Award: Science Education Enabling Careers, Supplement: Vaccine Victories over Viruses (V3)
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Testing, Informal Science Education, Students – Classroom Science Enrichment, Students – Out-of-School Programs

70. Authentic Community Engagement in Science

Matt Queen, Montana State University Billings Amanda Obery, Central Washington University

Improving student access to quality STEM education prior to middle school offers one way to strengthen pathways to healthcare careers. The more that students can identify with and see the relevancy of STEM, and specifically biomedical fields, to their lives, the more likely they are to be interested in these fields in the future. The Authentic Community Engagement in Science (ACES) project will work with local teachers, and biomedical professionals across eastern Montana to develop a culturally relevant, place-based biomedical and STEM curriculum, ensuring all students can identify and have role models in these fields. The curriculum is reinforced using a traveling, community-customized, multimedia biochemical stage show. In addition to the work done with the schools, a community engagement night invites the public to engage with the show and interact with an INBRE-based biomedical researcher. ACES Project is engaging with its second of five rural and American Indian locations and is building the case for rural biomedical education efforts that are deeply rooted in a sense of place.

Project: Authentic Community Engagement in Science
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Interactive Multimedia for STEM Learning, Programs for Families & the Public, Students – Classroom Science Enrichment

71. Imagining Possibilities in Postsecondary Education and Science, Year 3

Melinda Gibbons, University of Tennessee Erin Hardin, University of Tennessee

Imagining Possibilities is in Year 3 of providing postsecondary and STEM awareness and engagement programming for rural Appalachian high school students. Our poster provides highlights from our successful multi-week, in-school, curriculum for all 9th and 10th graders, our optional summer camp programs, and our development of role model videos and associated lesson plans.

Project: Imagining Possibilities
Funder: SEPA

Keywords: Research & Evaluation, Students – Classroom Science Enrichment, Students – Out-of-School Programs

Science Teaching & Learning

72. Adaptation and Mitigation: Beetles and Climate Change

Juliana Schuster, California State University Monterey Bay; Amir Attia, California State University Monterey Bay; Corin Slown, California State University Monterey Bay

A visual representation of the biological and ecological impacts of climate change on organisms helps students connect climate change impacts and develop solutions. The game centers around beetles as the characters, and players will travel through four different habitats, with the winner being the one who makes it to the end first. Students play the game with additional cards introducing climate change constraints. Students analyze data and the results from global climate models to make evidence-based decisions about climate change and associated future impacts to Earth's systems. The students think about the impact of climate change on a small scale so that students have fun, while simultaneously learning about the ecological ramifications of climate change, by placing them in the role of beetles and letting them traverse through different biomes through that lens.

Project: Environmental Science through Art (ESTA)

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Curriculum Testing, Students – Classroom Science Enrichment, Sustainability

73. Development of a tool to measure participants' perceptions of teaching on affective domains of learning

Trevor Laffin, Northern Illinois University; and Melani Duffrin, Northern Illinois University

FoodMASTER Learning Environment Advanced Design Strategies (LEADS) is an initiative to better align teaching practice to brain-based learning principles and measure the impact on affective domains of learning. This poster presentation will present preliminary work on the development of a measurement tool aimed at gathering data on participants perceived sensory comfort, relevance, belongingness, satisfaction, and confidence. The tool also includes the net promoter score scale. The tool has undergone face and content validity and data is currently being collected for exploratory factor analysis. Once validated, this tool will be adaptable and useful for a wide variety of learning environments.

Project: FoodMASTER

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Testing

74. FoodMASTER provides a unique on campus afterschool experience for high-risk youth

Allassane Twillie, Paul Wright, and Melani Duffrin, Northern Illinois University

FoodMASTER is a program that uses food as a tool to teach mathematics and science to kids. In 2021, the Northern Illinois University (NIU) P-20 Center STEAM initiative permanently hired a food STEAM professional and adopted FoodMASTER as a regular component of programming. In 2022, the NIU P-20 STEAM team started an afterschool program for DeKalb's Huntley and Clinton Rosette Middle Schools. The program provides transportation and programming for up to 40 students. FoodMASTER has quickly become one of the favorite program activities for the youth. This poster presentation will discuss the Dekalb City Illinois afterschool program for high-risk youth and observed outcomes of FoodMASTER programming.

Project: FoodMASTER

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Students – Out-of-School Programs

75. Outreach Design Education Program: Hackathon for Middle School Students

Aaron Kyle, Duke University

Middle school (Grades 6 – 8) is a critical time for students' formation of robust STEM identities. The lack of STEM identity is a major contributor to students, especially those from minority and disadvantaged backgrounds, not pursuing science-focused courses, college majors, and careers. The Outreach Design Education (ODE, formerly Hk Maker Lab) Program strives to augment grades 6 -12 students' STEM identity by empowering students with engineering design, the process that engineers use to identify and solve problems. The ODE program recently offered our first Hackathon for Middle School Students. In this activity, seventeen local middle school students were invited to a 1.5-day program at Duke University. Students were introduced to the engineering design process with an emphasis on problem identification, brainstorming, and creating low fidelity prototypes. The participating students were able to successfully use engineering design to uncover needs related to their school's community garden. They created 'looks-like' prototypes to visualize solutions. Students were observed to be engaged and highly excited about the program activities. Their self-reporting indicates that, while we did not see the desired improvements in STEM identity, students exhibited the desired greater levels of engineering design knowledge as a result of program participation.

Project: Hk Maker Lab 2.0: Inspiring Engineering Design Thinking in Grades 6 – 12 Students and Teachers

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Informal Science Education, Students – Out-of-School Programs

Teacher Professional Development

76. Learning Science Through Research - In the Classroom

Alyson Michael, New Hampshire Academy of Science; Chery Whipple, Colby Sawyer College

In addition to student research programming, the New Hampshire Academy of Science SEPA provides teachers with resources to bring inquiry-based science learning to their classrooms in two different ways. We have established and grown an Equipment Loan Library. We work alongside teachers to work new labs into their existing curriculum, deepen their existing labs, and provide them with the technical training needed to use what they are borrowing. This year we saw an increase in the number of teachers looking to borrow equipment and have loaned equipment to four different middle and high schools. At Colby Sawyer College (CSC), education and science students have been paired with current in-service K-12 teachers in a course. During the classroom component of the course, we first demonstrate phenomenon-based pedagogy and then ask each student-teacher pair to develop mini-lessons. Over the summer, CSC students, with the support of mentors, develop novel curricula that they implement in their mentor's classroom in the fall. In running this course twice, we have found that CSC students feel less anxious and more excited about teaching science, and both our students and mentors are dramatically more likely to utilize inquiry-based curricula when teaching future science courses.

Project: Learning Science Through Research

Funder: SEPA

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

77. Leveraging educator networks and social media for recruiting teachers to the SHAPE MATTERS program

Kathleen M. Hill, Pennsylvania State University Amber Cesare, Pennsylvania State University

The SHAPE MATTERS program offers teachers a two-week professional development experience to learn how scientists at Penn State research develop and explore biomolecular molecules. Since the COVID-19 pandemic, we have experienced challenges in recruiting teachers to the summer program with only four teachers participating in 2022. To improve recruitment for 2023, we reached out to other professional development providers to market the SHAPE MATTERS program. We advertised on our social media sites, including Facebook, Twitter, and LinkedIn. To increase the reach across social media platforms, we posted the SHAPE MATTERS program directly onto the social media pages of specific educator groups. Originally, we planned only for teachers from Pennsylvania to attend the program. To increase participation, we have now expanded our program to include teachers from nearby states (within a drivable distance). As a result, we have increased recruitment for the summer 2023 SHAPE MATTERS program.

Project: Shaping Authentic Practices by Engaging in Modeling of A Topic with Teachers to Explore Research in Science (SHAPE MATTERS)

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Research Experiences for Teachers, Teacher Professional Development

78. Pathways to Health Professions: The role of Social Determinants of Health, Precision Health, and Culturally Relevant Teaching Practices

Elizabeth Edmondson, Virginia Commonwealth University; Lisa Abrams, Virginia Commonwealth University; Hillary Parkhouse, Virginia Commonwealth University; Yonella Demars, Virginia Commonwealth University

PATHS is a newly funded five-year project designed to build health literacy knowledge and skills supported by a culturally responsive lens. PATHS will engage 60 teachers and their students (grades 7 through 12) from historically underserved rural and urban Virginia communities in health professions (formerly Allied Health) career awareness (Medical Lab Sciences, PT and OT, Radiation Science, and Dental Hygiene). Curriculum and pedagogical support (professional development) guided by culturally responsive practices. Our aim is to support teachers and ultimately students in learning about the skills and content of health professions, the impact of social determinants of health (SDH), and to develop their ability to work with large data sets through medical tools related to precision health. The curriculum tools will be web-based modularized units to address five areas of health professions, SDH, and precision health and will provide content-rich and inquiry-based exposure to careers and skills necessary for health professions. Teachers will participate in two summer institutes with support during school-year follow-up sessions and virtual coaching. The project team along with the Virginia Area Health Education Centers (AHEC) will support teachers and their students with sharing their learning at Community Health Fairs, STEM Fairs, and other student research conferences.

Project: Pathways for Authentic Teaching of Health Sciences (PATHS)

Funder: SEPA

Keywords: Curriculum Development, Teacher Professional Development, Social Determinants of Health

79. Teaching the Genome Generation: Cultivating High School Genomics Through Teacher Education

Christina Vallianatos, The Jackson Laboratory; Alexa Wnorowski, The Jackson Laboratory; Erica Gerace, The Jackson Laboratory; Emaly Piecuch, The Jackson Laboratory; Sarah Wojiski, The Jackson Laboratory; Charlie Wray, The Jackson Laboratory;

Teaching the Genome Generation (TtGG) provides pre-service and current high school teachers with the content knowledge, teaching strategies, and resources needed to enhance student learning in genetics and genomics, with an emphasis on math and data literacy. Our approach weaves three learning strands—molecular genetics, bioinformatics, and bioethics—together within the context of the Next Generation Science Standards (NGSS) and Common Core Math Standards. Currently, we aim to develop new curriculum and digital assets that can reach beyond our existing New England-based network of teachers. Newly designed modules emphasize quantitative skills in four genetics- and genomics-related content areas: cancer genetics, sequence comparison and identity, the origin of new variation, and ancestry. Each module includes standards-aligned activities focused on problem-solving or inquiry through the exploration, analysis, and interpretation of genetic and genomic data. Modules also encourage exploration of ethics and social justice topics relevant to modern genetics and genomics. Our new content is freely available on our website and includes teacher guides

and guided tutorials for new tools and skills. To further broaden our audience, we are developing a suite of laboratory simulations and interactives, which will be hosted on LabXchange and available to teachers around the world.

Project: Teaching the Genome Generation: Cultivating High School Genomics Through Teacher Education

Funder: SEPA

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

80. It's Contagious! Promoting the Biomedical Workforce Pipeline through Infectious Diseases.

Rosemary Riggs, Texas Biomedical Research Institute; Beatriz Guajardo, Texas Biomedical Research Institute

"It's Contagious! Promoting the Biomedical Workforce Pipeline through Infectious Diseases" is a cohort study which engages secondary STEM teachers with infectious disease research. A summer teacher professional development addresses gaps in teacher data literacy training through engagement with current infectious disease research articles and Texas Biomedical Research Institute scientists. Teachers then generate activities featuring data from the original research article to strengthen the connection between classroom curriculum and science research while exploring bioscience careers. During the following academic year, teachers implement these activities, applying data literacy skills to evaluate student activity outcomes and student responses to validated scales: Student Attitudes toward STEM (S-STEM) and Engagement in Science Survey. Teachers also maintain a reflective journal to evaluate their own STEM teaching practices. Through monthly Community of Practice (CoP) events, cohort teachers: 1) share their de-identified student data from the activities and scales, 2) engage in collegial discussions to analyze their experiences with cohort members, and 3) evaluate program impact on their STEM teaching practices.

Project: It's Contagious! Promoting the Biomedical Workforce Pipeline through Infectious Diseases.

Funder: SEPA

Keywords: Curriculum Development, Research & Evaluation, Research Experiences or Teachers, Students – Classroom Science Enrichment, Teacher Professional Development

81. Effectiveness of a virtual workshop on high school teacher knowledge and confidence in integrating ultrasound and CT imaging in the classroom

Kevin D. Phelan, University of Arkansas for Medical Sciences; Tiffany W. Huitt, University of Arkansas for Medical Sciences; Gregory R. Snead, University of Arkansas for Medical Sciences; Tonya Cook, University of Arkansas for Medical Sciences; Brittany Wilkerson, University of Arkansas for Medical Sciences; Billy R. Thomas, University of Arkansas for Medical Sciences; Karen L. Yanowitz, Arkansas State University

The effectiveness of teaching high school Anatomy & Physiology depends on providing students with correlative hands-on activities or incorporating stimulating, real life application presentations. Imaging of the body has rapidly developed over the last few decades, especially as it relates to ultrasound (US) scanning and 3D reconstructions of the body from computerized tomography (CT) scans. These two imaging modalities are perfectly suited to

provide the real-world application that will help students learn. However, online resources geared towards high school students are limited and teachers generally lack the necessary knowledge and confidence to incorporate them into their classroom. The ArkanSONO team is developing a free online repository of US and CT images and videos targeted towards high school students. In addition, for the last two years we have offered a virtual teacher workshop combining live US scanning of standardized patients with CT cases from the SECTRA Education Portal. Programmatic teacher evaluation data indicates increased knowledge of principles of US and CT imaging, increased ability to recognize structures in both modalities, and increased confidence in incorporating US and CT imaging in the classroom. These effects on high school teachers are likely to translate into enhanced student engagement in the classroom.

Project: ArkanSONO: A Technology Based Outreach Exposure Program for High School Students

Funder: SEPA

Keywords: Teacher Professional Development

82. Frontiers in Cancer Research: Teacher Professional Learning and Curriculum Resources

Jeanne Chowning, Fred Hutchinson Cancer Center; Regina Wu, Fred Hutchinson Cancer Center; Kristen Bergsman, Fred Hutchinson Cancer Center

Our poster features our experiences with our Teacher Professional Learning program, the Science Education Partnership, as well as with curriculum development. One of our SEPA units was just reviewed by the NextGenScience Peer Review Panel (PRP) and was posted on NextGenScience.org as an example of a quality unit! The storyline-based open access unit focuses on the concepts of cell growth, cell cycle, and mutations by using cancer as the anchoring phenomenon. We will also present vaccine-confidence resources developed supplement funding, our recent science education journal articles, and preliminary results from our research study.

Project: Frontiers in Cancer Research

Funder: SEPA

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

83. EMPOWER: Enacting Materials to Promote Ownership, Engagement and Relevance

Mon-Lin Monica Ko, University of Colorado Boulder; Barbara Hug, University of Illinois at Urbana-Champaign; Christina (Stina) Krist, University of Illinois at Urbana-Champaign; Kerri Wingert, University of Colorado Boulder; Enrique Suárez, University of Massachusetts Amherst

EMPOWER (Enacting Materials to Promote OWnership, Engagement and Relevance) is an ambitious program that empowers students to enact change in their local community. The introduction of the Next Generation Science Standards (NGSS) across the United States has spurred numerous efforts to design and disseminate NGSS-aligned curriculum materials. NGSS-aligned curriculum materials aim to shift science instruction away from rote memorization and toward the active co-construction of ideas by teachers and students. However, these curriculum materials often do not address persistent and problematic relationships between race, class, and health and environmental factors that minoritized students of color face in their

communities. The goal of the EMPOWER program is to prepare teachers to adapt and enact curriculum materials to address and respond to issues of sociopolitical relevance, so that students will be engaged, interested, and empowered to enact change in their local community. In this poster session, we will describe theory of action of the EMPOWER program and our planned professional learning and research activities starting in Summer 2023 and onward.

Project: EMPOWER (Enacting Materials to Promote OWnership, Engagement and Relevance)
Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Curriculum Development, Students – Classroom Science Enrichment, Teacher Professional Development

84. Moving Beyond Mendel's Peas

Sara Porter, UNC Greensboro; Kristina Yu, Exploratorium; Hilleary Osheroff, Exploratorium

In this poster, we present the design and analysis of a professional learning program to support science teachers to update their curriculum to align with the field's current understanding of the complex nature of genetic variation. Traditionally, teaching the science of inheritance and biological variation has centered in a framework in which genotype and phenotype have a clear and discrete relationship. However, single-gene, Mendelian traits represent only a drop in the bucket of human phenotypic variation. The study of the human genome tells us that variation in most human traits is influenced by dozens, hundreds, or thousands of genes working together, not by single genes. The designed professional development activities are grounded in a conceptual framework for understanding complex genetics focused on four constructs: complexity, probability, population and individual variation, and scale. We analyzed teacher participants' post-workshop interviews and coded their responses with this conceptual framework to identify shifts in their perceptions of genetic inheritance and variation and how the various activities supported those shifts. We found that different activities influenced teachers' conceptual shifts in one or two domains. We present implications for science teachers' learning of complex genetics and the next steps in our professional development model.

Project: The Phenomenal Genome
Funder: SEPA

Keywords: Curriculum Development, Informal Science Education, Research & Evaluation, Teacher Professional Development.

85. ESTELE: A Practicum-Based Approach for training K-5 NGSS Teacher Leaders

Michael Kennedy, Northwestern University; Maranda Don, Northwestern University

ESTELE: Developing the Next Generation of Science Teacher Leaders, uses a practicum-based strategy to train and support K-5 teachers to be NGSS instructional leads at their schools. In prior work, we developed a novel professional development model for training K-5 teachers new to NGSS instruction. The model integrates workshop-style NGSS learning with six days of practicum teaching at a Boys & Girls Club summer camp using school-year curricula. Teachers experienced large gains in confidence teaching science, time teaching science, and NGSS knowledge and skills. ESTELE adds a second, parallel and fully integrated track for experienced NGSS K-5 teachers (e.g. alumni of the prior program or similar) to become science teacher leaders (STLs) at their schools. Thus, ESTELE has two distinct teacher cohorts: those receiving introductory-level training (iNGSS) and those training to be STLs. STLs will co-lead both workshop and practicum coaching components for iNGSS teachers, receiving integrated

training in three STL domains: principles of teacher leadership, coaching, and assessment. In this way, STLs gain important leadership and coaching skills, while novice teachers learn NGSS pedagogy. During the academic year STLS will work with peer teachers at their schools to build school cultures receptive to NGSS reform.

Project: ESTELE: Developing the Next Generation of Science Teacher Leaders

Funder: SEPA

Keywords: Broadening Participation, Diversity & Equity, Early STEM Learning (PK-3), Teacher Professional Development, K-5 Elementary

Common Acronyms and Abbreviations

Abbreviation	Federal Agency
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 <ul style="list-style-type: none"> SAMHSA - Substance Abuse and Mental Health Services Administration
NIH	National Institutes of Health ICOs – NIH Institutes, Centers and Organizations

Abbreviation	Code	NIH Institute or Center
NCATS	TR	National Center for Advancing Translational Sciences CTSA – Clinical and Translational Science Awards
NCCIH		National Center for Complementary and Integrative Health
NCI	CA	National Cancer Institute <ul style="list-style-type: none"> YES – Youth Enjoy Science Research Education Program
NEI	EY	National Eye Institute
NHGRI	HG	National Human Genome Research Institute Genome – commonly used name for NHGRI
NHLBI	HL	National Heart, Lung, and Blood Institute
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 Musculoskeletal 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 <ul style="list-style-type: none"> CSR manages for annual SEPA and SEPA SBIR/STTR STEM Games reviews
FIC		Fogarty International Center

NIGMS – National Institute of General Medical Sciences

DRCB	Division for Research Capacity Building Dr. Ming Lei, Director
IDeA	Institutional Development Awards <ul style="list-style-type: none"> 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
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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

AIISL	Advancing Informal STEM Learning
ATE	Advanced Technological Education
CSforAll:RPP	Computer Science for All
DR-K12	Discovery Research PreK-12
DRL	Research on Learning in Formal and Informal Settings
ECR	EHIR Core Research
EHR	Education and Human Resources
ITEST	Innovative Technology Experiences for Students and Teachers
S&CC	Smart and Connected Communities
STEM+C	STEM + Computing K-12 Education

America's Seed Fund

EA	Educational Technologies and Applications <ul style="list-style-type: none">• STEM Games SBIR/STTR
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Other Federal Agencies Involved in STEM Education

ED	U.S. Department of Education <ul style="list-style-type: none">• IES – Institute of Education Sciences• STEM Games SBIR/STTR
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
USDA	United States Department of Agriculture <ul style="list-style-type: none">• NIFA – National Institute of Food and Agriculture