

## Welcome

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9:15 am-9:30 am  
Real-time/ live  
Eileen Parsons, NARST President

## Plenary Session

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### **Title: Beyond Buzzwords: Reimagining the Default Settings of Science & Society**

9:30 am-11:00 am  
Real-time/ live

#### **Presiders:**

Terrell Morton, University of Missouri  
Beth Covitt, University of Montana  
Alison Cullinane, University of Oxford

**Keynote Presenter:** Ruha Benjamin, Princeton University

**Abstract:** From everyday apps to complex algorithms, data science and technology have the potential to hide, speed, and deepen discrimination, while appearing neutral and even benevolent when compared to racist practices of a previous era. In this talk, Ruha Benjamin explores a range of discriminatory designs that encode inequity – what she terms the “New Jim Code.” This presentation takes us into the world of biased bots, altruistic algorithms, and their many entanglements, and provides conceptual tools to decode tech promises with historical and sociological insight. In so doing, Ruha will also focus on the role of STEM education as the ground zero for reimagining and retooling the default settings of science, technology, and society.

## Award 2020 & 2021 DCRA Citations

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11:00 am- 11:30 am  
**President:** Noemi Waight, University of Buffalo

## Networking / Social Sessions

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11:30pm -1:30 pm  
Real-time/ live

Participate in the “round robin.” Please visit committees in 15-minute segments from 11:30-12:15. Meet the leadership and find out more about any three of the following:

- Awards Committee
- Elections Committee
- External Policy and Relations Committee
- Program Committee
- Research Committee
- Website Committee

Drop-In Visit #1: 11:30 am-11:45 am

Drop-In Visit #2: 11:45 am-12:00 pm

Drop-In Visit #3: 12:00 pm-12:15 pm

Following the drop-in visits, please join the business meeting of a committee from 12:30-1:30 (except for the Elections Committee scheduled on Friday, April 9th from 8:30 am-9:30 am).

## LUNCH BREAK (on your own)

11:30am -12:30pm

## Research Interest Groups (RIGs) Meetings

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### Continental and Diasporic Africa in Science Education (CADASE)

12:30pm – 1:30pm

Real-time/ live

**Presiders:** Mary Atwater, University of Georgia  
Rona Robinson-Hill, Ball State University

The mission of CADASE is to support research in science education that will have a positive impact on the lives of people of African ancestry. This is accomplished by (a) encouraging science educators to engage in research aimed at meeting the needs of people of African ancestry; and (b) providing intellectual, professional, and personal space for science educators engaged in such research.

At the 2021 business meeting, CADASE members will approve the minutes of the last business meeting-2019, receive information about how to become a CADASE member, hear a brief treasurer report, learn about the election procedures for the candidates, and break out into rooms in which the CADASE Standing Committees will meet.

### Contemporary Methods for Science Education Research

12:30pm – 1:30pm

Real-time/ live

**Concurrent Session # 1 (Format: Real Time / Live)**  
**1:45 pm-3:15 pm**

**Administrative Sponsored Session**  
**Strand 11: Cultural, Social, and Gender Issues**

***Engaging Science Education Research and Praxis for the Good of the “Public” Amid Global Pandemics***

1:45 pm -3:15 pm  
Real time/ live

**Presenters:**

Bryan Brown, Stanford University  
Angela Calabrese-Barton, University of Michigan  
Natalie King, Georgia State University  
Okhee Lee, New York University  
Jomo Mutegi, Indiana University, IUPUI  
Vanessa Grady, Georgia State University  
Laura Peña, Georgia State University  
Elizabeth Davis, University of Michigan  
Leslie Herrenkohl, University of Michigan  
Day Greenberg, Michigan State University

**Administrative Sponsored Session**  
**Graduate Student Committee**

***Graduate Student Research Symposium***

1:45pm-3:15pm  
Real time/ live / posters

**Presiders:**

Christa Haverly, Northwestern University  
Kathryn Green, University of Georgia  
Melanie Kinskey, Sam Houston State University  
Theila Smith, University of Groningen  
Timothy Klavon, Temple University  
Lindsay Lightner, Washington State University  
Jessica Karch, University of Massachusetts Boston  
Chelsea Sexton, University of Georgia  
Klaudja Causi, University of Massachusetts – Boston  
Ayca Fackler, University of Georgia

**Effects of preservice biology teachers’ conceptions of purpose on engagement of learners’ funds of knowledge**

Matthew Shackley, University of California - Santa Barbara

**Engaging in Sensemaking For Equity: STEM Teacher Professional Development in Core Practices**

Karen Woodruff, Montclair State University

**Investigating Perceptions, Experiences, and Collectivism within Interdisciplinary Collaborations: A National Survey**

Katie McCance, North Carolina State University

**The Girl Boat: Shifting marginalized Mexican students’ identities, participation, and agency through community conservation**

Kelsie Fowler, University of Washington

**Opportunities for Sense-Making in Science for Students with Learning Disabilities/Difficulties: A Mixed Methods Study**

Rachel Juergensen, University of Missouri Columbia

**Towards a Conceptual Profile of Chemical Control**

Klaudja Causi, University of Massachusetts Boston

**Biology Methods: A Course in Need of a Catalogue**

Cole Entress, Columbia University

**A Portrait of Identity and Context: Manifestation of Postsecondary STEM Teaching**

Sule Aksoy, Syracuse University

**Going Virtual: Underrepresented Student Experiences in a Virtual Computing Camp**

Kristina Kramarczuk, University of Maryland, College Park

**Intersectionality of Black Male College Students: Their Science Identity, Science Learning, and Science Profession Decisions**

Regina McCurdy, University of Central Florida

## **An Investigation of Undergraduate Students' Spatial Thinking about Groundwater**

Holly White, University of Nebraska - Lincoln

## **Tracking elementary pre-service teachers' teaching efficacy and attitudes towards STEM after engagement with nanotechnology basics**

Martyna Laszcz, University of Massachusetts Boston

## **Elementary Teachers' Verbal Support of Disciplinary Integration in an NGSS-Aligned Unit**

Sarah Lilly, University of Virginia

## **Exploring Epistemic Practices of Middle School Students in Collaborative Contexts**

Ramya Sivaraj, University of Minnesota

## **Informal Education Outreach to Combat Deficit SciComm Training in University STEM Students**

Brenda Guerrero, Florida International University

## **How Do Young Children Learn Science through Narrative, Embodiment, and Play?**

Kyungjin Cho, Pennsylvania State University

## **An Exploration of Urban Latinx Youth Growth Mindsets in a Middle School Science Classroom**

Mark Waka, University of Buffalo

## **What are the sources of teaching self-efficacy for international graduate students? A survey study**

Zhigang Jia, Middle Tennessee State University

## **Administrative Sponsored Session Indigenous Science Knowledge Research Interest Group**

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### *Science Education, a Public Good for the Good of the Public? Contributing Indigenous Methodologies to Teaching, Learning and Research*

1:45pm-3:15pm

Real time/ live

#### **Presenters:**

Julie Robinson, University of North Dakota

Joshua Hunter, University of North Dakota

Bonni Gourneau, University of North Dakota

Anna Bahnson, United Tribes Technical College

Pauline Chinn, University of Hawai'i at Manoa

Dinesh Gautam, Shree Jagadamba Higher Secondary School

Yun-Ciao Wang, National Museum of Marine Biology and Aquarium

Bhaskar Upadhyay, University of Minnesota

Paichi Shein, National Sun Yat-sen University

Peresang Sukinarhimi, Rukai Cultural Museum of the Indigenous People Cultural Development Center

## **Strand 1: Science Learning: Development of Student Understanding**

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### ***Ethics and Decision-Making in Science Education***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Amy Farris, Pennsylvania State University

### **Developing and Using Multiple Models to Promote Scientific Literacy**

Li Ke, University of North Carolina at Chapel Hill

Troy Sadler, University of North Carolina at Chapel Hill

Laura Zangori, University of Missouri - Columbia

Patricia Friedrichsen, University of Missouri - Columbia

### **Consideration of participatory ethics when eliciting etic and emic perspectives of learning**

Sarah Frodsham, Oxford Brookes University

Deb McGregor, Oxford Brookes University

### **Defining Skills Required in the Decision-Making Process around Socioscientific Issues**

Caitlin Kirby, University of Nebraska – Lincoln

Amanda Sorensen, Michigan State University

Jenny Dauer, University of Nebraska – Lincoln

## **Strand 2: Science Learning: Contexts, Characteristics and Interactions**

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### ***Contexts, Characteristics, and Interactions in Science Education***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Susanna Hapgood, University of Toledo

### **Sounds of Science Sensemaking: Interrogating the Norms of Learning Spaces with Acoustemology and Critical Frames**

Michelle Brown, Pennsylvania State University

Frances Nebus Bose, Pennsylvania State University

Carla Zembal-Saul, Pennsylvania State University

### **The Influence of Teacher Questioning Approaches on Students' Productive Thinking**

Anne Emerson Leak, High Point University

Corrie Bruce, High Point University

Selcen Guzey, Purdue University

### **Defining the Future and Standing Apart: Opportunity Structures at an Urban, Inclusive STEM-Focused High School**

Jennifer Tripp, University of Buffalo

Noemi Waight, University of Buffalo

### **What's the Point?: Student Perspectives on Computation in Physics Class**

Paul Hamerski, Michigan State University

Daryl McPadden, Michigan State University

Marcos Caballero, Michigan State University

Paul Irving, Michigan State University

## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### ***Engaging Young Children in Science and Engineering Practices: A Conversation about Approaches to Research and Design***

1:45 pm -3:15 pm  
Real time/ live

### **Dance-STEP: Collective Embodied Science Models and the Particulate Nature of Matter**

Chris Georgan, Boston University

### **Using Iterative Co-Design to Develop Classroom Empirical Activity**

Eve Manz, Boston University  
Betsy Beckert, Boston University

### **Kindergarten Playground Collisions: Reconceptualizing Gravity as a Necessary Intellectual Resource**

Michelle Salgado, University of Washington  
David Phelps, University of Washington

### **Considerations when Engaging Young Learners in Scientific Modeling for Sense-making**

Christina Schwarz, Michigan State University  
Eve Manz, Boston University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***Curricular Sensemaking and Implementation***

1:45 pm -3:15 pm  
Real time/ live  
**President:** Magdeline Stephen, University of Witwatersrand

### **Changing Teacher Practice at Scale through Instructional Routines: Findings from a Field Test of High School Materials**

Kiran Purohit, New Visions for Public Schools  
Elizabeth Chatham, New Visions for Public Schools

### **Teacher planning for epistemic agency in discussion-based, storyline unit lessons**

Kevin Cherbow, Boston College  
Katherine McNeill, Boston College

### **Secondary Science Teachers Implementation of a Curricular Intervention when Teaching with Global Climate Models**

Kimberly Carroll Steward, University of Nebraska – Lincoln  
Devarati Bhattacharya, University of Nebraska – Lincoln  
Cory Forbes, University of Nebraska – Lincoln  
Mark Chandler, Columbia University

### **3D Alignment Between Curriculum and Assessments Matters: Results from a New Genetics Curriculum Field Test**

Ann Lambert, University of Utah  
Dina Drits-Esser, University of Utah  
Sheila Homburger, University of Utah  
Kristin Fenker, University of Utah  
Molly Malone, University of Utah  
Louisa Stark, University of Utah

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Intersection of Socio-cultural factors and college STEM***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Andy Cavagnetto, Washington State University

### **BioTAP: Barriers and Supports to Conducting Science Education Research on Graduate Student Teaching Development Practices**

Grant Gardner, Middle Tennessee State University

Judith Ridgway, Ohio State University

Gili Marbach-Ad, University of Maryland

Kristen Miller, University of Georgia

Elisabeth Schussler, University of Tennessee

Knoxville

### **Facilitating First-Generation College Student Persistence in STEM Majors**

Lisa Marco-Bujosa, Villanova University

Lauren Baker, Villanova University

### **Using Cultural-Historical Activity Theory to Understand an Interdisciplinary Team's Co-Development of High School Lab Activities**

Katherine McCance, North Carolina State University

Stephanie Teeter, North Carolina State University

Margaret Blanchard, North Carolina State University

Richard Vanditti, North Carolina State University

### **Productive Patterns of Overcoming Struggle During Undergraduate Chemistry Laboratory Activities**

Clarissa Keen, University of Massachusetts Boston

Hannah Sevia, University of Massachusetts Boston

## Strand 6: Science Learning in Informal Contexts

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### ***Youth Centered Informal Science***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Ngozi Okafor, University of Lagos

### **A Mixed Methods Study of Youths' STEM Interests in an After-School Club**

Deena Gould, University of New Mexico

Ian Gould, Arizona State University

### **The Design and Development of a Youth-Centered Art-Science Program**

Megan McKinley-Hicks, Boston College

Michael Barnett, Boston College

Helen Zhang, Boston College

Ariella Suchow, Boston College

### **Adding narrative elements to engineering activities evokes empathy and supports girls' use of engineering practices**

Susan Letourneau, New York Hall of Science

Dorothy Bennett, New York Hall of Science

ChangChia Liu, New York Hall of Science

Yessenia Argudo, New York Hall of Science

Dana Schloss, New York Hall of Science

Amelia Merker, New York Hall of Science

Satbir Multani, New York Hall of Science

Katherine Culp, New York Hall of Science

### **Hearing the Engineering in Children's Talk**

Ron Skinner, MOXI, The Wolf Museum of Exploration and Innovation

Danielle Harlow, University of California at Santa Barbara

Alexandria Muller, University of California at Santa Barbara

**Strand 7: Pre-service Science Teacher Education**

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***Equity-driven approaches among pre-service teachers***

1:45 pm -3:15 pm

Real time/ live

**President:** Scott Cohen, Georgia State University

**Examining Relevance in Pre-service Science Teacher Lesson Plans**

Kirby Whittington, Gooru.Org

Sherry Southerland, Florida State University

Miray Tekkumru Kisa, Florida State University

**Pre-Service Science Teachers' Development of Equitable and Just Approaches to Practice in University Methods Coursework**

Rachel Gordon, University of Michigan

**'Staying with the Trouble': Praxis Crisis in Science Teacher Education for Emergent Bilingual Learners**

Sara Tolbert, Te Whare Wananga O Waitaha

University of Canterbury

Caroline Spurgin, University of California- Santa Cruz

Doris Ash, University of California- Santa Cruz

**"Others have it, why can't they?" Leveraging collaborative inquiry in science teacher education**

Christina Macias, California State University- Fresno

Myunghwan Shin, California State University- Fresno

**Strand 8: In-service Science Teacher Education**

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***Approaches to PD Supporting Teacher Learning***

1:45 pm -3:15 pm

Real time/ live

**President:** Elizabeth Lewis, University of Nebraska–Lincoln

**Comparing Contexts for Professional Development: Student Work Analysis and Video Club**

Heather Johnson, Vanderbilt University

Andrea Henrie, Vanderbilt University

Bethany Daniel, Vanderbilt University

Ashlyn Pierson, Ohio State University

Danielle Kiefert, University of North Texas

**Elementary Science Teachers' Purposes and Practices for Connecting Multiple Representations**

Ashlyn Pierson, Ohio State University

Danielle Kiefert, University of North Texas

Sarah Lee, Vanderbilt University

Heather Johnson, Vanderbilt University

Andrea Henrie, Vanderbilt University

**Supporting Science Instruction with Vertical Teams: Teachers' Perceptions of Mixed Grade-Band Professional Learning Communities**

Daniel Pimentel, Stanford University

Tammy Moriarty, Stanford University

Janet Carlson, Stanford University

**Preparing Science Educators for Contextualized Instruction**

Kassandra L'Heureux, Université de Sherbrooke

Michael Giamellaro, Oregon State University

Marie-Claude Beaudry, Université de Sherbrooke

Jean-Philippe Ayotte-Beaudet, Université de Sherbrooke

Sherbrooke

Cory Buxton, Oregon State University

Talal Alajmi, Oregon State University



## Strand 10: Curriculum and Assessment

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### ***NGSS aligned assessment and instruction***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Marcus Kubsch, Leibniz Institute for Science and Mathematics Education

### **Noticing-Sensemaking-Modeling: A Framework for the Crosscutting Concepts**

Lori Andersen, University of Hawaii at Manoa

### **A Three-Dimensional Integrated Learning Progression and Aligned Assessments to Monitor Middle School Student Proficiency of Energy, Modeling and Cause and Effect**

Namsu Shin, Michigan State University

Peng He, Michigan State University

Tingting Li, CREATE for STEM Institute

Joseph Krajcik, Michigan State University

### **Bridging the Gap: Evaluating a Design Approach for Curriculum-neutral NGSS Benchmark Assessments in Middle School**

Maia Binding, University of California Berkeley - Lawrence Hall of Science

Lauren Brodsky, University of California Berkeley - Lawrence Hall of Science

### **Validating a Claim-Evidence-Science Idea-Reasoning (CESR) Framework for use in NGSS assessment Tasks**

Joseph Hardcastle, American Association for the Advancement of Science

Carey Hermann Abell, BSCS Science Learning

George De Boer, American Association for the Advancement of Science

## Strand 11: Cultural, Social, and Gender Issues

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### ***Science Identity***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Terrell Morton, University of Missouri-Columbia

### **Figured Worlds of Successful Women in Science During Their School Years**

Jonathan Hall, University of West Florida

### **Novice to Expert: Science Identity Development in Academically Proficient Students at an HBCU**

Karen Marshall, Oakwood University

Carmen Bucknor, Oakwood University

Sylvia James, National Science Foundation

Christyn Byrd, Oakwood University

Tatiana Fowler, Oakwood University

### **Promoting Scientific Literacy for All in the Classroom**

Gianna Lopez-Colson, University of Texas Rio Grande Valley

Miriam Ortiz, University of Texas Rio Grande Valley

### **Afterschool STEM Program as a Transformative Space for Teachers to Support Relationship Building with Students**

Ti'Era Worsely, University of North Carolina at Greensboro

Sara Heredia, University of North Carolina at Greensboro

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Reconstructing Reality through Simulations to Enable Classroom Enactment of Science Practices***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Hee-Sun Lee, The Concord Consortium

**Discussant:** Scott McDonald, Pennsylvania State University

#### **Presenters:**

Hee-Sun Lee, The Concord Consortium

Scott McDonald, Pennsylvania State University

Amy Pallant, The Concord Consortium

Chris Lore, The Concord Consortium

Jie Chao, The Concord Consortium

Gey-Hong Gweon, Physics Front

Charles Conner, University of South Florida

Trudi Lord, The Concord Consortium

Lisa Hardy, The Concord Consortium

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### ***Socioscientific Issues***

1:45 pm -3:15 pm

Real time/ live

**Presenter:** Shaghig Chaparian, American University of Beirut

### **University Biology Students' Pandemic Decisions: The Role of COVID-19 Science Beliefs and Sociocultural Membership**

Benjamin Herman, Texas A&M University

Michael Clough, Texas A&M University

Asha Rao, Texas A&M University

Joanne Olson, Texas A&M University

Alister Olson, Texas A&M University

Alex Sobota, Texas A&M University

Sarah Poor, Texas A&M University

### **Exploring Undergraduates' Breadth of Socio-Scientific Reasoning through Domains of Knowledge**

David Owens, Georgia Southern University

Troy Sadler, University of North Carolina at Chapel Hill

Destini Petitt, University of Nebraska-Lincoln

Corey Forbes, University of Nebraska-Lincoln

### **Changes in NOS Understandings after Engaging in Reflective Discussions and Information Evaluation about Socioscientific Issues**

Shaghig Chaparian, American University of Beirut

Saouma Boujaoude, American University of Beirut

### **Reviving the Orchard: Visions of Reclaiming Science Education for Nicaragua**

Kelsie Fowler, University of Washington

**Strand 14: Environmental Education and Sustainability**

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***Sociocultural and Situated Perspectives of Environmental Science Education***

1:45 pm -3:15 pm

Real time/ live

**Presider:** Tamara Peffer, Pennsylvania Department of Education

**An Inclusive Model of Theoretical Rigor in Environmental Education**

Roberta Hunter, Michigan State University

Gail Richmond, Michigan State University

**Productive Disciplinary Engagement in Three-Dimensional Agriscience Instruction**

Craig Kohn, Michigan State University

**A Situated Learning Approach for Designing and Implementation Educational Escape Games about Healthy Nutrition**

Tal Yachin, Technion - Israel Institute of Technology

Miri Barak, Technion - Israel Institute of Technology

**Environmental science curriculum development in local communities: A 'Cultural Historical Activity Theory perspective**

Xavier Fazio, Brock University

**Strand 15: Policy, Reform, and Program Evaluation**

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***Science teacher resiliency, commitments, and disciplinary sense-making within complex systems***

1:45 pm -3:15 pm

Real time/ live

**Presider:** Kathryn Bateman, Temple University

**Self-Efficacy and Commitment of Mid and Late Career High School Science Teachers**

Dorothy Holley, West Johnston High School

Soonhye Park, North Carolina State University

**Disciplinary Conflation in Integrated Science and Engineering**

Jacob Pleasants, Keene State College

Iliana De La Cruz, Texas A&M University

**Are the best and brightest high school students interested in science or mathematics teaching careers?**

Travis Fuchs, University of British Columbia

Gerhard Sonnert, Harvard Smithsonian

Sandra Scott, University of British Columbia

Philip Sadler, Harvard Smithsonian

**Perceptions of Coherence: Learning About Systems and Structures Through Participatory Redesign and Implementation**

William Lindsay, University of Colorado Boulder

**3:30 pm-5:00 pm (Real time/  
Live)**

**Administrative Sponsored Session  
Graduate Student Committee**

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***Graduate Student Forum***

3:30 pm- 5:00 pm  
Real time / live

The forum aims to guide and encourage beginning researchers by discussing the various parts of a graduate career, including getting involved in NARST, completing the dissertation, or searching for a position. Attendees of the forum are given the opportunity to participate in discussions with experienced colleagues on matters of academic and career interest.

**5:00 pm-6:00 pm (Real time/  
Live)**

**Administrative Sponsored Session  
Membership Committee**

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***Mentor-Mentee Nexus***

5:00 pm- 6:00 pm  
Real-time/ live

**Presiders:** ReAnna Roby, Vanderbilt University  
Shirly Avargil, Technion Israel Institute of Technology  
Sule Aksoy, Syracuse University

This session serves as a context for those first-time attendees, or those relatively new, to NARST (i.e. Mentee) to interact with more experienced NARST members (i.e. Mentor). Session leaders facilitate the introduction of mentors and mentees by identifying and matching interested parties and creating an environment that supports communication among mentors and mentees.

**Wednesday, April 7, 2021**

**6:00 pm- 8:00 pm (Real time/  
Live)**

**NETWORKING/ SOCIAL SESSIONS**

6:00 pm-8:00 pm  
Real Time/ Live

Participate in the “round robin.” Please visit committees in 15-minute segments from 6:00-6:45 pm. Meet the leadership and find out more about any three of the following:

- Equity and Ethics Committee
- Membership Committee
- Publications Advisory Committee
- Graduate Student Committee
- International Committee

Drop-In Visit #1: 6:00 pm-6:15 pm

Drop-In Visit #2: 6:15 pm-6:30 pm

Drop-In Visit #3: 6:30 pm-6:45 pm

Following the drop-in visits, please join the business meeting of a committee from 7:00-8:00 pm.

## Thursday 8:00am through Friday 7:00am

### Poster Session #1

*Posters are available for viewing for a 23-hour window for asynchronous interactions. Attendees can view the poster at the indicated link and post comments to which the presenter may respond. The posters in Session 1 will become inactive and inaccessible after Friday, 7:00 am. For a complete listing of Thursday's posters, please refer to the end of the Thursday schedule.*

## Author-scheduled 30-minute Q&A sessions

*Presenters will pre-record their presentations. Attendees will view the recorded presentations in advance of the Q&A session. Presenters will schedule a 30-minute block (like "office hours") on a sign-up sheet in advance of the conference. The scheduled time will be listed in the conference program.*

## 6:30am-8:00am Real time/ Live

### Administrative Sponsored Session International Committee

#### ***Promoting an International Agenda for Research and Science Teacher Education to Improve Science and Special Education***

6:30am-8:00am  
Real time/ live

#### **Presenters:**

Sonya Martin, Seoul National University  
Ileana Greca, Universidad de Burgos  
Eva Silfver, Umeå University, Sweden  
Ying-Ting Chiu, The Ohio State University  
Da Yeon Kang, Seoul National University  
Sungmin Im, Daegu University  
Daniel Cha, Daegu University  
Scott Cohen, Georgia State University  
Patrick Enderle, Georgia State University  
Renee Schwartz, Georgia State University

**Concurrent Session # 2 (Real Time / Live)**  
**8:00am -9:30am**

**Administrative Sponsored Session  
Awards Committee**

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***DCRA: On a Continuum of the Professional Scholarly Trajectories in Science Education: The Urgent Questions for the Next Generation of Science Education Research***

8:00am-9:30am  
Real time/ live

**Presenters:**

Noemi Waight, University at Buffalo

**Strand 1: Science Learning: Development of Student Understanding**

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***Science Learning through Modeling***

8:00am-9:30am  
Real time/ Live

**Presider:** Sharona Levy, University of Haifa

**Modeling-based Inquiry Instruction for promoting 10th graders' modeling competence and conceptual understanding of the Periodic Table**

Mei-Hung Chiu, National Taiwan Normal University  
Mao-Ren Zeng, National Taiwan Normal University and Municipal Dazhi High School, Taipei  
Shiao-Lan Chung, New Taipei Municipal and New Taipei Senior High School  
Jing-Ping Jong, New Taipei Municipal Jinhe High School

**Enhancing Student Modeling within an Integrated Chemistry and Earth Science Curriculum**

Jonathan Grooms, George Washington University  
Kevin Fleming, George Washington University  
Alan Berkowitz, Cary Institute of Ecosystem Studies  
Bess Caplan, Cary Institute of Ecosystem Studies

**Climate Education in Secondary Science: Comparison of Model-Based and Non-Model- Based Investigations of Global Climate Data**

Devarati Bhattacharya, University of Nebraska  
Kimberly Carroll Steward, University of Nebraska - Lincoln  
Corey Forbes, University of Nebraska – Lincoln

## Strand 2: Science Learning: Contexts, Characteristics and Interactions

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### ***Community & Social Factors in Identity, Motivation, and Learning***

8:00am-9:30am

Real time/ Live

**Presenter:** Cesar Delgado, North Carolina State University

### **Factors Contributing to Career Aspirations: Access to Science Resources and People**

M. Gail Jones, North Carolina State University

Katherine Chesnutt, North Carolina State University

Megan Ennes, University of Florida

Emily Cayton, Campbell University

### **Health in Our Hands: A community-inspired project-based learning approach to support social and emotional learning**

Idit Adler, Tel Aviv University

Consuelo Morales, Michigan State University

Irene Bayer, Michigan State University

Tali Tal, Technion - Israel Institute of Technology

Joseph Krajcik, Michigan State University

### **Gender Differences in STEM Classroom Emotional**

Felicity McLure, Curtin University

Barry Fraser, Curtin University

Rekha Koul, Curtin University

### **Capturing Chemical Control Speaking, Thinking and Doing**

Klaudja Caushi, University of Massachusetts – Boston

Hannah Sevia, University of Massachusetts – Boston

Boston

## Strand 2: Science Learning: Contexts, Characteristics and Interactions

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### ***Studying Contestations of Hegemonic Science Education as Public Good***

8:00am -9:30am

Real time/ live

### **Rejecting Narrow Definitions: Reimagining Equitable Science Classroom Discourse**

Enrique Suarez, University of Massachusetts – Amherst

### **Children's Play in Making as Contestations and Moves to Sociopolitical Elsewhere(s)**

Natalie Davis, Georgia State University

Shirin Vossoughi, Northwestern University

### **Repurposing the Physics Classroom for Environmental Justice**

Jasmine Jones, University of Illinois at Chicago

### **Co-designing Professional Development to Support Science Teachers Transdisciplinary Learning**

Daniel Morales-Doyle, University of Illinois at Chicago

Alejandra Frausto, Chicago Public Schools

Mindy Chappell, University of Illinois at Chicago

Tiffany Childress Price, University of Illinois at Chicago

Abel Farias, University of Illinois at Chicago



## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### ***Engaging Students in Science and Engineering Practices***

8:00am-9:30am

Real time/ Live

**Presenter:** Anna Maria Arias, Kennesaw State University

### **Teaching evolution in a 5th grade Spanish classroom: "Why do we have different skin colours?"**

Lucia Vazquez-Ben, Universidade da Coruña, Spain  
Anxela Bugallo-Rodriguez, Universidade da Coruña, Spain

### **An Exploratory Study on Computational Thinking in Elementary Science**

Jennifer Pietros, University of Rhode Island  
Sara Sweetman, University of Rhode Island

### **Elementary Teachers' Verbal Supports Across Science, Engineering, and Computer Science Disciplines in an NGSS-Aligned Unit**

Sarah Lilly, University of Virginia  
Anne McAlister, University of Virginia  
Sarah Fick, Washington State University  
Jennifer Chiu, University of Virginia

### **Implementation of NGSS Scientific Practices in Elementary Science Classrooms: A Comparative Study of Video Analysis**

Peter Hu, University of Pittsburgh  
Ling Liang, La Salle University  
Ying-Chih Chen, Arizona State University  
Takeshi Terada, Arizona State University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### **Model-based Teaching and Learning**

8:00am-9:30am

Real time/ Live

**Presenter:** Zac Patterson, The Ohio State University

### **High School Science Teachers' Integration of Computational Thinking into Data Practices to Support Student Investigations**

Erin Peters-Burton, George Mason University  
Peter Rich, Brigham Young University  
Laura Laclede, George Mason University  
Stephanie Stehle, George Mason University  
Anastasia Kitsantas, George Mason University  
Timothy Cleary, Rutgers University

### **A Preliminary Study to Explore In-Service Science Teachers Assessment Literacy in MBT**

Alexis Gonzalez-Donoso, University of British Columbia  
Samia Khan, University of British Columbia

### **Engaging secondary school students in model-based reasoning for conceptual understanding**

Shingo Uchinokura, Kagoshima University

### **Scientific Simulations as Educational Tools for the Post-Pandemic Era: the Case of the Susceptible-Infectious-Removed Model**

Eleonora Barelli, University of Bologna  
Olivia Levrini, University of Bologna

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Scaffolding and Support for College STEM Learning***

8:00am-9:30am

Real time/ Live

**Presenter:** Robert Idsardi, Eastern Washington University

### **Vygotskian professional development for biology instructors focusing on student thinking**

Sophia (Sun Kyung) Jeong, Ohio State University

Jakayla Clyburn, University of North Carolina at Greensboro

Paula Lemons, University of Georgia

### **Mentoring early-year undergraduate researchers:**

#### **Structures and support mechanisms**

Gaye Ceyhan, Bogazici University

John Tillotson, Syracuse University

### **A Framework Situating Failure in Developing Scientific Understanding: Investigating Students' Scientific Failures in Undergraduate Research**

Sandhya Krishnan, University of Georgia

### **Investigating the Relationship Between Self-Efficacy and Approach to Teaching in Undergraduate and Graduate Teaching Assistants**

Cody Smith, University of Nebraska-Lincoln

Annette Wierzbicki, University of Nebraska-Lincoln

Jenny Dauer, University of Nebraska-Lincoln

## Strand 6: Science Learning in Informal Contexts

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### ***From 'Physical to Digital': How institutions of informal science education adapt to an online presence during the COVID-19 crisis (and beyond)***

8:00am-9:30am

Real time/ Live

**Presenter:** Neta Shaby, Ben Gurion University of the Negev

**Discussant:** Ran Peleg, University of Southampton

#### **Presenters:**

Ran Peleg, University of Southampton

Neta Shaby, Ben Gurion University of the Negev

Carys Hughes, University of Southampton

Sarah Funk, Science Center Network

Claudia Sodini, K-productions

Nancy Staus, Oregon State University

Victoria Bonebrake, University of Washington

Ann Astroga, University of Washington

Elena Janniello, Università di Pisa

Antonella Gioli, Università di Pisa

## Strand 7: Pre-service Science Teacher Education

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### ***Making a Case for Emphasizing Modeling and Engineering***

8:00am-9:30am

Real time/ Live

**Presenter:** Jianlan Wang, Texas Tech University

### **Results of Elementary Preservice Teachers' Promotion of Norms of Interaction for Engineering Design**

Elaine Silva Mangiante, Salve Regina University

Kaitlin Gabriele-Black, Salve Regina University

### **Developing Preservice Science Teachers' Conceptions of Engineer and Engineering through an Elective STEM Course**

Nilay Ozturk, Kirsehir Ahi Evran University

Meltem Irmak, Gazi University

### **Preservice Elementary Teachers Making Sense of Scientific Modeling: A Longitudinal Study**

Adam Bennion, University of Michigan

Elizabeth Davis, University of Michigan

### **Dimensions of modeling: Knowledge, practice and product**

Maximillian Göhner, Freie Universität Berlin

Tom Bielik, Freie Universität Berlin

Moritz Krell, Freie Universität Berlin

## Strand 8: In-service Science Teacher Education

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### ***Curriculum and Assessment***

8:00am -9:30am

Real time/live

**Presenter:** Ashley Iveland, WestEd

### **Assessment for Learning: High School Science Teachers' Performance Assessment Practices during Integrated Science Teaching**

Nam-Hwa Kang, Korea National University of Education

### **Impact of Scoring the Illinois Science Assessment on K-12 Science Teachers' Practices**

Senetta Bancroft, Southern Illinois University Carbondale

Harvey Henson, Southern Illinois University Carbondale

Daniel Brown, Illinois State Board of Education

Angela Box, Southern Illinois University Carbondale

Yanyan Sheng, University of Chicago

Jennifer Rhodes, Southern Illinois University Carbondale

### **Growth in STEM Teachers' Formative Assessment Practices as Teachers Remain in High-Need Districts**

Shahar Abramvotich, University of Massachusetts Boston

Hannah Sevia, University of Massachusetts Boston

### **Expectations Regarding Students' Knowledge and Teachers' Content Knowledge in Particle Physics: A Comparative Study**

Anja Kranjc Horvat, CERN & University of Potsdam

Gerfried Wiener, CERN

Sascha Schmeling, CERN

Andreas Borowski, University of Potsdam

## Strand 10: Curriculum and Assessment

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### ***Learning progression assessments and teachers' classroom enactments of curricula***

8:00am-9:30am

Real time/ Live

**Presenter:** Joseph Krajcik, Michigan State University

**Discussant:** Knut Neumann, Leibniz Institute for Science and Mathematics Education

#### **Presenters:**

Elon Langbeheim, Ben-Gurion University of the Negev

David Fortus, Weizmann Institute of Science

Jeffery Nordine, Leibniz Institute for Science and Mathematics Education

Knut Neumann, Leibniz Institute for Science and Mathematics Education

Joseph Krajcik, Michigan State University

Hui Jin, Educational Testing Service

Hyo-Jeong Shin, Educational Testing Service

Dante Cisterna, Educational Testing Service

Erin Furtak, University of Colorado

Clarissa Deverel-Rico, University of Colorado Boulder

## Strand 11: Cultural, Social, and Gender Issues

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### ***Context, gender, and guidance***

8:00am-9:30am

Real time/ Live

**Presenter:** Charnell Long, University of Wisconsin-Madison

### **Connections between negative academic experiences and the impostor phenomenon in STEM**

Devasmita Chakraverty, Indian Institute of Management, Ahmedabad

### **Can the Culturo-Techno-Contextual Approach (CTCA) Dissolve the Barriers of African Students to Learning Difficult Concepts in Biology?**

Peter Okebukola, Lagos State University

Franklin Onowugbeda, Lagos State University

Oluseyi Ajayi, Lagos State University

Tokunbo Odekeye, Lagos State University

Deborah Agbanimu, Lagos State University

Esther Peter, Lagos State University

Aderonke Ebin, Lagos State University

Fred Awaah, University of Professional Studies Accra

### **Exploring Gender Issues in Higher Secondary Science Classroom**

Mohammad Siddique, University of Dhaka

Anina Mahmud, University of Dhaka

### **How Biology and Physics Faculty Guide Female and URM Faculty toward Leadership, Research, and Teaching**

Eugene Judson, Arizona State University

Lydia Ross, Arizona State University

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Modeling Tools that Support Thinking and Learning***

8:00am-9:30am

Real time/ Live

**Presenter:** Megan Silander, Center for Children and Technology

### **Using Automated Feedback to Engage Students in Discourse-Rich Modeling Practices**

Kihyun Ryoo, University of North Carolina-Chapel Hill

### **The World as a Lab: Real-life Data in STEM Projects**

Lutz Kasper, University of Education Schwabisch Gmuend

Patrik Vogt, Institute of Teacher Training, Mainz

### **Students' development of mental models when constructing particle-based computational models of electric conductors**

Elon Langbeheim, Ben Gurion University of the Negev

Sharona Levy, University of Haifa

Hagit Hel-Or, University of Haifa

Janan Saba, University of Haifa

### **Learning about Photosynthesis and Cellular Respiration in Plants with Cell-based Emergent Models (CEM)**

Sharona Levy, University of Haifa

Shani Goldstein, University of Haifa

Hana Anutz Almog, University of Haifa

Anat Yarden, Weizmann Institute of Science

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### ***Nature of Science in K-12 Education***

8:00am-9:30am

Real time/ Live

**Presenter:** Alison Cullinane, University of Oxford

### **Indiana Third/Fourth Grade Students' Conceptions of the Nature of Scientific Inquiry**

Valarie Akerson, Indiana University

Claire Cesljarev, Indiana University

Conghui Liu, Indiana University

Judith Lederman, Illinois Institute of Technology

Norman Lederman, Illinois Institute of Technology

### **Formative assessment of nature of science in a Grade 10 lesson on paradigm shift**

Wonyong Park, University of Oxford

Sibel Erduran, University of Oxford

Judith Hillier, University of Oxford

### **Exploring the Nature of Science in the Italian Physics Curriculum**

Alison Cullinane, University of Oxford

Martina Caramaschi, University of Bologna

Olivia Levrini, University of Bologna

Sibel Erduran, University of Oxford

### **NOS and Science Identity: "I Learned I didn't Know How to do Science"**

Robert Bennett, Georgia State University

Emily Turner, Georgia State University

Renee Schwartz, Georgia State University

## Strand 14: Environmental Education and Sustainability

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### ***Engaging with Socioscientific Issues***

8:00am-9:30am

Real time/ Live

**Presenter:** Bryan Nichols, Florida Atlantic University

### **Problematizing intuitive universals in socioscientific reasoning: using meta-epistemic reasoning practices to link mechanisms to context**

John Ruppert, Saint Peter's University

Masiel Infante, Saint Peter's University

### **Fostering Transformative Agency in Science Education: Students Imagining Technological Futures**

Antti Laherto, University of Helsinki

Tapio Rasa, University of Helsinki

Elina Palmgren, University of Helsinki

### **Doing Battle with the Dragons of Inaction: Place-Based SSI and Pro-Environmental Behaviors**

Mark Newton, East Carolina University

Benjamin Herman, Texas A&M University

Dana Zeidler, University of South Florida

### **Middle School Students' Informal Reasoning and Argument Quality for Different SSI**

Cansu Başak Uygün, Middle East Technical University

Ozgul Yilmaz-Tuzun, Middle East Technical University

**Concurrent Session # 3 (Real Time / Live)  
9:45 am- 11:15 am**

**Administrative Sponsored Session  
Publications Advisory Committee**

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***NSTA's Annual Research Worth Reading  
Recognition***

9:45 am -11:45 am  
Real time/ live

**Presenters:**

Deena Gould, Arizona State University  
Shakhnoza Kayumova, University of Massachusetts-  
Dartmouth  
Michael Bowen, National Science Teacher  
Association  
Cynthia Crockett, Harvard-Smithsonian Center for  
Astrophysics, Science Education Department,  
Cambridge, Massachusetts  
Knut Neumann, Leibniz Institute for Science  
Education

**Administrative Sponsored Session  
External Policy and Relations Committee**

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***Beyond Policies and Statements: Towards Equity in  
STEM Education***

9:45 am -11:45 am  
Real time/ live

**Presenters:**

Maya Garcia, Colorado Department of Education  
André DeLeón, Nevada Department of Education  
Jamie Ramage, Oregon Department of Education  
Philip Bell, University of Washington  
Remy Dou, Florida International University  
Deb Morrison, University of Washington

**Administrative Sponsored Session  
Research Committee**

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***2019 Sandra K. Abell Institute for Doctoral Students***

9:45 am -11:45 am  
Real time/ live

**Presenters:**

Gregory Rushton, Middle Tennessee State University  
Grant Gardner, Middle Tennessee State University  
Julie Luft, University of Georgia  
Anna Grinath, Idaho State University

## Strand 1: Science Learning: Development of Student Understanding

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### *Using Assessment to Characterize Student Knowledge*

9:45am -11:15 am

Real time/live

**Presenter:** Cesar Delgado, North Carolina State University

### **Mapping Consensus and Dissensus in Perspectives on Learning Progressions Research: Past, Present, and Future Figurations**

Michelle Wooten, University of Colorado Boulder  
Scott McDonald, Pennsylvania State University

### **Mind wandering of grade five students with high and low performance in TIMSS-like science test**

Sulaiman Al-Balushi, Sultan Qaboos University  
Khadijah Al-Balushi, Ministry of Education, Oman  
Rashid Al-Mherzi, Sultan Qaboos University  
Ibrahim Al-Harhi, Sultan Qaboos University  
Abdullah Ambusaidi, Ministry of Education, Oman  
Khalid Al-Saadi, Sultan Qaboos University  
Mohammed Al-Aghbari, Sultan Qaboos University

### **Using Mind Maps to Determine Students' Knowledge Dimensions on Disciplinary & Interdisciplinary Core Ideas**

Helen Semilariski, University of Tartu  
Regina Soobard, University of Tartu  
Miia Rannikmae, University of Tartu

### **Characterization of Undergraduate Students' and Instructors' Knowledge Integration of Cellular Biology Concepts**

Sharleen Flowers, Purdue University  
Stephanie Gardner, Purdue University

## Strand 2: Science Learning: Contexts, Characteristics and Interactions

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### *Eliciting and Supporting Students Doing Science*

9:45am -11:15 am

Real time/live

**Presenter:** Andy Cavagnetto, Washington State University

### **Strategies to Manage Uncertainty in Scientific Argumentation**

Ying-Chih Chen, Arizona State University

### **The Development of Middle School Students' Model-Based Explanations on Energy Transformations through Design Thinking**

Mustafa Topcu, Yildiz Technical University  
Ayse Ciftci, Mus Alparslan University

### **Factors Impacting Teachers' Understanding and Experiences Supporting Student Epistemic Agency During STEM Design Challenges**

Maria González-Howard, University of Texas at Austin  
Victor Sampson, University of Texas at Austin  
Christina Baze, University of Texas at Austin

### **Uncertainty and Cognitive Demand on Students' Thinking in Science Classrooms**

Danielle Vande Zande, Florida State University  
Ozlem Akcil Okan, Florida State University  
Miray Tekkumru Kisa, Florida State University



## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### *Science Education in Preschool*

9:45am -11:15 am

Real time/live

**Presenter:** Alison Mercier, University of Wyoming

### **Developing Preschool-Age Children's Spatial Sensemaking Practices through a Story-Driven Investigation**

Kyungjin Cho, Pennsylvania State University

Madison Botch, Pennsylvania State University

Julia Plummer, Pennsylvania State University

### **Culturally Responsive Teaching in an Elementary Science Enrichment Class**

Misty Thomas, Academic Venture Teacher

Melody Russell, Auburn University

### **Introducing a Lab Center in the Classroom—Promoting Preschoolers' Inquiry Practices and Science Preferences**

Netta Perry, Bar Ilan University

Ronit Fridman, Bar Ilan University

Ornit Spektor-Levy, Bar Ilan University

### **Modeling-based learning through distance education: The case of pre-school children investigating snails during covid-19 quarantine**

Loucas Luca, European University-Cyprus

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### *Curriculum Integration*

9:45am -11:15 am

Real time/live

**Presenter:** Zehavit Kohen, Technion Israel Institute of Technology

### **An Exploratory Study of the Goals Science Teachers' Achieve by Integrating Engineering into Science Class**

Todd Hutner, University of Alabama

Victor Sampson, University of Texas at Austin

Lawrence Chu, University of Texas at Austin

Christina Baze, University of Texas at Austin

Richard Crawford, University of Texas at Austin

### **The Effects of Integrated STEM Teaching on Students' STEM Literacy: A meta-analysis**

Waralee Sinthuwa, Kasetsart university

Chatree Faikhamta, Kasetsart University

Pongprapan Pongsophon, Kasetsart University

### **A Methodological Framework for Analyzing An Integrated STEM Curriculum and Its Enactment**

Chelsey Dankenbring, Purdue University

Selcen Guzey, Purdue University

Lynn Bryan, Purdue University

### **Teacher Change during Integrated Curriculum Reform as Evidenced by Episodes of Pedagogical Reasoning**

Kevin Fleming, George Washington University

Jonathon Grooms, George Washington University

Alan Berkowitz, Cary Institute of Ecosystem Studies

Bess Caplan, Cary Institute of Ecosystem Studies

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Innovative Techniques in College STEM Instruction***

9:45am -11:15 am

Real time/live

**Presenter:** Jonah Firestone, Washington State University Tri-Cities

### **The Effects of Scaling Up the Flipped Classroom Approach**

Robert Idsardi, Eastern Washington University  
Luis Matos, Eastern Washington University

### **Understanding the Emergence of Abstraction in Physical Chemistry Problem Solving**

Jessica Karch, University of Massachusetts Boston  
Hannah Sevan, University of Massachusetts Boston

### **Faculty Perceptions of College Students' Preparedness to Use Quantitative Reasoning (QR) in Introductory Biology Courses**

Anne Cleveland, Maine Maritime Academy  
Asli Sezen-Barrie, University of Maine  
Gili Marbach-Ad, University of Maryland

### **Out of Sight, Out of Mind? Effects of Using Concept Mapping in a Retrieval Setting**

Lukas Becker, University of Cologne  
Virginia Welter, University of Cologne  
Steffen Tröbst, Kiel University  
Ellen Aschermann, University of Cologne  
Jörg Großschedl, University of Cologne

## Strand 6: Science Learning in Informal Contexts

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### ***The Role of Informal Science Learning Environments in Supporting Scientific Engagement***

9:45am -11:15 am

Real time/live

**Presenter:** Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev

**Discussant:** Eleni Kyza, Cyprus University of Technology

### **Presenters:**

Tali Tal, Technion - Israel Institute of Technology  
Merav Shreiber, Netaim School, Ramat Gan  
Tom Bielik, Berlin Freie Universität  
Patricia Patrick, Columbus State University  
Neta Shaby, Ben-Gurion University of the Negev  
Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev  
Richard Sheldrake, University College London  
Michael Reiss, University of London  
Eleni Kyza, Cyprus University of Technology

## Strand 7: Pre-service Science Teacher Education

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### ***Coherent and current approaches in science teacher preparation***

9:45am -11:15 am

Real time/live

**Presenter:** Richard Lamb, East Carolina University

### **Promoting Coherent Science Teaching through Coherent Science Teacher Education: A Model Framework for Program Design**

Jeffrey Nordine, Leibniz Institute for Science and Mathematics Education

Stefan Sorge, Leibniz Institute for Science and Mathematics Education

Ibrahim Delen, Usak University

Robert Evans, University of Copenhagen

Kalle Juuti, University of Helsinki

Jari Lavonen, University of Helsinki

Pernilla Nilsson, Halmstad University

Mathias Ropohl, University of Duisburg-Essen

Matthias Stadler, University of Bergen

### **The tangle of emotions, agency, digital communication, and science as pre-service teachers learn to teach climate change**

Elizabeth Hufnagel, University of Maine

### **Teacher discourse practices supporting student progressive discourse in an ambitious science classroom**

Kraig Wray, Pennsylvania State University

Madison Botch, Pennsylvania State University

Scott McDonald, Pennsylvania State University

Amy Pallant, The Concord Consortium

Hee-Son Lee, The Concord Consortium

### **Investigating Preservice Teachers' Conceptualizations on Teaching Engineering: A Sequential Explanatory Design**

Rebekah Hammack, Montana State University

Tina Vo, University of Nevada- Las Vegas

## Strand 8: In-service Science Teacher Education

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### ***Computational Thinking and STEM Integration***

9:45am-11:15am

Real time/ Live

**Presenter:** Stephen Witzig, University of Massachusetts Dartmouth

### **The Effects of Teacher Professional Development in STEM Education: A Meta-Analysis**

Hye Sun You, Arkansas Tech University

Sunyoung Park, California Lutheran University

Minju Hong, University of Georgia

### **STEM as Pakistani Teachers view it: A Case of contextually relevant curricular units**

Tasneem Anwar, The Aga Khan University

### **Help Me Understand CT: Science Teachers' Perceived Barriers to CT Integration and Professional Support Needs**

Vance Kite, North Carolina State University

Soonhye Park, North Carolina State University

### **Integrating Computational Thinking into Elementary Inquiry-based Science Instruction: Affordances of a Community of Practice Model**

Heather Killen, University of Maryland – College Park

Merijke Coenraad, University of Maryland – College Park

Lautaro Cabrera, University of Maryland – College Park

Virginia Byrne, Morgan State University

Diane Ketelhut, University of Maryland

## Strand 10: Curriculum and Assessment

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### *Linguistic and cultural aspects of science curricula*

9:45am -11:15 am

Real time/live

**Presenter:** Peng He, Michigan State University

### **Exploring Plurality in Students' Ways of Knowing with Learning Progression-based Assessments of Computational Thinking**

Beth Covitt, University of Montana

Caroline Staudt, The Concord Consortium

Dale Cope, Independent Education Consultant

Joyce Massicotte, The Concord Consortium

### **Authentic Literacy and Language (ALL) for Science: Evaluating a Curriculum to Develop Elementary Disciplinary Literacy**

Nancy Moreno, Baylor College of Medicine

Alana Newell, Baylor College of Medicine

Misty Sailors, University of North Texas

### **Culturally relevant or more of the same? Unpacking standards-aligned elementary science curriculum materials**

Terrance Burgess, Michigan State University

### **Evaluating Educative Features for Emergent Multilingual Learners' Opportunities to Learn and Support for Three-dimensional Science and Language instruction**

Samuel Lee, Boston College

Sage Andersen, University of Texas at Austin

Karina Mendez Perez, University of Texas at Austin

Katherine McNeill, Boston College

## Strand 11: Cultural, Social, and Gender Issues

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### *Physical Sciences and Equity*

9:45am -11:15 am

Real time/live

**Presenter:** Bhaskar Upadhyay, University of Minnesota

### **Scientists' perspectives: Choosing an academic career in chemistry**

Shirly Avargil, Technion - Israel Institute of Technology

Daphna Shwarts Asher, Technion - Israel Institute of Technology

Shari Reiss, Technion - Israel Institute of Technology

Yehudit Judy Dori, Technion - Israel Institute of Technology and Samuel Neaman Institute for National Policy Research

### **Experiences in Freshman Chemistry: Using Cogenerative Dialogues to Identify Critical Issues Impacting African American Females**

Natasha Johnson, University of Toledo

David Jackson, University of Georgia

Deborah Tippins, University of Georgia

Ji Shen, University of Miami

### **Examining English Learners' Perceptions of Native Language Use in a Physical Science Classroom**

Rebecca Robertson Konz, University of Minnesota Twin Cities

Felicia Dawn Leammukda, Saint Cloud State University

Preethi Titu, Kennesaw State University

Gillian Roehrig, University of Minnesota

### **Israeli Arab students' participation in authentic physics inquiry in school**

Lulu Garah, Technion - Israel Institute of Technology

Shulamit Kapon, Technion - Israel Institute of Technology

## Strand 12: Technology for Teaching, Learning, and Research

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### *Using technology to improve students' scientific thinking*

9:45 am-11:45 am

Real time/ live

**Presenter:** Jonah Firestone, Washington State University Tri-Cities

### **CAI on Adaptation in Organisms and Biological Mechanism among Igbo Senior Secondary School Students**

Ngozika Mbajorgu, Enugu State University of Science and Technology, Nigeria

Patrick Ugwu, Enugu State University of Science and Technology, Nigeria

### **Framing in gesture-augmented simulations: How differing student frames impacts their sensemaking**

Nitasha Mathayas, Indiana University

### **Opening the Gate of Logic Gate as a Difficult Topic in Computer Studies in Nigerian Secondary Schools: Can CTCA be the Key?**

Deborah Agbanimu, Lagos State University, Nigeria

Peter Okebukola, Lagos State University, Nigeria

Esther Peter, Lagos State University, Nigeria

Aderonke Ebin, Lagos State University, Nigeria

Franklin Onowugbeda, Lagos State University, Nigeria

Adewale Adesina, National Open University of Nigeria

### **The Generation of Location-based Questions as means for Promoting Scientific Thinking among Middle School Students**

Shadi Asakle, Technion – Israel Institute of Technology

Miri Barak, Technion – Israel Institute of Technology

## Strand 12: Technology for Teaching, Learning, and Research

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### *Inservice Teachers' Needs and Uses of Digital Tools and Resources*

9:45am -11:15 am

Real time/live

**Presenter:** Alpaslan Sahin, Harmony Public Schools

### **Elementary Teachers' Adaptations of Technology for Knowledge Generation: Do Their Epistemic Orientations Make a Difference?**

Jale Ercan-Dursun, University of Alabama

Krystal Flantroy, University of Alabama

Jee Keyung Suh, University of Alabama

Brian Hand, University of Iowa

Gavin Fulmer, University of Iowa

### **Computer-Supported Collaborative Learning (CSCL): Pedagogical design framework**

Irit Sasson, Tel-Hai College

### **The Use of Simulations in Science Education**

Lisa Stinken-Rösner, Leuphana Universität Lüneburg

### **Design Principles and Evaluation of an Online Nanotechnology Professional Development Course for Teachers**

Yael Feldman-Maggor, Weizmann Institute of Science

Inbal Tuví-Arad, The Open University of Israel

Ron Blonder, Weizmann Institute of Science

**Strand 13: History, Philosophy, Sociology, and Nature of Science**

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***Acknowledging African American Scientists and Scientific Research***

9:45am -11:15 am

Real time/live

**Presenter:** Shari Watkins, American University

**Discussant:** Brian McGowan, American University

**Presenters:**

Shari Watkins, American University

Melody Russell, Auburn University

Willie Pearson, Georgia Institute of Technology

Ronald Mickens, Clark Atlanta University

Christopher Williams, National Museum of African

American History and Culture

Brian McGowan, American University

**Strand 14: Environmental Education and Sustainability**

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***Education in Place and Community***

9:45am -11:15 am

Real time/live

**Presenter:** Devarati Bhattacharya, University of Nebraska

***Indigenous Education and Behavior Modification Strategies for HIV/AIDS Management in Mining Communities in Zimbabwe: A case Study***

Emmanuel Mushayikwa, University of the Witwatersrand

Witwatersrand

Ledwina Hungwe, University of the Witwatersrand

***The Impact of Place Attachment in Socioscientific Reasoning of Puerto Rican High School Students***

Lorraine Ramirez Villarin, University of North Georgia

Samantha Fowler, Florida Institute of Technology

***Bridging Home Culture and School Science Culture Through Ethnic Education in Indigenous Community***

Mu-Yin Lin, University of Georgia

***Community Science, Citizen Science, and Community Scientific Literacy: Opportunities and Challenges for Environmental Stewardship***

Christopher Jadallah, University of California, Davis

Alexis Patterson Williams, University of California, Davis

Heidi Ballard, University of California, Davis

**Concurrent Session # 4. (Real Time / Live)**  
**11:30 am- 1:00 pm**

**Administrative Sponsored Session**  
**Strand 6: Science Learning in Informal Contexts**

***Learning in the Informal Context***

11:30am -1:00pm

Real time/ live

**Examining the nature of science understanding through Canadians' Tweets about COVID-19**

Samantha Jewett, University of Western Ontario  
Anton Puvirajah, University of Western Ontario  
Mohammad Azzam, University of Western Ontario  
Jingrui Jiang, University of Western Ontario

**Multimodal analysis of engagement in a science museum: The role of the body**

Dana Vedder-Weiss, Ben Gurion University of the Negev  
Neta Shaby, Ben-Gurion University of the Negev

**Leveraging acts of authentication to engage recent immigrant children in informal STEM**

Anton Puvirajah, University of Western Ontario  
Mina Sedaghatjou, Alfred University  
Mohammad Azzam, University of Western Ontario

**Engaging Learners in Computer Modeling and Flight Simulation to Create STEM Pathways**

Geeta Verma, University of Colorado Denver

**"I feel like I know everything about ants" - How youth navigate a learning ecosystem?**

Neta Shaby, Ben-Gurion University of the Negev  
Nancy Staus, Oregon State University  
Lynn Dierking, Oregon State University  
John Falk, Oregon State University

**Minoritized teens' communication competency as a proxy to STEM identification: A science center context**

Anton Puvirajah, University of Western Ontario  
Todd Campbell, University of Connecticut  
Geeta Verma, University of Colorado Denver

**Administrative Sponsored Session**  
**Research Committee**

***A Retrospective of the Abell Institute for Doctoral Students: Mentorship within the NARST community***

11:30am-1:00pm

Real time/ live

**Presenters:**

Tina Vo, University of Nevada, Las Vegas  
Asli Sezen-Barrie, University of Maine  
Li Ke, University of North Carolina at Chapel Hill  
Joshua Reid, Middle Tennessee State University  
Kelsey Lipsitz, Exploratorium

## **Administrative Sponsored Session Equity and Ethics Committee**

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### ***Basu Symposium***

11:30am -1:00pm

Real time/ live

### **Understanding international graduate students' teaching experience in science classroom through the lens of cultural competence: An exploratory study**

Zhigang Jia, Middle Tennessee State University

Grant E. Gardner, Middle Tennessee State University

### **Access points that facilitate preservice teachers' sense-making about systemic issues within a field experience**

Victor Kasper, Florida State University

Shannon Davidson, Florida State University

Lama Jaber, Florida State University

### **Virtual Mentoring and Epistemic Justice**

Deena L. Gould, University of New Mexico

Priyanka Parekh, Transylvania University

Eduardo Jose Nuñez Cruz, University of New Mexico

### **Learning to Integrate Science-Specific Literacy in Science Teaching: A Study of Elementary Preservice Teachers**

Regina McCurdy, University of Central Florida

Su Gao, University of Central Florida

Vassiliki Zygouris-Coe, University of Central Florida

Katherine Cruz-Dieter, University of Central Florida

Rebeca Grysko, University of Central Florida

### **Examining assessments in a technology-enhanced active learning science classroom**

Lucía B. Chacón-Díaz, The Ohio State University

### **Case study pedagogy and learning outcomes: A framework for teaching biology with narratives**

Ally Hunter, University of Massachusetts at Amherst

Melissa Zwick, Stockton University

### **Creating Nuance for Black Girls' Science Alignment Using the CLIC Framework**

Ashley Jackson, University of Michigan

### **A Critical Race Perspective of African American Elementary Teachers of Science**

Mario Pickens, University of North Florida

### **Exploring Pre-Service Teachers Science Teaching Identity and Agents of Change**

Katherine Cruz-Deiter, University of Central Florida

### **Fugitive Science Societies**

Charnell Chasten Long, University of Wisconsin-

Madison

### **The STEM impostor: A comparative study of Black females in two global contexts**

Marsha Simon, University of West Georgia



**Strand 2: Science Learning: Contexts, Characteristics and Interactions**

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***Engaging science teachers in Socioscientific implementation for global citizenship***

11:30 am -1:00pm  
Real time/ live

**Science teachers' pedagogical content knowledge development during enactment of socioscientific curriculum materials**

Durham Bayram-Jacobs, Eindhoven University of Technology

**Relation between SSI and scientific knowledge, according to a group of secondary school science teachers from Spain**

Silvia Alcaraz-Dominguez, Universitat de Barcelona

**Tension and conflict in implementing SSI as reflected in teachers' beliefs and implementation**

Emil Eidin, Michigan State University  
Yael Shwartz, Weizmann Institute of Science

**Socio-scientific issues as tools for improving environmental knowledge, skills, and behavior in pre-service education**

Anat Abramovich, Gordon Teachers College

**Strand 2: Science Learning: Contexts, Characteristics and Interactions**

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***Science Teaching, Learning, & Social Justice***

11:30 am -1:00pm  
Real time/ live

**Presider:** Sameer Honwad, SUNY Buffalo

**A Longitudinal Study Comparing Student Motivational Changes towards Science Learning in Grades 6 to 9**

Moonika Teppo, University of Tartu  
Regina Soobard, University of Tartu  
Miia Rannikmäe, University of Tartu

**Tools for Learning or Tools for Power? Middle School Students' Use of Engineering Tools**

Jeanna Wieselmann, Southern Methodist University  
Khomson Keratithamkul, University of Minnesota  
Emily Dare, Florida International University  
Elizabeth Ring-Whalen, St. Catherine University  
Gillian Roehrig, University of Minnesota

**Let's Count the Flowers: How Emergent Bilinguals' Collaboration Leads to Productive Disciplinary Engagement**

Sara Lee, Vanderbilt University

**Science Citizenship through Secondary Agricultural Education**

Rosalind Gawryla, Onondaga Central Schools  
Kevin Curry, c

## **Strand 5: College Science Teaching and Learning (Grades 13-20)**

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### ***Supporting 21st Century Students and Faculty***

11:30 am -1:00pm

Real time/ live

**Presiders:** Anne Emerson Leak, High Point University

### **Suddenly Online: Exploring Postsecondary Teaching, Attitudes, Technology, and Faculty Mental Well Being in Spring 2020**

Emily Walter, California State University, Fresno

Makayla Bailey, California State University, Fresno

Patricia Fernandez, California State University, Fresno

Arashnoor Gill, California State University, Fresno

### **Investigating instructional and discourse practices of college STEM instructors across instructor types, disciplines, years of teaching experiences, and class sizes**

Jourjina Alkhouri, University of California Merced

Cristie Donham, University of California Merced

Téa Pusey, University of California Merced

Alexander Stivers, University of California Merced

Adriana Signorini, University of California Merced

Petra Kranzfelder, University of California Merced

### **Exploring the Role of Peer Learning Assistants in Supporting Student Learning in College Biology Courses**

Brittney Ferrari, University of Georgia

Peyton LeBonte, University of North Carolina Greensboro

Greensboro

Julie Kittleson, University of Georgia

### **Developing 21st Century Skills Through Teaching and Learning Methods: Perceptions of STEM Students and Alumni**

Marina Tal, Technion - Israel Institute of Technology

Rea Lavi, Massachusetts Institute of Technology

Yehudit Judy Dori, Technion - Israel Institute of

Technology and Samuel Neaman Institute for

National Policy Research

## **Strand 7: Pre-service Science Teacher Education**

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### ***Examining Empathy and Emotions in Science Education***

11:30 am -1:00pm

Real time/ live

**President:** Jennifer Mesa, University of West Florida

### **The Role of Epistemic Empathy in Teachers' Learning and Responsiveness to Students' Experiences in Science**

Lama Jaber, Florida State University

### **Design Thinking for Making: Preservice Teachers' Learning to Teach Human-centered Making**

Myunghwan Shin, California State University, Fresno

Trang Phan, California State University, Fresno

### **Experiencing Science Through Wonder: Incorporating Aesthetics in Pre-Service Teacher Science Education**

Sharon Pelech, University of Lethbridge

David Blades, University of Victoria

### **Preservice Teacher Emotions in Teaching Science and Math**

Mihwa Park, Texas Tech University

Raymond Flores, Texas Tech University

## Strand 8: In-service Science Teacher Education

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### *The Influence of Networks on Teachers' Professional Development and Retention: Insights from Examining Communities of Practice through a Lens of Social Networks*

11:30 am -1:00pm  
Real time/ live

### **Teacher Perceptions of Belonging in Communities of Practice: What are you Belonging to?**

Rebecca Konz, University of Minnesota Twin Cities  
Jessica Doering, University of Kentucky  
Gillian Roehrig, University of Minnesota  
Margaret Schroeder, University of Kentucky  
Michael Beeth, University of Wisconsin  
Oshkosh/COEHS

### **Science and Mathematics Teacher Communities of Practice: Social Influences on Discipline-based Identity and Self-efficacy Beliefs**

Samuel Polizzi, Georgia Highlands College  
Joshua Reid, Middle Tennessee State University  
Yicong Zhu, Stony Brook University  
Gregory Rushton, Middle Tennessee State University

### **Early Career Teachers: Social Networks in Schools Affect Job Satisfaction and Career Commitment**

Gregory Rushton, Middle Tennessee State University  
Samuel Polizzi, Georgia Highlands College  
Yicong Zhu, Stony Brook University  
Joshua Reid, Middle Tennessee State University

### **Perceived Network Bridging Influences the Retention Decisions of Early Career Teachers**

Gillian Roehrig, University of Minnesota  
Yicong Zhu, Stony Brook University  
Samuel Justin Polizzi, Georgia Highlands College  
Joshua Reid, Middle Tennessee State University  
Greg Rushton, Middle Tennessee State University

## Strand 10: Curriculum and Assessment

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### *Automated Assessment of Argumentation in School Science: Developments and Challenges*

11:30am -1:00pm  
Real time/live

### **Assessing Higher Order Thinking of Complex Skill using Selected Response Items**

Linda Morrell, University of California- Berkeley  
Sara Dozier, Stanford University  
Weerephat Suksiri, University of California- Berkeley  
Jonathan Osborne, Stanford University  
Mark Wilson, University of California- Berkeley

### **Developing Automated Analysis for a Learning Progression to Assess Scientific Argumentation in Middle School Students**

Christopher Wilson, BSCS Science Learning  
Molly Stuhlsatz, BSCS Science Learning  
Brian Donovan, BSCS Science Learning  
Zoe Buck Bracey, BSCS Science Learning  
April Gardner, BSCS Science Learning  
Jonathan Osborne, Stanford University  
Tina Cheuk, Stanford University  
Kevin Haudek, Michigan State University  
Xiaoming Zhai, Michigan State University

### **Automated feedback to support students' revision of scientific arguments based on data from simulations**

Hee-Sun Lee, The Concord Consortium  
Gey-Hong Sam Gweon, Physics Front  
Amy Pallant, The Concord Consortium

### **Exploring bias in automated scoring of student argumentation**

Zoe Buck Bracey, BSCS Science Learning  
Molly Stuhlsatz, BSCS Science Learning  
Tina Cheuk, Stanford University  
Marisol Mercado Santiago, Michigan State University  
Christopher Wilson, BSCS Science Learning  
Jonathan Osborne, Stanford University  
Kevin Haudek, Michigan State University  
Brian Donovan, BSCS Science Learning  
April Gardner, BSCS Science Learning

## Strand 11: Cultural, Social, and Gender Issues

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### ***Teachers and Justice***

11:30 am -1:00pm

Real time/ live

**Presenter:** Mary Atwater, University of Georgia

### **Teachers of Color negotiating positionality in implementing justice-centered science pedagogy**

David Segura, Beloit College

Maria Varelas, University of Illinois at Chicago

Daniel Morales-Doyle, University of Illinois at Chicago

### **Leadership Professional Development for Diversifying the K-12 STEM Teaching Workforce**

Hyunju Lee, Smithsonian Science Education Center

Katie Gainsback, Smithsonian Science Education Center

Amy D'Amico, Smithsonian Science Education Center

### **Is it possible to teach just science? Designing Professional Development for justice-oriented science education**

Lenora Crabtree, University of North Carolina Charlotte

### **Understanding the Impact of STEM Teaching Internships on Underrepresented Student of Color**

Vanessa Gee, Indiana University–Purdue University Indianapolis

Jomo Mutegi, Indiana University–Purdue University Indianapolis

## Strand 11: Cultural, Social, and Gender Issues

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### ***Towards a Socially Just Society: Creating Learning Environments for Dignity and Equity in Engineering Education***

11:30am -1:00pm

Real time/live

### **An Identity Resources Approach for Supporting Teachers-of-Engineering for Minoritized Young People**

Christopher Wright, Drexel University

Bryan Brown, Stanford University

Rasheda Likely, Drexel University

Mikhail Miller, Drexel University

### **Centering Social Justice in Engineering: The Transformative Power of Learning about Diversity and Equity in Design**

Greses Pérez, Stanford University

Shannon Gilmartin, Stanford University

Carol Muller, Stanford University

Patrick Danner, Technical University of Munich

Sheri Sheppard, Stanford University

### **Becoming Part of an Engineering Community of Practice: How Students Across Lines of Difference Find Their Place in a Makerspace**

Eric Reynolds Brubaker, Stanford University

Chielo Mbaezue, Stanford University

### **My Life's Work: Re-engineering Education for Black Boys**

James Holly, Jr., Wayne State University

### **Design Justice in Humanitarian Engineering Education**

Brandon Reynante, Stanford University

## Strand 11: Cultural, Social, and Gender Issues

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### *Storied-Identities as a Lens to Studying Science Identity*

11:30am-1:00pm

Real time/ Live

#### **Presenters:**

Amal Ibourk, Florida State University  
Lucy Avraamidou, University of Groningen  
Theila Smith, University of Groningen  
Alison Mercier, University of North Carolina at Greensboro  
Shakhnoza Kayumova, University of Massachusetts-Dartmouth  
Allison Gonsalves, McGill University  
Anna Danielsson, Uppsala University  
Katia Nielsen, University of Copenhagen  
Jennifer Adams, University of Calgary

## Strand 12: Technology for Teaching, Learning, and Research

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### *Integrating Computational Thinking in Science Curricula: Teacher Professional Development and Student Assessment*

11:30 am -1:00pm

Real time/ live

#### **Positioning Teachers as Co-designers To Integrate CT Practices in STEM**

Sally Wu, Northwestern University  
Amanda Peel, Northwestern University  
Michael Horn, Northwestern University  
Uri Wilensky, Northwestern University

#### **Teachers' Sensemaking of CT Integration and Pedagogical Approaches**

Marissa Levy, Northwestern University  
Sally Wu, Northwestern University  
Sugat Dabholkar, Northwestern University  
Michael Horn, Northwestern University  
Uri Wilensky, Northwestern University

#### **Teachers' Perceptions of the Contribution of Computational Thinking to Science and Math Classrooms**

Arnon Hershkovitz, Tel Aviv University  
Connor Bain, Northwestern University  
Jacob Kelter, Northwestern University  
Michael Horn, Northwestern University  
Michael Horn, Northwestern University  
Uri Wilensky, Northwestern University

#### **Identifying Evidence of Student Engagement in CT via Automated Response Analysis**

Connor Bain, Northwestern University  
Arnon Hershkovitz, Tel Aviv University  
Sugat Dabholkar, Northwestern University  
Michael Horn, Northwestern University  
Uri Wilensky, Northwestern University

#### **Students' Attitudinal Change After Participating in a CT integrated Biology Unit**

Sugat Dabholkar, Northwestern University  
Susan Tran, Northwestern University  
Michael Horn, Northwestern University  
Uri Wilensky, Northwestern University

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### ***Reimagining Science Education in the Anthropocene***

11:30am -1:00pm

Real time/live

**Presider:** Maria Wallace, University of Southern Mississippi

**Discussant:** Sara Tolbert, University of Canterbury

#### **Presenters:**

Maria Wallace, University of Southern Mississippi

Sara Tolbert, University of Canterbury

Matthew Weinstein, University of Washington-Tacoma

Darrin Collins, University of Illinois at Chicago

Chessa Adsit-Morris, University of California - Santa Cruz

Lawrence Bencze, University of Ontario - Toronto

Michelle Wooten, University of Colorado - Boulder

Kathryn Ryker, University of South Carolina

Travis Weiland, University of Houston

Rachel Askew, Vanderbilt University

## Strand 14: Environmental Education and Sustainability

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### ***Models for Place-Based Science Education in Schools***

11:30am -1:00pm

Real time/live

#### **Investigating local environmental issues and fostering youth agency through a place-based participatory science model**

Erin Bird, University of California – Davis

Heidi Ballard, University of California – Davis

#### **Centering Power, Historicity, and Nature-Culture Relations in Place-Based Science Education**

Megan Bang, University of Washington

Carrie Tzou, University of Washington Bothell

Sharon Siehl, Tilth Alliance

Charlene Nolan, Western Washington University – Bremerton

Priya Pugh, University of Washington

Jordan Sherry-Wagner, University of Washington

Christine Benita, Seattle Public Schools

Leah Bricker, Spencer Foundation and Northwestern University

Veronica McGowan, University of Washington

#### **A national-scale curriculum adaptation model to incorporate local phenomena**

Katahdin Cook Whitt, Maine Mathematics and Science Alliance

Emily Harris, BSCS Science Learning

Lindsay Mohan, BSCS Science Learning

#### **Place-based storyline design: Selecting an anchoring problem for engineering in the garden**

Emily Harris, BSCS Science Learning

Lindsay Mohan, BSCS Science Learning

Whitney Cohen, Life Lab

Sara Severance, Life Lab

Jeffery Snowden, BSCS Science Learning

## Strand 14: Environmental Education and Sustainability

### ***Supporting climate and data literacy in rural communities by incorporating authentic experiences in formal and informal settings***

11:30 am -1:00pm

Real time/ live

### **Iterating a scientifically authentic data-rich informal learning experience to empower the next generation of climate stewards**

Leigh Peake, Gulf of Maine Research Institute

Andrew Pershing, Gulf of Maine Research Institute

Jeff Bate, Gulf of Maine Research Institute

Jacqueline DeLisi, Education Development Center, Inc.

### **Developing data- and climate-focused classroom curriculum**

Erin Bardar, Education Development Center

Amy Busey, Education Development Center

Patrick McDeed, Education Development Center

Randy Kochevar, Education Development Center

### **Got Data? Developing an online, choice-based assessment of data literacy skills**

Doris Chin, Stanford University

Rachel Wolf, Stanford University

Kristin Blair, Stanford University

Daniel Schwartz, Stanford University

### **Supporting student learning and interest in climate and data through a formal-informal connection**

Jacqueline DeLisi, Education Development Center

Janna Kook, Education Development Center

Una MacDowell, Education Development Center

Peter Tierney-Fife, Education Development Center

Virginia Fitzhugh, Education Development Center

### **Building a data-focused science center community of practice**

Virginia Fitzhugh, Education Development Center

Jeff Bate, Gulf of Maine Research Institute

Leigh Peake, Gulf of Maine Research Institute

## Strand 15: Policy, Reform, and Program Evaluation

### ***Theorizing and envisioning more equitable science education***

11:30am -1:00pm

Real time/live

**Presider:** Stefanie Marshall, University of Minnesota

### **The Impact of Neoliberal Ideologies on Elementary Science Education Policy: A Case Study**

Stefanie Marshall, University of Minnesota

### **Using Assemblage Theory to Develop New Ideas for Science Teacher Learning**

Kathryn Bateman, Temple University

Scott McDonald, Pennsylvania State University

### **Using an Ecological Model to Study Novice STEM Teacher Professional Resilience During the COVID-19 Pandemic**

Diane Wright, Colorado State University

Meena Balgopal, Colorado State University

Laura Sample McMeeking, Colorado State University

Andrea Weinberg, Arizona State University

### **How State Leaders Would Change Their State Systems of Science Education**

Abby Rhinehart, University of Washington

William Penuel, University of Colorado

Kathleen Arada, University of Washington

Maya Garcia, Colorado Department of Education

## LUNCH BREAK

1:00pm -2:00pm

**Concurrent Session # 5 (Format: Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)  
2:00pm-3:00pm**

**Strand 2: Science Learning: Contexts, Characteristics, and Interactions**

***Scientific Discourse and Argumentation***

2:00pm- 3:00pm

Advanced Pre-recorded Viewing & Live Q&A

**President:** David McKinney, University of Nevada, Las Vegas

**Towards improving science discussions: A framework to guide instructional decision making**

Emily Reigh, Stanford University

Jonathan Osborne, Stanford University

**Using a Discussion Types Framework to Support Collective Sensemaking**

Benjamin Lowell, Boston College

Kevin Cherbow, Boston College

Katherine McNeill, Boston College

**Students' argument evaluation as an epistemic and cognitive practice**

Qingna Jin, University of Alberta

Mijung Kim, University of Alberta

**Supporting progressive discourse in epistemically authentic geoscience investigations**

Scott McDonald, Pennsylvania State University

Kraig Wray, Pennsylvania State University

Jonathan McCausland, Pennsylvania State University

Kathryn Bateman, Temple University

Amy Pallant, The Concord Consortium

Hee-Sun Lee, The Concord Consortium

**Strand 2: Science Learning: Contexts, Characteristics, and Interactions**

***Constructing and Receiving Peer Feedback on Engineering Designs: Student Engagement and Pedagogical Supports***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Exploring Peer-Observers' Feedback on Engineering Communication Challenges**

Michelle Jordan, Arizona State University

Mia DeLaRosa, Arizona State University

**"I'm like a scientist:" Critique Sessions as Spaces of Learning and Identity in Urban Classrooms**

Rasheda Likely, Drexel University

Christopher Wright, Drexel University

Mikhail Miller, Drexel University

**Structures of Interaction in Elementary Engineering Peer-to-Peer Feedback**

Nicole Batrouny, Tufts University

**Elementary Teachers' Responsiveness to Supporting Students' Engineering Design Feedback**

Jeffrey Radloff, SUNY Cortland

Brenda Capobianco, Purdue University

**Towards a More Expansive Framing of Feedback in Elementary Engineering: The Social and Affective Benefits of Asking for and Giving Advice**

Chelsea Andrews, Tufts University

Kristen Wendell, Tufts University



## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### ***Elementary teachers' agency, confidence, and knowledge***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Karl Jung, University of South Florida

### **Variations in Rural Elementary Teachers' Confidence and Experience with Computer Science Integration by Teacher Type**

Joseph Brobst, Old Dominion University

Jennifer Maeng, University of Virginia

Joanna Garner, Old Dominion University

### **What is Necessary beyond Knowledge?: Exploring Epistemic Orientation as a Critical Element for Adaptive Expertise**

Jee Kyung Suh, University of Alabama

Jale Dursun, University of Alabama

Catherine Lammert, University of Iowa

Krystal Flantroy, University of Alabama

Eric Akuoko, University of Iowa

Brian Hand, University of Iowa

Gavin Fulmer, University of Iowa

### **Agency of In-service Elementary Science Teachers During a Global Pandemic**

Anica Miller-Rushing, University of Maine

### **Science as Thinkable and Doable: The Nature of Elementary Teachers' Professional Agency in High-Needs Schools**

Alison Mercier, University of Wyoming

## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### ***Implementing Elementary Science New Curricula***

2:00pm- 3:00pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Susanna Hapgood, University of Toledo

### **STEAM Curriculum Design and Implementation: Understanding Curricular Changes in an Elementary School**

Cassie Quigley, University of Pittsburgh

Dani Herro, Clemson University

Holly Plank, University of Pittsburgh

### **Framing Participant Structures for NGSS Teaching: Exploring Tenuous Terrain**

Laura Zangori, University of Missouri

Rachael Pinnow, University of Missouri

### **How Teacher Practices Influence Elementary Students' Social Emotional Learning**

I-Chien Chen, Michigan State University

Cory Miller, Michigan State University

Tingting Li, Michigan State University

Kayla Bartz, Michigan State University

Joseph Krajcik, Michigan State University

Barbara Schneider, Michigan State University

### **First Grade Teachers' Uptake of an Integrated Science-Literacy Curriculum in support of NGSS Instruction**

Ashley Iveland, WestEd

Robert Murphy, RAND

Alison Billman, University of California, Berkeley

Melissa Rego, WestEd

Christopher Harris, WestEd

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***Pedagogical Content Knowledge***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**President:** Henriette Burns, Washington State University

### **Investigating Science Teachers' Pedagogical Content Knowledge Related to Socio-scientific Issues and Development of their Students' Citizenship Skills**

Saiqa Azam, Memorial University of Newfoundland

Dürdane Bayram-Jacobs, Eindhoven University of Technology

Ineke Henze, Radboud University, Nymegen

Patrick Wells, Memorial University of Newfoundland

### **Biology teachers' Pedagogical Content Knowledge of Argumentation in China through Rasch analysis**

Yingzhi Zhang, Capital Normal University

Chenyang Liu, Taiyuan Normal University

### **Interactions between science teachers' pedagogical content knowledge and skills in their chemistry teaching practice**

Imran Tufail, University of Waikato

Chris Eames, University of Waikato

Maurice Cheng, University of Waikato

### **Pedagogical Content Knowledge of Computer Science Teachers for Teaching Algorithms**

Jacqueline Nijenhuis-Voogt, Radboud University, Nijmegen

Dürdane Bayram-Jacobs, Eindhoven University of Technology

Paulien Meijer, Radboud University, Nijmegen

Erik Barendsen, Radboud University & Open University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***How Teachers Navigate Tensions between Enacting Coherent Curriculum Materials and Supporting Students' Epistemic Agency***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Discussant:** Andy Elby, University of Maryland

### **Designing materials for student coherence, then revising for epistemic agency: A case for epistemic agency as an explicit design focus**

Mon Lin Ko, University of Illinois Chicago

Barbara Hug, University of Illinois at Urbana-Champaign

Stina Krist, University of Illinois at Urbana-Champaign

### **Variations in one teacher's conceptualization and support of students' epistemic agency within and across instructional moments**

Soo-Yean Shim, University of Illinois

Susan Kelly, University of Illinois

Daniel Voss, Northwestern University

Jacqueline Chis, University of Illinois at Urbana-Champaign

### **"Shutting down" now to "open up" later: Temporal tensions in pedagogical strategies for supporting epistemic agency**

Stina Krist, University of Illinois at Urbana-Champaign

Nitasha Mathayas, Indiana University

Nessrine Machaka, University of Illinois at Urbana-Champaign

### **Coordinating strategic responsiveness: Building on student thinking over time through instructional design**

Elizabeth Dyer, Middle Tennessee State University

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Educational Reform for Justice and Access***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Jacquelyn Chini, University of Central Florida

### **Teaching- & Research-Focused Faculty: Exploring STEM Instructional Reform in Higher Education**

Melo-Jean Yap, San Diego State University

Felisha Herrera, San Diego State University

Gabriela Kovats Sánchez, San Diego State University

### **Helping Students Rise to Their Full Potential through a Research Immersive Scholastic Experience in Biology**

Brittany Smith, Minnesota State University Mankato

David Sharlin, Minnesota State University Mankato

Rachel Cohen, Minnesota State University Mankato

Allison Land, Minnesota State University Mankato

### **Supporting Transfer Students Career Development through Science/Engineering Internships: A Narrative Case Study**

Shana Mcalexander, North Carolina State University

Margaret Blanchard, North Carolina State University

Richard Venditti, North Carolina State University

### **An Exploration of Perceptions of Justice in a Career-Forward Problem-Based Chemistry Laboratory**

Corey Payne, University of Florida

Kent Crippen, University of Florida

## Strand 6: Science Learning in Informal Contexts

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### ***Social Justice & Citizen Science***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

### **Developing Sense of Place in Urban Youth Through Citizen Science**

Cornelia Harris, University at Albany, SUNY

Alandeom Oliveira, University at Albany, SUNY

James Wager, University at Albany, SUNY

### **The Impacts of Informal Science Education on the Science Identity of Students of Color**

Roya Heydari, Columbia University

Felicia Mensah, Columbia University

### **Examining youth perceptions of citizen science and their agency with science during Citizen Science Programs**

Maryam Ghadiri, University of California-Davis

Heidi Ballard, University of California-Davis

Ana Benavides Lahnstein, The Natural History Museum, London, UK

Sasha Pratt-Taweh, The Natural History Museum, London, UK

Julia Lorke, Wissenschaft im Dialog, Berlin, Germany

Jessie Jennewein, Natural History Museum of Los Angeles County

Annie Miller, California Academy of Sciences, San Francisco

Lila Higgins, Natural History Museum of Los Angeles County

Rebecca Johnson, California Academy of Sciences

Lucy Robinson, The Natural History Museum, London

### **Youth-Initiated Moments Seeking Justice: Making Visible Youth's Imaginaries for STEM Learning**

Won Kim, Michigan State University

Angela Calabrese-Barton, University of Michigan

Sinead Brien, Michigan State University

Louise Archer, University College London

## Strand 7: Pre-service Science Teacher Education

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### ***Culture and Language Considerations in Pre-service Programs***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Justina Ogodo, Baylor University

### **Proposing Translanguaging Pedagogical Competencies for Enhancing Science Learning for Bilingual Students: A Meta-Synthesis Approach**

Noushin Nouri, University of Texas Rio Grande Valley

Alma Rodriguez, University of Texas Rio Grande Valley

Maryam Saberi, University of Shiraz

### **Fostering the Discourse of English Learners During the Enactment of Cognitively Demanding Task**

Walter Aminger, University of California, Santa Barbara

and Nevada State College

### **Secondary Science Pre-Service Teachers' Enactment of Language- and Literacy-Integrated Science Instruction in Linguistically Diverse Classrooms**

Alexis Rutt, University of Virginia

Frackson Mumba, University of Virginia

### **Virtual STEM Microteaching Experiences for Pre-Service Teachers: A Community Cultural Wealth Approach**

Vanessa Grady, Georgia State University

Natalie King, Georgia State University

## Strand 7: Pre-service Science Teacher Education

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### ***Early Childhood and Elementary Pre-service teachers***

2:00pm- 3:00pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Stephen Thompson, University of South Carolina

### **Pinterest as a Resource for Elementary Science Teachers: A Comparison of Two Science Topics**

Ryan Nixon, Brigham Young University

Shannon Navy, Kent State University

### **Developing Perceptions About Science in Pre-service Early Childhood Educators**

Bridget Miller, University of South Carolina

Benjamin Wiles, Clemson University

### **Engineering Practices as Fertile Ground for Pre-Service Teachers' Development of Pedagogical Beliefs**

Godze Tosun, Pennsylvania State University

Amy Farris, Pennsylvania State University

### **"Can we add a goal?": Examining unintended teacher learning within an instructional coaching partnership**

Amanda Tompkins, University of South Florida

Karl Jung, University of South Florida

## Strand 8: In-service Science Teacher Education

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### *In-service Teachers Engaging in Science and Engineering Practices*

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

### **Changes in teacher self-efficacy and beliefs: The impact of an engineering research experience for teachers (RET) program on science teachers**

Tiffany Lewis, Pennsylvania State University

Amber Cesare, Pennsylvania State Center for Science and the Schools

Kathleen Hill, Pennsylvania State University

### **Supporting teachers to MASTER developing practices-based curriculum**

Jennifer Jackson, Pennsylvania State University

Kathleen Hill, Pennsylvania State University

### **Advancing Teachers' Curricular Integration of Mathematics and Computational Thinking through a Research Experience Program**

Amber Cesare, Pennsylvania State Center for Science and the Schools

Kathleen Hill, Pennsylvania State University

Tiffany Lewis, Pennsylvania State University

Amy Farris, Pennsylvania State University

Courtney Nagle, Pennsylvania State University – Behrend

### **K-12 teachers use authentic STEM practices in the classroom based on research immersion experiences**

Matthew Johnson, Pennsylvania State University

Kathleen Hill, Pennsylvania State University

## Strand 10: Curriculum and Assessment

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### *Design, Development, and Testing of a Media-Rich Three-dimensional Middle School Science Unit*

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

### **Developing a unit designed for NGSS: Successes and Lessons Learned in the Development Process**

Lindsey Mohan, BSCS Science Learning

### **Developing a Media-Rich Digital Unit to Support 3D Teaching and Learning**

Catherine Stimac, Oregon Public Broadcasting

Heather Young, Oregon Public Broadcasting

### **Professional Development: Moving Beyond the Curriculum**

Betty Stennett, BSCS Science Learning

### **A Quasi-experimental Study of the Efficacy of a Designed-for-NGSS Unit and PD**

Susan Kowalski, BSCS Science Learning

Jeffrey Snowden, BSCS Science Learning

Lisa Carey, BSCS Science Learning

**Strand 11: Cultural, Social, and Gender Issues**

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***Culturally Responsive Instruction***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Noemi Waight, University of Buffalo

**A Case Study of a Teacher Attempting to Introduce a Culturally Relevant Approach to Physics**

Clausell Mathis, University of Washington

Sherry Southerland, Florida State University

**Science Education in a Diaspora Refugee Community: Perspectives from Two Tibetan Science Teachers**

Ngawang Gonsar, Gustavus Adolphus College,  
University of Minnesota

**The Relationship between Secondary Science Teachers' Self-Efficacy for Culturally Responsive Instruction and their Observed Practices**

Zachary Stepp, University of Florida

Julie Brown, University of Florida

**The Emphasis on Culturally Responsive Instruction in NSTA Science Scope and The Science Teacher Journals**

Michelle Joyce, University of Florida

Julie Brown, University of Florida

**Strand 12: Technology for Teaching, Learning, and Research**

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***Capitalizing on the Intersections of Pop Culture and Science***

2:00pm -3:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Denise Bressler, East Carolina University

**Forecasting Community Development and Sustainability on Social Media with Topic Modeling**

Lisa Lundgren, Utah State University

Richard Bex, University of Florida

Kent Crippen, University of Florida

Jennifer Bauer, University of Michigan

**Visual Literacy in Chemistry: Infographic vs Comic Book**

Christopher Preece, University of Kentucky

**Using Flipgrid as a reflection tool to capture students' design thinking in a second grade science classroom**

Sarah Guffy, University of South Alabama

Joe Gaston, University of South Alabama

Angela Rand, University of South Alabama

**Imagining Robots of the Future: Examining Sixth-Graders' Perceptions of Robots Through Their Literary Products**

Changzhao Wang, University of Miami

Ji Shen, University of Miami

Hua Ran, University of Miami

**Thurs 3:15- pm-4:15 pm  
(Real time/ Live)**

**Research Interest Groups (RIGs) Meeting**

3:15pm – 4:15pm  
Real-time/ live

***Latino/a (LARIG)***

The Latino/a research interest group supports social networks that further research agendas regarding Latino/a science learners. LARIG also serves as a support and mentoring alcoba (space) for Latin@s/Latino science educators and others interested in Latin@ science education. During our business meeting, we seek to plan future presentation formats, themes associated with presentations and online discussions, establish a system for collaborating on paper sets and workshops, update member contact lists, and discuss leadership roles and budget.

**3:30pm-until (Real time/  
Live)**

**NETWORKING/ SOCIAL CONCURRENT  
SESSIONS**

3:30pm – until  
Real-time/ live

**Thurs 4:15- pm-5:45 pm  
(Real time/ Live)**

**Administrative Sponsored Session  
Publications Advisory Committee**

***Publishing, Reviewing, and Writing for JRST***

4:15pm – 5:45pm  
Real-time/ live

**Presenters:**

Felicia Mensah, Teachers College, Columbia University  
Troy Sadler, University of North Carolina, Chapel Hill  
Doug Lombardi, University of Maryland, College Park  
Christine McDonald, Griffith University

## Poster Session #1 Thursday 8:00am through Friday 7:00am

*The following posters are available for viewing for a 23-hour window for asynchronous interactions. Attendees can view the poster (links will be provided) and post comments to the presenter, to which the presenter can respond. The posters will become inactive and inaccessible after Friday, 7:00 am.*

### **Strand 1 Posters**

#### **Consistency and Contradiction**

Cesar Delgado, North Carolina State University  
Gary Wright, North Carolina State University

#### **Socioscientific issues to engage middle school students in claims, evidence and reasoning**

Sissy Wong, University of Houston  
Jie Zhang, University of Houston  
Jennifer Donze, University of Houston  
Ma Glenda Wui, University of Houston  
Jackie Relyea, University of North Carolina  
Araceli Enriquez, University of Houston

#### **Student Learning in OTL Engineering Design integrated Science Instruction**

Laura Pottmeyer, University of Virginia  
Frackson Mumba, University of Virginia  
Ji Hoon Ryoo, Yonsei University, South Korea

#### **The role of confusion in conceptual change scenarios for pre-service science teachers**

Hye-Eun Chu, Macquarie University  
Mariya Pachman, Florida University  
Lori Lockyer, University of Technology Sydney

### **Strand 2 Posters**

#### **Negotiation to Consensus: Argumentation about Climate Change Evidence and Explanations**

Donna Governor, University of North Georgia  
Doug Lombardi, University of Maryland, College Park  
Catie Duffield, Temple University

#### **Research mentors' perceptions on ways to engage high school students in authentic inquiry**

Salih Yousef Faraj, Technion - Israel Institute of Technology  
Amos Cohn Oranim, Haifa University and ACHERET Center, Israel  
Shulamit Kapon, Technion - Israel Institute of Technology

#### **Metacognitive knowledge of science university students: the relationship with critical thinking skills**

Takuya Matsuura, Hiroshima University

#### **Introduce a coding instrument for the quantitative analysis of teachers' questioning chains**

Jianlan Wang, Texas Tech University  
Yuanhua Wang, West Virginia University  
Lu Guo, Texas Tech University  
Yanhong Guo, Texas Tech University  
Stacey Sneed, Texas Tech University  
Kyle Wipfli, Texas Tech University

#### **Computational Thinkers in Unplugged Pre-K Science Classrooms**

Semiha Gun-Yildiz, University of Massachusetts Dartmouth  
Stephen Witzig, University of Massachusetts Dartmouth

#### **The effects of flipped classrooms on K-16 students' science and math achievement: A systematic review**

Gary Wright, North Carolina State University  
Soonhye Park, North Carolina State University

#### **Using Social Network Analysis to Understand Longitudinal Change in Small Groups**

Brock Couch, Middle Tennessee State University  
Grant Gardner, Middle Tennessee State University



## **Students' Understandings and Experiences of Creativity and Risk in Science Learning**

Claire Paton, University of Calgary  
Jennifer Adams, University of Calgary  
Kristal Turner, University of Calgary

## **Impact of Argumentation on Students' Informal Reasoning about Socio-Scientific Issues**

Ihsan Ghazal, *missing*  
Saouma Boujaoude, American University of Beirut

## **When an NGSS-friendly Genetics Curriculum Unit Goes Online: A Naturalistic Study**

Ann Lambert, University of Utah  
Dina Driks-Esser, University of Utah  
Sheila Homburger, University of Utah  
Kristin Fenker, University of Utah  
Molly Malone, University of Utah  
Louisa Stark, University of Utah

## **Translanguaging from the Perspective of Disciplinary Science**

Ashlyn Pierson, Ohio State University  
Scott Grapin, University of Miami

## **Strand 3 Posters**

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### **Engaging students in PBL in science classrooms: The challenges for Chinese primary teachers**

Jing Lin, Beijing Normal University  
Liang Zeng, Beijing Normal University  
Huilei Han, Beijing Normal University  
David Fortus, Weizmann Institute of Science  
Knut Neumann, Leibniz-Institute for Science and Mathematics Education

### **Declarative Knowledge about the NGSS Among Early Childhood Educators Across A Year of Professional Development**

Susanna Hapgood, The University of Toledo  
Grant Wilson, The University of Toledo  
Jeanna Heuring, Keene State College  
Charlene Czerniak, The University of Toledo

### **Science Visual Literacy Practices of Current Elementary Teachers**

Michele Colandene, George Mason University

## **Examining the Relationship between Preschool Teachers' Attitudes and Beliefs towards Science and Classroom Practice**

Elica Bahar Sharifnia, University of Miami

## **Using Online Interventions to Address Summer Learning Loss in Rising Sixth-Graders**

Bob Shaw, Mary Institute and St. Louis Country Day School  
Scott Osborne, Clayton School District

## **Strand 4 Posters**

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### **A Storied Discipline: Exploring a Place for Narrative in Science Education**

Matthew Kloser, University of Notre Dame  
Michael Szopiak, University of Notre Dame  
Catherine Wagner, University of Notre Dame

### **Characteristics of Science Instructional Practices used by Arab Science Teachers in Israel**

Iyad Dkeidek, Al-Qasimi Academic College for Teachers and Al-Quds University  
Nael Eysa, Al-Qasimi Academic College for Teachers

### **Teacher Impacts on Middle School Students' Understanding of Lunar Phases: A Quantitative Inquiry**

Merryn Cole, University of Nevada Las  
Jennifer Wilhelm, University of Kentucky

### **The Progression of Preservice and In-service Science Teachers' Abilities to Teach Inquiry-based Science**

Jeanette Bartley, Illinois Institute of Technology  
Judith Lederman, Illinois Institute of Technology

### **Evaluating intercultural STEAM program in Australia-Korea contexts: Teachers' attitudes and beliefs towards STEAM**

Hye-Eun Chu, Macquarie University  
Sonya Martin, Seoul National University

### **The MakerSTEM Project: Building secondary educator's capacity engage youth in independent, place and community-based, scientific inquiry**

Judith Lemus, University of Hawaii at Manoa  
Tara O'Neill, University of Hawaii at Manoa

## **Revisiting the Relationship Between Science Teaching Practice and Scientific Literacy from a Global Perspective**

Hye Sun You, Arkansas Tech University  
Sunyoung Park, California Lutheran University

## **Investigating Groundwater: 7th-Grade Students' Mapping Models to Phenomena**

Holly White, University of Nebraska–Lincoln  
Cory Forbes, University of Nebraska–Lincoln

## **Exploring the Intersection of Data Practices and Computational Thinking: A Literature Review**

Laura Laclede, George Mason University

## **Knowledge Transfer: Instructional Approaches for Helping Students Understand the Deep Structure of Scientific Problems**

Hong Tran, University of Georgia  
Deborah Tippins, University of Georgia

## **Involvement of Industry in STEM education is South Africa**

Magdeline Stephen, Wits School of Education  
Emmanuel Mushayikwa, University of the Witwatersrand

## **Strand 5 Posters**

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### **Manifestation of Antisocial and Prosocial Power: Teacher Authority in Undergraduate Student Research Field Study Experiences**

Patricia Patrick, Columbus State University

### **Designing Professional Development of Higher Education Science Faculty Which Impacts Student Learning**

Peter Cormas, California University of Pennsylvania  
Louise Nicholson, California University of Pennsylvania  
Kyle Fredrick, California University of Pennsylvania  
Gregg Gould, California University of Pennsylvania

### **The Impact of Biology Instruction on Evolution Acceptance and Conflict in Underrepresented Minority Undergraduates**

Gena Sbeglia, Stony Brook University  
Ross Nehm, Stony Brook University

## **Training Scientists to Teach: Lessons Learned from Course Participant Reflections**

Sara Petchey, University of Zurich  
Kai Niebert, University of Zurich

## **Examining the Reasons Women Choose and Stay in a Geology Major: A Qualitative Multi-Case Analysis**

Ron Gray, Northern Arizona University  
Alexis Riche, Northern Arizona University  
Isabel Shinnick-Gordon, Northern Arizona University  
James C. Sample, Northern Arizona University

## **Chemistry students' understanding of dissolving and associated phenomena: The case of sodium chloride**

James Nyachwaya, North Dakota State University  
Krystal Grieger, North Dakota State University

## **Everything is Connected: Building Preservice Elementary Teachers' Content Knowledge through Educative Curriculum Materials**

Brooke Whitworth, Clemson University  
Lauren Simpson, Center for Mathematics & Science Education  
Whitney Jackson, University of Mississippi  
Julie James, University of Mississippi  
Alice Steimle, University of Mississippi

## **Examining Pre-service Teachers' Scientific Reasoning Skills When Learning to Attend to Students' Scientific Thinking**

Andrea Phillips, Indiana University - Bloomington  
Meredith Park Rogers, Indiana University

## **Undergraduate Engineering Students' Value Beliefs for Modeling Problems in Chemistry**

Lorelie Imperial, University of Florida  
Kent Crippen, University of Florida  
Charlotte Bolch, University of Florida  
Corey Payne, University of Florida

## **Building Student Confidence through Micro-Internships at a Central California Community College**

Zoe Buck Bracey, BSCS Science Learning  
Monica Weindling, BSCS Science Learning  
Mohammed Yahdi, Hartnell Community College

## **Emergency Response Teaching Online: STEM Faculty Perceptions and the Zone of Proximal Development**

Lynn Tashiro, California State University, Sacramento  
Mary McCarthy Hintz, Sacramento State University  
Judith Kusnick, California State University Sacramento

## **Distinct Role of Peer Effects and Sense of Belonging in Student Socialization and College Success**

Narmin Ghalichi, Bowling Green State University  
Clare Barratt, Bowling Green State University  
Moira Van Staaden, Bowling Green State University

## **Strand 6 Posters**

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### **Navigating a STEM Learning Ecosystem: Obstacles and Opportunities**

Neta Shaby, Oregon State University  
Nancy Staus, Oregon State University  
Lynn Dierking, Oregon State University  
John Falk, Institute for Learning Innovation

### **Who has a ruler? Parent and youth perceptions of family science capital**

Megan Ennes, University of Florida  
M. Gail Jones, North Carolina State University  
Gina Childers, Texas Tech University  
Katherine Chesnutt, North Carolina State University  
Emily Cayton, Campbell University

### **Exploring the presentation of climate change through virtual aquarium exhibits**

Dominique Ocampo, Texas State University  
Jenn Idema, Texas State University  
Kristy Daniel, Texas State University

### **Peer-Learning Research Community: An Investigation into the Effects on High School Students' Identity in Research**

Ben Koo, University of California, Berkeley  
Shruti Bathia, University of California, Berkeley  
Linda Morell, University of California, Berkeley  
Perman Gochyyev, University of California, Berkeley  
Mark Wilson, University of California, Berkeley  
Rebecca Smith, University of California, San Francisco

## **Parents Attitudes Towards Wi-Fi In Schools: The Role of Education in Engagement with Real-Life SSIs**

Keren Dalyot, Technion - Israel Institute of Technology  
Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

## **The weight of motivational factors on undergraduate students' decision to join STEM youth-based programming**

Alexandria Muller, University of California- Santa Barbara  
Kassandra Ortega, University of California- Santa Barbara  
Devon Christman, University of California- Santa Barbara  
Diana Arya, University of California- Santa Barbara  
Sarah Hirsch, University of California- Santa Barbara

## **Informal learning in social media? Comparing a popular COVID-19 podcast with its YouTube comments**

Anna Beniermann, Humboldt-Universität zu Berlin  
Alexander Bergmann, Leipzig University  
Alexander Büssing, Leibniz University Hannover; Institute of Natural Science Education

## **Identity Across the STEM Ecosystem**

Katie Wade-Jaimes, University of Memphis  
Kate Ayers, St. Jude Children's Research Hospital  
Robyn Penella, St. Jude Children's Research Hospital

## **Exploring the Relationship Between Personal Scientific Epistemologies and Free-Choice Learning Experiences**

Allison Metcalf, Florida State University  
Katrina Roseler, Chaminade University  
Sherry Southerland, Florida State University

## **Strand 7 Posters**

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### **Revisiting the Elementary Science Partnership: Adjusting to Shifting Challenges in a Pre-Service School-University Collaboration**

Jerome Shaw, University of California - Santa Cruz  
Samuel Severance, University of California - Santa Cruz

## **Mapping Community Assets in Preservice Secondary Science Education**

Kirsten Mawyer, University of Hawaii  
Heather Johnson, Vanderbilt University

## **Researching Teacher Self-efficacy: Linking Self-Efficacy to Teacher Effectiveness, Persistence and Retention**

Sarah Haines, Towson University  
Deepika Menon, University of Nebraska-Lincoln  
Jeanna Wieselmann, Southern Methodist University  
Sumreen Asim, Indiana University Southeast

## **Preservice Teachers' Unpacking Community Cultural Wealth with 5th Graders Learning about the COVID-19**

Christina Restrepo Nazar, California State University, Los Angeles  
Jamie Marsh, California State University, Los Angeles  
Socorro Orozco, California State University, Los Angeles

## **Convergence of Scientific and Mathematical modeling: Investigating elementary pre-service teacher interest and confidence in STEM**

Andrew Gilbert, George Mason University  
Jennifer Suh, George Mason University

## **Linking Pedagogical Content Knowledge and Teaching Practice in Science Teacher Education: A Systematic Literature Review**

Lukas Mientus, University of Potsdam  
Anne Hume, University of Waikato  
Peter Wulff, University of Potsdam  
Andreas Borowski, University of Potsdam

## **How Effective Is Feedback regarding Pre-Service Teachers' Representational Competence?**

Mathias Ropohl, University of Duisburg-Essen  
Julia Schwanewedel, Humboldt University of Berlin

## **Examining PCK Readiness from Participating in a Co-plan, Co-teach, and Co-reflect Early Practicum Experience**

Steven Newman, Indiana University  
Meredith Park Rogers, Indiana University

## **Exploring Teacher Candidates' Knowledge of Assessment through Science Journals**

E.J. Bahng, Iowa State University

## **Learning to Listen: Cultivating Pre-Service Teachers' Attunement and Responsiveness to Student Thinking**

Shannon Davidson, Florida State University  
Lama Jaber, Florida State University  
Allison Metcalf, Florida State University

## **Perspectivization: Empowering, Evoking and Revolutionizing Science Teacher Education for Social Justice**

Christina Restrepo Nazar, California State University, Los Angeles  
Jose Martinez Hinstroza, Texas State University

**Friday 8:00am through  
Saturday 7:00am**

**Poster Session #2**

*Posters are available for viewing for a 23-hour window for asynchronous interactions. Attendees can view the poster at the indicated link and post comments to the presenter for which the presenter may respond. The posters will become inactive and inaccessible after Saturday, 7:00 am. For a complete listing of Friday's posters, please refer to the end of the Friday schedule.*

*Presenters will pre-record their presentations.*

**Author-scheduled, 30-minute  
Q&A sessions #2**

*Attendees will view the recorded presentations in advance of the Q&A session. Presenters will schedule a 30-minute block (like "office hours") on a sign-up sheet in advance of the conference. The scheduled time will be listed in the conference program.*

**8:30 am-9:30 am (Real time/  
Live)**

**Research Interest Groups (RIGs) Meetings**

8:30am – 9:30am

Real-time/ live

**Engineering Education Research Interest Group (ENE-RIG)**

*Agenda to be added*

**Indigenous Science Knowledge Research Interest Group (ISK-RIG)**

At the 2021 business meeting, ISK members will discuss the following items: developing ideas and activities to engage with Indigenous Tribes and the NARST, developing ideas and activities to promote visions and missions of the ISK RIG more globally, developing priorities on how to use funds donated to ISK by NARST members, update on the edited book series on ISK, and any other ISK RIG related business the membership needs to discuss.

**Presiders:**

Bhaskar Upadhyay, University of Minnesota

Stacey Britton, University of West Georgia

Sharon Nelson-Barber, WestEd

Rouhollah Aghasaleh, Humboldt State University

**NETWORKING/ SOCIAL CONCURRENT  
SESSIONS**

8:30am – 9:30am

Real-time/ live

**Concurrent Session # 6 (Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)  
Special Time Slot 7:15 AM - 8:15 AM**

**Strand 5: College Science Teaching and Learning (Grades 13-20)  
Special Time Slot, 7:15-8:15 AM**

***Pedagogy and partnerships for the modern STEM college classroom***

7:15 am -8:15am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Emily Walter, California State University, Fresno

**Revision as an Essential Step in Modeling Cellular Respiration System Dynamics**

Lyrice Lucas, University of Nebraska–Lincoln

Tomáš Helikar, University of Nebraska–Lincoln

Joseph Dauer, University of Nebraska–Lincoln

**Impacts of Inquiry-based Teaching on Undergraduate Students' Engagement in Science and Environmental Awareness**

Ya-Chun Chen, National Chiao Tung University

Zuway-R Hong, Kaohsiung Medical University

Huann-Shyang Lin, National Sun Yat-Sen University;

Australian Catholic University

**Enacting a Persona Strategy in Knowledge Construction to Elicit Epistemic Goals and Support Epistemic Agency**

Heesoo Ha, Seoul National University

**Comparing Learning Assistant and Professor Talk Moves in an Undergraduate Engineering Science Class**

Isabella Stuopis, Tufts University

Kristen B. Wendell, Tufts University

Hoda Koushyar, Tufts University

**Strand 6: Science Learning in Informal Contexts  
Special Time Slot, 7:15-8:15 AM**

***Informal Science Learning in Museums and other places***

7:15 am -8:15am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Ran Peleg, University of Southampton

**Assessing participant learning outcomes in science museums: Building capacity for collective evaluation**

K. C. Busch, North Carolina State University

Lynn Chesnut, North Carolina State University

Regina Ayala Chavez, North Carolina State University

Lincoln Larson, North Carolina State University

Kathryn Stevenson, North Carolina State University

Charles Yelton, North Carolina Museum of Natural Sciences

Nicole Coscolluela, North Carolina Museum of Natural Sciences

**Online Learning in Museums and the influence of COVID-19 Museum Closures**

Megan Ennes, University of Florida

**Characteristics of Students' Abductive Reasoning According to Scientific and Historical Knowledge in Deoksugung Palace, Korea**

Jooyoung Jeon, Ewha Womans University

Donghee Shin, Ewha Womans University

**Empowering Publics to Engage with Socio-Scientific Issues in Science Exhibitions: Mental Health-Mind Matters**

Ana Maria Navas Iannini, University of Los Andes

Erminia Pedretti, University of Toronto

Kristen Schaffer, University of Toronto

Daniel Atkinson, University of Toronto

## **Strand 10: Curriculum and Assessment** **Special Time Slot, 7:15-8:15 AM**

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### ***Automated scoring and machine learning in science assessment***

7:15 am -8:15am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Shahar Abramovitch, University of Massachusetts Boston

### **When Can Multinomial Logistic Regression Best Classify Pre-Service Physics Teachers' Written Reflections?**

Peter Wulff, University of Potsdam

David Buschhüter, University of Potsdam

Anna Nowak, University of Potsdam

Andreas Borowski, University of Potsdam

### **Towards automated formative assessment of students' scientific explanations in Biology using Natural Language Processing**

Moriah Ariely, Weizmann Institute of Science

Tanya Nazaretsky, Weizmann Institute of Science

Giora Alexandron, Weizmann Institute of Science

### **Automated Scoring of Chinese Grades 7-9 Students' Competence in Interpreting and Arguing from Evidence**

Cong Wang, Beijing Normal University

Xiufeng Liu, State University of New York At Buffalo

Lei Wang, Beijing Normal University

Ying Sun, State University of New York At Buffalo

Jian Wang, Beijing Normal University

Shan Lin, Beijing Normal University

### **Applying Machine Learning to Automatically Evaluate Student Scientific Modeling Competence**

Xiaoming Zhai, Michigan State University

Jie Yang, Beijing Normal University

Tingting Li, CREATE for STEM Institute

Peng He, Michigan State University

Joseph Krajcik, Michigan State University

**Concurrent Session # 6 (Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)  
Regular Time Slot 9:30 AM – 10:30 AM**

**Strand 1: Science Learning: Development of Student Understanding**

***Multiple Ways of Representing Knowledge***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Anita Schuchardt, University of Minnesota

**A Framework to Foster Knowledge Acquisition Processes in STEM and Computing Education**

Burkhard Priemer, Humboldt-Universität zu Berlin  
Annette Upmeier Zu Belzen, Humboldt-Universität zu Berlin

**Breaking Barriers to Students Multiple Representations Using Multiple Representations Learning Strategy**

Olugbenga Akindoju, Lagos State University  
Olatunde Owolabi, Lagos State University  
Hakeem Akintoye, Lagos State University, Ojo  
Yinka Orulebaja, Lagos State University

**Writing in Science: A Tool for Personal and Three-Dimensional Sensemaking**

Kirsten Edwards, Michigan State University  
Charles Anderson, Michigan State University

**A New Perspective on Multimodality in Science Learning and Teaching**

Ayca Fackler, University of Georgia

**Strand 1: Science Learning: Development of Student Understanding**

***Student Thinking About Genetics and Evolution***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Cari Herrmann Abell, BSCS Science Learning

**Mechanistic reasoning about gene environment interactions**

Michal Haskel Ittah, Weizmann Institute of Science  
Ravit Golan Duncan, Rutgers University

**Teleology and essentialism in the context of genetics: a fresh look at students' conceptions**

Florian Stern, University of Geneva  
Kostas Kampourakis, University of Geneva  
Marine Delaval, Université de Lille  
Andreas Mueller, University of Geneva

**Learning About Evolution: An Intervention Study on the Elucidation of Misconceptions and Context-related Surface Features**

Helena Aptyka, University of Cologne  
Victoria Hollmann, University of Cologne  
Daniela Fiedler, Kiel University  
Jörg Großschedl, University of Cologne

**Characterizing Students' Use of Mechanistic Reasoning to Explain Allele Relationships**

Gur Livni Alcasid, Weizmann Institute of Science  
Michal Haskel Ittah, Weizmann Institute of Science



## Strand 2: Science Learning: Contexts, Characteristics, and Interactions

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### ***Interest, Motivation, and Critical Thinking in Science Learning***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sara Samiphak, University of California – Berkeley

### **Elementary Student Latent Expectancy-Value-Cost Science Motivation Classes and Their Association with Science Achievement**

David McKinney, University of Nevada, Las Vegas

### **Examining the Predictors of Middle School Students' Interests in Computationally Demanding Science Careers**

Arif Rachmatullah, North Carolina State University  
Madeline Hinckle, North Carolina State University  
Danielle Boulden, North Carolina State University  
Eric Wiebe, North Carolina State University

### **The Effects of Critique-driven Inquiry (CDI) Teaching Intervention on Primary and Secondary School Students' Critical Thinking and Scientific Inquiry Competency**

Ying-Yan Lu, Kaohsiung Medical University  
Zuway-R Hong, Kaohsiung Medical University  
Huann-Shyang Lin, National Sun Yat-Sen University  
Thomas Smith, Northern Illinois University  
Wen-Yi Hsu, Kaohsiung Medical University

### **An Exploration of Multilevel Effects of Student- and School- Factors on Elementary Students' Attitudes towards Science**

Shuchen Guo, Nanjing Normal University  
Enshan Liu, Beijing Normal University

## Strand 2: Science Learning: Contexts, Characteristics, and Interactions

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### ***Research of Primary Science Teaching and Learning in China – the Past and the Future***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Yang Yang, Beijing Normal University  
**Discussant:** Siqi Li, Beijing Normal University

### **Presenters:**

Yang Yang, Beijing Normal University  
Siqi Li, Beijing Normal University  
Yajie Xin, Qingdao University  
Zongfang Zhang, Qingdao University  
Yueyuan Meng, Qingdao University  
Xinhui Zhou, Qingdao University

## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### ***Engineering Education in the Primary Grades***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Laura Zangori, University of Missouri

### **To What Extent Does Construction Play Enhance Engineering Thinking and Self-Regulation Capabilities?**

Ornit Spektor-Levy, Bar-Ilan University

Taly Shechter, Bar-Ilan University

### **Elementary Teachers' Scaffolding of Engineering Practices: Issues with "The Engineering Design Process" as Instructional Model**

Jacob Pleasants, Keene State College

Joanne Olson, Texas A&M University

### **Examining Changes in Practitioner Journals Pre and Post Covid as a Worked Example**

Brandi Kamp, Clemson University

Daniel Alston, University of North Carolina at Charlotte

### **Elementary Teacher Beliefs, Understandings, and Confidence to Integrate Engineering: Implications and Opportunities**

Whitney McCoy, University of Virginia

Jennifer Maeng, University of Virginia

Amanda Gonczi, Michigan Technological University

Robert Handler, Michigan Technological University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***In Search of New Tools for Meaningful Learning in Chemistry – We Stumbled on Culturo-Techno-Contextual-Approach***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

#### **Presenters:**

Adekunle Ibrahim Oladejo, Lagos State University

Ibukunolu Adebiyi Ademola, Lagos State University

Peter Okebukola, Lagos State University

Fred Awaah, University of Professional Studies, Ghana

Deborah Oluwatosin Agbanimu, Lagos State University

Franklin Onowugbeda, Lagos State University

Aderonke Foluso Ebin, Ogun State Institute of Technology

Esther Oluwafunmilayo Peter, Lagos State University

Michael Adelani Adewusi, Lagos State University

Tokunbo Ola Odekeye, Lagos State University

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Rethinking STEM college course designs***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Joshua Reid, Middle Tennessee State University

### **Integrating a Real-Life Software Project into a Model-Based Systems Engineering MOOC**

Hanan Kohen, Technion - Israel Institute of Technology

Niva Wengrowicz, Technion- Israel Institute of Technology

Dov Dori, Technion- Israel Institute of Technology

### **Students' and Instructors' Conceptions of Scientific Hypotheses and Predictions: A Case for Closer Scrutiny**

Anupriya Karippadath, Purdue University

Stephanie Gardner, Purdue University

### **Partnering With Undergraduates to Redesign an Introductory Chemistry Laboratory Course**

Hannah Jardine, The Catholic University of America

Elizabeth Griffith, University of Maryland

### **How does the lack of effective training impact biology GTAs? A descriptive study**

Santiago Ojeda-Ramírez, Universidad de los Andes

Stephanie Toro, Universidad de los Andes

Catalina Zuluaga-Arias, Universidad de los Andes

## Strand 6: Science Learning in Informal Contexts

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### ***Scaling an Effective Analysis-of-Practice PD***

**Program in Four Contexts: Development, Successes, and Challenges**

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

### **Translating and Scaling a Face-to-Face, Video-based Elementary Science PD Program to an Online Environment**

Susan Kowalski, Biological Science Curriculum Study

Amy Belcastro, Biological Science Curriculum Study

Connie Hvidsten, Biological Science Curriculum Study

Angelina Constantine, University of Minnesota

Farah Faruqi, University of Minnesota

Karen Askinas, Biological Science Curriculum Study

Renee DeVaul, Biological Science Curriculum Study

Gillian Roehrig, University of Minnesota

### **Adapting and Scaling a Videobased, Analysis-of-Practice PD Program for High School Biology Teachers**

Jody Bintz, Biological Science Curriculum Study

Connie Hvidsten, Biological Science Curriculum Study

Cynthia Gay, Biological Science Curriculum Study

Lacey Eckels, Jefferson County KY Public Schools

Christopher Wilson, Biological Science Curriculum Study

Molly Stuhlsatz, Biological Science Curriculum Study

### **Adapting and Scaling the LAST PD Program Conceptual Framework in Preservice Teacher Education Programs**

Abraham Lo, Biological Science Curriculum Study

Betty Stennett, Biological Science Curriculum Study

Connie Hvidsten, Biological Science Curriculum Study

Karen Askinas, Biological Science Curriculum Study

### **Factors that Support and Challenge Scaling of Videobased Analysis-of-Practice PD through K-6 Teacher Leader Development**

Kathleen Roth, Cal Poly Pomona Foundation

Nicole Wickler, Cal Poly Pomona

Rebecca Eddy, Cobblestone Applied Research & Evaluation, Inc.

## Strand 7: Pre-service Science Teacher Education

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### ***Identity Development in Science Teachers***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Frackson Mumba, University of Virginia

### **Challenges in Representing Science Teacher Identity in Classroom-Based Science Formative Assessments**

Kristen Larson, Columbia University

Felicia Mensah, Columbia University

Jessica Riccio, Columbia University

### **"I wasn't aware, until I was aware ": Reflective Practices for Teacher Empowerment**

Elanur Yilmaz, Middle East Technical University

Elif Sönmez, Kastamonu University

### **Persistence in a STEM Teaching Program: Examining the Effects of Disciplinary Identity and Teaching Identity**

Ingelise Giles, Florida International University

Nicole Cook, Florida International University

Zahra Hazari, Florida International University

Maria Fernandez, Florida International University

Laird Kramer, Florida International University

### **The role of motivation in pre-service physics teachers' learning to notice students' preconception**

Martin Schwichow, PH Freiburg

Katharina Hellmann, University of Education

Freiburg

## Strand 8: In-service Science Teacher Education

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### ***Teacher Engagement and Leadership***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Douglas Larkin, Montclair State University

### **Which Hat Should I Wear? Examining Teacher Positioning and Engagement in Professional Development**

Patrick Enderle, Georgia State University

Jennifer Schellinger, Florida State University

Ozlem Akcil Okan, Florida State University

Claudia Hagan, Georgia State University

Samantha Skrob, Florida State University

Ellen Granger, Florida State University

Todd Bevis, Florida State University

### **Pushing against the tides: How engaging in research promotes teacher leadership development**

Joshua Reid, Middle Tennessee State University

Allison Hardee, Middle Tennessee State University

Brett Criswell, West Chester University

Gregory Rushton, Middle Tennessee State University

### **Curriculum-Based Professional Development to Support Teachers' Vision of Recent Shifts in Science Instruction**

Katherine McNeill, Boston College

Renee Affolter, Boston College

Benjamin Lowell, Boston College

Casandra Gonzalez, Boston College

Kevin Cherbow, Boston College

### **Job Embeddedness and Professional Support: A Case Study of Science Teacher Retention in One District**

Douglas Larkin, Montclair State University

Liz Carletta, Montclair State University

Suzanne Poole Patzelt, Montclair State University

Khadija Ahmed, The Center for Research and

Evaluation on Education and Human Services

## Strand 8: In-service Science Teacher Education

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### ***Opportunities and Challenges of Facilitating Educators' Understanding and Use of the Next Generation Science Standards***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Discussant:** Annemarie Palincsar, University of Michigan

#### **Presenters:**

Susanna Hapgood, University of Toledo  
Charlene Czerniak, University of Toledo  
Amelia Wenk Gotwals, Michigan State University  
Tanya Wright, Michigan State University  
Gavin Fulmer, University of Iowa  
Brian Hand, University of Iowa  
Elizabeth Lehman, University of Chicago  
James Pellegrino, University of Illinois at Chicago  
Nancy Songer, University of Utah  
Annemarie Palincsar, University of Michigan

## Strand 10: Curriculum and Assessment

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### ***Teacher observation and attitudes towards science evaluation***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Lori Andersen, University of Hawai'i, Manoa

### **Teachers' perspectives of three-dimensional formative assessments embedded within a curriculum: An initial study**

Consuelo Morales, Michigan State University  
Jane Lee, Michigan State University  
Idit Adler, Tel Aviv University  
Irene Bayer, Michigan State University

### **Empirical Validation of a STEM Observation Instrument Using Exploratory Factor Analysis**

Joshua Ellis, Florida International University  
Emily Dare, Florida International University  
Mark Rouleau, Michigan Technological University  
Elizabeth Ring-Whalen, St. Catherine University  
Benny Mart Hiwatig, University of Minnesota Twin Cities  
Khomson Keratithamkul, University of Minnesota  
Feng Li, Florida International University  
Farah Faruqi, University of Minnesota  
Preethi Titu, Kennesaw State University  
Gillian Roehrig, University of Minnesota

### **Challenges in assessing chemistry lab reports among pre-service teachers**

Yoram Zemel, Technion - Israel Institute of Technology  
Gabriela Shwartz, Technion - Israel Institute of Technology  
Shirly Avargil, Technion - Israel Institute of Technology

### **Educative Curriculum Materials for Teacher Educators: Building Preservice Teachers' Content Knowledge for Teaching about Matter**

Deborah Hanuscin, Western Washington University  
Emily Borda, Western Washington University  
Josie Melton, Western Washington University  
Jamie Mikeska, Educational Testing Service

## Strand 12: Technology for Teaching, Learning, and Research

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### *Virtual Rehearsal Simulations to Explore Elementary Pre-service Teachers' Scientific Discourse Skills*

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**Discussant:** Carrie Lee, East Carolina University

#### **Presenters:**

Tammy Lee, East Carolina University

Carrie Lee, East Carolina University

Mark Newton, East Carolina University

Paul Vos, East Carolina University

Jennifer Gallagher, East Carolina University

Daniel Dickerson, East Carolina University

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### *Teaching and Learning in the College Science Classroom*

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Sally Wu, Northwestern University

### **The design components of an online course in research ethics for science and engineering students**

Miri Barak, Technion - Israel Institute of Technology

### **Interrelationship between perceived innovative thinking and actual innovation, online vs. face-to-face learners**

Maya Usher, Technion - Israel Institute of Technology

Miri Barak, Technion - Israel Institute of Technology

### **Computational Practices in Science Disciplines**

Claudia Fracchiolla, University College Dublin

Claire Mullen, University College Dublin

Maria Mehaan, University College Dublin

### **Investigating Students' Engagement with Science Videos: An EEG Study**

Ido Davidesco, University of Connecticut

Or Dagan, New York University

## Strand 14: Environmental Education and Sustainability

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### ***Approaches to education for sustainability and sustainable development***

9:30 am -10:30 am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Shelley Rap, Weizmann Institute of Science

### **"Speak to Me in Numbers" – Interdisciplinary Teaching of Sustainable Development Goals**

Shelley Rap, Weizmann Institute of Science

Ayshi Sindiani, Weizmann Institute of Science

Moran Bodas, Sheba Medical Center; Tel Aviv University

Sherman Rosenfeld, Weizmann Institute of Science

Ron Blonder, Weizmann Institute of Science

### **Science Comics for the Public Good: Enhancing Environmental Literacy in/of the Anthropocene**

Katherine Bruna, Iowa State University

Lyric Bartholomay, University of Wisconsin-Madison

Sara Erickson, Iowa State University

### **Realizing the social dimension of science education for desired citizenry**

Tapashi Binte Chowdhury, University of Tartu

Jack Holbrook, University of Tartu

Miia Rannikmae, University of Tartu

### **Sustainable Development Practices: Impacts of Significant Life Experiences, Knowledge, and Attitudes by Controlling School Environment**

Ridvan Elmas, Afyon Kocatepe University

Savas Pamuk, Akdeniz University

Yakup Saban, Afyon Kocatepe University

**Concurrent Session # 7 (Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)  
10:45-11:45 AM**

**Strand 2: Science Learning: Contexts, Characteristics, and Interactions**

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***COVID & Social Justice***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Gianna Lopez-Colson, University of Texas Rio Grande Valley

**STEM teachers' curriculum practices in online teaching during the Covid-19 pandemic: A Canadian context**

Isha DeCoito, Western University

Mohammed Estaiteyeh, University of Western Ontario

**Empowering K-12 Science Teachers as Equity Advocates and Designers of Transformative Justice-Centered Science Learning Communities**

Tammy Visintainer, San José State University

**Ideological Practice in Science Learning: Navigating Complex Terrain of Climate and Politics in US Classrooms**

Lynn Zummo, University of Utah

**Has COVID-19 left 3D Science in Elementary School on Life Support?**

Sally Crissman, TERC

Roger Tobin, Tufts University

Sara Lacy, TERC

**Strand 4: Science Teaching—Middle and High School (Grades 5-12)**

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***Teaching Practices***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Todd Hutner, University of Alabama

**Testing Two Teacher Preparation Programs for Effective Science Teaching**

Elizabeth Lewis, University of Nebraska–Lincoln

Lyrica Lucas, University of Nebraska–Lincoln

Amy Tankersley, University of Nebraska–Lincoln

Elizabeth Hasseler, University of Nebraska–Lincoln

Anna Rivero, Seattle University

Brandon Holding, University of Nebraska-Lincoln

**Overcoming Obstacles - Supporting Teachers to Implement Inquiry-Based Teaching**

Alice Hesse, Leibniz Institute for Science and Mathematics Education

Stefan Sorge, Leibniz Institute for Science and Mathematics Education

Knut Neumann, Leibniz Institute for Science and Mathematics Education

**Evoking Meaning and Connection: Using Awe to Teach Science**

Julianna Nieuwsma, North Carolina State University

Gail Jones, North Carolina State University

Kathryn Rende, North Carolina State University

Emma Refvem, North Carolina State University

Sarah Carrier, North Carolina State University

Jill Grifenhagen, North Carolina State University

Cesar Delgado, North Carolina State University

Pamela Huff, North Carolina State University

**Exploring Interactions between Urban Science Teachers' Epistemological Beliefs and their Understanding of Argumentation**

Teresa Massey, Georgia State University

Patrick Enderle, Georgia State University

Desmond Lee, Georgia State University

Claudia Hagan, Georgia State University



## Strand 6: Science Learning in Informal Contexts

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### ***STEM Interest Development***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Susan Letourneau, New York Hall of Science

### **Authentic STEM research, practices of science, and interest development in an informal science education program**

Bobby Habig, American Museum of Natural History  
Preeti Gutpa, American Museum of Natural History

### **Content, Context, and Structure of Family STEM Conversations and Their Influence on STEM Identity**

Heidi Cian, Florida International University  
Remy Dou, Florida International University

### **Parent Gender as a Contributing Factor in the Development of College Students' STEM Identity**

Sheila Castro, Florida International University  
Heidi Cian, Florida International University  
Remy Dou, Florida International University

### **Integrating Authentic Learning with Career Role Models to Promote Student Interest in Biosciences**

Stephanie Couch, Massachusetts Institute of Technology  
Melanie Kalainoff, Kalainoff Consulting and Research, LLC  
Leigh Estabrooks, Lemelson-MIT Program  
Helen Zhang, Boston College  
Anthony Perry, Lemelson-MIT Program  
Alazar Ayele, Biogen Community Lab, Biogen Inc.  
Amanda Marvelle, Biogen Community Lab, Biogen Inc.  
Connor Hanley, Biogen Community Lab, Biogen Inc.  
Alex Cameron, Biogen Community Lab, Biogen Inc.

## Strand 7: Pre-service Science Teacher Education

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### ***Development of Pedagogy and Practice of Pre-service Teachers***

10:45am -11:45 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Karin Lohwasser, University of California, Santa Barbara

### **Examining asset and deficit perspectives of preservice science teachers' knowledge and learning**

Ron Gray, Northern Arizona University  
Scott McDonald, Pennsylvania State University  
David Stroupe, Michigan State University

### **Reflective Practice in Microteaching: An Analysis of Preservice Secondary STEM Teachers' Video-based Reflections**

Deepika Menon, University of Nebraska-Lincoln  
Rosetta Ngugi, Towson University

### **Employing Distinctiveness as A Framework to Understand Teacher Noticing**

Lu Wang, Indiana University Kokomo

### **From Fractured to Structured: Examining the Characteristics of Preservice Science Teachers' PCK and PCK Development**

William Reynolds, North Carolina State University  
Soonhye Park, North Carolina State University  
Mwenda Kudumu, North Carolina State University

## Strand 7: Pre-service Science Teacher Education

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### ***Taking Up Socioscientific Issues***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Stephen Witzig, University of Massachusetts Dartmouth

### **Pre-service Science Teachers' Informal Reasoning and Decision-Making Modes regarding COVID-19**

Cigdem Han Tosunoglu, Marmara University

Ferah Ozer, Bogazici University

### **Instructional Decision-Making for Preservice Teachers' Socioscientific Issues-Based Teaching**

Melanie Kinskey, Sam Houston State University

Dana Zeidler, University of South Florida

### **Pre-service teachers' experiences and perceptions of learner-learner talk: A lens into future teaching methods**

Nomfundo Radebe, University of Witwatersrand

Emmanuel Mushayikwa, University of the Witwatersrand

### **Influence of a COVID-19 SSI Unit on Elementary Teachers' Trust in Science and Scientists**

Lisa Borgerding, Kent State University

Bridget Mulvey, Kent State University

## Strand 10: Curriculum and Assessment

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### ***Curricular innovations in high school biology***

10:45am- 11:45 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Cari Hermann Abell, BSCS Science Learning

### **Measuring the Efficacy of an Approach to Integrating Quantitative Reasoning in High School Biology**

Molly Stuhlsatz, BSCS Science Learning

Melissa Kjellvik, Michigan State University

Elizabeth Schultheis, Michigan State University

Jeffrey Snowden, BSCS Science Learning

Brian Donovan, BSCS Science Learning

Louise Mead, Michigan State University

### **Teacher Decision-Making in High School Biology Curriculum Co-Design: A Comparative Case Study Analysis**

Elizabeth Chatham, New Visions for Public Schools

Kiran Purohit, New Visions for Public Schools

### **Teaching an SSI Unit in an Inclusive Secondary Biology Classroom**

Rachel Juergensen, University of Missouri Columbia

Laura Zangori, University of Missouri

Patricia Friedrichsen, University of Missouri

Columbia

Tanner Oertli, University of Missouri Columbia

Troy Sadler, University of North Carolina at Chapel Hill

Hill

### **Updating Genetics Education - Introducing Epigenetics with Dialogic Teaching in Secondary Classrooms**

Karin Thörne, Karlstad University

Niklas Gericke, Karlstad University

Birgitta Mc Ewen, Karlstad University

## Strand 10: Curriculum and Assessment

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### ***In-service Teachers Engaging in Science and Engineering Practices***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

### **Changes in teacher self-efficacy and beliefs: The impact of an engineering research experience for teachers (RET) program on science teachers**

Tiffany Lewis, Pennsylvania State University

Amber Cesare, Pennsylvania State Center for Science and the Schools

Kathleen Hill, Pennsylvania State University

### **Supporting teachers to MASTER developing practices-based curriculum**

Jennifer Jackson, Pennsylvania State University

### **Advancing Teachers' Curricular Integration of Mathematics and Computational Thinking through a Research Experience Program**

Amber Cesare, Pennsylvania State Center for Science and the Schools

Kathleen Hill, Pennsylvania State University

Tiffany Lewis, Pennsylvania State University

Amy Farris, Pennsylvania State University

Courtney Nagle, Pennsylvania State University - Behrend

### **K-12 teachers use authentic STEM practices in the classroom based on research immersion experiences**

Matthew Johnson, Pennsylvania State University

Kathleen Hill, Pennsylvania State University

## Strand 10: Curriculum and Assessment

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### ***Evaluating science identity, attitudes, and career aspirations***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Xiaoming Zhai, Michigan State University

### **A Survey to Measure Secondary School Students' Identity in Research (IR-SH)**

Linda Morrell, University of California, Berkeley

Shruti Bathia, University of California, Berkeley

Ben Koo, University of California, Berkeley

Perman Gochyyev, University of California, Berkeley

Mark Wilson, University of California, Berkeley

Rebecca Smith, University of California, San Francisco

Francisco

### **A systematic review of the conceptual framework of attitude toward science instruments**

Radu Bogdan Toma, Universidad de Burgos

Jesús Ángel Meneses Villagrà, Universidad de Burgos

Norman Lederman, Illinois Institute of Technology

### **Career Aspirations in Elementary Students: A Comparison of Three Measures**

Kelli Paul, Indiana University

Adam Maltese, Indiana University

Merredith Portsmore, Tufts University

Karen Miel, Tufts University

Jungsun Kim, Indiana University

### **Reproducing Oppression: Identifying How Four Levels of Oppression are Reproduced within the Science Classroom**

Khanh Tran, Purdue University

Selcen Guzey, Purdue University

## Strand 11: Cultural, Social, and Gender Issues

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### ***Science Education Research in Culturally and Linguistically Diverse Contexts: Critical Views and Emerging Questions***

10:45am- 11:45 am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sara Wilmes, University of Luxembourg

**Discussant:** Maria Varelas, University of Illinois At Chicago

#### **Presenters:**

Sara Wilmes, University of Luxembourg

Christina Siry, University of Luxembourg

Helen Douglass, University of Tulsa

Shakhnoza Kayumova, University of Massachusetts-Dartmouth

Minjung Ryu, University of Illinois at Chicago

Casey Elizabeth Wright, Purdue University

Sara Salloum, University of Balamand

Mavreen Rose Tuvilla, Texas State University

Geeta Verma, University of Colorado Denver

Maria Varelas, University of Illinois At Chicago

## Strand 12: Technology for Teaching, Learning, and Research

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### ***STEM Capital***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Cassie Quigley, University of Pittsburgh

### **Constructing "STEM Identity": Test of an Expanded Identity Model**

Remy Dou, Florida International University

Heidi Cian, Florida International University

### **Gender Differences in Early STEM Capital: A Focus on K-4 STEM Experiences**

Susie Cohen, Florida International University

Zahra Hazari, Florida International University

Gerhard Sonnert, Harvard Smithsonian

Philip Sadler, Harvard Smithsonian

### **'It Was a Completely Different Change in Environment': Contribution of Immigration History to STEM Identity**

Alexandra Martinez, Florida International University

Remy Dou, Florida International University

Heidi Cian, Florida International University

### **Building Community and Leveraging Cultural Resources: Black & Latina Girls in a Virtual STEM Camp**

Laura Peña, Georgia State University

Natalie King, Georgia State University

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Leveraging Mixed-reality Classroom Simulators for Professional Development to Support Student-centered STEM Learning Environments***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

### **Using TeachLivE Mathematics Diagnosis Simulations with Pre-service Elementary Teachers**

Enrique Ortiz, University of Central Florida

### **How Do GTAs Conceptualize and Utilize Error Framing in a Mixed-reality Classroom Simulator**

Ashley Geraets, University of Central Florida

Constance Doty, University of Central Florida

Andrew Chesire, University of Central Florida

Tong Wan, Westminster College

Jacqueline Chini, University of Central Florida

Erin Saitta, University of Central Florida

### **Impact of GTA Practice with Questioning Strategies Using a Mixed-reality Simulator**

Constance Doty, University of Central Florida

Ashley Geraets, University of Central Florida

Tong Wan, Westminster College

Erin Saitta, University of Central Florida

Jacqueline Chini, University of Central Florida

### **Mixed Reality Integrated Learning Environment for Teaching Training of STEM Teaching Assistants**

Fengfeng Ke, Florida State University

Zhaihuan Dai, Florida State University

Chih-Pu Dai, Florida State University

Luke West, Florida State University

Xin Yuan, Florida State University

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### ***The Nature of Science & Engineering Practices***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sahar Alameh, University of Kentucky

### **The Nature of Scientific Explanation (NOSE): Examining the Quality and 'Goodness' of Explanation among Students, Teachers, and Scientists**

Sahar Alameh, University of Kentucky

Fouad Abd-El-Khalick, University of North Carolina at Chapel Hill

David Brown, University of Illinois

### **County Science Specialists' Views of Aligning Historical and Experimental Sciences with NGSS Science Practices**

Laura Schneider, St. Mary's College of Maryland

Julie Kittleson, University of Georgia

### **Epistemic Aspects of Engineering for K-12 Education**

Ezgi Yesilyurt, Weber State University

Hasan Denzi, University of Nevada, Las Vegas

Erdogan Kaya, George Mason University

### **Differences and interrelations between science and engineering – Stereotypes and experts' perceptions**

Lior Keren, Technion - Israel Institute of Technology

Shulamit Kapon, Technion - Israel Institute of Technology

**Strand 14: Environmental Education and Sustainability**

***Factors intervening with formal and informal green educational initiatives***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**Biosphere 2 as an Informal Learning Platform to Assess Motivation, Fascination, and Cognitive Achievement for Sustainable Development**

Baierl Tessa, University of Bayreuth

Bruce Johnson, University of Arizona

Kevin Bonine, University of Arizona

Franz Bogner, University of Bayreuth

**Knowledge Acquisition and Environmental Values in a Microplastic Learning Module: Does the Learning Environment Matter?**

Patrica Raab, University of Bayreuth

Franz Bogner, University of Bayreuth

**Environmental attitude-sets and fascination for biology as predictors of biodiversity-related, cognitive achievement**

Jennifer Schneiderhan, University of Bayreuth

Franz Bogner, University of Bayreuth

**Covid-19 and Lockdown Schooling: How Digital Learning Environments Influence Semantic Structures & Sustainability Knowledge**

Sonja Fiedler, University of Wuerzburg

Franz Bogner, University of Bayreuth

**Strand 15: Policy, Reform, and Program Evaluation**

***From 'Physical to Digital': How institutions of informal science education adapt to an online presence during the COVID-19 crisis (and beyond)***

10:45am -11:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Neta Shaby, Ben Gurion University of the Negev

**Discussant:** Ran Peleg, University of Southampton

**Presenters:**

Ran Peleg, University of Southampton

Neta Shaby, Ben Gurion University of the Negev

Carys Hughes, University of Southampton

Sarah Funk, Science Center Network

Claudia Sodini, K-productions

Nancy Staus, Oregon State University

Victoria Bonebrake, University of Washington

Ann Astroga, University of Washington

Elena Janniello, Università di Pisa

Antonella Gioli, Università di Pisa

**NARST MEMBERSHIP MEETING**

**12:00pm -1:00pm**

**LUNCH BREAK**

**12:00pm -1:00pm**

**Concurrent Session # 8 (Real Time / Live)**  
**1:15 -2:45pm**

**Administrative Sponsored Session**  
**Equity and Ethics Committee**

***Making the Case to Empower, Evoke, and Revolutionize the Culture of Science for Social Equity***

1:15 pm -2:45 pm  
Real time/ live

**Presenters:**

Sami Kahn, Princeton University  
Stefanie Marshall, University of Minnesota  
Shari Watkins, American University

**Administrative Sponsored Session**  
**Publications Advisory Committee**

***How to Get Your Research Published in Science Education Journals***

1:15 pm -2:45 pm  
Real time/ live

**Presiders:**

Shakhnoza Kayumova, University of Massachusetts-Dartmouth  
Tina Cheuk, Stanford University  
Dante Cisterna, Educational Testing Service

**Presenters:**

*Asia-Pacific Science Education*  
Sonya Martin, Seoul National University

*Cultural Studies of Science Education*  
Catherine Milne, New York University  
Christina Siry, University of Luxembourg  
*Evolution: Education and Outreach*  
Ross Nehm, Stony Brook University

*International Journal of Science Education*  
Gail Jones, North Carolina State University

*Journal of Research in Science Teaching*  
Felicia Mensah, Columbia University  
Troy Sadler, University of North Carolina, Chapel Hill

*Journal of Science Education and Technology*  
Kent Crippen, University of Florida, Gainesville

*Journal of Science Teacher Education*  
Geeta Verma, University of Colorado, Denver  
Todd Campbell, University of Connecticut

*Journal of Teacher Education*  
Gail Richmond, Michigan State University

*Research in Science Education*  
Angela Fitzgerald, University of Southern Queensland

*Science Education*  
Sherry Southerland, Florida State University

*Science & Education*  
Sibel Erduran, University of Oxford

*Studies in Science Education*  
Lucy Avraamidou, University of Groningen  
Justin Dillon, University of Exeter

**Administrative Sponsored Session  
Continental and Diasporic Africa in Science  
Education (CADASE) RIG**

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***CADASE RIG: Educative STEM Materials That Use  
and Evoke African American Capital***

1:15 pm -2:45 pm  
Real time/ live

**Going beyond Ceremony: Creating Educative STEM  
Materials That Use and Evoke African American  
Capital**

Catharine Quinlan, Howard University

**Science Education, A Public Good for the Good of  
the Public? Research on and for the African  
Diaspora to Empower, Evoke, and Revolutionize**  
Contributed CADASE posters

**Administrative Sponsored Session  
President**

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***National Academies of Sciences (NAS) Board of  
Science Education (BOSE) Contribution to Science  
Education as a Public Good***

1:15pm -2:45pm  
Real time/ live

**Presenters:**

Heidi Schweingruber, National Academies of Science  
BOSE

Kenne Dibner, The National Academies of Sciences,  
Engineering and Medicine

Megan Bang, Northwestern University

Maya Garcia, Colorado Department of Education

William Penuel, University of Colorado



## Strand 2: Science Learning: Contexts, Characteristics, and Interactions

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### *Social Factors in College Science*

1:15pm- 2:45 pm

Real time/ Live

**Presenter:** Veronique Merritt, Columbia University

### **Group interaction patterns during argument-based data interpretation tasks in undergraduate biology**

Andy Cavagnetto, Washington State University

Olivia Prestis, Washington State University

Ayden Hackett, Washington State University

Larry Collins, Washington State University

Jessie Arneson, Washington State University

Jacob Woodbury, Washington State University

William Davis, Washington State University

Erika Offerdahl, Washington State University

### **What Professors Say during Collaborative Tasks:**

#### **Facilitation in a POGIL Chemistry Class**

Shaghayegh Fateh, Middle Tennessee State University

University

Zubeyde Demet Kirbulut, Harran University

Amy Phelps, Middle Tennessee State University

Joshua Reid, Middle Tennessee State University

Gregory Rushton, Middle Tennessee State University

### **Should high school biology teachers relate to students' religious faith during evolution class?**

Reut Stahi-Hitin, Weizmann Institute of Science

Anat Yarden, Weizmann Institute of Science

### **Disparities in Mentoring Experiences and Academic/Career Outcomes of STEM**

#### **Undergraduates during the COVID-19 Pandemic**

Guan Saw, Claremont Graduate University

Chi-Ning Chang, University of Kansas

Paul Hernandez, Texas A&M University

## Strand 3: Science Teaching—Primary School (Grades preK-6)

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### *The Roles and Uses of Crosscutting Concepts in Elementary Teaching*

1:15pm -2:45pm

Real time/ Live

### **Co-occurring Crosscutting Concept Use in Elementary Preservice Teachers' Lesson Plans to Support Ambitious Teaching and Three-dimensional Science Learning**

Amanda Benedict-Chambers, Missouri State University

Carrie-Ann Sherwood, Southern Connecticut State University

### **A Comparative Case Study of Preservice and Inservice Teachers' Implicit Use of CCCs in Lesson Planning**

Tina Vo, University of Nevada- Las Vegas

Nicole Thomas, University of Nevada- Las Vegas

Astha Metha, University of Nevada- Las Vegas

### **Exploring Relationships among Educative Materials and Elementary Teachers' Use of CCCs in NGSS-based instruction**

Sarah Fick, Washington State University

Jennifer Chiu, University of Virginia

### **Inservice Elementary Teachers' Successes and Challenges in Using the Crosscutting Concepts in Three-Dimensional Learning**

Anna Maria Arias, Kennesaw State University

Brendan Callahan, Kennesaw State University

Michael Dias, Kennesaw State University

Karen Kuhel, Kennesaw State University

Deborah Hanuscin, Western Washington University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***Investigating Aspects of the Modeling Competence: Practices and Metaknowledge***

1:15 pm -2:45 pm  
Real time/ live

### **Examining Student Engagement with ST and CT through Modeling in a Science Classroom**

Jonathan Bowers, Michigan State University

### **Characterizing students progression patterns in CT and ST through modeling**

Emil Eidin, Michigan State University  
Israel Touitou, Michigan State University

### **Validation of a Rating Scale to Assess Learners' Meta modeling Knowledge using the Argument-based Approach**

Paul Engelschalt, Humboldt University of Berlin  
Anna Beniermann, Humboldt University of Berlin  
Annette Upmeier Zu Belzen, Humboldt-Universität Zu Berlin  
Dirk Krueger, Freie Universitaet Berlin

### **Evaluating Pre-service Science Teachers' Metacognitive Knowledge of the Modeling Process**

Tom Bielik, Freie Universitaet Berlin  
Moretz Krell, Freie Universitaet Berlin  
Dirk Krueger, Freie Universitaet Berlin

## Strand 7: Pre-service Science Teacher Education

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### ***Beliefs and Efficacy Among Pre-service teachers***

1:15pm -2:45 pm  
Real time/ live

**President:** Jennifer Maguire, Virginia Tech University

### **Experiences in Science Methods Courses and Science Teaching Efficacy**

Sheryl McGlamery, University of Nebraska Omaha  
Bridget Franks, University of Nebraska at Omaha  
Saundra Shillingstad, University of Nebraska at Omaha

### **Influence of preservice science teachers' beliefs and goals in the learning tasks they design**

Diego Rojas-Perilla, Columbia University

### **Changes in Pre-Service Elementary Teachers' Science Teaching Self-Efficacy and Reformed-Based Science Teaching and Learning Beliefs**

Laura Eicher, Clemson University  
Cynthia Deaton, Clemson University

### **To Teach or not to Teach: Examining persistence of interest in mathematics and science teaching**

Andrew Marichal, Florida International University  
Zahra Hazari, Florida International University  
Gerhard Sonnert, Harvard Smithsonian  
Philip Sadler, Harvard Smithsonian

## Strand 8: In-service Science Teacher Education

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### *Handbook of Research on Science Teacher Education*

1:15pm -2:45pm

Real time/ Live

**Discussant:** Michele Koomen, Gustavus Adolphus College

#### **Presenters:**

Julie Luft, University of Georgia

Gail Jones, North Carolina State University

Andrew Gilbert, George Mason University

Elizabeth Edmondson, Virginia Commonwealth University

Allan Feldman, University of South Florida

Michael Reiss, University of London

Eve Manz, Boston University

David Stroupe, Michigan State University

Michele Koomen, Gustavus Adolphus College

Shannon Navy, Kent State University

## Strand 10: Curriculum and Assessment

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### *Assessing student reasoning in the context of systems and processes*

1:15 pm -2:45 pm

Real time/ Live

**Presenter:** Molly Stuhlsatz, BSCS

### **Improving Student's Understanding of Biological Variation in Experimental Design and Analysis Through a Curricular Intervention**

Anita Schuchardt, University of Minnesota

Jessica Dewey, University of Minnesota

Jenna Hicks, University of Minnesota

### **Uncovering Students' Developing Understanding of Interdependent Relationships in Ecosystems**

Sara Dozier, Stanford University

Anna MacPherson, American Museum of Natural History

Linda Morell, University of California, Berkeley

Weerephat Suksiri, University of California, Berkeley

Mark Wilson, University of California, Berkeley

Jonathan Osborne, Stanford University

### **Rethinking Assessments for Systems**

Karyn Housh, Indiana University

Abeera Rehmat, Indiana University-Bloomington

Cindy Hmelo-Silver, Center for Research on Learning & Technology

Dante Cisterna, Educational Testing Service

Lei Liu, Educational Testing Service

### **High school students' ability to connect biological processes when studying evolution**

Rebecca Ellis, Michigan State University

Louise Mead, Michigan State University

Frieda Reichsman, The Concord Consortium

Jim Smith, Michigan State University

Kiley McElroy-Brown, The Concord Consortium

Genevive Bondaryk, Brandeis University

Maria Berry, Michigan State University

Pete White, Michigan State University

## Strand 11: Cultural, Social, and Gender Issues

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### ***Whiteness***

1:15pm-2:45pm

Real time/ live

**Presenter:** Natalie King, Georgia State University

### **The Power of Faculty Learning Communities on the development of Inclusive Teaching in STEM Learning Environments**

Mojtaba Khajeloo, University of Missouri – Columbia

Marcelle Siegel, University of Missouri – Columbia

Yejun Bae, University of Missouri – Columbia

Terrell Morton, University of Missouri – Columbia

Charles Nilon, University of Missouri – Columbia

Johannes Schul, University of Missouri – Columbia

Courtney Ngai, University of Missouri – Columbia

Adele Du, University of Missouri – Columbia

### **STEM Schools as a Property of Whiteness in Urban Areas**

Katie Wade-Jaimes, University of Memphis

Bonelli Dobbs, University of Memphis

### **Hear and Listen: Experiences of Adult Black Women in Science Classes**

Renee Schwartz, Georgia State University

Melissa Schoene, Georgia State University

### **Discourses White Men Use to Maintain White and Male Supremacy in Physics**

Melissa Dancy, Dancy Consulting

Apriel Hodari, Eureka Scientific Inc

## Strand 11: Cultural, Social, and Gender Issues

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### ***Motivation and Under-Representation***

1:15pm – 2:45 pm

Real Time/ Live

**Presenter:** Katie Wade-Jaimes, University of Memphis

### **Analyzing discussions of under-representation in a high school classroom**

Ben Archibeque, Florida International University

Geoff Potvin, Florida International University

Zahra Hazari, Florida International University

Robynne Lock, Texas A&M Commerce

### **Individualistic or Systemic? High School Girls Make Sense of Gender Inequality in Engineering**

Tatiane Russo-Tait, University of Texas at Austin

Katherine Doerr, University of Texas at Austin

Catherine Rieggle-Crumb, University of Texas at Austin

Austin

Ursula Nguyen, University of Texas at Austin

### **Motivational factors mediating attitudes toward STEM careers amongst a national sample of middle school students**

Elif Oz, University of Notre Dame

Matthew Kloser, University of Notre Dame

### **Making Explicit Latinx Female Physics Students' Goal Contents**

Brian Zamarripa Roman, University of Central Florida

Jacqueline Chini, University of Central Florida

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Alternate Avenues of Assessment***

1:15pm – 2:45 pm

Real time/ Live

**Presenter:** Jamie Mikeska, Educational Testing Service

### **Exploring the Effect of Construct Complexity on Machine Learning Assessments of Argumentation**

Kevin Haudek, Michigan State University

Xiaoming Zhai, Michigan State University

### **Automatic Assessment of Electronic Causal Maps for Authentic Scientific Inquiry**

Joseph Reilly, Harvard University

### **Comparing two Task Analysis Guides in Science: Examination of Cognitive Demand**

Richard Lamb, East Carolina University

Troy Sadler, University of North Carolina at Chapel Hill

Knut Neumann, Leibniz Institute for Science Education

David Fortus, Weizmann Institute of Science

Pavlo Antonenko, University of Florida

Amanda Kavner, East Carolina University

Douglas Hoston, East Carolina University

### **Integrating Flipgrid for Science Formative Assessment: A Case Study of an Elementary Preservice Teacher's Learning**

Sharfun Islam Nancy, University of South Florida

Karl Jung, University of South Florida

## Strand 14: Environmental Education and Sustainability

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### ***Education for environmental science literacy***

1:15pm -2:45pm

Real time/ Live

**Presenter:** May Lee, University of Groningen

### **Secondary Students' Sense-Making of Graphs Related to Climate Change**

May Lee, University of Groningen

Alicia Alonzo, Michigan State University

### **Unifying formal academic and environmental education priorities: Student outcomes framework for Environmental Literacy Education**

Amy Green, University of Maryland, College Park

John Baek, NOAA Education

### **Reimagining open schooling as a sustainable goal in the pandemic era**

Giulia Tasquier, University of Bologna

Olivia Levrini, University of Bologna

Paola Fantini, University of Bologna

Erik Knain, University of Oslo

Alfredo Jornet Gil, University of Oslo

### **Perceptions of Environmental Literacy Preparedness: An Intrastate Systemic Analysis of Districts' Environmental Literacy Plan Implementation**

Tamara Peffer, Pennsylvania Department of Education

Ann Gaudino, Millersville University

Nanette Marcum-Dietrich, Millersville University

Steven Kerlin, Stroud Water Research Center

**Friday, April 9, 2021**

**Strand 15: Policy, Reform, and Program Evaluation**

***Designing Learning for Just and Resilient Climate Action***

1:15pm -2:45pm

Real time/ Live

**Presenter:** Rachel Han, University of Washington

**Discussant:** Alberto Saldamando, Indigenous Environmental Network

**Presenters:**

Rachel Han, University of Washington

Alberto Saldamando, Indigenous Environmental Network

Sara Tolbert, Te Whare Wananga O Waitaha University of Canterbury

Daniel Wildcat, Haskell Indian Nations University

Asli Sezen-Barrie, University of Maine

David Long, Morehead State University

Alexandra Gillis, Brooklyn College

Christina Guevara, University of Washington

Roberta Hunter, Michigan State University

Deb Morrison, University of Washington

**Fri 3:15pm – until (Real time/ Live)**

**NETWORKING/ SOCIAL CONCURRENT SESSIONS**

3:15pm – until

Real-time/ live

**Poster Session #2**  
**Friday 8:00am through Saturday 7:00am**

*The following posters are available for viewing for a 23-hour window for asynchronous interactions. Attendees can view the poster (links will be provided) and post comments to the presenter, to which the presenter can respond. The posters will become inactive and inaccessible after Saturday, 7:00 am.*

**Strand 8 Posters**

**Rethinking Professional Development in STEM education: A situated perspective in Qatar**

Nasser Mansour, University of Exeter  
Carol Murphy, University of Tasmania  
Abdullah Abu-Tineh, Qatar University  
Nigel Calder, Waikato University

**Moving beyond providing resources: A multi-system analysis of science teacher leadership**

Rachel Ruggirello, Washington University St. Louis  
Alison Brockhouse, Washington University St. Louis  
Maia Elkana, Washington University St. Louis  
Derek Scott, Wentzville School District

**PD for Elementary Teachers' Instruction for Space-Sciences Lessons Focusing on Crosscutting Concepts**

Soon Lee, Kennesaw State University

**Evaluating a Network Improvement Community Program: A Cohort-Based Study of Longitudinal Student STEM Outcomes**

Jessica Richardi, University of Rhode Island  
Shane Tutwiler, University of Rhode Island  
Jay Fogleman, University of Rhode Island  
Sara Sweetman, University of Rhode Island

**Science Teachers' Discourse and Professional Vision of Student Motivation**

Wisam Sedawi, Ben-Gurion University of the Negev  
Livat Eshchar- Netz, Ben-Gurion University of the Negev  
Hasida Yakobov, Ben-Gurion University of the Negev  
Dana Vedder-Weiss, Ben-Gurion University of the Negev

**Developing Ambitious Instruction through Pedagogical Reasoning with Peers**

Kimberly Lebak, Stockton University

**A review of Intervention Studies to improve Teacher 21st Century Skills**

Hiya Almazroa, Princess Nourah Bint Abdulrahman University  
Wadha Alotaibi, Princess Nourah Bint Abdulrahman University

**Invested Students are Engaged Students: Science Teachers' Focus on Student Behavior and Student-Centered Teaching**

Vance Kite, North Carolina State University  
Megan Polzin, North Carolina State University  
Wm. Matthew Reynolds, North Carolina State University  
Soonhye Park, North Carolina State University

**"That's not evidence!": Teacher's navigating conceptual and pedagogical dilemmas in Earth science teaching**

Jonathan McCausland, Pennsylvania State University  
Jennifer Jackson, Pennsylvania State University  
Scott McDonald, Pennsylvania State University  
Amy Pallant, The Concord Consortium  
Hee-Sun Lee, The Concord Consortium

**From Being A Science Teacher to A Science Teacher Leader: A Review of the Literature**

Hatice Ozen Tasdemir, University of Georgia  
Julie Luft, University of Georgia

**A Study of Teacher Sensemaking about Productive Student Talk in Science Classrooms Problem**

Danielle Vande Zande, Florida State University  
Miray Tekkumru Kisa, Florida State University

## **District Science Coordinators and Science Teaching-Research Officers: A Review of the Literature Comparing Science Teacher Leaders in the United States and Mainland China**

Yuxi Huang, University of Georgia  
Julie Luft, University of Georgia

## **Creating community through the Noyce Buddy Program with novice STEM teachers**

Sarah Guffey, University of South Alabama  
Susan Ferguson, University of South Alabama  
Andre Green, University of South Alabama

## **Talking about English Learners: Integrating Language and Content in Inquiry Science**

Bethany Daniel, Vanderbilt University

## **Exploring Experienced Science Teachers' Vision for Science Teaching**

Alfred Limbere, Montclair State University  
Mika Munakata, Montclair State University  
Emily Klein, Montclair State University  
Monica Taylor, Montclair State University

## **Strand 10 Posters**

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### **Developing Assessment Tasks to Measure Model-Based Reasoning in Biology**

Cari Herrmann Abell, BSCS Science Learning  
Brian Donovan, BSCS Science Learning  
Emily Harris, BSCS Science Learning  
Jeffery Snowden, BSCS Science Learning  
Molly Stuhlsatz, BSCS Science Learning  
Christopher Wilson, BSCS Science Learning

### **Exploring Science Teacher Educators' Evaluation of a Score Report to Support Content Knowledge for Teaching**

Dante Cisterna, Educational Testing Service  
Jamie Mikeska, Educational Testing Service  
Katherine Castellano, Educational Testing  
Jennifer Lentini, Educational Testing Service

### **Challenges of Prospective Science Teacher Educators When Designing Science Methods Courses: Analysis Through a PCK Lens**

Jose Pavez, University of Georgia

### **Conceptual Models of Technological Solutions: Assessing Graduate Engineering Students' Novelty and Model-based Systems Thinking**

Rea Lavi, Massachusetts Institute of Technology  
Yehudit Judy Dori, Technion - Israel Institute of Technology; Samuel Neaman Institute for National Policy Research

Dov Dori, Technion - Israel Institute of Technology; Massachusetts Institute of Technology

### **Does the term "argument" make it harder to measure argument? Item Difficulty After Revised Wording**

Andrea Ash, University of Iowa  
Gavin Fulmer, University of Iowa  
Brian Hand, University of Iowa  
Jihyun Hwang, University of Iowa  
Jee Kyung Suh, University of Alabama

### **Assessing algorithmic thinking skills in early primary school amid environmental studies**

Kalliopi Kanaki, University of Crete  
Michail Kalogiannakis, University of Crete  
Emmanouil Poulakis, University of Thessaly  
Panagiotis Politis, University of Thessaly

### **Evolution acceptance and knowledge in Europe: a systematic review of the state of research**

Anna Beniermann Humboldt-Universität zu Berlin  
Paul Kuschmierz, Justus Liebig University Giessen; Institute for Didactics of Biology  
Andra Meneganzin, Università degli Studi di Padova  
Rianne Pinxten, University of Antwerp; Antwerp  
Telmo Pievani, Università degli Studi di Padova  
Dragana Cvetkovi, University of Belgrade  
Evangelia Mavrikaki, National and Kapodistrian University of Athens  
Dittmar Graf, Justus Liebig University Giessen; Institute for Didactics of Biology

### **How does Integrated STEM Life Sciences Unit Affect Middle School Students' Engagement and Academic Success?**

Zeynep Akdemir, Purdue University  
Saira Anwar, University of Florida  
Muhsin Menekse, Purdue University  
Selcen Guzey, Purdue University



## **Investigating students' performance on explanations, developing and using model via the use of Next Generation Science Assessment (NGSA)**

Mao-Ren Zeng, National Taiwan Normal University  
Mei-Hung Chiu, National Taiwan Normal University  
Peng He, Michigan State University  
Joseph Krajcik, Michigan State University

## **Diversity in Knowledge, Conformity in Acceptance of Evolution? Lessons From a Cross-European Evolution Assessment**

Paul Kuszmierz, Justus Liebig University Giessen;  
Institute for Didactics of Biology  
Anna Beniermann, Humboldt University of Berlin  
Dittmar Graf, Justus Liebig University Giessen;  
Institute for Didactics of Biology

## **Unsung Global Trailblazers in STEM: Promoting Pioneers from the African and Latinx Community**

Beverly A. Miller, Georgia Southern University  
Amber Whitfield, Georgia Southern University

## **The Effect of Teacher Talk on Student Engagement during an Integrated Unit**

Valarie Bogan, Purdue University  
Selcen Guzey, Purdue University

## **Assessment of Student Learning in Integrated STEM Education: A Descriptive Study**

Benny Mart Hiwatig, University of Minnesota - Twin Cities  
Gillian Roehrig, University of Minnesota

## ***Strand 11 Posters***

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### **Multicultural Science Content and Contexts in Zambian Biology Curriculum Materials**

Vivien Chabalengula, University of Virginia

### ***STEM Career Transformation: Influences to the Pathways of Community College Women of Color STEM Majors***

Melo-Jean Yap, San Diego State University

## **Preparing Culturally Responsive Elementary Science Teachers: The SCI-Bridge Model**

Brian Williams, Georgia State University  
Nancy Schafer, Georgia State University  
Diane Truscott, Georgia State University  
Ana Solana-Campos, Georgia State University  
Stephanie Byrd, Georgia State University

## **Introducing Engineering as an Altruistic STEM Career to Broaden Participation**

Joni M Lakin, University of Alabama  
Edward W Davis, Auburn University  
Zahra Karimi, Auburn University  
Lindsay Norris, Auburn University  
Virginia Davis, Auburn University

## **Transnational Ph.D. Students' Learning Trajectories with the Lens of Identity Resources**

Selin Akgun, Michigan State

## **Factors Affecting High School Students' Stem Career Interest: Findings from A 4-Year Study**

Alpasian Sahin, Harmony Public Schools  
Hersh Waxman, Texas A&M University - College Station

## **Building antiracist science teachers for Indigenous schools: Lessons from a science professional development workshop**

Bhaskar Upadhyay, University of Minnesota

## **Maintaining Critical Virtual Counterspaces for Minoritized Communities in the COVID-19 Pandemic**

Ann Varnedoe, Vanderbilt University  
William Robinson, Vanderbilt University  
Ebony McGee, Vanderbilt University

## **Factors affecting science academic achievement of women and girls of color: A Meta-synthesis**

Joe De Leon, University of Texas Rio Grande Valley  
Maria Rodriguez, University of Texas Rio Grande Valley

## **Strand 12 Posters**

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### **In Their Words: How Students Discuss Motivation, Success, and Learning After Designing STEM Video Games**

Denise M. Bressler, East Carolina University  
Len Annetta, East Carolina University  
Richard Lamb, East Carolina University  
Alexis Dunekack, East Carolina University

### **Teacher Perceptions about an Engineering Argumentation Discussion within a Simulated Classroom after Feedback and Practice**

Jamie Mikeska, Educational Testing Service  
Pamela Lottero-Perdue, Towson University  
Debra Brockway, Educational Testing  
Dante Igor, Cisterna-Albuquerque,  
Pontificia Universidad Católica de Chile  
Samira Sackietey, Educational Testing Service  
Joseph Ciofalo, Educational Testing Service

### **Developing Online Assignments: Chemistry Teachers' Knowledge and Perceptions**

Orit Hercovitz, Technion - Israel Institute of Technology  
Merav Versano, Technion - Israel Institute of Technology  
Yehudit Judy Dori, Technion - Israel Institute of Technology; Samuel Neaman Institute for National Policy Research, Haifa

### **Development of representational competence through a sequence with augmented reality for the learning of chromatography**

Cristian Merino, Pontificia Universidad Católica de Valparaíso  
Ainoa Marzabal, Pontificia Universidad Católica de Chile  
Waldo Quiroz, Pontificia Universidad Católica de  
Sonia Pino, Pontificia Universidad Católica de  
Brant Miller, University of Idaho

### **Augmented Reality Teaching in Science Education**

Philipp Strauß, University of Education, Weingarten  
Manuel Krug, University of Education, Weingarten  
Johannes Huwer, University of Education, Weingarten  
Holger Weitzel, University of Education, Weingarten

### **Technological pedagogical content knowledge in biology education: Educational technologies in secondary and post-secondary classrooms a systematic literature review**

Olena James, Middle Tennessee State University  
Grant Gardner, Middle Tennessee State University

### **Exploring User Actions while Engaged with a Haptically-enabled Science Simulation (HESSs) for Teaching about Buoyancy**

James Minogue, North Carolina State University  
Emily Brunsen, North Carolina State  
Kern Qi, Davidson College  
Tabitha Peck, Davidson College  
David Borland, University of North Carolina - Chapel Hill

### **Describing Perceptions of Presence Among Students with ADHD in Using Emerging Technologies for Science Learning**

Rebecca Hite, Texas Tech University  
Gina Childers, Texas Tech University  
Gail Jones, North Carolina State University  
Elysa Corin, Institute for Learning Innovation  
Mariana Pereyra, Universidad De La República Uruguay

### **A CSCL Approach for Learning Communities: Supporting Development of Students' Scientific Competencies and STEM Identities**

Elena Boldyreva, University of Toronto  
James Slotta, University of Toronto

## **Strand 13 Posters**

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### **Empowering Informed Action Using an Integrated Nature of Science and Socio-scientific Reasoning Framework**

Zoubeida Dagher, University of Delaware

### **Upper Elementary Students' Interactions with Nature of Science Read-Alouds**

Jeanne Brunner, University of Massachusetts Amherst  
Christine McGrail, University of Massachusetts Amherst  
Kathleen Mahoney, University of Massachusetts Amherst

## **The Most Common Ideas Secondary Students Considered When Making Decisions Across Socioscientific Issue Topics**

Dawnne LePrete, Illinois Institute of Technology  
Norman Lederman, Illinois Institute of Technology

## **Exploring school students' ability to recognise warrants in interdisciplinary argumentation between science and religious education**

Liam Guilfoyle, University of Oxford  
Sibel Erduran, University of Oxford

## **How scientists perceive and value communicating the nature of science to the public**

Sarah Poor, Texas A&M University  
Benjamin Herman, Texas A&M University

## **Investigating University Students' Perceptions of the Nature of Science**

Selin Akgun, Michigan State University  
Ebru Kaya, Bogazici University

## **New Directions in Socioscientific Issues Research**

Dana Zeidler, University of South Florida  
Benjamin Herman, Texas A&M University  
Troy Sadler, University of North Carolina-Chapel Hill

## **Illustrating Linkages between Natures of Science and Engineering**

Jeffrey Radloff, SUNY Cortland  
Brenda Capobianco, Purdue University

## **Selecting Parts of History of Developing and Using Models: Are Modeling Practices Really New Generation?**

Ayca Fackler, University of Georgia

## **Exploring Physicist, Chemist, and Biologist Views of Scientific Models**

Yi-Wen Huang, National Changhua University of Education  
Meng-Fei Cheng, National Changhua University of Education

## **Exploring Physicists' Views of Scientific Models**

Meng-Fei Cheng, National Changhua University of Education  
Yi-Wen Huang, National Changhua University of Education  
Chien-Yu Lin, National Changhua University of Education

## **Strand 14 Posters**

### **A Multi-Perspective Reflection of High School Science Students on Environmental Issues**

Mercy Nyamekye, University of Education of Winneba, Ghana  
Sakyiwaa Danso, University of the Witwatersrand, Johannesburg

### **Art and Travel Abroad: Influencing Student Goals, Environmental Interests and Conceptions of Science**

Susannah Sandrin, Arizona State University  
Becky Ball, Arizona State University  
Richard Lerman, Arizona State University

### **Investigating the influence of computational affordances of a global climate model on students' explanations about global climate change (GCC)**

Devarati Bhattacharya, University of Nebraska  
Kimberly Carroll Steward, University of Nebraska - Lincoln  
Cory Forbes, University of Nebraska-Lincoln

### **Caring about where we are: Exploring philosophical and pedagogical perspectives of place**

Sara Salisbury, Middle Tennessee State University

### **How do Faculty at a Business School Conceptualize Environmental Issues and Incorporate these Issues in their Classrooms?**

Hamza Malik, University of Massachusetts Dartmouth  
Stephen Witzig, University of Massachusetts Dartmouth

### **Relationships between College Students' Epistemological Beliefs About Climate Science and Attitudes toward Climate Change**

Lisa Borgerding, Kent State University  
Jeff Papa, Kent State University  
Barb Currey, Kent State University

### **Seeing Stuff Differently: Inquiry Science Didn't Change the Environmental Worldview of Preservice Teachers But...**

Jean-Philippe Ayotte-Beaudet, Université De Sherbrooke  
Bryan Nichols, Florida Atlantic University

## **Climate Change Education in Rural Spaces**

Jean-Philippe Ayotte-Beaudet, Université De Sherbrooke

Madison Scheer, Colorado State University

Meena Balgopal, Colorado State University

## **Science Education Contexts of Culture, Land, and Community: An 'Aina-Based Model Supporting Teacher Eco-Identity Development**

Sheri Fitzgerald, Pacific American Foundation

## **Turkish Preschool Teachers' Professional Development Needs: A Joint Collaboration Project on Education For Sustainability**

Tulin Guler Yildiz, Hacettepe University

Ridvan Elmas, Afyon Kocatepe University

Savas Pamuk, Akdeniz University

Deniz Kahrirman-Pamuk, Mersin University

Gelengul Haktanir, Ankara University

## **Strand 15 Posters**

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### **Translating Research into Classroom Practice: Who is Publishing in Science Education Practitioner Journals (SEPIs)?**

Joseph A. Taylor, University of Colorado, Colorado Springs

G. Michael Bowen, Mount Saint Vincent University

Marcus Kubsch, Leibniz Institute for Science and Mathematics Education

Ryan Summers, University of North Dakota

Patricia Patrick, Columbus State University

Abdirizak Warfa, University of Minnesota

Cathy Lachapelle, Boston College

Asli Sezen-Barrie, University of Maine

Selcen Guzey, Purdue University

### **Teachers' negotiations of bias in relation to teaching resources offered to schools by industrial actors**

Maria Andrée, Stockholm University

Lena Hansson, Kristianstad University

### **Spectacle and Policy: STEM in the Early Trump Administration**

Matthew Weinstein, University of Washington-Tacoma

## **Basu Scholars Posters**

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### **2019 Basu Scholars**

**Examining Elementary Students' Images of Engineers and Interests in Engineering Careers**  
Ezgi Yesilyurt, Weber State University

### **Minority STEM Undergraduates: A Comprehensive Model for STEM Identity and Self-Efficacy**

Kelly Shepard, Illinois Institute of Technology

Ivan Mutis, Illinois Institute of Technology

### **Urban Science Teacher Education Across Contexts: An Examination of Teacher Learning through the Lenses of Identity and Agency**

Lisa Marco-Bujosa, Villanova University

### **A case study of how science and mathematics teachers' knowledge and beliefs influence their implementation of a problem and project based curriculum**

Mary Nyaema, University of Iowa

### **Approaches to Learning Biology of Women of Color: The Intersectionality of Gender, Race, and Science Identity**

Angela Google, Middle Tennessee State University

Anna Grinath, Idaho State University

Grant Gardner, Middle Tennessee State University

### **How a "Judgement Free" Space Influences African American Girls Sisterhood and STEM Identity**

Faith Freeman, Guilford County Schools

Edna Tan, University of North Carolina at Greensboro

### **Gendered preferences for science education disciplines in elementary grades**

Radu Bogdan Toma, University of Burgos

### **Teaching Practices in large STEM classes: Perception from Undergraduate and Graduate Students**

Ngawang Gonsar, University of Minnesota and Gustavus Adolphus College

Lorelai Patrick, Fort Hays State University

Sehoya Cotner, University of Minnesota

## 2018 Basu Scholars

### **Supporting multilingual students' engagement in science practices: A case for fostering translanguaging science classrooms**

María González-Howard, University of Texas at Austin

Karina Mendez Perez, University of Texas at Austin

Sage Andersen, University of Texas at Austin

### **Becoming a Teacher: Reflective Practice as a Way of Exploring Secondary Science Teacher Beliefs and Practices**

Preethi Titu, Kennesaw State University

Gillian Roehrig, University of Minnesota

Joshua Ellis, Florida International University

### **Science for Our Children: Othermothering within an Elementary Science Network**

Stefanie Marshall, University of Minnesota-Twin Cities

Jessica Forrester, University of Minnesota-Twin Cities

**Concurrent Session # 9 (Real Time / Live)**  
**8:00 am – 9:30 pm**

**Administrative Sponsored Session  
International Committee**

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***Crossing Boundaries: Examining and Problematizing  
Interdisciplinarity in Science Educations***

8:00 am -9:30 am  
Real time/ live

**Presenters:**

Laura Branchetti, University of Parma, Italy  
Olivia Levrini, University of Bologna  
Shalamit Kapon, Technion – Israel Institute of  
Technology  
Maayan Schvartzer, Technion – Israel Institute of  
Technology  
Tal Peer, Acheret Center, Israel  
Wonyong Park, University of Oxford  
Jen-Li Wu, National Taiwan Normal University  
Sharona Levy, University of Haifa  
Asnat Zoharm, University of Haifa  
Ilana Dubovi, Ben-Gurion University

**Administrative Sponsored Sessions  
Awards Committee**

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***ODRA and ECRA: On a Continuum of the  
Professional Scholarly Trajectories in Science  
Education: The Urgent Questions for the Next  
Generation of Science Education Research***

8:00am-9:30am  
Real time/ live

**Presenter:**

Noemi Waight, University at Buffalo

**Strand 2: Science Learning: Contexts,  
Characteristics, and Interactions**

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***Socioscientific Issues-Based Instruction for Scientific  
Literacy Development***

8:00am -9:30 am  
Real time/ Live

**Presenter:** Wardell Powell, Framingham State  
University

**Discussant:** Aysegul Oguz Namdar, Recep Tayyip  
Erdogan University

**Presenters:**

Sami Kahn, Princeton University  
Wardell Powell, Framingham State University  
Aysegul Oguz Namdar, Recep Tayyip Erdogan  
University  
Hyunok Lee, Seoul National University  
Mark Newton, East Carolina University  
Dilek Karisan, Adnan Menderes University  
Gillian Roehrig, University of Minnesota  
Benzegül Durak, Duzce University  
Li Ke, University of North Carolina at Chapel Hill  
Dana Zeidler, University of South Florida

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***NGSS Practices and Implementation***

8:00am -9:30am

Real time/ Live

**Presenter:** Teresa Massey, Georgia State University

### **Impacts of COVID-19 on Science Instruction and NGSS Enactment in Grades 6-8**

Meghan Macias, University of California, Santa Barbara

Ashley Iveland, WestEd

Elizabeth Arnett, WestEd

Melissa Rego, WestEd

Maya Salcido White, WestEd

### **Teachers' use of the Next Generation Science Standards for alignment of instructional materials**

Jamie Tanas, University of Iowa

Gavin Fulmer, University of Iowa

### **How Middle-School Science Teachers Enact Phenomena in NGSS Classrooms**

Jonathan Boxerman, WestEd

Kimberly Nguyen, WestEd

Jasmine Marckwordt, University California Santa Barbara

Ashley Iveland, WestEd

### **The Effect of 5E Instructional Model-Based Class on Students' Understanding of Crosscutting Concepts**

Dongxue Jin, Beijing Normal University

Enshan Liu, Beijing Normal University

## Strand 7: Pre-service Science Teacher Education

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### ***Pre-Service Teachers' Use of Learning Progressions to Inform Classroom Instruction***

8:00am -9:30 am

Real time/ Live

### **How Do Pre-Service Teachers Use Learning Progressions When Interpreting Student Thinking in Mechanics?**

Cristoph Münster, Justus Liebig University Giessen

Claudia Von Aufschnaiter, Justus Liebig University Giessen

### **Investigating How Pre-service Teachers Draw on Their Understanding of Student Ideas to Elicit Student Thinking**

James Hancock, Alma College

Alicia Alonzo, Michigan State University

### **Pre-service Teachers' Use of Learning Progressions When Responding to Students' Ideas**

Sisi Han, Beijing Normal University

Alicia Alonzo, Michigan State University

### **A Pre-service Teacher's Use of Learning Progressions When Planning Instruction in Two Contexts**

Julia Christensen, Michigan State University

Sisi Han, Beijing Normal University

Alicia Alonzo, Michigan State University

## Strand 10: Curriculum and Assessment

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### ***Learning and assessment in project-based and problem-based curricula***

8:00am -9:30 am

Real time/ Live

**Presenter:** Jeffery Nordine, Leibniz Institute for Science and Mathematics Education

### **Integrating Computer Science in Science Classrooms: Learning Computational Thinking and Expanding Perceptions of Computer Science**

Eric Greenwald, University of California, Berkeley

Ari Krakowski, University of California, Berkeley

### **The Performance and Assessment of Students' Collaborative Problem Solving in Project-based Learning**

Yanan Zhao, Beijing Normal University

Lei Wang, Beijing Normal University

### **Examining the relationships between post-unit assessments and summative assessment in elementary project-based science classrooms**

Tingting Li, CREATE for STEM Institute

I-Chien Chen, Michigan State University

Emily Miller, University of Wisconsin Madison

Kayla Bartz, Michigan State University

Joseph Krajcik, Michigan State University

### **Tracking the Progress of High School Students' Modeling Proficiencies Across Sequential Project-based Learning Chemistry Curriculum: A Longitudinal Study**

Peng He, Michigan State University

I-Chien Chen, Michigan State University

Israel Tuitou, Michigan State University

Sarah Maestrales, Michigan State University

Joseph Krajcik, Michigan State University

## Strand 14: Environmental Education and Sustainability

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### ***Traditional Ecological Knowledge (TEK): Water Stories, Sustainability, Models, and Evidence***

8:00am -9:30 am

Real time/ Live

**Presenter:** Bhaskar Upadhyay, University of Minnesota

**Discussant:** Femi Otulaja, University of the Witwatersrand

### **Presenters:**

Rouhollah Aghasaleh, Humboldt State University

Bhaskar Upadhyay, University of Minnesota

Sharon Nelson-Barber, WestEd

Pauline Chinn, University of Hawaii at Manoa

Jonathan Boxerman, WestEd

Paichi Shein, National Sun Yat-sen University

Kai-Lung Wang, National Sun Yat-sen University

Wei-Ting Li, Taichung Municipal Sha-Lu Junior High School

Peresang Sukinarhimicc, Indigenous People Cultural Development Center

Femi Otulaja, University of the Witwatersrand



Saturday, April 10, 2021

**Concurrent Session # 10 (Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)**

**9:45 am – 10:45 am**

**Strand 1: Science Learning: Development of Student Understanding**

***Students' Understanding of Physical Science Concepts***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Jennifer Tripp, University at Buffalo

**Experience doesn't matter but the direction does:**

**Differential accuracy in relative motion problems**

Jason Morphew, Purdue University

**Mapping the territory: The development of students' repertoires of ideas about energy**

Marcus Kubsch, Leibniz Institute for Science and Mathematics Education

**The Development of Middle School Students' Conceptual Learning on Energy Transformations through Design Thinking**

Ayse Ciftci, Mus Alparslan University

Mustafa Topcu, Yildiz Technical University

**The Process of Doing Science – a Study of Three Students Exploring Sound and Light**

Sebastian Björnhammer, Stockholm University

Jakob Gyllenpalm, Stockholm University

Iann Lundegård, Stockholm University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions**

***Contextual, Socio-Emotional, and Attitudinal Factors across K-12 Education***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Henriette Burns, Washington State University

**Investigating the relevance of an intervention course to raise middle school student's science-related career awareness**

Regina Soobard, University of Tartu

Aet Möllits, Tallinn University

Miia Rannikmäe, University of Tartu

**The Efficacy of Project-based Learning Science on Supporting Students' Learning Energy in No-Western Classroom**

Jie Yang, Beijing Normal University

Sisi Han, Beijing Normal University

Jian-Xin Yao, National Institute for Curriculum and Textbook Research, P. R. China

Yu-Ying Guo, Beijing Normal University

Joseph S. Krajcik, Michigan State University

**Addressing the Affective Dimension of Learning through Biophilia in Classroom Gardening**

Aimee Fraulo, North Carolina State University

**The Trade-Off Between STEM Knowledge Acquisition and Language Learning in Short-Scale Bilingual Implementations**

Tamara Roth, University of Bayreuth

Franz Bogner, University of Bayreuth

## Strand 2: Science Learning: Contexts, Characteristics and Interactions

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### ***Epistemic & Disciplinary Engagement in Middle and Secondary School***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Zoe Buck Bracey, BSCS

### **Small Teacher Moves with Big Impacts in Shaping Students' Sensemaking and Intellectual Authority in Science**

Jennifer Schellinger, Florida State University

Sierra Morandi, Florida State University

Sherry Southerland, Florida State University

Lama Jaber, Florida State University

Miray Tekkumru Kisa, Florida State University

Harini Krishnan, Florida State University

### **"Dude... Just Put a Mirror Here": Examining Epistemic Practices in Middle School Collaborative Engineering Contexts**

Ramya Sivaraj, University of Minnesota

Jeanna Wieselmann, Southern Methodist University

Gillian Roehrig, University of Minnesota

### **Finding Alignment in Framing: Dynamics of Collaborative Disciplinary Engagement in Science**

Harini Krishnan, Florida State University

Lama Jaber, Florida State University

Jennifer Schellinger, Florida State University

Sherry Southerland, Florida State University

### **Anchoring epistemic agency and participation within place-based learning progressions**

Lezly Taylor, Virginia Polytechnic Institute and State University

Brenda Brand, Virginia Tech University

George Glasson, Virginia Polytechnic Institute and State University

## Strand 4: Science Teaching—Middle and High School (Grades 5-12)

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### ***Socioscientific Issues in the Science Classroom***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Joseph Brobst, Old Dominion University

### **Teaching Science During a Pandemic: A National Study of Teacher Decision Making**

Patrick Smith, Horizon Research, Inc.

Peggy Trygstad, Horizon Research, Inc.

Laura Craven, Horizon Research, Inc.

### **The most challenges and needs for teachers to engaging students in SSI learning**

Jing Lin, Beijing Normal University

Huilei Han, Beijing Normal University

Liang Zeng, Beijing Normal University

Troy Sadler, University of North Carolina at Chapel Hill

Knut Neumann, Leibniz Institute for Science and Mathematics Education

### **Teaching Controversial Socio-Scientific Issues: Challenges and Affordances**

Janelle Bailey, Temple University

Ananya Matewos, St. Norbert College

Sanlyn Buxner, Planetary Science Institute/University of Arizona

**Strand 4: Science Teaching—Middle and High School (Grades 5-12)**

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***Student Thinking and Interest in Science***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** John Holmquist, Florida Institute of Technology

**An Analysis of Secondary Student Views of Quantum Physics**

Zac Patterson, Ohio State University

Lin Ding, Ohio State University

**Enhancing Students' Interest in Science and STEM**

**Careers: The Role of Career-based Scenarios**

Irene Drymiotou, University of Cyprus and University of Groningen

Lucy Avraamidou, University of Groningen

Constantinos Constantinou, University of Cyprus

**Enacting Rigorous Science Lessons: Leveraging Students' Ideas for Enhancing Demand on Student Thinking Problem**

Ozlem Akcil Okan, Florida State University

Miray Tekkumru Kisa, Florida State University

**Concept Maps in Learning Biology: Concept Mapping from Memory is more beneficial than from Text**

Sina Lenski, University of Cologne

Jörg Großschedl, University of Cologne

**Strand 4: Science Teaching—Middle and High School (Grades 5-12)**

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***Teacher Learning Through Practice***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sina Lenski, University of Cologne

**Teacher Emphasis and What It Reveals About Chemical Ideas and Practices**

Gregory Banks, University of Massachusetts Boston

Hannah Sevan, University of Massachusetts Boston

**What Epistemological Resources Affect Chemistry Teachers' Sense of "What worked"**

Adam Schafer, University of Wisconsin - Madison

Ryan Stowe, University of Wisconsin - Madison

**Expanding the STEM teacher pool: A history teacher's experience teaching a high school engineering course**

Adam Carberry, Arizona State University

Medha Dalal, Arizona State University

Malay Nagda, Arizona State University

Brendan McCarthy, College Park Academy

**Challenges and Supports for Secondary Science and Mathematics Teacher Retention**

Christine Lotter, University of South Carolina

Jennifer Crooks-Monastra, University of South Carolina

Greysi Irdam, University of South Carolina

Jan Yow, University of South Carolina

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Authentic Learning Inside and Outside the Classroom***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Jorge Solis, University of Texas At San Antonio

### **Exploring the Kinds of Evidence Cited in an Integrated STEM Learning Experience Incorporating Argumentation**

Carina Rebello, Purdue University

Jeffrey Murray, Purdue University

N. Sanjay Rebello, Purdue University

### **Exploring Students' Values and Classroom Experiences across a Consortium of Four Universities**

Gili Marbach-Ad, University of Maryland

Patrick Sheehan, University of Maryland

Katerina Thompson, University of Maryland

Lindsay Wheeler, University of Virginia

Cindy Ghent, Towson University

Jackie Bortiatynski, Pennsylvania State University

### **Establishing a Baseline of Science Communication Skills**

Rashmi Shivni, Northern Illinois University

Christin Cline, Northern Illinois University

Morgan Newport, Northwestern University

Shupey Yuan, Northern Illinois University

Heather Bergan-Roller, Northern Illinois University

### **How Different Course-based Undergraduate Research Experience Models Impact Student Perceptions of the Scientific Research Culture**

Jessica Dewey, University of Minnesota

Anita Schuchardt, University of Minnesota

## Strand 5: College Science Teaching and Learning (Grades 13-20)

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### ***Reasoning and Thinking about STEM***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Scott Cohen, Georgia State University

### **Students' Visual Patterns in Solving Synthesis Physics Tasks**

Bashirah Ibrahim, University of Bahrain

Lin Ding, Ohio State University

### **Student Explanations about Molecular Processes in Information Flow and Transfer in Biology**

Juli Uhl, Michigan State University

Kevin Haudek, Michigan State University

### **An Investigation of Undergraduate Students' Spatial Thinking about Groundwater**

Holly White, University of Nebraska–Lincoln

Cory Forbes, University of Nebraska–Lincoln

### **Sensemaking opportunities for mathematical equations differ across instructors teaching the same scientific phenomenon**

FangFang Zhao, NanJing Normal University

Linh Chau, University of Minnesota

Anita Schuchardt, University of Minnesota

## Strand 6: Science Learning in Informal Contexts

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### ***Creating in Informal Science***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Elgin Leary, University of Georgia

### **Once Upon a Time We Had to Stay at Home: STEM Stories and Phone Photos in My (or Any) Family Culture**

Phyllis Katz

### **Making Board Games as Building Models: What are Some Implications for Environmental Science Education?**

Priyanka Parekh, Transylvania University

Elisabeth Gee, Arizona State University

Kelly Tran, High Point University

Earl Aguilera, California State University, Fresno

Taylor Kessner, Arizona State University

Luis E. Pérez Cortés, Arizona State University

Sinem Siyahhan, California State University, San

Marcos

### **Creating Comics about COVID-19 to understand the intersections between Science, Community, and Equity**

Shakuntala Devi Gopal, SUNY Buffalo

Anthony White, SUNY Buffalo

Jessica Scates, SUNY Buffalo

Sameer Honwad, SUNY Buffalo

Ryan Rish, SUNY Buffalo

### **Photo-elicitation as a technique for identifying triggers of Situational Interest during a nature reserve visit**

Bhamini Kamudu, University of Witwatersrand

Marissa Rollnick, University of Witwatersrand

Eunice Nyamupangedengu, University of

Witwatersrand

## Strand 6: Science Learning in Informal Contexts

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### ***Experiences in Informal Science***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**President:** Henry James Evans, University of Copenhagen

### **A Mixed Blessing: High School Students' Visiting a University: Self-Reported Experience and a Wishlist**

Efrat Nativ Ronen, Technion - Israel Institute of Technology

Tali Tal, Technion - Israel Institute of Technology

### **Students' Perception of Kitchen Activities in Promoting Secondary School Chemistry Learning Outcomes in Nigeria**

Ngozi Philomena Okafor, University of Lagos

### **An authentic experience with a SEM as Enacting Endogenous Science for Capacity Building**

Ella Yonai, Weizmann Institute of Science

Ron Blonder, Weizmann Institute of Science

### **Using Makerspace Activity in a Low-income Context**

Wanja Gitari, University of Toronto

## Strand 6: Science Learning in Informal Contexts

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### *Informal Science in Media and Society*

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sanlyn Buxner, University of Arizona

### **Supports and Challenges during Educational Crisis: Examining the Impact of the Pandemic on Youth Pathways**

Rachel Chaffee, American Museum of Natural History

Preeti Gupta, American Museum of Natural History

Karen Hammerness, American Museum of Natural History

Timothy Podkul, SRI International

Anna MacPherson, American Museum of Natural History

Michael Chavez-Reilly, American Museum of Natural History

Kea Anderson, SRI International

Daniel Princiotta, SRI International

Daniela Saucedo, SRI International

### **Gendered engagement with posts authored by female scientists on Facebook**

Keren Dalyot, Technion - Israel Institute of Technology

Yael Rozenblum, Technion - Israel Institute of Technology

Ella Lachman, Little Big Science

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

### **Science News Websites: Making Science Accessible for All**

Ifat Zimmerman, Technion - Israel Institute of Technology

Tali Tal, Technion - Israel Institute of Technology

Avshalom Ginosar, The Academic College of Emek Yezreel

### **Depression and Test Anxiety in Science Stream high Schoolers: Influence of Dummy Schools in India**

Parth Soni, Indian Institute of Management Ahmedabad

Kathan Shukla, Indian Institute of Management Ahmedabad

## Strand 7: Pre-service Science Teacher Education

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### *COVID and Course Design*

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Elizabeth Lewis, University of Nebraska-Lincoln

### **Emergency Remote Teaching of Science Methods Courses During the COVID-19 Pandemic**

Martha Canipe, Northern Arizona University

### **Ed+engineering Teams of Undergraduate Education and Engineering Students Transition Online to Teach Elementary Students Engineering**

Kristie Gutierrez, Old Dominion University

Orlando Ayala, Old Dominion University

Jennifer Kidd, Old Dominion University

Pilar Pazos, Old Dominion University

Stacie Ringleb, Old Dominion University

Krishna Kaipa, Old Dominion University

### **Supporting Preservice Elementary Teachers' Development of Science Concepts and Practices in an Online Course**

Nidaa Makki, The University of Akron

Danielle Dani, Ohio University

Andrea Maria Anderson, Ohio University

## Strand 8: In-service Science Teacher Education

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### ***Sociocultural Perspectives on teacher learning and classroom practice***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Jennifer Maguire, Virginia Tech

### **Exploring Teachers' Stories through a Culturally Responsive Lens**

Jamie Wallace, American Museum of Natural History

Elaine Howes, American Museum of Natural History

Arthur Funk, American Museum of Natural History

Sean Krepski, American Museum of Natural History

Maya Pincus, American Museum of Natural History

Raghida Sharif, American Museum of Natural History

Samantha Swift, American Museum of Natural History

History

Susan Sylvester, American Museum of Natural History

History

Kin Tsoi, American Museum of Natural History

Caity Tully, American Museum of Natural History

### **Opportunities for Reflecting on Opposition to Learning Evolution During a Teacher Training Course**

Merav Siani, Weizmann Institute of Science and Herzog College

Herzog College

Reut Stahi-Hitin, Weizmann Institute of Science

Anat Yarden, Weizmann Institute of Science

### **Analyzing whether teachers' task values influenced their implementation of bioeconomy-focused lessons: A pilot study**

Margaret Blanchard, North Carolina State University

Karen Collier, North Carolina State University

Aparajita Rajwade, North Carolina State University

Katherine McCance, North Carolina State University

Shana McAlexander, North Carolina State University

Richard Venditti, North Carolina State University

### **Formative Interventions for Expansive Teacher Learning in Multilingual Science Education: Change Laboratories for Transformation of Practice**

Sara Salloum, University of Balamand

Saouma Boujaoude, American University of Beirut

## Strand 13: History, Philosophy, Sociology, and Nature of Science

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### ***Using Augmented Reality and Mixed Reality to Enhance Science Learning***

9:45 am -10:45am

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Richard Lamb, East Carolina University

### **Working as Intended? How Procedural Fidelity and Flow Impact Learning in a Game-Based Science Curriculum**

Shane Tutwiler, University of Rhode Island

Denise Bressler, East Carolina University

Len Annetta, East Carolina University

### **Using Augmented-Reality to reduce Cognitive Load while learning Organic Chemistry**

Sebastian Keller, University of Duisburg-Essen

Stefan Rumann, University of Duisburg-Essen

Sebastian Habig, University of Duisburg-Essen

### **Comparing Integrated Presentation Formats for Technology-Enhanced Science Experiments**

Michael Thees, Technische Universität Kaiserslautern

Kristin Altmeyer, Saarland University

Sebastian Kapp, Technische Universität Kaiserslautern

Kaiserslautern

Eva Rexigel, Technische Universität Kaiserslautern

Fabian Beil, Technische Universität Kaiserslautern

Pascal Klein, Georg-August Universität Göttingen

Sarah Malone, Saarland University

Roland Brünken, Saarland University

Jochen Kuhn, Technische Universität Kaiserslautern

### **A Study of Mixed Reality Technology on Elementary School Students Reading of Science Expository Text**

Len Annetta, East Carolina University

Denise Bressler, East Carolina University

Ashley Holder, Fayetteville State University

Alexis Dunekack, East Carolina University

**Concurrent Session # 11 (Advance Viewing of Pre-recorded Presentations with 60-minute Real time/ Live Q&A)**

**11:00 am – 12:00 pm**

**Strand 5: College Science Teaching and Learning (Grades 13-20)**

***Buttress and Barriers to Constructing College Cultures of STEM***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Shana McAlexander, North Carolina State University

**Approaches to Learning Biology of Women of Color: The Intersectionality of Gender, Race, and Science-Identity**

Angela Google, Middle Tennessee State University

Anna Grinath, Idaho State University

Grant Gardner, Middle Tennessee State University

Eshan Patel, Middle Tennessee State University

**A qualitative investigation of students' acceptance of evolution**

Ryan Dunk, University of Northern Colorado

Jason Wiles, Syracuse University

**Culturally Responsive Teaching in Undergraduate Science Learning Spaces**

Hillary Barron, University of Minnesota - Twin Cities

Julie Brown, University of Florida

Sehoya Cotner, University of Minnesota

**Physical Science Doctoral Students' Perspectives on Obstacles and Opportunities for Identity Development in Graduate School**

Anne McAlister, University of Virginia

Sarah Lilly, University of Virginia

Jennifer Chiu, University of Virginia

**Strand 5: College Science Teaching and Learning (Grades 13-20)**

***Alternative Routes to College STEM***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Petra Kranzfelder, University of California, Merced

**Nature of Uncertainty in Undergraduate Non-Majors Biology Labs: Face-to-Face vs. Online Formats**

Samantha Skrob, Florida State University

Sherry Southerland, Florida State University

**"In the End, You Actually Remember Learning Stuff": First-Generation College Undergraduates Perspectives of Student-Centered Instruction**

Ashley Harlow, University of California, Irvine

Brian Sato, University of California, Irvine

**Non-traditional adult learners as legitimate participants in undergraduate STEM outreach programs**

Hannah Huvad, University of Colorado, Denver

Robert Talbot, University of Colorado, Denver

Michael Ferrara, National Science Foundation

**Creating Communities of Support at Two-Year HSIs: Serving Underrepresented Students in STEM**

Victoria Rodriguez-Operana, San Diego State University

Gabriela Kovats Sánchez, San Diego State University

Felisha Herrera, San Diego State University

Marlena Wolfgramm, San Diego State University



## Strand 6: Science Learning in Informal Contexts

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### ***Informal Educator Experiences***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**President:** Clausell Mathis, University of Washington

### **Preservice Elementary Teachers' Perspectives of Informal Science Spaces**

Michelle Forsythe, Texas State University

Yun-Wen Chan, Texas State University

### **Teaching Science to Refugees: A Multi-site Case Study of Volunteer Educators in Non-formal Education Settings**

Erika Gillette, College of Mount Saint Vincent

### **Informal Science Educators' Perceptions of Effective Facilitation Practices**

Alexandria Muller, University of California- Santa Barbara

Kyle Van Loon, University of California- Santa Barbara

Molly Hay, University of California- Santa Barbara

Jasmine Marckwordt, University of California- Santa Barbara

Ron Skinner, MOXI, The Wolf Museum of Exploration and Innovation

Danielle Boyd Harlow, University of California- Santa Barbara

### **Parent-child Science Talk to Support Children's Informal Learning at Home**

Wahyu Setioko, Ohio State University

Lin Ding, Ohio State University

## Strand 6: Science Learning in Informal Contexts

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### ***Informal Science Clubs***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**President:** Alpaslan Sahin, Harmony Public Schools

### **Bridging formal and informal education in an afterschool science club for children from low-income communities**

Lydia Burke, University of Toronto

Megan Pham-Quan, University of Toronto

Novella Ricotti, University of Toronto

Natalie Marentic, University of Toronto

### **Investigating How 4-H Project Manuals Engage Children in Science & Engineering Practices**

Ashley Kookan, West Virginia University

Jennifer Murray, West Virginia University

Melissa Luna, West Virginia University

### **Students as Informed Citizens: Constructing Socioscientific Arguments in an Elementary After-School Program**

Melissa Cieto, University of Massachusetts

Dartmouth

Stephen Witzig, University of Massachusetts

Dartmouth

### **"A Leg Up": Accelerating High School Students' Career Trajectories Through Informal STEM Programs**

Kathryn Rende, North Carolina State University

Emma Refvem, North Carolina State University

M. Gail Jones, North Carolina State University

Sarah Carrier, North Carolina State University

Megan Ennes, University of Florida

Julianna Nieuwsma, North Carolina State University

## Strand 7: Pre-service Science Teacher Education

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### ***Development of Pre-service Teacher Knowledge and Practice***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Bridget Miller, University of South Carolina

### **Fostering the TPACK of science teacher students in a pedagogical makerspace**

Anna-Lisa Max, PH Weingarten

Sarah Lukas, PH Weingarten

Holger Weitzel, PH Weingarten

### **The Effects of Modeling Based STEM Education on Alternative Nature of Science Understandings of Pre-service Science Teachers**

Ayse Buber, Dokuz Eylul University

Gul Unal Coban, Dokuz Eylul University

### **Impact of Professional Learning Communities on Preservice Teacher Usage of Reformed Teaching Practices**

Rachael Tawbush, University of Alabama

Dennis Sunal, University of Alabama

### **Towards a Deeper Understanding - The Impact of Cognitive Support on Pre-Service Teachers' Content Knowledge**

Dustin Schiering, Leibniz Institute for Science and Mathematics Education

Stefan Sorge, Leibniz Institute for Science and Mathematics Education

Knut Neumann, Leibniz Institute for Science and Mathematics Education

## Strand 7: Pre-service Science Teacher Education

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### ***Expanding the Toolkit for Pre-service Teachers***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Imran Tufail, University of Waikato

### **Opportunities and Tensions When Teaching for the edTPA**

Karin Lohwasser, University of California, Santa Barbara

Soo-Yean Shim, University of Washington

Caroline Hadley Long, University of Washington

Mark Windschitl, University of Washington

### **Lessons from using PAR as Pedagogy in science methods with elementary preservice teachers**

Rachel Askew, Vanderbilt University

### **Engaging international emerging teachers in co-authoring tools through a TAS framework**

Moyu Zhang, New York University

### **How Practice-oriented Teacher-training Modules Affect Pre-service Biology Teachers' Views on Inclusive Science Education**

Elizabeth Watts, Friedrich Schiller Universität Jena

## Strand 8: In-service Science Teacher Education

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### ***Teacher Engagement in Science Practices***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Nidaa Makki, The University of Akron

### **Research Experience Enriches Teachers' Classroom Practices Related to Science and Engineering Practices and STEM Careers**

Sanlyn Buxner, University of Arizona

Daniel Moreno, University of Arizona

Larry Horvath, San Francisco State University

John Keller, University of Colorado

Melissa Yisak, American Institutes for Research

Bo Zhu, American Institutes for Research

Deidre Sessoms, Sacramento State University

Dermot Donnelly-Hermosillo, Fresno State

Elsa Bailey, San Francisco State University

Stamatis Vokos, Cal Poly, San Luis Obispo

### **Critical Events as Catalysts for Cultivating Teachers' Understandings about Science through Firsthand Research Experiences**

Shannon Davidson, Florida State University

Lama Jaber, Florida State University

Sherry Southerland, Florida State University

### **Designing professional learning experiences to support teachers' computational thinking learning and confidence**

Amanda Peel, Northwestern University

Jacob Kelter, Northwestern University

Michael Horn, Northwestern University

Uri Wilensky, Northwestern University

### **The Efficacy of SciWorld in Solving the Transfer Problem and Supporting Teacher Enactment of the Next Generation Science Standards**

Darby Feldwinn, University of California, Santa Barbara

Sarah Hough, University of California, Santa Barbara

Sammi Lambert, University of California, Santa Barbara

Vanessa Woods, University of California, Santa Barbara

## Strand 8: In-service Science Teacher Education

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### ***Teacher Self Efficacy and Perceptions***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Elizabeth Lewis, University of Nebraska–Lincoln

### **Supporting Elementary Teachers in High-need Schools to Teach STEM**

Amanda Gunning, Mercy College

Meghan Marrero, Mercy College

Elena Nitecki, Mercy College

Latanya Brandon, SUNY New Paltz

Kristen Larson, Mercy College

Brian Baldwin, Kean University

### **In-service Course Supporting Teacher Ownership of Proposed Teaching Strategies**

Ana Valdmann, University of Tartu

Miia Rannikmäe, University of Tartu

Jack Holbrook, University of Tartu

### **Teachers' Self-Efficacy Beliefs for Teaching Science as Inquiry: A Large National Sample in Oman**

Mohamed Shahat, Sultan Qaboos University

Ambusaidi Abdullah, Sultan Qaboos University

David Treagust, Curtin University

### **A Comparative Analysis of High School Science Teachers' Perceived Approach and Efficacy Teaching Problem-Solving**

Bryanna Nelson, Purdue University

Hui-Hui Wang, Purdue University

Neil Knobloch, Purdue University

Sarah LaRose, Purdue University

## Strand 8: In-service Science Teacher Education

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### ***Approaches to STEM Implementation***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Matthew Johnson, Pennsylvania State University

### **Exploring Science Teacher Noticing in Informal Science Settings**

Sara Heredia, University of North Carolina Greensboro

Ti'Era Worsley, University of North Carolina at Greensboro

Jakayla Clyburn, University of North Carolina at Greensboro

### **Digging Deeper into Conceptions of Integrated STEM: Focusing on 21st Century Skills and STEM Careers**

Emily Dare, Florida International University

Khomson Keratithamkul, University of Minnesota

Benny Mart Hiwatig, University of Minnesota Twin Cities

Feng Li, Florida International University

### **Engaging Agency to Teach Science: Examining Elementary Teachers' Participation and Enactment of School-Based Professional Development**

Jessica Chen, Columbia University

### **Enhancement of the pedagogy of scientific argumentation and supporting teacher agency in the secondary classroom**

Zeynep Guler, University College London

## Strand 10: Curriculum and Assessment

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### ***Curriculum and assessment in the context of physics***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Ya-nan Zhao, Beijing Normal University

### **Analysis of the Spanish-Language Force Concept Inventory: Lost in Translation?**

Cesar Delgado, North Carolina State University

Hye Sun You, Arkansas Tech University

Natalia Murillo-Quirós, Instituto Tecnológico de Costa Rica

Mónica Hernández-Campos, Instituto Tecnológico de Costa Rica

### **Subject matter as a discipline-culture a new curricular organization for improving understanding in learning science**

Lina Vinitzky-Pinsky, Achva Academic College, Israel

Irena Vladimirsky, Achva Academic College, Israel

Igal Galili, Hebrew University of Jerusalem, Israel

### **Student Facets of Thinking in Parallel Contexts**

Philip Hernandez, Stanford University

Jim Minstrell, FACET Innovations, LLC

Maria Araceli Ruiz-Primo, Stanford University

Min Li, University of Washington

Klint Kanopka, Stanford University

Ruth Anderson, FACET Innovations, LLC

Dongsheng Dong, University of Washington

Xiaoming Zhai, Michigan State University

### **Analyzing the Use of Educative Curriculum Materials in Physics Teaching**

Judith Breuer, Universität Paderborn

Christoph Vogelsang, Universität Paderborn

Peter Reinhold, Universität Paderborn

## Strand 11: Cultural, Social, and Gender Issues

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### ***Students and STEM***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Maria Wallace, University of Southern Mississippi

### **"It just represents, you know, me": Latinx Students Developing Identities as Engineers-in-training**

Jasmine McBeath Nation, California Polytechnic University

### **Science practices as an opportunity for student language development: Affordances, tensions, and ideological contradictions**

Emily Reigh, Stanford University

### **Shifting stereotypes: low-stakes assignments highlighting counterstereotypical scientists alter students' perceptions of and relatability to scientists**

Kelsey Metzger, University of Minnesota Rochester

Bradley Craker, University of Minnesota Rochester

Yuefei Shen, University of Minnesota Twin Cities

### **Influences on Historically Underrepresented Minority Students' Decisions to Enroll and Persist in STEM Majors**

Shetay Ashford-Hanserd, Texas State University

Kristy Daniel, Texas State University

Dana García, Texas State University

Yasiry Lerma, Texas State University

Rosio Pedroso, Texas State University

## Strand 11: Cultural, Social, and Gender Issues

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### ***Teacher Leadership and Engagement in PD***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Kimberly Staples, Kansas State University

### **Science Teachers' Process Skills, Inquiry, and Problem-Based Learning During Induction: A Randomized Controlled Trial**

Shannon Navy, Kent State University

Jennifer Maeng, University of Virginia

Randy Bell, Oregon State University

Fatma Kaya, Kent State University

### **STEM Teachers' Professional Learning Community During the COVID-19 Pandemic**

Zehavit Kohen, Technion - Israel Institute of Technology

Orit Cohen Nissan, Technion - Israel Institute of Technology

### **Experiences of School Science Coordinators During the COVID-19 Pandemic: An International Perspective**

Harleen Singh, University of Georgia

Hong Tran, University of Georgia

Hatice Ozen Tasdemir, University of Georgia

Yuxi Huang, University of Georgia

Julie Luft, University of Georgia

### **Science Teacher Engagement in Professional Learning**

Irit Vivante, Ben Gurion University of the Negev

Dana Vedder-Weiss, Ben-Gurion University of the Negev

## Strand 11: Cultural, Social, and Gender Issues

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### ***STEM Identity***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Cesar Delgado, North Carolina State University

### **STEM Identities, First-generation College Students, and Family Influence**

Megan McGinty, University of Alaska Fairbanks

Laura Carsten Conner, University of Alaska Fairbanks

### **Developing STEM identities in students in the "big middle". Connections between identity and socioeconomic level**

Carne Grimalt-Álvaro, Universitat Rovira I Virgili

Digna Couso, Crecim-Universitat Autònoma De Barcelona

### **Examining the Intersection of Spirituality/Religiousness, Race/Ethnicity, and Gender on the Physics Career Choices**

Saeed Moshfeghyeganeh, Florida International University

Amanda Smith, Florida International University

Zahra Hazari, Florida International University

### **Who is a STEM Person?: Analysis of Criteria Used to Define and Differentiate STEM People**

Elizabeth Palma-D'Souza, Florida International University

Remy Dou, Florida International University

Heidi Cian, Florida International University

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Digital Tools to Support Inservice and Pre-Service Teachers' Professional Learning***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Yael Feldman-Maggor, Weizmann Institute of Science

### **Promote computational thinking of middle-school teachers through SPARC-integrated science instruction**

Jianlan Wang, Texas Tech University

Yuanlin Zhang, Texas Tech University

Joshua Hawkins, Texas Tech University

Monica Romero, Texas Tech University

### **Science teachers' perceptions regarding digital curation as a personalized learning activity that promotes professional learning**

Efrat Dayan, Technion - Israel Institute of Technology

Dina Tsybulsky, Technion - Israel Institute of Technology

### **Elementary Pre-Service Teachers' Learning of Content Knowledge: A Qualitative Research Using Top Hat Digital Platform**

Samantha Lynch, Wayne State University

Jazlin Ebenezer, Wayne State University

### **Different Teaching Experience: How Teachers Personalized a Teaching Unit in an Online Chemistry Learning System**

Ehud Aviran, Weizmann Institute of Science

Ron Blonder, Weizmann Institute of Science

## Strand 12: Technology for Teaching, Learning, and Research

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### ***Teaching and Learning with Technology through the COVID-19 Pandemic***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Miri Barak, Technion - Israel Institute of Technology

### **The COVID-19 Pandemic Implications on a Flipped Project-Based MBSE course**

Niva Wengrowicz, Technion- Israel Institute of Technology

Hanan Kohen, Technion - Israel Institute of Technology

Dov Dori, Technion - Israel Institute of Technology

### **Uncharted Territories: Teaching Science Virtually in the Era of COVID-19**

Justina Ogodo, Baylor University

Marsha Simon, University of West Georgia

Dana Morris, Baylor University

Mark Akubo, Florida State University

### **Learning Experience and Instructional Design Efforts Promoting Self-Efficacy and Task-Value in Undergraduate Science Online Courses**

Joseph Wong, University of California, Irvine

Brad Hughes, University of California, Irvine

### **Multi-modal online teaching during national lockdown: Exploring the blended continuum teaching science**

Frikkie George, Cape Peninsula University of Technology

Ekaterina Rzyankina, Cape Peninsula University of Technology

Keith Langenhoven, University of the Western Cape

## Strand 14: Environmental Education and Sustainability

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### ***Learning out of doors***

11:00am -12:00 pm

Advanced Pre-recorded Viewing & Live Q&A

**Presenter:** Sara Salisbury, Middle Tennessee State University

### **Engaging the Urban Classroom with the Natural World: Lessons Learned During A Pandemic**

Gary Holliday, The University of Akron

Lara Roketenetz, The University of Akron

### **Impacts of contextualized outdoor education on what and how elementary students learn about ecosystem relationships**

Jean-Philippe Ayotte-Beaudet, Université De Sherbrooke

Pierre Chastenay, Université du Québec à Montréal

Alain Paquette, Université du Québec à Montréal

Michael Giamellaro, Oregon State University

Marie-Claude Beaudry, Université de Sherbrooke

Kassandra L'Heureux, Université de Sherbrooke

Estelle Desjarlais, Université du Québec à Montréal

### **A Comparative Study Between Outcomes of an In-person vs. Online Introductory Field Course**

Alexandra Race, University of California - Santa Cruz

Maria De Jesus, Florida State University

Roxanne Beltran, University of California - Santa Cruz

Erika Zavaleta, University of California - Santa Cruz

### **Preservice teachers' perceptions and practices of outdoor learning: A case study of time spent outdoors**

Gerald Tembrevilla, University of British Columbia – Vancouver

Hartley Banack, University of British Columbia

**Saturday, April 10, 2021**

**CLOSING SESSION**  
**12:15-1:00 pm (Real time/ Live)**

**Presidential Closing Remarks,  
2022 Conference Information**

12:15pm-1:00pm  
Real time/ Live

**Author-Scheduled Presentations**  
**Day and Time to be determined by authors**

*Author-scheduled presentations will be listed here as  
their dates and times are established.*