"Fostering Equity and Culturally Relevant STEM Practices for COVID-19 and Beyond"

Program Agenda

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Friday, February 5:

2:00 PM Advisory Board Meeting prior to Annual Conference – *Zoom Meeting Link*

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4:45 PM Poster Presentation – Padlet (link)

- Dr. Jessica Krim, Southern Illinois University at Edwardsville

Poster #	Author Name	Presentation Title	Institution Name
1	Tiffany Sulser	The Impact of Scientific Investigation on Student Comprehension and Comfort with Complex Scientific Topics.	Southern Illinois University Carbondale
2	Matthew Hagaman and Sandi Lawson	Lessons Developed as a Traveling Earth Science Educator	Center for STEM Education at Bradley University and Peoria Academy of Science Geology Section
3	Helen Meyer, Lillian Sims and Randall Gibson	Using Trade Books to Teach the History and Nature of Science	University of Cincinnati and Cincinnati Public Schools
4	Alison Wallace, Wyatt Pugh, Brady Vizenor, Katie Olson, Jake Pundsack and Tim Harms	Noyce Neighbor$ and Networks	Minnesota State University Moorhead
5	Caitlin Leech and Dr.Tammy Schwartz	Women Empowerment in STEM through Community-Grounded Curriculum	Miami University
6	Renee Lopez, Faith Hudgens, Ryan Welsh, David Gibson, and Karen Renzaglia	Summer Research Immersion: Teacher Training and Authentic Research Experiences Improve STEM Learning While Strengthening Teacher Identity as Practicing Scientists	Southern Illinois University Carbondale
7	Noyce project personal from across Midwest region moderated by Nicolle von der Heyde	Noyce Midwest Summer Workshops 2021-2022	Illinois State University; Rockford Public Schools; Illinois State University and Regional Office of Education #17; Lewis University; Ohio Northern University; Kansas State University; University of Central Arkansas; SIUE; IUPUI

* Indicates Sub-Grant awardees from 2019.

Saturday, February 6:

10:00 AM Opening Plenary Session / Keynote Speaker – *Zoom Room (link)*

- Dr. Jessica Krim, Southern Illinois University at Edwardsville
  - Dr. Samuel Museus is Professor of Education Studies at the University of California, San Diego. Q&A will follow the presentation.
    - Dr. Samuel Museus is Professor of Education Studies at the University of California, San Diego. He also serves as Founding Director of the National Institute for Transformation and Equity at Indiana University. Museus has produced well over 300 publications and conference presentations focused on diversity and equity, campus environments, and college student outcomes. His publications include 10 books, including Creating Campus Cultures: Fostering Success among Racially Diverse Student Populations and Racism and Racial Equity in Higher Education. Museus is also creator of the Culturally Engaging Campus Environments (CECE) Model of College Success and the CECE survey, which are tools that colleges and universities around the nation are now using to advance their inclusion and equity agendas and foster success among racially diverse populations.

      Museus has previously received several national awards in recognition of the impact of his scholarship, including the Association for the Study of Higher Education (ASHE) Early Career Award in 2011 and the NASPA George D. Kuh Outstanding Contribution to Research and Literature Award in 2014. His work has also been featured in several high-profile media outlets, such as NPR, the Boston Globe, and the Washington Post. Museus also consults with college campuses in the United States and abroad that seek to transform their institutions and cultivate more inclusive organizational environments.

12:00 PM **Session 1**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

12:00 – 12:30 PM **STUDENTS TO SCIENTISTS: TRANSFORMATIVE ACTION RESEARCH** – *Alyssa Weisentein, Andrea Burzynski, Megin Rice, and Holly Dunderdale, Southern Illinois University Carbondale - STRAND 1 (SCIENCE / STEM)*

Traditional science courses often consist of "cookbook" style labs with known outcomes. These activities fall short of student involvement in authentic scientific processes. Students' understanding of what they have done or why may be lacking. A transition to authentic labs is needed and holds hope for a greater understanding of the content and process of science. These experiences align with science and engineering practices in the Next Generation Science Standards and help students understand the complexity, uncertainty, and messiness of research. This project was designed to reflect authentic scientific research as a collaborative, interdisciplinary process. Four teachers (chemistry, biology, and pre-calculus) at two high schools investigated how students viewed their engagement in authentic research by studying the effect of sunscreens on the germination rate of Ceratopteris (C-ferns) spores. Chemistry students reviewed the structure of sunscreens, biology students sowed spores and counted germination rates, and math students analyzed the data. All students watched a video on C-ferns and their life cycle. Each group of students created a video

explaining their portion of the research so that all students understood each stage of the process. Data sources included pre- and post-test surveys, student reflections, and researcher observations. In terms of content knowledge, this approach resulted in improved test scores. Students also demonstrated excitement about doing relevant, authentic research and experienced increased confidence in their abilities to conduct scientific research. There was a high level of student engagement and students concluded with a greater understanding of the nature of science.

12:00 – 1:00 PM **USING DESIGN-BASED TASKS TO EXPLORE AREA MEASUREMENT** - *EDWARD MOONEY AND JEFFREY BARRETT, ILLINOIS STATE UNIVERSITY- MATHEMATICS DEPARTMENT* - ***STRAND 1*** *(MATH / STEM)*

Bishop (1988) considered mathematics a cultural product noting people in most cultures engage in six fundamental mathematical activities as they develop mathematical knowledge: counting, locating, measuring, designing, playing and explaining. People explore their world using various activities related to science and engineering (NRC, 2012). The Next Generation of Science Standards (NGSS Lead States, 2013) consider constructing explanations and designing solutions a vital practice for all students to learn to prepare for STEM fields. At Grades 3 – 5, the standards recommend students "Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem" (NGSS Lead States, 2013, p.46). Thus, we considered design problems an accessible instructional consideration suitable for elementary students. Geometric measurement is a critical domain that is difficult for many students. The focus of this study was to determine if the incorporation of design processes into instructional activities for area measurement may enhance engagement and learning of students from low-resource, historically marginalized communities. We adapted activities from a learning trajectory for area measurement, prompting Grade 3 students to integrate knowledge of arrays, multiplication, and area measurement. Results suggest the design focus prompted students' integration of knowledge of space and number by engaging in novel representations of designed objects such as parking lots. Design-based tasks on measurement also prompted multiplicative thinking among students who had been less engaged in tasks involving arrays to represent multiplication.

12:00 – 12:45 PM **RESEARCH VS EVALUATION IN NSF GRANTS, CULTURALLY RELEVANT EVALUATION** - *KAVITA MITTAPALLI, MN ASSOCIATES, INC* - ***STRAND 3***

Culture is a cumulative body of learned, shared, and lived behavior, values, customs, and beliefs common to a particular group or society. In essence, culture makes us who we are as humans. It can be described as the socially transmitted pattern of beliefs, values, and actions shared by groups of people. With respect to evaluation, it affects everything from how a person with limited English proficiency understands and accesses consent forms or understands survey or interview questions, to the appropriateness of survey or interview questions related to the study itself, to the format and context in which data and results are analyzed and presented. In my presentation, I will talk about the CRE framework and how it can be used to evaluate Noyce and other STEM grants funded by the NSF.

2:00 PM **Session 2**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

2:00 – 2:30 PM **WINDMILL EXPERIMENTATION – A TEST STATION FOR INTERACTIVE DESIGN + MATH ACTIVITIES** - *TODD FRANCE AND DR. TENA ROEPKE, OHIO NORTHERN UNIVERSITY* - ***STRAND 1*** *(SCIENCE / STEM)* **Summer Workshop**

In this workshop, presenters from Ohio Northern University's Engineering Education Program will demonstrate how to use a small-scale windmill "test station" that can be used at any grade level. This custom-made device allows students to evaluate the effectiveness of windmill blades they design themselves. The windmill test station has been used at our outreach events at elementary schools and by teachers of all grade levels who have attended our professional development workshops. Activities can range from purely open-ended design to structured investigations. Students enjoy activities with the test station because it is dynamic, they can clearly see the effectiveness of their blade designs, and it is easy to iterate on their designs (a key element of the engineering design process).

Teachers appreciate that the test station is easy to use (i.e., students can collect data with little oversight), allows for authentic experimentation (with a clear connection to renewable energy), and has a multitude of math connections. Examples of these connections include:

- Elementary: using basic measurement tools (ruler, measuring tape, stopwatch, scale)
- Middle school: calculating velocity, converting units, determining surface area, creating a column chart
- High school: calculating horsepower, investigating correlations, optimizing efficiency, creating a scatter chart, using a spreadsheet

This workshop will touch on a number of ways the windmill test station can be utilized at various grade levels, and a brief overview of the two-day workshop will be presented.

2:00 – 2:30 PM **EXAMINING MIDDLE SCHOOL STUDENTS' METHODS OF JUSTIFICATION** - *EDWARD MOONEY AND LESLIE REYES-HERNANDEZ, ILLINOIS STATE UNIVERSITY* - ***STRAND 1*** *(MATH)*

Studies have shown that secondary students and undergraduate students struggle with providing valid mathematical proof (e.g. Inglis & Alcock, 2012). Recommendations from the National Council of Teachers' of Mathematics (NCTM, 2000) and the Common Core State Standards of Mathematics (CCSSM, 2010) state that students in all grades beginning in kindergarten, should have numerous opportunities to write and develop valid mathematical arguments. Knuth et al. (2009) found that middle school students typically used empirical arguments as justification, as mirrored in the research of secondary students. However, Bieda's (2009) study found that there was virtually no improvement of students' abilities to construct viable arguments from the sixth to eighth grade. To move towards a clear sense of middle students' ability to justify, we presented students with 3 tasks – one based on number properties, one based on algebraic thinking and one based on geometric thinking – and examined the way they justified their solution as well as the mathematical quality of the justification. Results showed that students not only use empirical arguments; but they are capable of other methods of justification. However, results show that most students' justifications were not mathematically complete.

2:00 – 2:30 PM **TAKEAWAYS FROM A PD & MENTORING PILOT PROGRAM** - *KRISHNA MILLSAPP AND LARA SMETANA, LOYOLA UNIVERSITY CHICAGO* - ***STRAND 3***

Midwest Noyce Conference Presentation Proposal Takeaways from a PD & Mentoring Pilot Program Novice teacher need individualized and cohort mentoring to help them successfully navigate student teaching and first years of independent teaching (Ingersoll & Strong, 2011; Youngs, Bieda & Kim, 2019). Mentoring, goal setting, and community-building are deemed especially important for new teachers, especially while navigating instructional challenges during a global pandemic. This study investigates the development of a new Professional Development & Mentoring Program. Programming in Fall 2020 was planned using information obtained from interviews and surveys with Scholars. Program elements included two, one-on-one goal setting meetings with a program mentor, three mandatory and two optional group sessions. Due to school COVID restrictions, classroom observations by the mentor were not possible to carry out. All meetings were held via Zoom. Each group session was dedicated to a new topic such as social-emotional learning, engaging students in remote and hybrid class settings, problems of practice in math and science teaching, and mindfulness practices for teachers and students. The following research questions guided the study: 1) What needs did Scholars express in terms of mentoring? What would Scholars like from a mentoring program? What would an ideal mentor/mentee relationship be? 2) What do Scholars feel they need the most support in? What goals did they set for themselves? 3) How did we respond to Scholars' requests/needs/goals in designing the mentoring program? 4) What were the Scholars' reactions to the PD & Mentoring program's first semester? Findings and implications for our program and other Midwest Noyce induction programs will be shared in the presentation.

2:00 – 2:30 PM **SUPPORTING YOUR STUDENTS IN DEVELOPING AND USING SCIENTIFIC MODELS WITH AN INTRODUCTION TO THE NEXTGEN ASET SCIENCE AND ENGINEERING PRACTICES (SEP) TOOLS** - *LARRY HORVATH/PI WESTERN REGIONAL NOYCE ALLIANCE/SAN FRANCISCO STATE UNIVERSITY*

Join us as we explore the implementation of an inquiry-based and phenomena focused lesson; and then analyze student thinking around their initially developed explanatory models. Practice using an online version of a NextGen ASET SEP tool to unpack student thinking and support their developing ability to think like a scientist as they critique and refine their models.

4:00 PM Networking Social – Zoom Room (Link)

- Dr. Jessica Krim, Southern Illinois University at Edwardsville
  - Grab your favorite beverage and join conference attendees in a virtual opportunity to mingle. Discussions will focus on the conference theme and opportunities to network and apply for grant funding to implement projects with students.

Sunday, February 7:

10:00 AM **Session 3**

- **Strands 1 and 2 Workshops** – (Click on the title of the presentation to join Zoom meeting)

10:00 – 11:30 AM **TESLA: TEACHERS ENGINEER SCIENCE LEARNING FOR ALL** - *Sarah Boesdorfer, Allison Antink-Meyer; and Rebekka Darner, Illinois State University - **STRAND 1** (SCIENCE / STEM) *Summer Workshop**

Opportunity gaps persist in science education and pathways to STEM careers. Culturally responsive educators who know how to design science instruction that leverages students' cultural, intellectual, and community assets in ways that are integrated with disciplines' practices and knowledge are needed to close these gaps. Engineering by nature is context-dependent and deeply, culturally embedded. As part of NGSS-aligned science curricula, the integration of engineering and science practices and disciplinary knowledge in science classrooms can provide an authentic context for instruction that embodies cultural relevance for science learning. Through Teachers Engineer Science Learning for All (TESLA) we seek to support secondary science teachers' design of culturally relevant, science instruction that integrates engineering practices. Because this is a burgeoning theoretical framework, TESLA is in need of practicing teachers who can contribute to its conceptual development and test its tenets in authentic science classes. As a preview to our summer TESLA Professional Development Workshop in June of 2021, this workshop will explore the overlap between culturally responsive practices and engineering education, and foster brainstorming of how these ideas can be translated to the classroom. In this 1-hour workshop, we hope to begin partnerships with teachers who are committed to culturally relevant implementation of the NGSS so that we together can create effective and actionable teaching strategies for teachers.

10:00 – 10:30 AM **COMPETITIONS TO INSPIRE INTEREST IN MATHEMATICS** - *VALORIE ZONNEFELD AND RYAN ZONNEFELD, DORDT UNIVERSITY - **STRAND 2** (MATH)*

Competitions provide many benefits to students and the mathematics community at large while giving students exposure to important mathematical ideas and practices. This talk explores examples of successfully implemented competitions including relay races, March Madness Competitions, Fantasy Football, "The Amazing Race," and more. Some competitions have a specific mathematical focus: March Madness focuses on data analytics; Fantasy Football focuses on fractions, integers, or decimals; Desmos Designs focuses on functions. Other competitions include mathematics from across the curriculum as well as recreational mathematics. Participants will (1) discuss the benefits and potential drawbacks of competitions for students, (2) explore ways to use competitions in their specific settings, and (3) share additional ideas for mathematical competitions.

10:00 – 11:30 AM **VIEWING OUR WORLD THROUGH A STEM LENS: STRATEGIES TO ENGAGE STUDENTS IN FINDING STEM APPLICATIONS IN EVERYDAY LIFE** – *NICOLLE VON DER HEYDE, ILLINOIS STATE UNIVERSITY - **STRAND 2** (SIENCE/MATH/STEM)*

This presentation is offered twice during the conference (Sessions 3 and 12).
This interactive workshop will provide science, math, and STEM educators with strategies and resources developed by the talkSTEM initiative – a non-profit organization whose mission is the development of future generations of female and

underrepresented STEM leaders. The workshop will focus on two flexible strategies that can be implemented in multiple ways to engage students in finding STEM connections in the world around them. The first involves teachers or students capturing images of objects, structures, or curiosities in their environment; marking the image with STEM applications or questions; and (optionally) posting the image on social media using #STEMlens. The second strategy involves the production of a 2-3 minute video that highlights STEM connections and/or poses a STEM question or problem for others to ponder or solve. In addition to posting these videos on social media, they can be used as collections of resources for teachers and students as they learn about specific STEM concepts.

10:00 – 11:30 AM **ENGAGING STUDENTS IN STEM - GETTING THEM FOCUSED IN CLASS!** – *ERIC LEWIS, SAN FRANCISCO UNIFIED SCHOOL DISTRICT*

In this workshop, you will see and experience a variety of strategies, demonstrations and routines that can help you to engage students in STEM classrooms from the moment class starts until the moment class ends. You will be participating in whole and small group discussions, sharing best practices, and leaving with ideas to implement into your classroom - virtual or not!

12:00 PM **Session 4**

- **Strands 1, 2 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

12:00 – 1:00 PM **THE BIG PICTURE OF ELECTRICAL POWER: ONLINE, INQUIRY-BASED INTERACTIVES** - *MATTHEW HAGAMAN AND BRAD CHRISTENSEN, CENTER FOR MATHEMATICS, SCIENCE, AND TECHNOLOGY AT ILLINOIS STATE UNIVERSITY - **STRAND 1** (SCIENCE / STEM)*

Where does energy come from? How does energy move? How do automation and human operators solve problems on the electrical Where does energy come from? How does energy move? How do automation and human operators solve problems on the electrical grid? It's easy to take electricity for granted, but the electrical grid provides incredible evidence of how improvements in scientific understanding led to great innovation in engineering.

The Smart Grid for Schools (SGFS) program has provided curriculum enhancement opportunities to hundreds of teachers and skill enhancement opportunities for tens of thousands of students. SGFS provides free hands-on and virtual manipulatives to teach students about energy, innovation, and careers.

This session will focus on the SGFS Virtual Grid Construction Game. Students position power plants, poles, and a variety of buildings on the screen, then tap buildings to draw wires between them and light up their city. Students complete a series of challenges which take them through the historical development of the electrical grid. In doing so, students learn to use meters, switches, and automation to control the flow of electricity.

Additional tools will also be introduced, including the Virtual Smart Home (helping students to understand energy consumption and renewable energy sources), the Career Switching Game (letting students fully explore careers in power engineering, switch control, and energy trading), and a variety of virtual reality experiences.

12:00 – 12:30 PM **STRATEGIES TO CONNECT STEM STUDENTS TO TEACHING CAREERS** - *CHETNA PATEL AND ALMA RODRIGUEZ ESTRADA, AURORA UNIVERSITY* - ***STRAND 3***

Illinois is facing a shortage of qualified STEM teachers, especially those who are culturally diverse and underrepresented in the field of STEM education. Aurora University's NSF Noyce Building Capacity grant addresses strategies to increase STEM secondary education teachers at a Hispanic Serving Institution. Activities include the establishment of a STEM Advisory Panel to collaborate and identify the needs of the community, surveys to gain insights into student perceptions of teaching, and scheduling campus wide events to promote teaching as a career as well as events to increase retention and graduation of current STEM students. Results from the implementation of the activities will be presented.

12:00 – 1:30 PM **DEVELOPING SCIENTIFIC KNOWLEDGE THROUGH EVERYDAY EXPERIENCES** – *FAITH YARBERRY, UNIVERSITY OF CENTRAL ARKANSAS* - ***STRAND 2*** *(SCIENCE)* **Summer Workshop**

The professional development workshop offered July 17-23, 2022, focus is to support teachers in designing culturally relevant pedagogy meeting Next Generation Science Standards (NGSS) using student's experiences and online media accessed by students. Student's everyday actions and experiences make the individual. Equitable learning opportunities are created when educators design learning experiences illustrating scientific principles while connecting student's to their everyday interests and knowledge. This type of lesson can also encourage students to look at their world through a scientific lens.

This workshop is designed to provide you with lesson plans and activities centered around YouTube Videos, Literature, Pseudoscience, Rural Life, and Urban Life, that can be utilized in the classroom. Additionally, attendees will develop lesson plans and activities derived from their student's perspective. Activities and lesson plans offered and created will be stored in a shared drive accessible to all attendees.

Thermal expansion activities and demonstrations derived from a YouTube Video showing the Eiffel Tower will be presented at the Spring 2021 Midwest Regional Noyce Conference. The activities will meet the NGSS standard for constructing explanations and designing solutions in 6th-8th grades. The activities will lead to a discussion that explains why the Eiffel Tower is 15 cm taller in the summer and an understanding of how engineers combat thermal expansion in bridges, which is the piece that relates to student experiences. Finally, we will discuss additional activities that could be developed from the Eiffel Tower video that could lend to student exploration involving concepts of geometry and inquiry-based learning.

12:00 – 1:30 PM ~~**4D METHOD: A WEEKLY FRAMEWORK FOR INTENTIONAL PLANNING** – *DONNA DELACALZADA, SEQUOIA HIGH SCHOO* –~~ *SESSION WAS CANCELLED*

Description: “Not just 2D or 3D, but 4D!” The 4D method is a weekly framework focused on equity and engagement designed for high school science, but also portable across disciplines. Discuss, Discover, Demonstrate, and Deepen, or the 4D method, is grounded in common core and provides the foundation for approaching NGSS curriculum. The sequence is structured so students are guided through the process of critical thinking every week. The bonus is the routine also serves as a “survival guide” for the busy teacher to ensure intentional planning and quality learning experiences. In this workshop, you’ll participate in four core activities equipped with strategies for a diverse group of students whether in distance-learning, in-person instruction, or a flipped classroom.

2:00 PM Plenaries Session – (Click on the title of the presentation to join Zoom meeting)

- **Dr. Sandra Richardson,** Program Director for the Robert Noyce Teacher Scholarship Program – ***STRANT 3 (PI’s and Noyce Project Faculty)***
  - Dr. Sandra Richardson is a Program Director at the National Science Foundation (NSF) in the Division of Undergraduate Education in the Directorate of Education and Human Resources. Prior to her position at NSF, she served as an Associate Professor of Mathematics in the Department of Mathematics & Computer Science at Virginia State University in Petersburg, VA and previously held a joint faculty appointment in Department of Mathematics and Department of Teacher Education at Lamar University in Beaumont, TX. She holds a B.S. in Mathematics from Dillard University, where she was a student in LS-LAMP during her sophomore, junior, and senior years. She later earned both a M.S. and Ph.D. in Mathematics Education from Purdue University. She graduated from high school at the age of 15 and received her Ph.D. at the age of 23. Dr. Richardson discussed the status of the Robert Noyce Program and shared the organization’s plans for the future.

- **Stipend Requirements and Sub-Grant Opportunity** Explained – ***STRAND 1 AND 2***
  - This session will provide important information regarding the stipend requirements and sub-grant opportunities offered through attending the 2021 Midwest Conference. All conference attendees are eligible to receive up to $750 in stipend support, divided into three components: 1) participating in the 2021 conference, 2) purchasing materials and resources for use in the classroom and for instruction, and 3) submitting a shared resource – stemming from the conference experience – to be shared with the larger Midwest Noyce community. In addition to the stipend, new sub-grant opportunities will be announced and explained. Working collaboratively with other Noyce projects in the region, conference attendees can apply for grant funds to enact learning experiences that support the goals of the conference, including addressing issues of equity and the use of culturally relevant STEM practices in the classroom. Time will be provided to engage in discussion with session attendees regarding potential collaborations.

Tuesday, February 9:

10:00 AM **Session 5**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

10:00 – 10:30 AM **INVESTIGATING NOVICE TEACHERS' PROFESSIONAL IDENTITY TENSIONS (PASSKEY 725973)** - *LARA SMETANA AND ALI KUSHKI, LOYOLA UNIVERSITY CHICAGO* - ***STRAND 1*** *(SCIENCE / STEM)*

Beginning STEM teachers face numerous challenges as they negotiate a variety of perspectives, expectations, and roles. A better understanding of these challenges, or tensions, and how teachers navigate them has become a focus of STEM teacher education research. Framed within a theoretical triangulation that views novice teachers as social beings who actively affectively appraise and practically react to tensions arising from complexities of educational settings, the study investigated the doubts, dilemmas, and uncertainties that novice science teachers face alongside the ways they cope with these. Participants were five teacher candidates enrolled in a master's secondary science education program. Primary data were open-ended responses to a questionnaire, which probed respondent's experiences with and about 13 different scenarios that depicted common professional tensions faced by novice teachers. Further sources were observation notes collected in a practicum class taught by one of the researchers as well as participants' reflections on the experience of completing the questionnaire as an awareness-raising tool. Data were analyzed and coded for categories of experienced tensions. Then, instances of affective appraisals of tensions faced and subsequent coping strategies were identified and tabulated. Tensions related to care for students, teacher confidence, and incongruous perceptions of situational realities vs. ideal ones emerged as predominant themes. These were accompanied by affective appraisals with low to moderate severity with different ensuing comping strategies. Findings are of particular relevance for better understanding of how novice science teachers can be best supported by their preparation and induction programs such that the developmental processes are productive.

10:00 – 11:30 AM **GET THE FACTS OUT ABOUT STEM TEACHING CAREERS…DATA DRIVEN MYTH BUSTERS** - *WILLIAM HUNTER, ILLINOIS STATE UNIVERSITY* - ***STRAND 3***

Get the Facts Out is an NSF funded partnership between the Colorado School of Mines and four national societies: American Physical Society, American Chemical Society, American Association of Physics Teachers, and the Association of Mathematics Teacher Educators. GFO is a unique project that is designed to reach STEM majors in a large fraction of all U.S. mathematics, chemistry and physics departments and has potential to significantly address teacher shortages in these high-need STEM disciplines. This will be a 45-minute presentation/workshop in which we look at data about teaching STEM in the high school and myths that the public, faculty, and students hold about teaching careers. Attendees will get a chance to see data from multiple professions in the USA and participant messages that have helped to break through these myths.

12:00 PM **Session 6**

- **Strands 1 and 2 Workshops** – (Click on the title of the presentation to join Zoom meeting)

12:00 – 1:00 PM **STRATEGIES FOR BLENDED LEARNING IN CHEMISTRY** - *Candace Woodside, University of Cincinnati* - ***STRAND 1*** *(SCIENCE)*

Educational strategies have to be more flexible this academic year. Strategies can be solely online or available during blended learning. An online lab on Trends of the Periodic Table allows students to follow the procedure and subsequently collect data and complete a lab

report either online or as a hard copy. An additional Chemistry activity can be done in-person or online as needed to learn and understand VSEPR structures.

12:00 – 12:30 PM **DATA-DRIVEN DECISION-MAKING WORKSHOP** - *TUAN NGUYEN AND SHERRI MARTINIE, KANSAS STATE UNIVERSITY* - ***STRAND 2*** *(MATH / SCIENCE / STEM)* **Summer Workshop**

Over the past two decades, data has become increasingly available to schools and school districts. The ubiquity of data—in the form of student, teacher, administrator and staff data systems—present both possibilities and pitfalls for administrators poised to make more informed decisions aimed at improving their school system. This series of workshops aims to build students' data literacy, that is, their ability to understand, analyze, and act on multiple types of data. Data-based decision making in education refers to teachers, principals, and administrators systematically collecting and analyzing various types of data to guide a range of decisions to help improve the success of students and schools. Upon this foundation, participants will practice linking data to instructional and school improvement. This series of workshops supports teachers and school leaders as they acquire the knowledge and techniques to implement data-driven decision-making principles in a professional, ethical, legal and methodologically sound manner. The objectives of the workshop are: 1. Be exposed to the theories, models, frameworks, and findings in the research literature on data use in education to inform your own thinking and future use of data for decision-making. 2. Develop your ability to systematically gather, organize, and analyze qualitative and quantitative data that inform your equity-driven decision-making. 3. Create effective data products (i.e., visual and written) that provide internal and external stakeholders with information on school inputs, processes, outputs, and satisfaction. 4. Develop your ability to lead others in using data for equity-driven decision making.

2:00 PM **Session 7**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

2:00 – 3:00 PM **EARTHCACHING FOR TEACHERS: DESIGNING LOCAL OUTDOOR LEARNING EXPERIENCES FOR EARTH SCIENCES** - *SHARON M. LOCKE, COLIN WILSON, AND GEORGIA BRACEY, SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE – STRAND 1 (SCIENCE)*

Field-based activities are crucial for providing students with authentic learning opportunities in earth science, but there are substantial challenges in bringing outdoor, field-based learning into K-12 classrooms. In this workshop, participants will learn how to create local field experiences using the EarthCache model to support student learning of earth science concepts and scientific practices. During the workshop we will share the process our team used to create a set of local EarthCaches, which were tested over several semesters in a university science course for teachers. Based on pre-service teacher feedback and research findings, we identified a set of design principles that educators can use to create EarthCaches in their own school area or community. Participants will receive an educator's guide, design checklist, and tutorial videos.

2:00 – 2:30 PM **A CALCULUS LESSON TO EXPOSE STUDENTS TO TEACHING** – *SEBASTIAN WYMAN, AURORA UNIVERSITY – STRAND 3*

As part of Aurora University's NSF Noyce Capacity Building Grant, the researchers created and implemented a semester long project designed to increase the number of STEM teachers graduating from the university. The need in Illinois for qualified STEM teachers, especially those from underrepresented backgrounds is high. By giving students in Calculus, I experience interacting and teaching 8th graders at the John C. Dunham STEM Partnership School, located on campus, we hope to influence the career choice of our STEM interested students. Results of student surveys on attitude towards teaching will be presented.

4:00 PM Keynote Speaker – *Zoom Room (link)*

- Dr. Jessica Krim, Southern Illinois University at Edwardsville
    - **Dr. Natalie C. Johnson** was recently appointed as Department Chair and Assistant Professor of Mathematics at National Louis University.
        - Dr. Natalie C. Johnson was recently appointed as Department Chair and Assistant Professor of Mathematics at National Louis University. Prior to that, she served over 30 years as an educator and community service advocate. She is the founder and CEO of READit, an education consulting firm specializing in closing the achievement gap across the U.S., college and career readiness, and financial literacy. Her clients included: Northwestern University, Lewis University, and FERMI Lab. Although she retired from teaching high school mathematics in May 2020, she realized an illustrious career in K-12 public school education where she taught and mentored students and staff at the middle school, high school and collegiate levels covering courses such as algebra, geometry, trigonometry, pre-calculus and calculus. She also taught Advanced Placement AB and BC Calculus for over ten years as well as Differential Equations and remains an AP Advocate.

          She successfully served on several action-oriented committees to improve student learning includ-ing: Metea Valley High School's (MVHS) School Improvement Planning (SIP) Team and Lewis University's Education Advisory Board. She wrote and implemented a College Test Prep course that resulted in as much as a 7-point increase in student ACT scores. She mentors youths in organizations including: The Leadership Initiative, 100 Black Men of Chicago-Western Suburb Chapter, Girl Scouts of America, and DuPage African Methodist Episcopal (AME) Church. She splits her time serving as Vice President of Experimax of Naperville, a company that services the community by selling, buying, repairing, and recycling pre-owned Apple products and more. Prior to teaching high school full-time, she worked in several capacities for McDonald's Corporation: Business Analyst, computer programmer, and Division Technology Manager; UNISYS as a computer programmer; Sargent-Welch Scientific Company as an Operations Manager; and Los Alamos National Laborato-ry (LANL) as a research assistant. She recently presented at the World Congress on Education in Dublin, Ireland.

          A recent awardee of the U.S. Presidential Award for Excellence in Mathematics and Science Teaching, Dr. Johnson's motto is simple - "Learn, Earn and Return." At the age of 22, while working at LANL, she (then Natalie Carter) co-authored the journal The Weierstrass Transform in X-Ray Analysis. In 2000, she was presented the McDonald's Corporation Innovation Award for creating and implementing SpeedPass (cashless technology) at McDonald's. She currently serves on the advisory board of Lewis University's School of Education, mentors NOYCE Scholars, mentors' youth in the community, and is a member of DuPage African Methodist Episcopal (AME) Church. She is also a member of: Council of Presidential Awardees in Mathematics (CPAM), National Council of Teachers of Math (NCTM), Society

for Industrial and Applied Mathematics (SIAM), TODOS: Math for All, and is an honorary member of the Board of Educators for the National Academy for Future Physicians (NAFP). Dr. Johnson has been honored for exemplar teaching and leadership by Metea Valley High School, NAACP, The Leadership Initiative, Indian Prairie School District 204 (IPS-D204), National Society of High School Scholars (NSHSS), Indian Prairie School District 204's Parent Diversity Advisory Committee (PDAC), City of Aurora, Illinois State Directors of Student Activities (ISDSA), and DuPage AME Church.

Dr. Johnson holds a Ph.D. in Industrial/Organizational Psychology (Grand Canyon University [GCU]), MA in secondary education (Lewis University), MS degree in applied mathematics (Rens-selaer Polytechnic Institute of Technology [RPI]), and a BS degree in pure mathematics (Talladega College). She is the wife of Thayer Johnson (over 32 years); mother of two adult sons, Jelani and Jakobi Johnson, and is the daughter of Mr. and Mrs. John and Hattie Carter. She enthusiastically and unwaveringly credits God for His grace, mercy, and favor as she continues to serve others.

8:00 PM **Session 8**

- **Strands 1 and 2 Workshops** – (Click on the title of the presentation to join Zoom meeting)

8:00 – 9:00 PM **STORYMAPPING THE DISPROPORTIONATE EFFECTS OF THE COVID-19 PANDEMIC** - *LAURA LUSARDI AND RACHELLE HAROLDSON, UNIVERSITY OF WISCONSIN-RIVER FALLS – STRAND 1 (SCIENCE)*

Over the course of 2020, the COVID-19 pandemic has swept across the globe and the U.S. alone has seen the highest case numbers and fatality rates out of the rest of the world. But not every individual in the U.S. has seen the same impact of the pandemic, in fact, research has shown that COVID-19 has had widely disproportionate effects on communities of low socioeconomic status, Black/African American and Latinx backgrounds, and older generations. This pandemic has provided us with an incredibly unique opportunity to study the impacts of the pandemic in real time, and as such, provides a great opportunity to conduct investigations in the classroom. ArcGIS StoryMaps is an exceptionally powerful online tool that allows for the investigation of current, real-world data through interactive maps and storytelling elements. Through the use of this tool, classroom investigations can be conducted so students can apply their inquiry and critical thinking skills to examine social justice issues through the lens of science. In this project, we outline the process for using the Who is Most Affected by COVID-19? StoryMap to construct a student-led investigation that can be conducted in both a virtual learning environment or in-person learning format.

8:00 – 8:30 PM **ENCOURAGING COLLABORATIVE CRITICAL REFLECTION UPON CLASSROOM PARTICIPATION PATTERNS UTILIZING EQUITY ANALYTICS** - *BRENDAN DAMES AND COREY WEBEL, UNIVERSITY OF MISSOURI – STRAND 2 (MATH)*

Researchers have revealed issues of equity within mathematics education, such as math-gender stereotypes and diminished opportunities for students of color through tracking, lowered teacher expectations, and standardized testing (Berry, 2008; Cvencek, Meltzoff, & Greenwald, 2011). In this presentation, we share the cases of three elementary educators, all of whom utilized an equity analytics tool named EQUIP (Equity QUantified In Participation), to uncover participation patterns within their whole class math

conversations (Reinholz & Shah, 2018). Working within a NOYCE Master Teacher Fellows (MTF) cohort, the three teachers exhibited vulnerability in sharing patterns of classroom inequities with peers, providing and receiving feedback with one another. Teachers attributed differences in participation to both underlying personal biases and student characteristics. These cases suggest that equity analytics can support elementary teachers' ability to critically reflect upon equitable practices and consider ways in which underlying implicit biases may affect students' classroom participation by race, gender or other indicators of status. A brief tutorial will also be provided for preservice and in-service teachers on how to use the EQUIP tool within their own classrooms.

8:00 – 8:30 PM **INTEGRATING NGSS ALIGNMENT AND THE 5E FRAMEWORK TO SUPPORT BUILDING STEM LITERACY** - *SIMONE LEWIS-KOSKINEN/SCIENCE FROM SCIENTISTS*

In this session, attendees will participate in a hands-on biology lesson and guided breakdown of the lesson structure to highlight NGSS alignment and each component of the 5E framework. We will model how a lesson can be designed to (1) focus on culturally responsive approaches to engage students in STEM content, (2) create relevant experiences for students to explore and explain phenomena, (3) provide resources to elaborate on content + science and engineering practices, and (4) assess students' learning. Additionally, we will discuss findings and implications of our approach throughout the lesson.

Wednesday, February 10:

10:00 AM **Session 9**

- **Strands 1, 2 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

10:00 – 11:00 AM **UTILIZING STRUCTURED DIALOGUE WITH CONTEXTUALIZED PRACTICE AS A PATHWAY TO SUCCESS IN HIGH NEED CLASSROOMS** - *CATHERINE KLEHM AND LEIGHANNE LOCKE, ORAL ROBERTS UNIVERSITY – STRAND 3*

The Noyce Program at Oral Roberts University, MASST (Math and Science Scholarships for Teaching), was built around a research-based, specialized training called Structured Dialogue. The training began during the internship phase and continued throughout the scholar phase of the program. Structured Dialogue was emphasized at various stages of matriculation throughout the teacher preparation program and extended into the obligation years. Structured Dialogue served as one unifying experience for all Noyce Scholars in the MASST program. Another unifying experience for all Noyce Scholars was the summer internship experience with high-need students in an educational setting. In the course of the internship, Structured Dialogue occurred informally on a daily basis and formally, with the MASST Program PI and Co-PI, on a weekly basis. These frequent discussions proved to be significant. This presentation will explain the original plan, its implementation, and the results that followed.

10:00 – 11:30 AM **SOCIAL JUSTICE TEACHING IN THE STEM CLASSROOM** – *JENNIFER HERNANDEZ AND JESSICA S. KRIM, SOUTHERN ILLINOIS UNIVERSITY – STRAND 2 *Summer Workshop**

This workshop will be an introduction to the summer offering of the same title. Workshop leaders will engage and inform participants of the three components of social justice in STEM Education; comprised of the curriculum, teaching, and classroom. An in-depth examination of the synthesis of STEM content with a social justice perspective will immerse preservice and inservice teachers in the process of learning while emphasizing the real-world contextual applications of STEM content in order to (1) eliminate the distinction between science education and the communities they serve in public and private school settings, (2) become aware of and understand modeling of under-represented epistemologies in science education, and (3) create authentic science experiences for students within culturally relevant spaces. Together, these three approaches allow STEM preservice and inservice educators to be able to identify culturally responsive teaching practices that will challenge/upset/replace the status quo of privileged segments of science education, i.e. white, male, religious, socio-economic status, and others.

12:00 PM **Session 10**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

12:00 – 1:30 PM **CREATING A COMMUNITY CLASSROOM IN A VIRTUAL WORLD** - *MICHELLE CHILDRESS, UNIVERSITY OF ARKANSAS – STRAND 1 (MATH / SCIENCE / STEM)*

Knowledge of students in the classroom is imperative to effectively meeting the needs of all children as stated in Charlotte Danielson's Framework of Teaching (The Danielson Group). Child development, learning process, special needs; student skills, knowledge, and proficiency; and interests and cultural heritage are necessary components for a conducive learning environment. Building a strong community of learners allows the teacher to build curriculum specific to students, enhance specific student skills, build relationships with students, and create a classroom of respect and rapport. Building a strong community of learners allows the students to build relationships with students, engage in collaboration with ease, and develop a safe learning environment. With the shift in class dynamics due to the pandemic, our classroom environment of "community" has changed dramatically. Zoom and virtual classrooms are increasingly becoming the new normal where teachers and students are feeling a sense of disconnect and consequently classrooms are becoming impersonal. Ice breaker activities have been successful tools for developing a classroom community and collaboration for some time, however; they have never been so important and necessary than now. Ice breaker activities have been shown to successfully engage students, build teacher/student and student/student relationships, and practice communication and collaboration skills. In this workshop, the presenter will introduce ice breaker activities and establish the relationship connected to the Teacher Excellence and Support System (TESS), guide participants through several ice breaker activities, and will lead an in-depth discussion incorporating the activities into zoom and virtual classroom environments.

12:00 – 1:30 PM **HOW DO WE KNOW THEY KNOW? ASSESSMENTS OF STUDENT LEARNING IN THE VIRTUAL/HYBRID CLASSROOM** - *STEPHANIE MATTESON, UNIVERSITY OF MISSOURI SAINT LOUIS, NOYCE SCHOLAR – STRAND 1 (SCIENCE)*

Using scientific writing and CER as an assessment tool in the virtual/hybrid learning era.

Virtual and hybrid learning has presented teachers with new challenges, ranging from technology integration, engaging content delivery, and assessment of learning. Teachers are presented with the challenge to assess the efficacy of lessons and learning opportunities, which can be exacerbated in the virtual/hybrid classroom. Creating quality online assessments, which serve as authentic measures of knowledge acquisition and application is time consuming. Moreover, it takes time to equitably grade and provide individualized feedback for learners. The CER (claim, evidence, reasoning) framework is an effective and efficient formative and summative assessment tool in the virtual/hybrid classroom.

Participants will explore the use of scientific writing using CER with students, how to provide detailed feedback and assess students understanding. Sample CER Unit assessments across physical and life science courses and editable grading rubrics will be shared.

12:00 – 12:30 PM **COMMUNITY COLLEGE COLLABORATION IN SUPPORTING FUTURE SCIENCE AND MATH TEACHERS** – *KRISTIN COOK, AKHTAR MAHMOOD, BELLARMINE UNIVERSITY* – *STRAND 3*

A partnership with Kentucky Community & Technical College System (KCTCS) was established by our Noyce Capacity Building project as a transfer pipeline that will enable recruitment of a diverse pool of interested STEM students. KCTCS is comprised of 16 community colleges and is the largest provider of post-secondary education in the state of Kentucky with an enrollment of 106,498 students (55% female and 45% male); 56% are Pell grant recipients, 44% are underrepresented minorities and 32% are first generation students. The availability of scholarships will be critical in attracting qualified community college students who have completed an Associate's degree to transfer to Bellarmine University (BU) by means of a 2x2 pathway in their respective STEM discipline and obtain a teacher certification in their third year after completing the Early Entry MAT degree.

BU is committed to making the Noyce Scholars program a central institutional focus. The administration from KCTCS and BU signed a formal partnership agreement called 2BU that will allow community college students to transfer to BU with a reduced tuition fee and no application fee. Students will also be able to access all campus amenities, programs, and events, and have the ability to live on campus. As part of the Strategic Plan, BU is committed to advancing equity, diversity and inclusion in the academic environment and has embraced diversity as central to academic excellence by recruiting and retaining a diverse student body and expanding curricular initiatives to prepare students for an increasingly diverse and global culture.

2:00 PM **Session 11**

- **Strand 1 Workshop** – (Click on the title of the presentation to join Zoom meeting)

2:00 – 3:30 PM **A LIGHT INTRODUCTION TO NGSS INSTRUCTION** – *JOSH RAPPUHN,* – *STRAND 1 (SCIENCE / STEM) *Summer Workshop**

Participants will act as students in an inquiry driven unit about light based on HS.PS4.A: Wave Properties. They will be given a compelling phenomenon around the shape of light and shadows. Participants will ask questions that will be used to drive activities, create model-based representations of their thinking, and internalize new connections to the topic. This will lead participants to create a new understanding that will allow them to be able to demonstrate mastery of performance expectation HS PS4 3: evaluate the claims,

evidence and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that some situations one model is more useful than the other.

3:00 – 3:30 PM **ENGAGING DIVERSE LEARNERS WITH ART INTEGRATION AND STEAM** - *APRIL BARTNICK, SIU RIVER REGION SUSTAINABILITY: NOYCE MASTER TEACHING FELLOWS PROGRAM – STRAND 1 (SCIENCE / STEM)*

Critical and creative thinking go hand-in-hand in science. However, spending time on art projects is considered a fun or downtime activity in elementary education. Yet, research shows that incorporating art in science education provides students the opportunity to be creative while deepening their understanding of science concepts. During the Fall of 2019, I conducted an action research project with ten 5th-grade students receiving special education services under Specific Learning Disability. My research focused on special education students creating art projects in science education, thereby incorporating art activities into STEM learning (STEAM). Specifically, I assessed students' understanding of scientific concepts after incorporating art projects into a lesson centered on the life cycle of the model fern, Ceratopteris richardii (C-fern), which included direct instruction and hands-on learning activities using dissecting microscopes. As a part of the lesson, students drew and made colored notecards with phases of the life cycle and then created a poster. The final project was "Zoom in on STEAM" paintings consisting of Earth, habitat, the whole plant, and different life cycle stages of the C-fern at the microscopic level. Using post-assessments from the science unit and focus group interviews with the students, the data revealed increases in engagement, understanding, and appreciation for science. Students expressed excitement and happiness when discussing the art component of the science unit. "Zoom in on STEAM" is a creative way for students to advance their knowledge and gain a deeper understanding of difficult science concepts.

4:00 PM **Session 12**

- **Strands 2 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

4:00 – 5:30 PM **VIEWING OUR WORLD THROUGH A STEM LENS: STRATEGIES TO ENGAGE STUDENTS IN FINDING STEM APPLICATIONS IN EVERYDAY LIFE** – *NICOLLE VON DER HEYDE, ILLINOIS STATE UNIVERSITY – STRAND 2*

This presentation is offered twice during the conference (Sessions 3 and 12).
This interactive workshop will provide science, math, and STEM educators with strategies and resources developed by the talkSTEM initiative – a non-profit organization whose mission is the development of future generations of female and underrepresented STEM leaders. The workshop will focus on two flexible strategies that can be implemented in multiple ways to engage students in finding STEM connections in the world around them. The first involves teachers or students capturing images of objects, structures, or curiosities in their environment; marking the image with STEM applications or questions; and (optionally) posting the image on social media using #STEMlens. The second strategy involves the production of a 2-3 minute video that highlights STEM connections and/or poses a STEM question or problem for others to ponder or solve. In addition to posting these videos on social media, they can be used as collections of resources for teachers and students as they learn about specific STEM concepts.

4:00 – 4:45PM **A CASE FOR CLINICAL RESIDENCIES IN DEVELOPING TEACHER LEADERS** - *DEBORAH D. SACHS, KATHERINE W. STICKNEY, KIMBERLY M. BAKER, JEAN S. LEE, AND JAS'MINIQUE POTTER, UNIVERSITY OF INDIANAPOLIS AND CHAPEL HILL 7TH AND 8TH GRADE CENTER – STRAND 3*

Our presentation will explore how clinical residency teacher preparation programs provide the ideal opportunity to introduce preservice teacher candidates to the various components of teacher leadership and to begin to develop, in those candidates, the attributes of teacher leaders. We will also introduce how we combine the Teacher Leadership Competencies developed by the Center for Teaching Quality, the National Board for Professional Teaching Standards, and the National Education Association (2018) with the stories of three of our program graduates to illustrate the success of our approach for promoting teacher leadership in preservice and early career teachers

8:00 PM **Session 13**

- **Strands 1 Workshops** – (Click on the title of the presentation to join Zoom meeting)

8:00 – 9:00 PM **BUILDING AND UNDERSTANDING BIG NUMBERS** - *JANET MOORE, ILLINOIS STATE UNIVERSITY – STRAND 1 (MATH / SCIENCE / STEM) *Summer Workshop**

Students build intuition about abstract concepts and numbers when they have concrete, hands-on experiences. Whether they are solving algebraic equations, working with scientific notation, or representing scientific phenomena with models, concrete experiences provide a foundation for understanding and interpreting abstract ideas. In this session, participants will deepen their own intuitive understanding of large numbers and through hands-on exploration. Then, with an intuitive ability to visualize large numbers, participants will make sense of scientific notation numbers and operations. Finally, we will imagine how similar concrete experiences have the power to transform math and science classrooms into exciting spaces for creative exploration, problem solving, and critical thinking. This workshop is a preview of the more in-depth week-long and weekend workshops, "Building Shared Experiences through Concrete Investigations", which will be held in Summer and Fall 2021.

8:00 – 9:00 PM **ENERGY AT HOME: ONLINE, INQUIRY-BASED INTERACTIVES** - *MATTHEW HAGAMAN AND BRAD CHRISTENSEN, CENTER FOR MATHEMATICS, SCIENCE, AND TECHNOLOGY AT ILLINOIS STATE UNIVERSITY – STRAND 1 (SCIENCE / STEM)*

How does electrical energy transform into light? How does a leaky faucet waste electricity? How can 'smart' devices bring an electric bill to near zero? It's easy to take technology for granted, but a greater understanding of the electricity we use every day gives us greater control over our budget and our environmental impact.

The Smart Grid for Schools (SGFS) program has provided curriculum enhancement opportunities to hundreds of teachers and skill enhancement opportunities for tens of thousands of students. SGFS provides free hands-on and virtual manipulatives to teach students about energy, innovation, and careers.

This session will focus on the SGFS Virtual Smart Home. The smart home lets students see the energy impact of lights, heating/cooling, water use, and renewable energy sources. By completing challenges and engaging in experimentation, students can learn to automate their virtual home, minimizing their energy use, their energy cost, and their carbon footprint.

Additional tools will also be introduced, including the Virtual Grid Construction Game (helping students to understand where electricity comes from, where it goes, and how it flows), the Career Switching Game (letting students fully explore careers in power engineering, switch control, and energy trading), and a variety of virtual reality experiences.

8:00 – 9:00 PM **PROMOTING EQUITY THROUGH FORMATIVE ASSESSMENT IN HIGH SCHOOL MATHEMATICS** - *KIM SEASHORE, SFSU STAJES NOYCE PI*

Formative assessment describes teaching practices that activate students' knowledge to inform subsequent instruction. In this session, we will investigate several lessons that can be used both in face-to-face and remote instruction where students build off of each other's thinking. From these lessons, we will draw a variety of strategies for engaging students in self-assessment and leveraging them as resources for each other's learning.

Thursday, February 11:

10:00 AM **Session 14**

- **Strands 1 and 3 Workshops** – (Click on the title of the presentation to join Zoom meeting)

10:00 – 11:30 AM **TOOLS FOR MANEUVERING THROUGH DISTANCE LEARNING** - *MARSHA BOOKER AND VALECIA KELLY, UNIVERSITY OF CINCINNATI – STRAND 1 (MATH / SCIENCE / STEM)*

In this session, teachers will learn how to find and use chrome extensions that make virtual meetings and teaching more engaging. Teachers will learn how to create a Virtual Homebase for students/parents using Google Slides/Powerpoint and Bitmojis. Teachers will learn how to create a Digital Interactive Notebook. Finally, teachers will learn how to turn their favorite PDF's into digital documents that they can use in Distance Learning classroom. We will close the session with Q & A and sharing of additional ideas and resources.

10:00 – 11:30 AM **DEVELOPING A COMPETITIVE NOYCE TRACK 4 PROPOSAL** - *GILLIAN ROEHRIG, UNIVERSITY OF MINNESOTA; HANNAH SEVIAN, UNIVERSITY OF MASSACHUSETTS BOSTON; WENDY SMITH, UNIVERSITY OF NEBRASKA LINCOLN; JEANNA WIESELMANN, SOUTHERN METHODIST UNIVERSITY; KLAUDJA CAUSHI, UNIVERSITY OF MASSACHUSETTS BOSTON; RACHEL FUNK, UNIVERSITY OF NEBRASKA LINCOLN – STRAND 3*

The overarching objective of Persistence, Effectiveness, and Retention Studies In STEM Teaching (PERSIST) is to bolster the rigor and creativity of Noyce Track 4 research proposals through participation in community-building that leverages and shares resources and

forms mutually beneficial collaborations that further the Noyce program's agenda. The purpose of this workshop is to engage participants in learning about current Noyce Track 4 research projects and discuss potential future Track 4 research. This proposed workshop will first share information about Noyce Track 4 proposals and the focus on contributing to the field related to STEM teacher recruitment, persistence, and induction in high-need schools. The workshop will share information gathered from current Noyce Track 4 projects about their research questions, methodologies, and findings, and then engage the audience in discussions about important Noyce-related research questions and potential future Noyce Track 4 submissions, for the purpose of enhancing the quality and scope of Track 4 research. After discussions about leading-edge research questions and needs related to STEM teacher recruitment, persistence, and induction in high-need schools, we will invite participants to form small groups. In these small groups, facilitated by members of the PERSIST project team, audience members will select one of the topics from the whole group discussion to explore in more depth. In addition to supporting a more thorough understanding of the topic and potential research questions, this small group activity will also allow audience members to identify colleagues with similar research interests for potential future collaborative research.

12:00 PM **Session 15**

- **Strands 1 Workshops** – (Click on the title of the presentation to join Zoom meeting)

12:00 – 1:00 PM **USING SCIENCE MODELS TO TEACH ABOUT COVID SAFETY** - *LILLIAN SIMS, UNIVERSITY OF CINCINNATI – STRAND 1 (SCIENCE)*

The presenter will demonstrate how she used science models in conjunction with scientific explanations to help students learn principles associated with safe practices during the COVID-19 pandemic. The goal of this lesson is to help students conceptually understand why they need to implement safe practices at their school during in-person learning.

12:00 – 1:30 PM **USING STEM PROJECTS TO TEACH MATHEMATICS** - *Brad Christensen, Illinois State University – STRAND 1 (MATH / SCIENCE)*

In this hands-on workshop, participants will complete several STEM projects that are specifically designed to TEACH mathematics. This process will demonstrate how the project can be used as a vehicle for instruction, not simply as the application of the concepts at the end of the unit. This shift of pedagogy has proven to be exceptionally effective, providing the learner with a context within which the concept is framed. Projects appropriate for grades K-12 will be addressed.

2:00 PM **Session 16**

- **Strands 1 Workshops** – (Click on the title of the presentation to join Zoom meeting)

2:00 – 3:30 PM **COMPUTATIONAL THINKING IN CHILDREN'S BOOKS AND GRAPHIC NOVELS: WHAT LITERATURE HAS TO OFFER** - *RACHELLE HAROLDSON AND EVAN DAVID BALLARD, UNIVERSITY OF WISCONSIN - RIVER FALLS – STRAND 1 (MATH / STEM)*

As schools and governments adopt computer science standards for younger students, one approach involves integrating computational thinking elements and practices into existing curricula. In addition, many books about computer science have been published for

students in K-8. Picture books and graphic novels that demonstrate computational thinking can serve as a resource to teachers interested in teaching these 21st century skills alongside literacy skills. These books also provide opportunities for differentiation, as they engage with computational thinking at varying levels. This study analyzes 26 picture books and graphic novels published between 2015 and 2020 for students in grades K-6 for evidence of the elements of computational thinking (abstraction, generalization, decomposition, algorithmic thinking, debugging). Using A K-6 Computational Thinking Curriculum Framework (Angeli et al., 2016), we identify the relative level of the five computational thinking elements featured in the books as compared to the age groups for which the books were written. The results include charts educators can use to find and differentiate texts for students' varying literacy interest levels and computational thinking competency. In addition, we suggest ways for CT integration in language arts and unplugged activities to promote CT for a well-rounded curriculum.

2:00 – 2:45 PM **FUSE: Culturally Responsive Teaching Practices for After School Clubs** - *Susan Gunn, Sheree Joseph-Bos, and Meaghan Polega, Davenport University – STRAND 1 (STEM)*

Davenport University's Future Urban STEM Educators (FUSE) clubs are designed to ignite the FUSE and spark interest in STEM education for students traditionally underrepresented in STEM fields and STEM teaching. FUSE clubs were established in the 2019-2020 academic year at four sites (schools and community-based organizations). As part of FUSE, students spend time exploring STEM concepts, engaging in fine arts activities and learning about social justice issues and/or individuals of color working in the field. Concepts of STEM teaching are infused throughout all components of each module. After two weeks of working with the content and developing lesson plans, high school students then teach the content to middle school students. FUSE implements culturally responsive STEM education through several specific methods which include gamifying instruction, storifying instruction and making instruction social. The FUSE curriculum provides opportunities for participants to gain teaching experience while simultaneously reinforcing STEM concepts. The curriculum is hands-on and demonstrates the relevance of various STEM fields to everyday life. Additionally, the curriculum is designed to enhance STEM self-efficacy among students through exposing them to people of color actively engaged in various STEM fields. All lessons are aligned to Next Generation Science Standards. Thus, students are engaged in STEM learning in ways that are both culturally responsive as well as consistent with best STEM teaching practices. The COVID-19 pandemic necessitated modification of the FUSE curriculum to fit virtual formats. Our presentation will provide an overview of curriculum modifications and address integrating culturally responsive best practices for virtual learning.

4:00 PM Closing Plenary Session – *Zoom Meeting Link*

- Dr. Jessica Krim, Southern Illinois University at Edwardsville
  - Moving forward
  - Using resources and upcoming workshops/webinars
  - **New Sub-Grantee awards announced.*

4:00 PM Adjourn

6:00 PM Advisory Board Meeting Post Annual Conference – *Zoom Meeting Link*