**Breakout Session Abstracts**

**Wednesday, May 29**

**Concurrent Breakout Sessions #1: Wednesday, 10:15 – 11:30 am**

**Motivating Extended Engagement and STEM Learning in a Free-Choice Environment: Immersive Games Offer Playful Challenge**

*Presenters:* Teresa MacDonald, University of Kansas Natural History Museum; Anastasia Thanukos, University of California Museum of Paleontology; Lisa White, University of California Museum of Paleontology

It is well-established that serious games of many varieties can support STEM learning, but the potential of immersive, escape-style games to enhance learning has been only minimally explored. This session will introduce participants to VENOMventure, an escape-style game that transports English- and Spanish-speaking families with kids ages 8 and up to a fantastical research facility where they work together for 20-45 minutes to solve a biomedical mystery and learn about evolutionary trees and their medical applications. Data collected at pilot sites show that the game significantly improves players’ understanding of evolutionary trees (both immediately after and longitudinally at a four week follow-up), while providing a fun and memorable collaborative experience of perseverance leading to success. Attendees will work together to solve puzzles from VENOMventure and gain an understanding of how the game motivates families to engage in discourse about scientific concepts and test their co-constructed understandings. In addition to learning about VENOMventure and its key outcomes, attendees will collaborate to identify factors that contribute to learning in this format and will examine opportunities to incorporate elements of immersive games into their own, diverse educational program formats.

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

* Experience and understand the primary features of immersive games that can support conceptual STEM learning
* Become familiar with data suggesting that immersive games can support STEM learning
* Reflect on similarities and differences among the supports for constructivist learning offered by immersive games and by the participants’ own programs (e.g., research internships, formal curricular internships, after school clubs, etc.)
* Consider opportunities within their own programs to incorporate elements of immersive games if appropriate (e.g., play, narrative, puzzles)

*Strand:* Informal Science Education

*Room: Olympus*

**Aligning Multimedia to NGSS**

*Presenters:* Brinley Kantorski, Duquesne University; Georgia Hodges, University of Georgia; Kelly Bruzdewicz, Duquesne University; Kristin Fenker, University of Utah

Join us for a training session on aligning Next Generation Science Standards (NGSS) with educational multimedia products. Explore what the NGSS are, how they are used in K-12 classrooms, and why it is important to align multimedia products to the standards. Explore online tools for accessing the NGSS and learn strategies for aligning multimedia resources with NGSS benchmarks. Gain valuable skills to curate, evaluate, and adapt multimedia materials that resonate with NGSS principles. This interactive session will walk you through real-world examples and provide ample time for you to practice aligning yourself.

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

* Understand what the NGSS are and how they are used in K-12 classrooms
* Be able to locate, access, and search the NGSS online
* Be able to align existing multimedia products to the NGSS

*Strand:* Informal Science Education

*Room: Idaho*

**\*Meet the Trans-NIH SEPA Scientific/Research Contacts**

*Facilitator:* Katherine Nielsen, University of California, San Francisco.

*Panelists:*

* Tony Beck, PhD, National Institute of General Medical Sciences (NIGMS)
* Neeraj Agarwal, National Eye Institute (NEI)
* Anissa F. Brown, PhD, National Institute of Dental & Craniofacial Research (NIDCR)
* Maria Carranza, PhD, National Institute on Aging (NIA)
* Dorothy (Dottie) M. Castille, PhD, National Institute on Minority Health and Health Disparities (NIMHD)
* (Jay) James Churchill, PhD, National Institute of Mental Health (NIMH)
* Bryan Kim, Office of Data Science Strategy (ODSS)
* Kathy Mann Koepke, PhD, National Institute of Child Health and Human Development (NICHD)
* Marguerite Matthews, PhD, National Institute of Neurological Disorders and Stroke (NINDS)

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 questions from session attendees.

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: Grand Ballroom*

**Exploring Issues of Power, Agency, and Justice in K-12 Science Classrooms Through 3 Cases of NGSS Curriculum Design and Enactment**

*Facilitators:* Barbara Hug, University of Illinois; Kristen Bergsman, Fred Hutchinson Cancer Center, Jeanne Chowning, Fred Hutchinson Cancer Center, Regina Wu, Fred Hutchinson Cancer Center; Irene S. Bayer, Michigan State University; Consuelo Morales, Michigan State University; Mon-Lin Monica Ko, University of Colorado Boulder

Using three case examples, participants will learn how different SEPA projects are currently addressing issues of power, agency, and justice in K-12 science classrooms through NGSS professional learning, curriculum design and enactment. Cases will focus on three distinct practices aligned to the intent of NGSS: 1) productive discourse in science classrooms (high school), 2) student inquiry through community action research projects (middle school) and 3) critical consciousness and student agency (middle and high school).

Through this interactive session, participants will use cases provided as a starting place to engage in discussions about the affordances and challenges of each case theme. The session will be structured as a highly interactive session with the majority of the time spent in small group conversations. The session will open with a brief introduction, followed by multiple longer small group discussions where participants will engage in focused discussions about each case. Participants will be able to share their experiences exploring similar topics in their own projects during these small group conversations. In addition to sharing experiences, participants will brainstorm modifications for specific tools and resources. A final whole group synthesis discussion will allow participants to identify key take-aways for application to their own SEPA projects.

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

* Consider design challenges and opportunities that arise during co-design work with curriculum and teachers.
* Examine how lessons learned through the specific case examples could be applied to different contexts.
* Develop a shared understanding of how issues of power, agency and justice need to be considered while engaged in co-design work around curriculum and classroom enactment.

*Strand:* Science Teaching and Learning

*Room: Teton*

**Concurrent Breakout Sessions #2: Wednesday, 2:30 – 3:45 pm**

**Engaging Families in STEM Education Programs**

*Presenters:* Holly Burke, University of Kentucky Markey Cancer Center; Michelle Johnson, University of Alabama at Birmingham Center for Community Outreach Development; Megan Mekinda, University of Chicago Medicine Comprehensive Cancer Center

Family engagement in STEM education programs can be a powerful tool to boost students’ attitudes, performance, and outcomes. Accordingly, family engagement efforts are a required component of R25 YES programs that support grades 6-12. This session explores opportunities and challenges of family engagement, with case studies from YES programs in Alabama, Illinois, and Kentucky. Discussion prompts include bi-directional benefits of family engagement for students, families, and STEM education programs; barriers to engagement, in general and for specific populations; essential characteristics of engagement initiatives; and measures of success. Conference attendees with established, budding, or simply aspirational family engagement initiatives are encouraged to contribute.

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

* Consider literature and resources to set the groundwork for meaningful family engagement in STEM education programs.
* Explore strategies developed by three R25 YES programs—and other session attendees—to foster communication, trust, and the exchange knowledge between families and program providers for the sake of improved trainee outcomes.
* Collaborate with session attendees to develop a working set of guidelines and recommendations for successful family engagement initiatives.

*Strand:* Broadening Participation

*Room: Wyoming*

**Incorporating Cutting-Edge Research into Curriculum and Instruction: Opportunities and Challenges**

*Presenters:* Dana Brown Haine, University of North Carolina at Chapel Hill; Lynn C. Chesnut, University of North Carolina at Chapel Hill; Kathleen M. Gray, University of North Carolina at Chapel Hill

The incorporation of timely and relevant environmental issues into standards-aligned curricula and classroom instruction offers a number of opportunities for authentically engaging learners, but often comes with challenges inherent in addressing an unfolding area of scientific research, a persistent environmental problem, and an evolving regulatory landscape. Participants in this interactive session will hear from educators with a NIEHS-funded research center, the UNC Center for Environmental Health and Susceptibility, that features current research on a range of environmental health topics in its curriculum development as well as teacher professional development initiatives. Educators will showcase the Center’s SEPA-funded program, Iterative Design to Engage All (IDEA) Learners, which brings teachers and scientists together to co-create curricula around an emerging environmental health issue, PFAS (per- and polyfluoroalkyl substances) contamination. Presenters will describe processes and approaches for creating educational activities that utilize published research data and will model at least one data interpretation activity to showcase strategies for translating research into instructional activities. Presenters will address challenges inherent in this work and will facilitate dialogue so attendees can hear from others and reflect on the varied challenges and solutions encountered across projects. Dialogue will also center strategies for engaging students in learning about persistent environmental problems while also instilling hope and motivating action.

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

* Learn about an emerging environmental health issue that can be used to authentically engage learners
* Reflect on the benefits to learners and teachers of incorporating current environmental issues into curriculum and instruction
* Identify strategies for incorporating published data into educational activities
* Describe the challenges associated with incorporating current environmental issues into standards-aligned curriculum and instruction, as well as teacher professional development
* Contribute to dialogue about opportunities and challenges to learn from attendees

*Strand:* Curriculum Development

*Room: Olympus*

**Engaging Teachers and Students with Big Data Through the All of Us Research Hub**

*Presenters:* Matthew Blank, Baylor College of Medicine; Molly Malone, University of Utah; Alexa Wnorowski, The Jackson Laboratory

Excite the next generation of investigators by introducing teachers and students to research and the power of “big data”! The All of Us Research Program is making its historic biomedical database available to researchers at all stages of their careers, including high school and community college students, via the All of Us Research Hub. We’ll discuss the different ways our programs have engaged high school teachers and students in using this unique and robust dataset to formulate and investigate their own research questions about biomedicine and health in the United States. We’ll also share tips and tricks for working within the requirements of the All of Us Research Program and materials we have developed to help others engage with this rich source of data.

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

* Learn about the All of Us Research Program.
* Understand the key components of the All of Us Research Hub, including the aggregate-level public Data Browser and the registered-level Researcher Workbench that requires programming in R, RStudio or Python.
* Access curriculum materials that were designed to help students engage with the All of Us Research Hub.
* Discuss lessons learned about timelines and requirements for working within the constraints of the academic year and education setting.
* Discuss and share with one another strategies for educating teachers and students about formulating good research questions.

*Strand:* Research Experiences for Students & Teachers

*Room: Teton*

**Bridge Builders: Fostering Teamwork and a Sense of Belonging in STEM**

*Presenters:* Rachel Harris, University of California, San Francisco; Ren Rountree, Medical University of South Carolina

Join UCSF's Science and Health Education Partnership (SEP) Teen Wellness Connection (TWC) and MUSC's Teen Science Ambassador Program (TSAP) for an engaging breakout session aimed at fostering teamwork and a sense of belonging within teen programs. Through experiential activities and discussions, participants will explore the significance of group building and belonging, drawing from shared experiences and research insights. From icebreakers to closing circles, attendees will learn practical strategies and methodologies proven to enhance program retention and confidence among teens. By dedicating time in the curriculum for team building, SciEd projects can reap short-term benefits such as improved intergroup relationships during the program, leading to increased retention. Long-term advantages include building participants' confidence and fostering their science identity and sense of belonging in STEM. Join us for an insightful conversation on building STEM communities where the next generation of STEM leaders can thrive, and leave equipped with actionable examples to implement in your own projects.

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

* Gain an understanding of the significance of group building and belonging for program participants
* Engage in team building activities to foster a sense of belonging
* Identify benefits for teen programs to connect through ritual, facilitated activities, unstructured time
* Share knowledge and experience of group building and belonging
* Consider how to develop group building and belonging in their own programs

*Strand:* Science Teaching and Learning

*Room: Idaho*

**Thursday, May 30**

**Concurrent Breakout Sessions #3: Thursday, 1:00 – 2:15 pm**

**Building Bridges: Engaging in Strategic Partnerships for Advancing Cancer Research and Education**

*Presenter:* Emily McLaughlin, Mayo Clinic

This breakout session aims to delve into the critical role of strategic partnerships in driving advancements in cancer research and education. Recognizing the multifaceted nature of the field, this session seeks to explore effective strategies for building collaborative relationships with partners across the scope of our work. Through insightful discussions and shared experiences, we aim to equip participants with the tools and knowledge needed to foster impactful partnerships that accelerate progress in cancer research and education.

Understanding the Importance of Building Relationships:

* Explore the significance of engaging others in cancer research and education
* Discuss the mutual benefits of collaboration

Strategies for Successful Engagement:

* Share best practices for identifying and approaching potential collaborators
* Discuss effective communication strategies to build and maintain fruitful relationships

Overcoming Challenges:

* Identify common challenges faced in engaging and developing partnerships
* Discuss strategies and solutions to overcome barriers and build resilience in collaborative efforts

Expected Outcomes:

* Increased awareness of the importance and benefits of engagement in strategic partnerships
* Identification of effective strategies for initiating and maintaining successful collaborations
* Insights into navigating challenges and overcoming barriers
* Inspiration and knowledge gained from real-world examples of successful partnerships
* Strengthened capacity of participants to establish and leverage strategic partnerships

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

* Gain valuable insights and practical tools to enhance their ability to engage in and cultivate strategic partnerships that contribute to the collective advancement of cancer research and education.

*Strand:* Broadening Participation

*Room: Arizona*

**More Than Surveys: Strategies to Increase Student Engagement in Evaluation Through Participatory Methods**

*Presenters:* Rachel Scott, University of Mississippi; Sarah Mason, University of Mississippi; Marie Barnard, University of Mississippi; Tess Johnson, University of Mississippi

In order to design programs that engage students in STEM learning, it is critical to collect student feedback on their experience and perceptions of program design. In this session, the Project SCORE evaluation team and investigators share how they redesigned evaluation data collection elements to increase student interest and engagement. The team adapted items from the annual student post-survey into interactive posters that students used to share their responses to questions in a gallery walk format. Once students had made initial responses, students were asked to review peer responses and were given the opportunity to provide additional responses/comments. Additionally, Likert-scale items were adapted so that as students recorded their responses, they were able to see pictographs of the data emerge and reflect on it in real-time.

To fully engage in this session, attendees should bring a current survey protocol that they are using for data collection in their program. Presenters will share criteria for identifying questions that can best be adapted for increased engagement. Attendees will have the opportunity to identify their own survey items for redesign. Attendees will also have the opportunity to collaborate with peers and discuss the advantages/ disadvantages of adapting identified survey items.

Additionally, presenters will invite attendees to experience what it is like to engage with redesigned survey items through a facilitated gallery walk. The purpose of the facilitated gallery walk is to help increase attendee confidence in using this data collection method in the future.

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

* Understand the benefits of student engagement in evaluation activities,
* Identify survey questions that can be redesigned for greater engagement,
* Build skills and have tools and resources to facilitate future participatory data collection approaches.

*Strand:* Research and Evaluation

*Room: Idaho*

**Data Science Empowerment for SEPA Students: Engaging Students through a Collaborative Portal of Big Data Applications Using Student Generated Experimental Results**

*Presenters:* Jake Luo, Mohammad Assadi Shalmani, Craig Berg, Michael Carvan, Renee Hesselbach, David Petering, University of Wisconsin-Milwaukee

In this era of rapidly advancing data science and artificial intelligence, the integration of data science principles within hand-on experimental research offers a transformative approach for students. Our project introduces a pioneering data science portal designed for SEPA students and teachers, facilitating the collaborative creation, execution, and analysis of research projects. This interactive platform empowers students to design experiments, such as analyzing the effects of pollutants on aquatic life, and to contribute and leverage a growing repository of experimental data generated by other students. Incorporating the FAIR principles (Findability, Accessibility, Interoperability, and Reusability) and foundational statistical analysis techniques, the portal serves as a conduit for individual and collective scientific inquiry. The portal encourages forming student-led research teams, enables project collaboration by sharing and integration of experimental data, and fosters a deeper understanding of 'big data' analytics in scientific research. Through hands-on activities, this session will explore the portal's capabilities in fostering a deeper understanding of data science in research, enhancing students' skills in data management, statistical analysis, and the critical evaluation of "big data" for research insights. Our session will explore the portal's features and benefits and its potential for science education by making data science accessible and engaging.

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

* Gain insights into the importance of data science skills in enhancing scientific research and education,
* Strategies for teaching students to conduct experiments, analyze data using basic statistical methods, and collaborate effectively within a research team,
* Practical approaches for integrating an interactive data science portal into SEPA programs, facilitating student engagement in environmental health research projects,
* The potential of combining individual and aggregated student data to enrich scientific inquiry and understanding
* Opportunities to incorporate the portal into different SEPA programs

*Strand:* Research and Evaluation

*Room: Olympus*

**Classroom-based Communities of Practice to Promote Science Learning and Science Specific Disciplinary Literacy in Elementary School**

*Presenters:* Alana Newell, Baylor College of Medicine; Misty Sailors, WestEd; Jimmie Thomas, Baylor College of Medicine; Molly Marek, University of Texas at Austin; Dolores Garay, Baylor College of Medicine; Nancy Moreno, Baylor College of Medicine

Many state science standards now require middle and high school students to develop discipline-specific skills to read, write and communicate like scientists. These skills help bring learners into the community of practice of science and potentially develop their identities as future science or health professionals. We have found, however, that science-specific literacies can be introduced effectively in the elementary grades, with the important benefits of developing children’s science interest and abilities early in their educational paths. In this session, participants will gain experience with an instructional framework that builds young learners’ science knowledge and skills, and their science-specific disciplinary literacies. The framework, called Authentic Literacy and Language (ALL) for Science, models how real-world life scientists work with living systems or model organisms and simultaneously rely on published sources to support and extend their knowledge. Attendees will have opportunities to share their experiences with existing elementary science curricula, learn explicit approaches to teaching science-specific literacies and become part of a network focused on engaging elementary school learners in scientific practices.

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

* Identify elements of a scientific community of practice present in elementary science classrooms.
* Consider approaches to develop elementary learners’ abilities to read, write and communicate in ways that are specific to science.
* Practice strategies to link science investigations to literature-based research.
* Connect with other attendees who are focused on developing children’s identities as members of a science community.

*Strand:* Science Teaching and Learning

*Room: Wyoming*

**Independent High School Research; HRI Challenges Texas Schools to Try It Out**

*Presenters:* Gwen Stovall, The University of Texas at Austin; Deanna Buckley, The University of Texas at Austin; Bailey Williams, The University of Texas at Austin

The University of Texas High School Research Initiative (HRI) Expansion Project is a scientific inquiry program that trains rural teachers, builds inquiry-driven curriculum based on ongoing UT research, and provides a supportive network of undergraduate mentors and faculty.

Our NIH SEPA supported program is currently in year 3 of 5, and we are eager to share our preliminary results and details of our teacher training. Our curriculum modules that have been field tested in year two include Virtual Drug Screening, Fish Behavior, Caffeinated E. Coli, and Habitat Scouts.

Led by UTeach Master Teacher, Deanna Buckley, participants also learn research methods in the summer professional development which includes quantitative analysis and scientific communication applicable to every discipline. Goals for the teacher training address familiarizing participants with activities and labs, collaboratively adjusting curriculum to meet the needs of high school students based on feedback from previous students and their teacher-participants.

High school students experience innovative resources including cell phone spectrophotometers, interactive online molecular modeling, and specialized assays for soil microbes and fish anxiety. Participating classrooms also have access to virtual office hours with undergraduate mentors and research educators to enhance all facets of student research.

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

* Challenges and successes will be highlighted in a robust discussion regarding the complex nature of potential impact in a traditional, systemic network of Texas high schools where there are currently more uncertified teachers than certified, and high stakes testing prioritized.
* Rich methods of instruction such as inquiry may not be readily embraced by professionals. Samples of inquiry from each module will be shared with related activities as well as what we have learned with recruitment and retention, development and modification of activities, growth of teacher leaders, network development, and communication strategies to connect university research with high school classrooms.

*Strand:* Teacher Professional Development

*Room: Teton*

**Concurrent Breakout Sessions #4: Thursday, 2:30 – 3:45 pm**

**Persistence in STEM: Sharing Strategies and Resources**

*Facilitators:* Gwen Stovall, The University of Texas at Austin; Deanna Buckley, The University of Texas at Austin; Bailey Williams, The University of Texas at Austin

Many SciEd programs seek to support middle and high school students’ connections to STEM, often with the goal that students will pursue science studies and careers. Social psychology concepts such as future possible selves, sense of belonging, science identity, and researcher identity are associated with STEM persistence. In this session, four SEPA PIs will start the sharing and brainstorming with case studies illustrating features of their programs and how they use measures of such concepts to assess associations with persistence in STEM. They will also describe challenges and opportunities in longitudinal assessment. With presenters and other attendees, participants will explore how projects can support a sense of belonging and identity in STEM.

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

* Learn about research methods, studies, and resources related to persistence in STEM.
* Share strategies used in their SciEd projects that are associated with persistence in STEM.
* Discuss and synthesize practices that support a sense of belonging in STEM.

*Strand:* Broadening Participation

*Room: Snowbasin*

**Integrating Career Awareness & Exploration into K-12 classrooms**

*Presenters:* Erin E. Hardin, University of Tennessee; Melinda M. Gibbons, University of Tennessee

Many SEPA projects hope to expand students' interest in biomedical careers, but few SEPA investigators have been explicitly trained in career development and career awareness. In this session, the presenter will provide an overview of theory and research on career development to help participants understand stages of career development and specific activities and assessment tools that could be used with different ages. We will discuss both explicit career-focused activities as well as how an understanding of important underlying constructs (e.g., self-efficacy, interests) can be leveraged in implementing activities that are not specifically career-focused. The workshop format means that participants will have ample time to share their own activities and collectively brainstorm new ones.

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

* demonstrate a basic understanding of the developmentally appropriate career needs of children and adolescents at different stages
* identify activities that may be used to promote career exploration and awareness at different stages
* be familiar with different assessment tools for measuring career exploration and other career-related outcomes

*Strand:* Curriculum Development

*Room: Idaho*

**Game Design in the Classroom**

*Presenters:* Vanya Manthena, MPH; Jessica Henry, PhD; Yul A. Stites; Ci3 at the University of Chicago

Game design offers an interactive context to build and experiment with complex systems. In Summer 2023, the Center for Interdisciplinary Innovation and Inquiry in Sexual and Reproductive Health (Ci3) at the University of Chicago worked with Chicago high school teachers to create a classroom-based game design curriculum that would engage students in a variety of learning styles, build social-emotional and systems thinking skills, and provide an “in” to serious discussion.

In this session, we will explore HHA’s methodology in a game design workshop of our own. Participants will have the option to redesign an existing game to model their desired system or begin to build their own game prototype from scratch. Through engaging in the design process, session participants will develop a deep understanding of how educators can incorporate elements of game design into their own curriculum to achieve specific learning objectives and build social-emotional learning skills. Finally, we’ll review examples of HHA board games initially prototyped by young people and discuss next steps for implementation and evaluation.

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

* Understand the specific affordances of integrating game design into science curricula
* Understand the process of prototyping an educational board game
* Have begun prototyping a board game on a related topic of their choice

*Strand:* Interactive Multimedia

*Room: Wyoming*

**“What I’ve Learned Along the Way”: Reflections from SEPA/YES Program Leaders on Proposals to Publications and Everything in Between**

Presenters: Maurice Godfrey, University of Nebraska Medical Center; Pamela Koch, Teachers College Columbia University; Alana Newell, Baylor College of Medicine; Nathan Vanderford, University of Kentucky College of Medicine

Writing grant proposals is a common experience we share. However, the lessons we learn during and after the proposal stage vary greatly. How do we harness the lessons we’ve learned to produce stronger proposals and programs in the future? Join us to hear from four seasoned SEPA and YES Program Leaders about the experiences they have had while preparing grant proposals, implementing a project, and looking ahead to the next potential grant. This session will cover topics including, but not limited to: preparing a strong budget, evaluation and research plan in a proposal, using supporting documents in a proposal advantageously, publishing, and building capacity over multiple grants. During the session participants will meet in small groups to further discuss these topics with presenters and other attendees.

As a result of this session, conference attendees will:

* + - * Discuss challenges and potential strategies for writing SEPA/YES grant proposals
      * Identify strategies to leverage key components of a grant proposal, such as budget, evaluation and supporting documents to strengthen a proposal
      * Reflect on potential ways to disseminate findings and build capacity over multiple grants

*Strand:* Project Administration

*Room: Teton*

**\* Demographics in a Changing Landscape: Applied Contextual Considerations for Recruitment, Engagement, and Evaluation of Underrepresented Populations in STEM and Biomedical Research Training Programs**

*Presenters:* Stephanie Paris, Oregon Health & Science University; Shanthia Espinosa, Oregon Health & Science University; Amanda Braley, Oregon Health & Science University; David Boone, University of Pittsburgh Medical Center; Lisa Marriott, Oregon Health & Science University

This interactive session invites attendees who train youth in Science, Technology, Engineering, and Mathematics (STEM) to share considerations for incorporating demographics into federally-funded training programs. Federal initiatives call for expansion of collected demographics and support of diversity, equity, inclusion, and accessibility (DEIA). Yet at the 2023 SciEd meeting, reports of state and organizational restrictions to demographics and DEIA initiatives highlighted direct impacts for student recruitment, program implementation, and outcomes evaluation of historically underrepresented students in SciEd programs nationwide. This session amplifies the voices of the SciEd community through two activities that recognize the breadth of STEM programs and their contextual settings nationwide. First, a rose-thorn-bud activity will prompt session attendees to share successes, challenges, and innovations associated with integrating demographics into program efforts. Second, a forecasting activity will map opportunities for enhancing demographic-related practices across contextual settings. Ultimately, this session aims to build community and capacity around navigating demographic practices in federally-funded SciEd training programs nationwide

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

* Identify challenges that nationwide STEM training programs face when attempting to measure and evaluate diversity.
* Locate resources for measuring expanded demographic categories important to the inclusion of underrepresented students in STEM training programs
* Identify opportunities for using demographic data to improve STEM training environments

*Strand:* Research and Evaluation

*Room: Grand Ballroom*

**Concurrent Breakout Sessions #5: Thursday, 4:00 – 5:15 pm**

**Partnering with Teachers of Middle School Science, Mathematics, English Language Arts and Special Education to Support Their Diverse Learners by Use of a STEM Multimodal Text Set Targeting NGSS Engineering Standards**

*Presenters:* William Folk, PhD and Delinda Van Garderen, PhD, University of Missouri, Columbia MO

The Linking Science, Mathematics and Literacy for ALL Learners program (LSML4AL; R25GM146287) supports STEM teaching through development and implementation of innovative i) multimodal STEM text sets; ii) virtual teacher professional development – communities of practice (vPD-CoP); and iii) scenario-based assessments (SBAs) of science argumentation. Evidence collected to date indicates teachers of science, math, ELA and SPED collaborate and use skills and resources acquired through participation in the LSML4AL program (Lannin et al, 2023; doi.org/10.1177/073194872311876) to increase grade 6-8 students’ comprehension, vocabulary, and reasoning. Supported by appropriate scaffolds, learners with differing abilities and disabilities engage with reading grade-level complex texts adapted from the primary literature and improve science argumentation skills measured by validated SBAs (Romine et al, 2023; doi.org/10.1177/07319487231209505).

This session will provide a brief overview of the LSML4AL program and introduce a new text set based upon the Laserphaco patents for cataract surgery and the development of community ophthalmology programs by Dr. Patricia E. Bath, M.D. The text set targets NGSS Middle School Engineering Standards and Performance Expectations, with attention also to NGSS Physical Science and Life Science Standards and CCSS-ELA/Math concepts.

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

* Develop understanding of multimodal STEM text sets and scaffolded instruction for engagement with grade-band complex texts.
* Review evidence such resources help learners with differing abilities and disabilities actively engage with grade-level complex texts and improve science argumentation.
* Engage with a text set that targets NGSS MS-ETS-1 Engineering Standards and Performance Expectations and pertinent SBAs.

*Strand:* Curriculum Development

*Room: Arizona*

**Citizen DNA Barcode Network: Applying Hands-on DNA Barcoding Techniques with Citizen Scientists in Informal Settings**

*Presenters:* Jeffry Petracca, Cris Fernandez-Marco, David Micklos, Cold Spring Harbor Laboratory DNA Learning Center

DNA barcoding is a technique that allows for rapid identification of species using a marker region within an organism’s DNA. The protocols and skills required to conduct DNA barcoding are approachable for diverse audiences, making it a useful technique to engage citizen scientists in STEM in informal settings. This is the foundation of the DNA Learning Center’s SEPA-funded Citizen DNA Barcode Network (CDBN). CDBN has already engaged nearly 3,000 citizen scientists nationally and generated thousands of sequencing reads. Of these sequences, several hundred DNA barcodes have been published to GenBank with citizen scientists as authors. In this breakout session, you will learn the protocols of DNA barcoding by processing an insect specimen (feel free to bring your own!). You will extract DNA, conduct PCR, and practice loading an agarose gel, but will be asked to return later in the conference to see how your sample performed, and a virtual bioinformatics session will be held after the SciEd conference to learn how the DNA barcode sequence can be used to identify your plant or insect. Information will also be available for those interested in implementing DNA barcoding at their institutions with support from CDBN and the DNALC.

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

* Extract DNA from an insect specimen.
* Set up and conduct PCR to target a DNA barcoding marker region.
* Practice loading and running samples on an agarose gel.
* Interpret results of PCR and DNA sequencing after the SciEd session.
* Identify their samples using bioinformatics tools.
* Introduce DNA barcoding to citizen scientists at their own institutions.

*Strand:* Informal Science Education

*Room: Idaho*

**Crafting Robust Curriculum Assessments: Using Backwards Design to Develop Instruments that Enhance the Publishability of Research and Evaluation Findings**

*Presenters:* Rebecca J. Peterson, University of Utah; Harini Krishnan, University of Utah; Molly Malone, University of Utah; Louisa A. Stark, University of Utah

In this hands-on workshop, participants will learn how to apply the principles of backwards design to develop assessments that are tightly aligned with curricular learning objectives. By clearly defining measurable learning outcomes and the cognitive complexity at which students are expected to demonstrate mastery, assessments can be crafted as tools to gather data on the effectiveness of the curriculum in meeting its defined goals. Participants will practice writing assessment items tied to learning objectives at specified Depth of Knowledge (DOK) levels. Strategies for establishing validity arguments to support assessment data use will also be discussed. Ultimately, this 75-minute session will equip researchers with tools to create robust assessments that can provide an objective determination of a curriculum's strengths and weaknesses, elevating the quality and publishability of curriculum studies.

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

* Use Depth of Knowledge (DOK) levels to clarify what students will be able to know, do or understand after they use a set of curriculum materials.
* Write assessment items that align with and measure Learning Objectives at the DOK level specified.
* Evaluate one assessment item to check cognitive complexity.
* Describe ways in which one can establish validity arguments to support use of the assessment data for its intended purpose.

*Strand:* Research and Evaluation

*Room: Teton*

**\*Optimizing Teacher Immersive Research Experience**

*Presenters:* M. Eileen Dolan and Megan Mekinda, University of Chicago; Anna Marsden and Liz Morales, University of Utah; Hari Nakshatri, Indiana Univerisity; Jasmine McDonald, Mary Beth Terry and Marian LaForest at Columbia University

We recognize teachers as STEM professionals that strive to continually grow their depth of content knowledge, their craft of teaching, and motivate excellence from their students. The R25 YES program allows for up to 2 years of STEM development for existing teachers. One way to support educators in their goals are through immersive hands-on research experiences. These experiences have the potential to help teachers implement novel instructional approaches, encourage personal academic/career advancement, and lead to new insights and improved science learning and practice. As teachers grow to identify as scientists through this experience, this may translate to greater authenticity in their teaching and empathy for students as they increase their own sensitization to the challenges of scientific research. Time spent in academic laboratories also allows the teachers to build relationships with academic faculty/staff for further collaborations. Another approach to STEM development of existing teachers is collaborating with existing teacher-based organizations to provide exposure to curated cutting-edge content and pedagogy that is readily implemented into the classroom; thereby, fostering personal STEM creativity without excess burden. Teachers are facing increasing challenges including burnout and attrition, recruitment (particularly from rural areas), and appropriate compensation. This session includes a discussion of the advantages and challenges of these STEM development programs from the program leaders and the engaged teachers.

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

* Explore advantages and challenges of immersive teacher research experiences
* Learn about best practices for measuring success of teacher research experiences
* Learn ways teachers can work with program leadership to create innovative curricular activities that bolster scientific skills and knowledge among high school students.
* Identify didactic activities to complement the research experience such as the responsible conduct of research, science communication, and engaging with scientific literature.
* Identify special efforts and investment needed to attract teachers from rural school districts.

*Strand:* Research Experiences for Students & Teachers

*Room: Grand Ballroom*

**Near-peer Mentor Training Compilation: SciEd Community Collaboration**

*Presenters:* Debra Yourick, Kathleen Umayam and Adaeze Egwuatu, Walter Reed Army Institute of Research (WRAIR); Holly Brown and Emily Kuehn, Department of Defense STEM

Many SciEd projects that include the near-peer mentoring model have developed selection and training programs over the course of their projects, all since the earliest characterization and basic evaluation of the concept from 2000-2006 at WRAIR. Inclusive of WRAIR’s materials, this breakout will allow attendees to share near-peer mentor selection and training practices within their projects. Participants may also suggest additions to the training presented in the breakout based on their valuable experience in science teaching and learning within the SciEd community. With cooperation from those attending, participants will receive a follow-on overview of existing NPM training materials and NPM evaluation instruments. The breakout participants will consider how the group can continue advancing this compilation going forward in order to improve training and evaluation techniques. Peer mentoring programs may also have training contributions; we invite their collaboration with this effort.

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

* Receive a brief review of near-peer mentor training elements from WRAIR programs carried out in both formal and informal environments.
* Learn about earlier NPM evaluations from WRAIR and fellow breakout participants.
* Present their own contributions to training regimens for the widely used near-peer mentor model.
* Plan follow-up to share/provide additional detail on suggested program elements.
* Take part in the creation of a final compilation of curriculum elements along with sufficient contact information and training details to expand their own NPM training programs.

*Strand:* Science Teaching and Learning

*Room: Olympus*