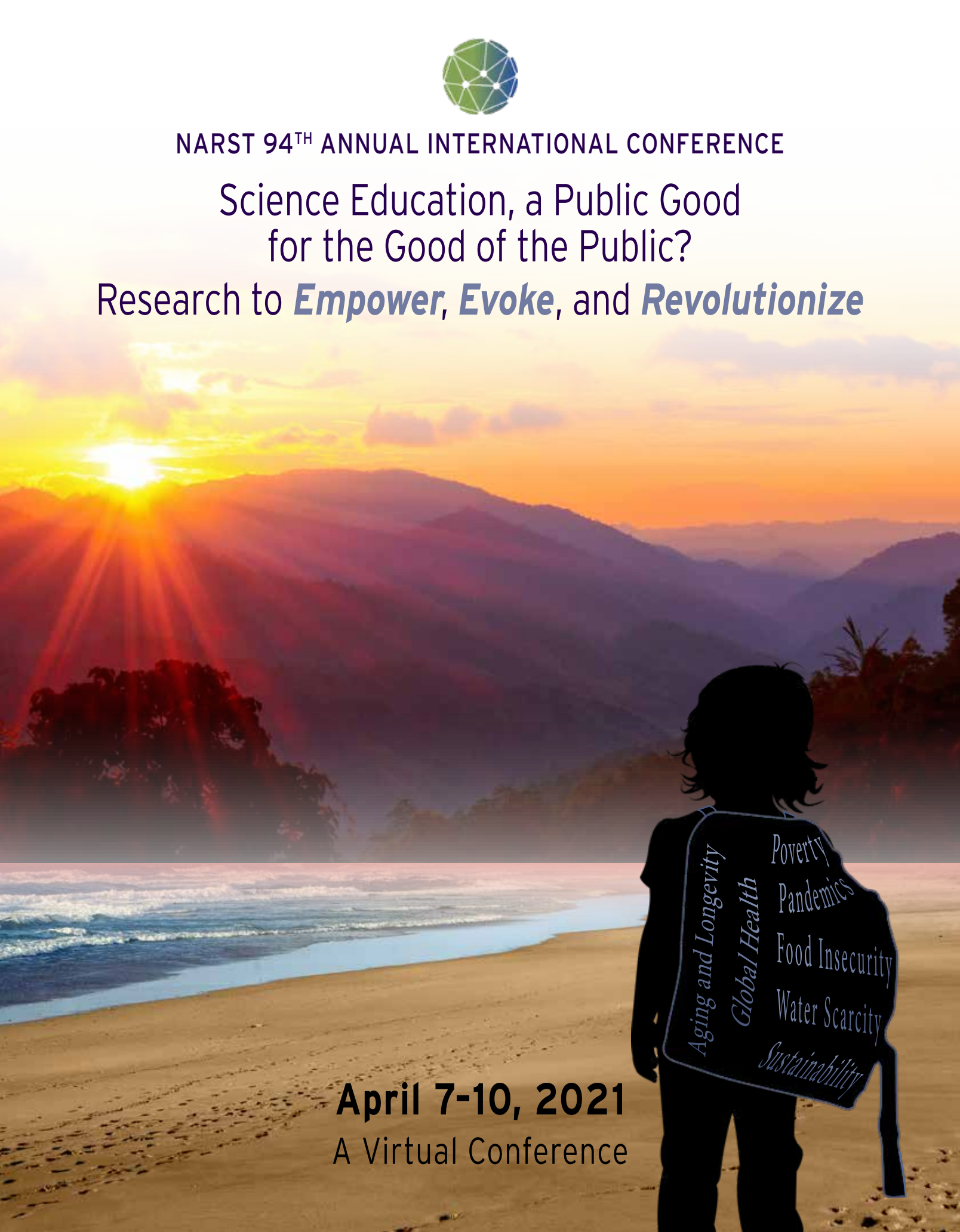
NARST 94TH ANNUAL INTERNATIONAL CONFERENCE

Science Education, a Public Good for the Good of the Public?

Research to ***Empower***, ***Evoke***, and ***Revolutionize***



April 7-10, 2021

A Virtual Conference

BREAKTHROUGH

INCLUSIVE
ACTION
TOOL KIT

science FRIDAY

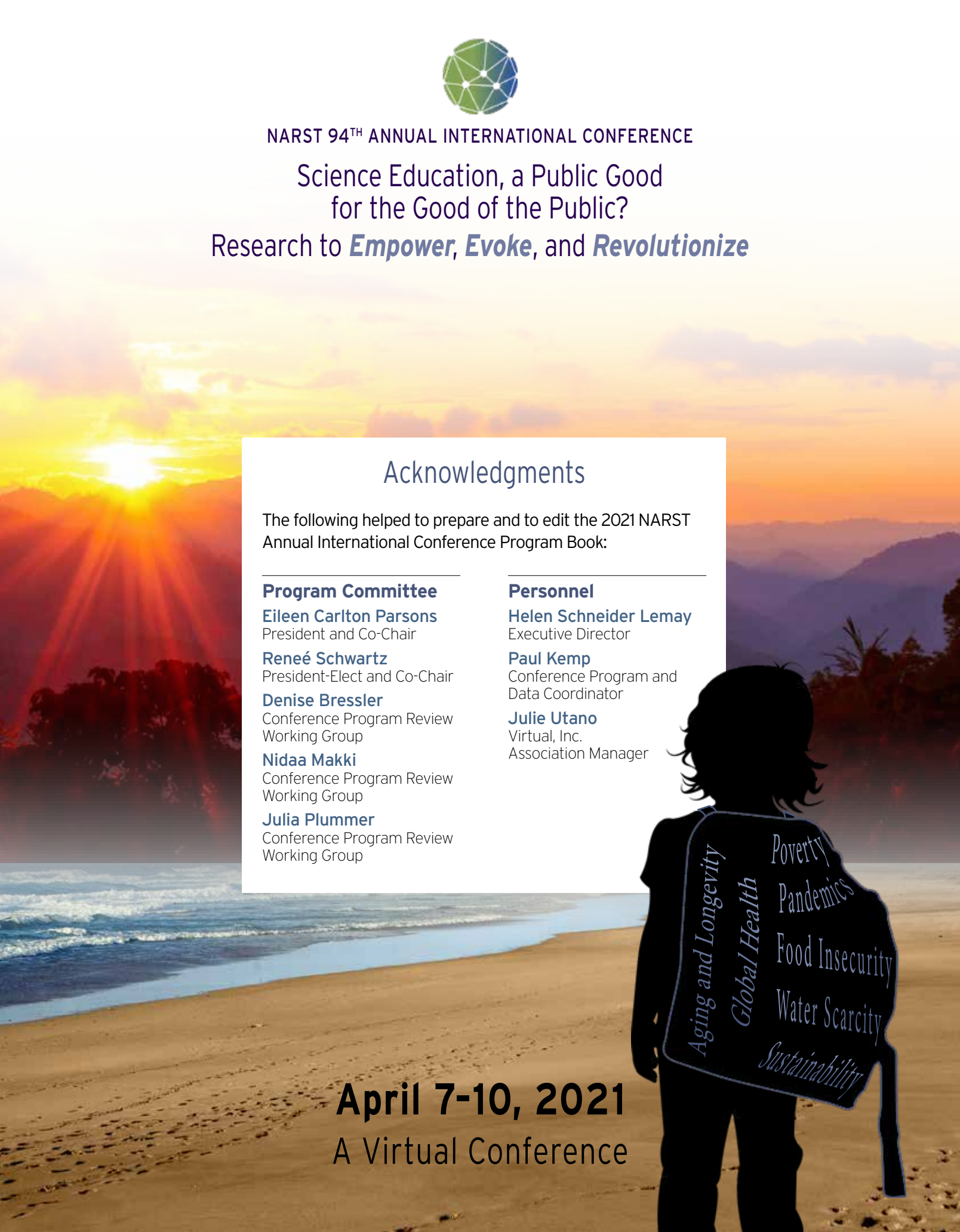
hhmi | Tangled Bank Studios

Version 1.0
(September 2020)

NARST 94TH ANNUAL INTERNATIONAL CONFERENCE

Science Education, a Public Good for the Good of the Public?

Research to ***Empower***, ***Evoke***, and ***Revolutionize***



Acknowledgments

The following helped to prepare and to edit the 2021 NARST Annual International Conference Program Book:

Program Committee

Eileen Carlton Parsons
President and Co-Chair

Reneé Schwartz
President-Elect and Co-Chair

Denise Bressler
Conference Program Review Working Group

Nidaa Makki
Conference Program Review Working Group

Julia Plummer
Conference Program Review Working Group

Personnel

Helen Schneider Lemay
Executive Director

Paul Kemp
Conference Program and Data Coordinator

Julie Utano
Virtual, Inc.
Association Manager

April 7-10, 2021

A Virtual Conference

NARST 94TH ANNUAL INTERNATIONAL CONFERENCE

Table of Contents

Please note that this program is subject to change.

Check the addendum posted at the meeting and on the website for updates.

General Information

Information about NARST

NARST is a worldwide organization for improving science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy.

The Association is incorporated as a non-profit corporation in the State of Minnesota. The official publication is the *Journal of Research in Science Teaching* (*JRST*). NARST encourages presentations of a wide variety of investigations in all aspects of science education, including action, historical, philosophical, ethnographic, experimental, and evaluative research studies. Reports of empirical research, critical reviews, and theoretical works are encouraged. In October 2010, to reflect the Association's growing international focus and membership, the Board approved referring to the Association by its acronym only. At the April 2011 Board Meeting, the tagline for the Association was approved by the Board. Thus, the Association's name and tagline is:

NARST—A global organization for improving science education through research.

Research areas of interest to NARST members include, but are not limited to, curriculum and assessment, science learning in different contexts, teacher education, policy and reform, technology, equity studies, and methods of teaching.

NARST Mission Statement

NARST is a worldwide organization of professionals committed to the improvement of science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research.

The ultimate goal of NARST is to help all learners achieve science literacy. NARST promotes this goal by: **1)** encouraging and supporting the application of diverse research methods and theoretical perspectives from multiple disciplines to the investigation of teaching and learning in science; **2)** communicating science education research findings to researchers, practitioners, and policy makers; and **3)** cooperating with other educational and scientific societies to influence educational policies.

Member Benefits

Ten issues of the *Journal of Research in Science Teaching* (*JRST*) are published each volume year. *JRST* has been ranked as one of the highest quality educational journals according to studies published by War, Holland and Schramm (*American Educational Research Journal*) and Guba and Clark (*Educational Researcher*) for the American Educational Research Association (AERA). These authors identified *JRST* as clearly the top research journal in science education.

Members have access to the *JRST* online through Wiley InterScience. Members also have access to a listserv, an opportunity to connect with members from 40 different countries, and access to various initiatives. Visit narst.org for more information.

Code of Ethical Conduct

The purpose of the National Association of Research in Science Teaching (NARST) Code of Ethical Conduct is to articulate a set of aspirational principles to guide and support members as they engage in professional activities—research, teaching, and service. NARST members are science education professionals who include researchers, practitioners, and graduate students from various cultures worldwide. These aspirational principles align with and support the mission of the organization to help all members achieve, develop, and contribute meaningfully to the improvement of science teaching and learning through research. NARST expects its members to adhere to the highest ethical standards. The Code of Ethical Conduct serves as a guide to the everyday professional conduct of science educators.

Unfamiliarity with NARST's Code of Ethical Conduct is not a valid defense for engaging in or failing to challenge observed unethical behavior. We accomplish this through our Code of Ethical Conduct where there is:

A. Professional Competence

Science education professionals strive to maintain the highest levels of competence in their work; they recognize the limitations of their expertise; and they undertake only those tasks for which they are qualified by education, training, or experience. They recognize the

need for ongoing education in order to remain professionally competent; and they utilize the appropriate scientific, scholarly, professional, technical, and administrative resources needed to ensure honesty and integrity. Science education professionals conduct research, teach, practice, and provide service only within the boundaries of their competence, based on their education, training, supervised experience, or appropriate professional experience. They consult with other professionals when necessary for the benefit of their students, research participants, and clients. They maintain awareness of current scientific, scholarly, and professional information in their fields of activity and undertake continuing efforts to maintain competence in the skills they use. Importantly, professional competence must also include a willingness to accept and integrate new information and experiences, regardless of the effect that process has on research outcomes.

B. Integrity

It is the social responsibility of science education professionals to maintain integrity in all conduct, publications, and forums, and give due credit to the contributions of others. Adhering to this standard means science education professionals do not fabricate, falsify, or plagiarize. Public comments on matters of importance that are relevant to science education must be made with care and accuracy. Adhering to this standard means science education professionals do not use deficit language, deceptive statements concerning research data, or otherwise knowingly make false, misleading or deceptive statements in practicing and presenting research. Comment and debate within the bounds of collegiality and professionalism that keep the organization moving forward and current with emergent issues and perspectives are encouraged. Adhering to this standard means science education professionals do not use dismissive remarks or gestures, restrict multiple voices, or use derogatory language. In short, science education professionals conduct their professional activities in ways that engender trust and confidence.

C. Professional and Scholarly Responsibility in Science Teaching, Learning, and Research

Science education professionals have a responsibility to use research practice and policy to advance NARST members' understanding of the teaching and learning of science in all learning contexts– formal, informal, local, and global–through research, practice, and policy. They adhere to the highest scholarly and professional standards within their field of expertise and accept responsibility for adherence to those standards. Science education professionals should regard the tutelage of graduate students and early career faculty as a trust conferred by the organization for which they work, as well as NARST, for the promotion of these individuals' learning and professional development.

Science education professionals understand that they form a community and show respect for other science education professionals even when they disagree on theoretical, methodological, or personal approaches to professional activities. In activities involving marginalized populations, it is essential that responsible science education professionals seek out the voices and experiences of members of these groups and treat them as critical to their scholarship. While always endeavoring to be collegial, science education professionals must never let the desire to be collegial outweigh their shared responsibility for ethical behavior. When appropriate, they consult with colleagues, NARST's Equity and Ethics

Committee, or organizational entities such as their institutional review board in order to prevent, avoid, or challenge unethical conduct.

D. Respect for People's Rights, Dignity, and Diversity

Science education professionals respect the rights, dignity, and worth of all people in their professional activities. They treat other professionals, students, research participants, and members of the organization fairly, respectfully, and without exploitation or harassment. Science education professionals acknowledge the rights of others to hold values, attitudes, and opinions that differ from their own and take reasonable steps to avoid harm to others in the conduct of their work. They learn with others, share ideas honestly, give credit for others' contributions, and encourage others to contribute their unique skills, knowledge, and interests in professional environments. Science education professionals are sensitive to cultural, individual, and role differences in teaching, studying, and providing service to groups of people with distinctive characteristics, as well as the power differential that might result from such differences.

Science education professionals carefully avoid discrimination and bias toward individuals and groups based on race, gender, age, religion, ethnicity, nationality, sexual orientation, gender expression, gender identity, presence of disabilities, educational background, socioeconomic status, or other personal attributes. They refrain from making biased assumptions about others and perpetuating demeaning attitudes and stereotypes. Science education professionals do not accept any forms of discrimination and actively challenge implicit and explicit forms of discrimination.

E. Social Responsibility

Science education professionals are aware of their scientific and professional responsibility to the communities and societies in which they live. This awareness extends to their involvement and service to an increasingly diverse and international NARST community. NARST members are guided by the values and standards that reflect the professional literature. They strive to promote equity and the public good by advancing scientific and scholarly knowledge. Science education professionals are aware of the differences in society and culture that impact scholarly knowledge and academic work. They value and embrace the public trust in research and teaching and are concerned about their ethical behavior and the behavior of other science education professionals that might compromise that trust. Science education professionals should reasonably expect of themselves and others to be guided by a code of ethics that supports efforts to resolve ethical dilemmas.

References

AERA Council. (2011). Code of ethics: American Educational Research Association. Educational Researcher, 40(3), 145-146.

American Sociological Association. (1999). Code of ethics and policies and procedures of the ASA committee on professional ethics. Retrieved from: http://www.asanet.org/membership/code-ethics

American Psychological Association. (2017). Ethical principles of psychologists and code of conduct. Retrieved from: http://www.apa.org/ethics/code/

Explanation of Paper Session Types

Type	Description
Paper Sessions Organized by the Program Committee:	Stand-alone papers grouped by strand coordinators comprise this session. The session title in the conference program features a common thread among the grouped papers. In this session, a real-time/live presentation of no more than 15 minutes is provided for each paper with approximately 5 additional minutes used for Q&A.
Symposium	This paper session type emphasizes a theme or issue identified by the proposers. The symposium does not usually offer a slate of individual presentations; consequently, individual papers are not listed in the conference program and presenters are listed as a group. The proposer(s) of the symposium decide what transpires during the session.
Related Paper Sets	This paper session type features several related research papers reporting studies that originate from a common base of research. This session type allows for common elements of design or approach to be presented once rather than repetitively. The proposer(s) of the related papers sets decide what transpires during the session. Because these sessions are indistinguishable from the paper sessions organized by the Program Committee, these sessions are labeled "related paper set" in the PDF version of the 2021 conference program.
Posters	This paper session type visually showcases the presenters' work in a standard poster format.

Explanation of Program Session Formats

Session	Description
Pre-Conference Workshops	Interactive working group sessions before the official Conference
Graduate Student Forum	Synchronous opportunity for graduate students to interact and learn.
Mentor-Mentee Session	Synchronous opportunity for first attendees to conference and early-career individuals to interact with more seasoned NARST members.
Poster Sessions	Traditional poster display activated for a 23-hour window with asynchronous interaction by way of chat during the 23 hours.
Author-Scheduled Presentations (all Strands)	These slots are scheduled by necessity. Authors prerecord and post presentations. In addition, authors schedule a 30-minute Q&A (analogous to "office hours") with author-designated time and appropriate link posted in the conference program. Participants view the pre-recorded presentation in advance of the "office hours."
Networking/ Social Concurrent Sessions	Synchronous opportunities to interact with participants around a theme/topic/ activity.
Concurrent Sessions	Two session types: Synchronous sessions in which multiple papers are presented and discussed. Presentations are pre-recorded and viewed in advance by attendees with only a synopsis and Q&A conducted in real-time.

Guidelines for Real-Time/Live Meeting Presenters

- Presenters join live sessions 10 minutes in advance of the session start time.
- Presenters will be co-host upon joining the Zoom meeting room.
- In paper sessions organized by the Program Committee, all papers are allotted 15 minutes for presentation followed by 5 minutes of Q&A. Presiders along with the presenters will determine if the Q&A occurs after each presentation or after all presentations have concluded.
- For the symposium, the proposer(s) manage what transpires in the session, with the assistance of a presider or discussant if the proposer(s) designated a person to serve in these roles at the time of the proposal submission. Presiders or discussants are inconsistently listed in the program for this session type.
- Presenter(s) should become familiar with the Zoom platform and practice using it, especially with the functions they may employ (e.g., screen share, breakout, mute/unmute, camera on/off).

Guidelines for Pre-recorded Meeting Presenters

- Advanced Pre-recording Viewing & Live Q&A presentations are referred to as "On-Demand Playback + Live Q & A" in other materials; they are the same. Attendees are expected to view pre-recorded presentations in advance of the scheduled session. At the scheduled session held real-time/live, presenters will provide a verbal summary (no more than 5 minutes) of the research and engage attendees in Q&A and discussion. As in the case at an in-person conference, the exact proceedings of the 60-minute live session will be determined by the speakers and the presider of the session (e.g., Q&A after each presenter summary or Q&A after all presenter summaries).
- Presenters join live sessions 10 minutes in advance of the session start time.
- Presenters will be co-host upon joining the Zoom meeting room.
- Presenter(s) should become familiar with the Zoom platform and practice using it (e.g., mute/unmute, camera on/off).

Guidelines for Poster Meeting Presenters

- This paper session type visually showcases the presenters' work in a standard poster format.
- The eposter is presented in the template provided by NARST. Because many posters will be displayed for attendees to peruse and read, a standardized template will enable attendees to focus more quickly on the content in lieu of navigating an array of formats—a tax on cognitive processing.
- The eposter template is standardized in terms of its size. Please do not change the overall size or increase the number of boxes/sections. Please feel free to change the color scheme, the header/title for boxes/ sections, decrease the number of boxes/sections, and add any information (text, pictures, and graphs, etc.) you deem pertinent to your work.

Guidelines for Presiders and Discussants

Presiders or discussants are listed for some, but not all, sessions in the conference program. For sessions without presiders or discussants, it is necessary for presenters to assume the essential duties and set aside time for discussion so that the audience participants can contribute to a discussion of the papers.

The role of the presider involves several functions. Guidance on fulfilling the role is as follows:

- Become familiar with the Zoom platform before the conference.
- Arrive 10 minutes prior to the start of the session.
- Check pronunciations of the names of the presenters and their institutions.
- For the sessions for which it is appropriate (e.g., paper sessions organized by the Program Committee), meet with presenters, and make a time plan, retaining the order of presenters in the program.
- It may be helpful to develop a power point title slide and "share screen" so attendees can see the session title as they enter the space.
- Enable Live Transcription/Caption
- Start session promptly.
- Announce the session title to ensure attendees are in the space they intended.
- Remind the audience to mute their microphones by directing them to the microphone icon (usually located at the bottom, top, or side of the Zoom window).
- Remind the audience of the chat function for their use by directing them to the comment icon (usually located at the bottom, top, or side of the Zoom window).
- Introduce presenters and serve as timekeeper.
- For the sessions for which it is appropriate (e.g., paper sessions organized by the Program Committee), signal when presenters have 5, 3, and 1 minute remaining of a 15-minute presentation and 1 minute remaining of a 5-minute summary. It is important to end each presentation within the agreed allocated time to ensure fairness to all presenters and to end the session on time. One suggestion that may be followed: if someone begins to exceed the presentation's allotted time, then politely interrupt and announce to the audience that further discussion directly with the author(s) is encouraged offline at the conclusion of the entire session.
- Facilitate discussion and manage Q&A, assuring equitable involvement of audience members.
- At the conclusion of the session, remind the audience to leave the virtual space and remind them of the time of the next session.

The role of the discussant primarily focuses on papers. Guidance is as follows:

- Read papers, provided by presenters, before the session.
- If a presider is not present, then perform presider duties as detailed in the guidance for presiders.
- After the presentation, make brief and cogent remarks on each paper with suggestions for future research.

Networking Concurrent Sessions: Together around the Globe

April 8th at 3:30 – 5:30 pm

Aikido–(and Physics!) Inspired Breathing, Balance, Stretching, and Movement

(duration: 30 min)

We will spend our time together learning and practicing a series of movements we can use to help our bodies and minds prepare for or unwind from too much computer time. Combining movements from Aikido (a Japanese Martial Art), understandings from physics, and some ideas from Tai Chi, we will focus on necks, shoulders, backs, and wrists in particular, but we will also do whole body movements to reconnect with our bodies and help us move more comfortably. We will also do some focused breathing. No experience, ability, or equipment necessary–all are welcome. Looking forward to seeing you on the (virtual) mat!

CADASE Graduate Student Fireside Chat: Navigating Academe with Success

(duration: 60 min)

The goal of this session is to support doctoral candidates and newly minted graduates with securing careers in the academy. Panelists include early career scholars who will discuss their experiences navigating the academic job market.

The CADASE Social: Intriguing Scenes from Movies and TV Shows

(duration: 45 min)

The CADASE Steering Committee will feature members of the CADASE RIG to facilitate the engagement of informal conversations around movies and TV shows that have entertained and intrigued us throughout the COVID-19 pandemic.

Knitting Circle—All Levels Welcome
(duration: 60 min)

Wouldn't it be great to just sit and knit? Bring your own yarn and needles—this session will gather knitters new and experienced to create the community that is built when we learn and create together. New knitters can pick up some tips on casting on, and simple stockinette stitches, while experienced knitters can swap ideas and techniques.

Learning Science in the Schoolyard—Centering Equity
(duration: 60 min)

Come gather with other researchers and practitioners interested in outdoor learning at school. Hear about others' work and share ways in which we can work towards more equitable experiences in the schoolyard. Topics include place-based instruction, building educator capacity, and the impact of remote learning in the pandemic. Bring some tea or coffee and meet new colleagues!

Let's Escape Together!
(duration: 60 min)

Need to escape from your reality for a little while? We will divide up in pairs to try a virtual escape style experience. It's freely available online and partners can simply call each other to communicate. If you escape with time to spare, we can chat about the value of escape experiences for STEM education or we can just celebrate your epic escapes!

NSF Funding Programs and More
(duration: 120 min)

In this session, NSF program officers will describe various funding opportunities in formal and informal STEM education, undergraduate and graduate STEM education, as well as CAREER for junior faculty. They will also describe the standard proposal review process and the merit review criteria. Much time will be for Q&A on various topics ranging from writing competitive proposals, to volunteering to be a proposal reviewer, managing funded programs, and working at NSF as a rotating and permanent program officer. The session will consist of both formal presentations and informal discussion. Pending the interests of attendees and technology, breakout sessions may also take place.

NARST Fellows Award Program
(duration: 45 min)

This session will introduce and celebrate NARST's first named Fellow(s). The Fellow(s) will have an opportunity to briefly share their work and engage with a vision for developing the NARST Fellows Community. In addition, this session will also provide a forum for the NARST community to learn more about the award program.

NARST Has Talent: An April FARSE
(duration: 45 min)

A digital reincarnation of FARSE, this year's "Talent" show will feature a competition of creative 3-minute video products competing for "likes" to make it into the final online showcase sent out via the NARST listserv. A farcical look at academic life through the eyes of our members in the context of COVID-19, pets, children, backyard activities, new hobbies, exercise, musical ventures, and academic pursuits.

"PeTagogy": Meeting Pets of NARST Members
(duration 30 min)

PeTagogy is an informal 30-minute session for NARST members to introduce their pets. Pets include loving dogs, grumpy cats, chickens, horses, lizards, and all the exotic pets one can have! Live pet introductions are encouraged, but pictures and short videos are accepted to show during this live session.

April 9th at 8:30 – 9:30 am

Art-based Social Meet-up
(duration: 30 min)

This is a short informal session where we can get to know each other in a different way. In the session I will give a brief introduction of art-based-methods and we will then engage in an exercise. The idea is to use art-based methods to experiment with getting to know each other in a fun way despite the distance.

Drop Your Research/Theory/Test tube like it's Hot
(duration: 60 min)

This session will provide a space for informal community building. It will involve a jam session that will feature an eclectic musical lineup from all over the world. The goal here is to provide a space to connect with other NARST members, decompress, and dance the time away. Since the act of dancing is related to spatial awareness, raises the heart rate, and results in the release of endorphins, we hypothesize that dancing in community will inform positive vibes for NARST'ers.

April 9th at 3:15 – 5:30 pm

Among Us Scholars
(duration: 60 min)

Participants for this session will play the video game "Among us".

Enjoying or Enduring the Process of Tenure during the COVID-19 Pandemic
(duration: 60 min)

This general session is open to all non-tenure, tenure-track professors and postdoctoral fellows. The goals are **1)** to socialize and get to know others who are in the tenure process, **2)** to use discourse to ease our pent-up stress and emotions, and **3)** to amuse, uplift, share, and guide each other on ways to fulfill this self-enamored milestone, which we all hope to achieve. Lastly, it will provide a networking opportunity for collaborative work for those with similar interests.

Informal Music Sharing/Jamming Networking
(duration: 60 min)

The session will start by networking fellow musicians within the NARST community. We will discuss common musical interests and any instruments we play (including vocals). This could lead to collaborations between annual meetings that could lead to fun live performances and or/ sing-a-longs at annual meetings. At the session, if time permits, we might even jam a little.

Mindfulness Practices for Stress Relief and Self Care in the Time of COVID
(duration: 90 mins)

Organizer:
Paula Huffman, University of North Carolina at Chapel Hill, UNC Program on Integrative Medicine

This Mindfulness workshop will:

- Develop strategies for using Mindfulness Techniques that can be practiced anywhere, anytime.
- Practice techniques that help to cultivate the ability to respond from a calmer baseline to daily life events.
- Learn ways to slow the ruminating mind, thereby decreasing catastrophic thinking and its effect on our overall well-being.
- Enhance stress resiliency as we develop techniques for intentionally focusing on positive and pleasurable life events.

Research Interest Groups (RIGs) Information

The Continental and Diasporic Africa in Science Education RIG (CADASE)
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.

Latino/a RIG (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.

Contemporary Methods for Science Education Research
The broad purpose of this RIG is to advance the mission of NARST by maintaining the rigor of science education studies, as well as promoting more standardized research practices across the organization such that we are better able to learn from and synthesize each other's work. The intent is that these outcomes will, in turn, allow us to keep advancing the field and maintain the relevance of our research to improving science teaching and learning.

Engineering Education RIG (ENE-RIG)
The purpose of the RIG in Engineering Education is to synergize research in science and engineering education, promote rigorous research in engineering education, and provide a collaboration and discussion space supporting intellectual and professional exchange and networking.

Indigenous Science Knowledge RIG (ISK-RIG)
The purposes of ISK RIG is to bring together scholars, practitioners, policy makers, and community members who are interested and involved in Indigenous science education. The mission is to bring likeminded and eager science educators who are committed to providing science opportunities to better the lives of all Indigenous Tribes and peoples of the world.

General Information

Strand Key

Strand 1:	**Science Learning–Development of Student Understanding**
Strand 2:	**Science Learning: Contexts, Characteristics, and Interactions**
Strand 3:	**Science Teaching–Primary School Characteristics and Strategies** (Grades PreK-6)
Strand 4:	**Science Teaching–Middle and High School Characteristics and Strategies** (Grades 5-12)
Strand 5:	**College Science Teaching and Learning** (Grades 13-20)
Strand 6:	**Science Learning in Informal Contexts**
Strand 7:	**Pre-service Science Teacher Education**
Strand 8:	**In-service Science Teacher Education**
Strand 9:	*Discontinued*
Strand 10:	**Curriculum and Assessment**
Strand 11:	**Cultural, Social, and Gender Issues**
Strand 12:	**Technology for Teaching, Learning, and Research**
Strand 13:	**History, Philosophy, Sociology, and Nature of Science**
Strand 14:	**Environmental Education and Sustainability**
Strand 15:	**Policy, Reform and Program Evaluation**

2020–2021 NARST Leadership Team

Officers and Board of Directors:

President
Eileen Carlton Parsons, University of North Carolina at Chapel Hill

President-Elect
Reneé Schwartz, Georgia State University

Secretary-Treasurer
Jerome Shaw, University of California Santa Cruz

Immediate Past President
Tali Tal, Technion, Israel Institute of Technology

Executive Director
Helen Schneider Lemay

Executive Board:

(21) **Jennifer D. Adams**, University of Calgary

(21) **Alejandro J. Gallard**, Georgia Southern University

(21) **Senay Purzer**, Purdue University

(21) **Christa Haverly** (Graduate Student Coordinator), Northwestern University

(22) **Noemi Waight**, University of Buffalo

(22) **Bhaskar Upadhyay**, University of Minnesota

(22) **Sonya N. Martin** (International Coordinator), Seoul National University

(23) **Christina Schwarz**, Michigan State University

(23) **Knut Neumann**, IPN-Leibniz Institute for Science and Mathematics Education

(23) **Brooke Whitworth**, Clemson University

General Information

NARST Liaison to NSTA:
(21) **G. Michael Bowen**, Mount Saint Vincent University

NSTA Representative:
(21) **Cynthia Crockett**, Harvard-Smithsonian Center for Astrophysics

***JRST* Editors:**
(25) **Troy Sadler**, University of North Carolina at Chapel Hill

(25) **Felicia Moore Mensah**, Teachers College, Columbia University

2020-2021 Strand Coordinators:

Strand 1:
Science Learning—Development of Student Understanding
(21) **Sarah J. Fick**, Washington State University
(22) **Bahadir Namdar**, Recep Tayyip Erdogan University

Strand 2:
Science Learning: Contexts, Characteristics and Interactions
(21) **Julia Plummer**, Pennsylvania State University
(22) **Edna Tan**, University of NorthCarolina-Greensboro

Strand 3:
Science Teaching—Primary School Characteristics and Strategies
(Grades preK-6)
(21) **Ryan Nixon**, Brigham Young University
(22) **Ornit Spektor-Levy**, Bar Ilan University

Strand 4:
Science Teaching—Middle and High School Characteristics and Strategies
(Grades 5-12)
(21) **Neta Shaby**, Oregon State University
(22) **Shannon Navy**, Kent State University

Strand 5:
College Science Teaching and Learning
(Grades 13-20)
(21) **Jonah Firestone**, Washington State University Tri-Cities
(22) **Anne Emerson Leak**, High Point University

Strand 6:
Science Learning in Informal Contexts
(21) **Anton Puvirajah**, University of Western Ontario
(22) **June Teisan**, Belle Isle Aquarium

Strand 7:
Pre-service Science Teacher Education
(21) **Michelle A. Fleming**, Wright State University
(22) **Takumi Sato**, Virginia Tech

Strand 8:
In-service Science Teacher Education
(21) **Nidaa Makki**, The University of Akron
(22) **Donna Governor**, University of North Georgia

Strand 10:
Curriculum and Assessment
(21) **Elon Langbeheim**, Ben-Gurion University
(22) **Ke Li**, University of North Carolina at Chapel Hill

Strand 11:
Cultural, Social, and Gender Issues
(21) **Cesar Delgado**, North Carolina State University
(22) **Terrell Morton**, University of Missouri

Strand 12:
Technology for Teaching, Learning, and Research
(21) **Denise M. Bressler**, East Carolina University
(22) **Leigh Ann Haefner**, Penn State Altoona

Strand 13:
History, Philosophy, Sociology, and Nature of Science
(21) **Alexandria K. Hansen**, Fresno State University
(22) **Alison Cullinane**, University of Oxford

Strand 14:
Environmental Education and Sustainability
(21) **Idit Adler**, Tel Aviv University
(22) **Beth Covitt**, University of Montana

Strand 15:
Policy, Reform, and Program Evaluation
(21) **Carrie D. Allen**, University of North Texas International
(22) **Mercy Ogunsola-Bandele**, National Open University of Nigeria

Program Proposal Reviewers:

Adam Bennion
Adekunle Oladejo
Adiv Gal
Adolfo Obaya
Aimee Fraulo
Alana Newell
Alexandra Race
Alexandria Muller
Alfred Limbere
Alice Langhans
Alicia Alonzo
Alison Mercier
Alister Olson
Allison Metcalf
Amanda Benedict-Chambers
Amanda Obidike
Amanda Peel
Amanda Tompkins
Amber Cesare
Amy Farris
Ana Valdmann
Andrea Anderson
Andrea Phillips
Andrés Espinoza-Cara
Andrew Gilbert
Angela Chapman
Anita Schuchardt
Anna Beniermann
Anna MacPherson
Anna Maria Arias
Anne Emerson Leak
Anupriya Karippadath
April Holton
Arif Rachmatullah
Ashley Iveland
Ashlyn Pierson
Austin Heil
Ayca Fackler
Ayelet Baram-Tsabari
Bashirah Ibrahim
Ben Herman
Benjamin Archibeque
Benjamin Ewing
Benjamin Lowell
Benny Mart Hiwatig
Beth Powell
Bhaskar Upadhyay
Bradley Davey
Brandon Grossman
Brendan Callahan
Brian Zamarripa Roma
Bridget Miller
Brittany Smith
Brock Couch
Caitlin Kirby
Camila Amaral
Cari Herrmann Abell
Carina Rebello
Carme Grimalt-Álvaro
Carmen Fies
Caroline Spurgin
Carrie-Anne Sherwood
Cassie Quigley
Cesar Delgado
ChangChia Liu
Charnell Long
Chelsea Andrews
Chelsea Sexton
Christa Haverly
Christine Mcdonald
Christopher Jadallah
Christopher Preece
Cigdem Han Tosunoglu
Clarissa Keen
Claudia Fracchiolla
Clausell Mathis
Climant Khoza
Cody Smith
Cong Wang
Coralie Delhaye
Corey Payne
Corinne Lardy
Cristian Merino
Daniel Pimentel
Danielle Dani
Danielle Vande Zande
David Fortus
David McKinney
David Owens
David Segura
Dawnne LePretre
Deborah Agbanimu
Deena Gould
Denise Bressler
Devarati Bhattacharya
Devasmita Chakraverty
Diane Wright
Diego Rojas-Perilla
Dina Tsybulsky
Douglas Larkin
Dustin Schiering
Edna Tan
Elaine Silva Mangiante
Elanur Yilmaz
Eleanor Kenimer
Eleonora Barelli
Elgin Leary
Elizabeth De Los Santos
Elizabeth Hufnagel
Elizabeth Lewis
Elizabeth Watts
Elon Langbeheim
Emily Allen
Emily Dare
Emily Reigh
Emine Sahin-Topalcengiz
Emmanuel Mushayikwa
Engin Karahan
Eric Greenwald
Erin Peters-Burton
Estelle Blanquet
Eugene Judson
Eunjin Bahng
Eve Manz
Ezgi Yesilyurt
Faith Weeks
FangFang Zhao
Franz Bogner
Frieda Reichsman
Frikkie George
G. Bowen
Gail Jones
Gary Holliday
Gary Wright
Gaye Ceyhan
Gena Sbeglia
Georgia Hodges
Gerald Tembrevilla
Gianna Lopez-Colson
Gifty Asamani
Gili Marbach-Ad
Giulia Tasquier
Gozde Tosun
Grant Gardner
Greses Pérez
Guopeng Fu
Gyeong-Geon Lee

Program Proposal Reviewers: *(continued)*

Hamza Malik
Hannah Jardine
Harini Krishnan
Harleen Singh
Heather Bergan-Roller
Heather Johnson
Heather Killen
Heather Page
Heesoo Ha
Heidi Cian
Helena Aptyka
Henriette Burns
Holger Weitzel
Hye Sun You
Hye-Eun Chu
Hyun-Jung Cha
I-Chien Chen
Idit Adler
Ido Davidesco
Ihsan Ghazal
Imran Tufail
Isha DeCoito
Iyad Dkeidek
J. Mesiner
Jacob Pleasants
Jacqueline Nijenhuis-Voogt
Jacquelyn Chini
Jaimie Miller-Friedmann
Jale Dursun
James Minogue
James Nyachwaya
Jamie Wallace
Janelle Bailey
Jasmine Nation
Jason May
Jason Morphew
Jeanna Wieselmann
Jeanne Brunner
Jean-Philippe Ayotte-Beaudet
Jeffrey Nordine
Jeffrey Radloff
Jennifer Idema
Jennifer Maguire
Jennifer Pietros
Jennifer Schellinger
Jennifer Tripp
Jessica Chen
Jessica Dewey
Jessica Karch
Jianlan Wang
Jie Yang
Jielan Hegazy
Jing Lin
John Ruppert
Jonah Firestone
Jonathan Hall
Jonathan McCausland
Joni Lakin
Jooyoung Jeon
Joseph Brobst
Joseph Hardcastle
Joseph Wong
Joshua Ellis
Joshua Reid
Judith Gouraige
Juli Uhl
Julia Plummer
Julia Woithe
Justin Andersson
Justina Ogodo
K. C. Busch
Karin Lohwasser
Karl Jung
Karyn Housh
Kate Henson
Kate Walker
Katherine McCance
Katherine Wade-Jaimes
Kathryn Bateman
Kelsey Metzger
Keren Dalyot
Ketevan Kupatadze
Kevin Cherbow
Kevin Curry
Kevin Fleming
Kimberly Staples
Kiran Purohit
Kirsten Edwards
Kraig Wray
Kristen Larson
Kristie Gutierrez
Kristina Kramarczuk
Kübra Özmen
Kyungjin Cho
Laura Carsten Conner
Laura Peña
Laura Schneider
Laura Zangori
Lauren Madden
Len Annetta
Liam Guilfoyle
Lina Vinitsky-Pinsky
Lindsay Wheeler
Ling Liang
Lisa Borgerding
Lisa Lundgren
Lisa Marco-Bujosa
Lisa Stinken-Rösner
Lorelie Imperial
Lori Andersen
Lorraine Ramirez Villarin
Lu Wang
Lucia Vazquez-Ben
Lukas Becker
Lulu Garah
Lutz Kasper
Lynne Zummo
Lyrica Lucas
Madison Scheer
Magdeline Stephen
Mai Lill Lunde
Marcus Kubsch
María González-Howard
Maria Wallace
Marina Birkenstock
Mark Newton
Martha Canipe
Martin Schwichow
Mary Atwater
Matthew Johnson
Matthew Weinstein
Maurina Aranda
May Lee
Megan Ennes
Megan McGinty
Megan McKinley-Hicks
Meghan Macias
Melanie Kinskey
Melanie Shores
Melissa Dancy
Melo-Jean Yap
Mercy Ogunsola-Bandele
Merryn Cole
Michael Adewusi
Michail Kalogiannakis
Michal Haskel Ittah
Michalis Livitziis

Program Proposal Reviewers: *(continued)*

Michelle Forsythe
Michelle Joyce
Mika Munakata
Miri Barak
Mohammad Siddique
Mohammed Estaiteyeh
Molly Stuhlsatz
Moriah Ariely
Mu-Yin Lin
Myunghwan Shin
Nam-Hwa Kang
Nancy Nasr
Nancy Staus
Narendra Deshmukh
Narmin Ghalichi
Natalie Ahne
Natalie King
Nazihan Ursavas
Neha Anand
Neta Shaby
Netta Perry
Ngonidzashe Mushaikwa
Ngozi Okafor
Nicholas Bourke
Nilay Ozturk
Nitasha Mathayas
Niva Wengrowicz
Noemi Waight
Orit Ben Zvi Assaraf
Orit Hercovitz
Ornit Spektor-Levy
Ozgul Yilmaz-Tuzun
Ozlem Akcil Okan
Parth Soni
Patricia Patrick
Patrick Smith
Paul Hamerski
Pedro Teixeira
Peng He
Peter Cormas
Peter Garik
Peter Okebukola
Peter Wulff
Petra Kranzfelder
Phillip Boda
Phyllis Katz
Preetha Menon
Preethi Titu
Priyanka Parekh
Qingna Jin
Rachael Gordon
Rachael Tawbush
Rachel Askew
Rachel Chaffee
Rachel Ruggirello
Radu Bogdan Toma
Ran Peleg
Raquib Khan
Rea Lavi
Rebecca Hite
Regina McCurdy
Regina Soobard
Remy Dou
Renee Schwartz
Richard Lamb
Robert Bennett
Robert Idsardi
Roberta Hunte
Ron Gray
Ross Nehm
Saed Sabah
Saeed Moshfeghyeganeh
Sahar Alameh
Saiqa Azam
Sakyiwaa Danso
Salih Faraj
Sally Wu
Samantha Skrob
Sandhya Krishnan
Sanlyn Buxner
Sara Heredia
Sara Salisbury
Sara Petchey
Sara Salloum
Sara Samiphak
Sarah Carrier
Sarah Frodsham
Sarah Lilly
Scott McDonald
Shadi Asakle
Shahar Abramovitch
Shakuntala Gopal
Shana Mcalexander
Shane Tutwiler
Shannon Davidson
Sharfun Islam Nancy
Sharon Pelech
Sharona Lev
Shelley Rap
Sheri Fitzgerald
Shreyashi Halder
Sibel Telli
Sina Lenski
Siqi Li
Sisi Han
Sissy Wong
Sonya Martin
Soon Lee
Sophia Jeong
Sphamandla Zulu
Stanley Lo
Stanton Belford
Stefan Sorge
Stefanie Marshall
Stephanie Teeter
Stephen Burgin
Stephen Thompson
Stephen Witzig
Stina Krist
Suat Celik
Sugat Dabholkar
Sulaiman Al-Balushi
Sule Aksoy
Susan Letourneau
Susanna Hapgood
Susannah Sandrin
Susie Cohen
Sylvia James
T.B.M. Chowdhury
Takuya Matsuura
Tamara Peffer
Tamara Roth
Tammy Lee
Taolane Bonnqe
Tasneem Anwar
Teresa Leavens
Teresa Massey
Terrance Burgess
Terrell Morton
Theila Smith
Ti'Era Worsley
Tina Vo
Tingting Li
Todd Hutner
Uchenna Emenaha
Valarie Akerson
Valarie Bogan
Vance Kite

Program Proposal Reviewers: *(continued)*

Victoria Corr
Victoria Rodriguez-Operana
Vivien Chabalengula
Wanja Gitari
Wardell Powell
William Matthew Reynolds
Wisam Sedawi
Won Kim
Wonyong Park
Yael Feldman-Maggor
Yael Shwartz
Ying-Chih Chen
Ying-Yan Lu
Yingzhi Zhang
Yiwen Huang
Yonghee Lee
Yoonsung Choi
Yvonne Thevenot
Zac Patterson
Zehavit Kohen
Zeynep Akdemir
Zoe Buck Bracey
Zoubeida Dagher
Zuway-R Hong

NARST Presidents:

1928 W. L. Eikenberry
1929 W. L. Eikenberry
1930 W. L. Eikenberry
1931 Elliot R. Downing
1932 Elliot R. Downing
1933 Francis D. Curtis
1934 Ralph K. Watkins
1935 Archer W. Hurd
1936 Gerald S. Craig
1937 Walter G. Whitman
1938 Hanor A. Webb
1939 John M. Mason
1940 Otis W. Caldwell
1941 Harry A. Carpenter
1942 G. P. Cahoon
1943 Florence G. Billig
1944 Florence G. Billig
1945 Florence G. Billig
1946 C. L. Thield
1947 Earl R. Glenn
1948 Ira C. Davis
1949 Joe Young West
1950 N. Eldred Bingham
1951 Betty Lockwood
1952 Betty Lockwood
1953 J. Darrell Barnard
1954 George G. Mallinson
1955 Kenneth E. Anderson
1956 W. C. Van Deventer
1957 Waldo W. Blanchet
1958 Nathan S. Washton
1959 Thomas P. Fraser
1960 Vaden W. Miles
1961 Clarence H. Boeck
1962 Herbert A. Smith
1963 Ellsworth S. Obourn
1964 Cyrus W. Barnes
1965 Frederic B. Dutton
1966 Milton P. Pella
1967 H. Craig Sipe
1968 John M. Mason
1969 Joseph D. Novak
1970 Willard D. Jacobson
1971 Paul D. Hurd
1972 Frank X. Sutman
1973 J. David Lockard
1974 Wayne W. Welch
1975 Robert E. Yager
1976 Ronald D. Anderson
1977 O. Roger Anderson
1978 Roger G. Olstad
1979 James R. Okey
1980 John W. Renner
1981 Stanley L. Helgeson
1982 Stanley L. Helgeson
1983 Carl F. Berger
1984 Ann C. Howe
1985 Ertle Thompson
1986 David P. Butts
1987 James P. Barufaldi
1988 Linda DeTure
1989 Patricia Blosser
1990 William G. Holliday
1991 Jane Butler Kahle
1992 Russell H. Yeany
1993 Emmett L. Wright
1994 Kenneth G. Tobin
1995 Dorothy L. Gabel
1996 Barry J. Fraser
1997 Thomas R. Koballa, Jr.
1998 Audrey B. Champagne
1999 Joseph S. Krajcik
2000 David F. Treagust
2001 Sandra K. Abell
2002 Norman G. Lederman
2003 Cheryl L. Mason
2004 Charles W. (Andy) Anderson
2005 John R. Staver
2006 James A. Shymanksy
2007 Jonathan F. Osborne
2008 Penny J. Gilmer
2009 Charlene M. Czerniak
2010 Richard A. Duschl
2011 Dana L. Zeidler
2012 J. Randy McGinnis
2013 Sharon J. Lynch
2014 Lynn A. Bryan
2015 Valarie L. Akerson
2016 Mary M. Atwater
2017 Mei-Hung Chiu
2018 Barbara Crawford
2019 Gail Richmond
2020 Tali Tal
2021 Eileen R. C. Parsons
2022 Reneé Schwartz

General Information

NARST Executive Directors:

(NARST created the position of Executive Secretary in 1975; the title was changed to Executive Director in 2003)

1975-1980	Paul Joslin
1980-1985	Bill Holliday
1985-1990	Glenn Markle
1990-1995	John Staver
1995-2000	Art White
2000-2002	David Haury
2002-2007	John Tillotson
2007-2017	Bill Kyle
2018-2021	Helen Schneider Lemay

JRST Editors:

1963-1966	J. Stanley Marshall
1966-1968	H. Craig Sipe
1969	James T. Robinson
1970-1974	O. Roger Anderson
1975-1979	David P. Butts
1980-1984	James A. Shymansky
1985-1989	Russell H. Yeany, Jr.
1990-1993	Ronald G. Good
1994-1999	William C. Kyle, Jr.
1999-2001	Charles W. (Andy) Anderson James J. Gallagher August
2002-2005	Dale R. Baker Michael D. Piburn
2006-2010	J. Randy McGinnis Angelo Collins
2011-2015	Joseph S. Krajcik Angela Calabrese Barton
2016-2020	Fouad Abd-El-Khalick Dana L. Zeidler
2021-2025	Troy Dow Sadler Felicia Moore Mensah

Emeritus Members:

Alan McCormack
Albert Nous
Ann Osman
Avi Hofstein
Barbara Crawford
Bill Jaffarian
Carl Angell
Charles McFadden
Dale Baker
David Haury
David Kennedy
Donald Riechard
Donald Schmidt
Doris Ash
Doris Simonis
Ed Van Den Berg
Edward Smith
Ellen Simmons
Elsa Feher
George Bodner
Gerald Krockover
Gian Pedemonte
Glenn Berkheimer
Glenn Markle
Gottfried Merzyn
Guilford Bartlett
Hanna Arzi
Hans Andersen
Helmut Dahncke
Herbert Thier
Ivo Lindauer
J. Prather
J. Swift
Jacqueline Mallinson
James Poth
James Shymansky
Jane Kahle
Jay Lemke
John Christopher
Joseph Novak
Julia Clark
Larry Enochs
Larry Yore
Leonie Rennie
Linda Phillips
Lowell Bethel
Mansoor Niaz
Manuel Sequeira
Marianne Barnes
Marlene Their
Michael Agin
Michael Padilla
Nitza Barnea
Obed Norman
Onno De Jong
Paul Joslin
Peter Hewson
Peter Okebukola
Richard Haney
Richard Walding
Robert Dehaan
Robert Poel
Robert Sherwood
Robert Williams
Rodney Doran
Roger Olstad
Ronald Anderson
Ryda Rose
Stanley Helgeson
Sung Jae Pak
Todd Hill
Uri Ganiel
Uri Zoller
Vincent Lunetta
Wayne Welch
William Holliday

NARST Award Recipients:

Distinguished Contributions to Science Education through Research Award

This award is presented at the Annual International Conference but is bestowed only when an outstanding candidate, or candidates, has been identified. It is given to recognize individuals who, through research over an extended period of time, have made outstanding and continuing contributions, provided notable leadership, and made a substantial impact in the area of science education.

Year	Awardee
1986	Anton E. Lawson
1987	Paul DeHart Hurd
1988	John W. Renner
1989	Willard Jacobson
1990	Joseph D. Novak
1991	Robert L. Shrigley
1992	Pinchas Tamir
1993	Jack Easley, Jr.
1994	Marcia C. Linn
1995	Wayne W. Welch
1996	Carl F. Berger
1997	Rosalind Driver
1998	James J. Gallagher
1999	Peter J. Fensham
2000	Jane Butler Kahle
2001	John K. Gilbert

Year	Awardee
2002	Audrey B. Champagne
2003	Barry J. Fraser
2004	Robert E. Yager Paul Black
2005	John C. Clement
2006	David Treagust
2007	Kenneth Tobin
2008	Dorothy Gabel
2009	Peter W. Hewson Leonie Jean Rennie Wolff-Michael Roth
2010	Reinders Duit Joseph Krajcik
2011	Norman Lederman
2012	Charles W. (Andy) Anderson Larry Yore
2013	Dale R. Baker

Year	Awardee
2014	Glen Alkenhead Richard Gunstone Frances Lawrenz
2015	Richard A. Duschl Meshach Mobolaji Ogunniyi
2016	Lynn D. Dierking John N. Falk Dana L. Zeidler
2017	Avi Hofstein
2018	Marissa Rollnick Jonathan Osborne
2019	Mary M. Atwater Maria Pilar Jiménez-Aleixandre
2020	Judy Dori Saouma Bou Jaoude
2021	Valerie Akerson Greg Kelly

General Information

Outstanding Doctoral Research Award

This award is given annually for the Doctoral Research judged to have the greatest significance in the field of science education from among all theses and dissertations nominated this year for the award.

Year	Awardee	Advisor
1992	Rene Stofflett	Dale R. Baker
1993	Julie Gess-Newsome	Norman G. Lederman
1994	Carolyn W. Keys	Burton E. Voss
1995	Jerome M. Shaw	Edward Haertel
1996	Christine M. Cunningham	William L. Carlsen
1997	Jane O. Larson	Ronald D. Anderson
1998	Kathleen Hogan	Bonnie K. Nastasi
1999	Fouad Abd-El-Khalick	Norman G. Lederman
2000	Danielle Joan Ford	Annemarie S. Palinscar
2001	Iris Tabak	Brian Reiser
2002	Mark Girod	David Wong
2003	Hsin-Kai Wu	Joseph Krajcik
2004	David L. Fortus	Ronald Marx Joseph Krajcik
2005	Thomas Tretter	Gail M. Jones
2006	Stacy Olitsky	Kenneth Tobin
2007	Julia Plummer	Joseph S. Krajcik

Year	Awardee	Advisor
2008	Victor Sampson	Douglas Clark
2009	Lei Liu	Cindy E. Hmelo-Silver
2010	Heather Toomey	Phillip Bell Zimmerman
2011	Jeffrey J. Rozelle	Suzanne M. Wilson
2011	Catherine Eberbach	Kevin Crowley
2012	Melissa Braaten	Mark Windschitl
2013	Lori Fulton	Jian Wang
2014	Daniel Birmingham	Angela Calabrese Barton Anne-Lise Halvorsen
2015	Allison Godwin	Geoffrey Potvin
2016	Anna MacPherson	Jonathan Osborne
2017	Anita Schuchardt	Christian Schunn
2018	Katherine Wade-Jaimes	Renée Schwartz
2019	Anita S. Tseng	Jonathan F. Osborne
2020	Netta Shaby	Orit Ben Zvi-Assaraf
2021	Eben witherspoon	Christian D. Schunn

Early Career Research Award

The Early Career Research Award is given annually to the early researcher who demonstrates the greatest potential to make outstanding and continuing contributions to research in science education. The recipient will have received his/her doctoral degree.

Year	Awardee
1993	Wolff-Michael Roth
1994	Deborah J. Tippins
1995	Nancy B. Songer
1996	Mary B. Nakhleh
1997	Peter C. Taylor
1998	J. Randy McGinnis
1999	Craig W. Bowen Gregory J. Kelly
2000	Angela Calabrese Barton
2001	Julie A. Bianchini
2002	Alan G. Harrison

Year	Awardee
2003	Fouad Abd-El-Khalick
2004	Grady J. Venville
2005	Randy L. Bell
2006	Heidi Carlone
2007	Bryan A. Brown
2008	Hsin-Kai Wu
2009	Troy D. Sadler
2010	Thomas Tretter
2011	Katherine L. McNeill
2012	Victor Sampson
2013	Alandeom W. Oliveira

Year	Awardee
2014	Cory Forbes
2015	Benjamin C. Herman
2016	Richard L. Lamb
2017	Ying-Chih Chen David Stroupe
2018	Doug Lombardi
2019	Hosun Kang Eve Manz
2020	Brian Donovan Dana Vedder Weiss
2021	Lama Jaber

General Information

The *Journal of Research in Science Teaching (JRST)* Award

The *JRST* Award was awarded annually to the author or authors of the *Journal of Research in Science Teaching* article judged to be the most significant publication for the Volume year. It was awarded annually between 1974 and 2015.

Year	Awardee
1974	Donald E. Riechard Robert C. Olson
1975	Mary Budd Rowe
1976	Marcia C. Linn Herbert C. Thier
1977	Anton E. Lawson Warren T. Wollman
1978	Dorothy L. Gabel J. Dudley Herron
1979	Janice K. Johnson Ann C. Howe
1980	John R. Staver * Dorothy L. Gabel * Linda R. DeTure
1981	William C. Kyle, Jr.
1982	*Robert G. Good* * *Harold J. Fletcher* * F. David Boulanger
1983	Jack A. Easley, Jr.
1984	Marcia C. Linn Cathy Clement Stephen Pulos
1985	Julie P. Sanford
1986	Anton E. Lawson
1987	Russell H. Yeany Kueh Chin Yap Michael J. Padilla
1988	Kenneth G. Tobin James J. Gallagher
1988	Robert D. Sherwood * Charles K. Kinzer * John D. Bransford * Jeffrey J. Franks * Anton E. Lawson *
1989	Glen S. Aikenhead
1990	Richard A. Duschl Emmett L. Wright
1991	E. P. Hart I. M. Robottom
1992	John R. Baird Peter J. Fensham Richard E. Gunstone Richard T. White
1993	Nancy R. Romance Michael R. Vitale
1994	E. David Wong
1995	Stephen P. Norris Linda M. Phillips
1996	David F. Jackson Elizabeth C. Doster Lee Meadows Teresa Wood
1997	C. W. J. M. Klassen P. L. Linjse
1998	Julie Bianchini
1999	Phillip M. Sadler
2000	Allan G. Harrison J. Grayson David F. Treagust
2001	Fouad Abd-El-Khalick Norman G. Lederman
2002	Andrew Gibert Randy Yerrick
2003	Sofia Kesidou Jo Ellen Roseman
2004	Jonathan Osborne Sue Collins Mary Ratcliffe Robin Millar Richard Duschl
2005	Jonathan Osborne Sibel Erduran Shirley Simon
2006	Troy D. Sadler Dana L. Zeidler
2007	Jerome Pine Pamela Aschbacher Ellen Roth Melanie Jones Cameron McPhee Catherine Martin Scott Phelps Tara Kyle Brian Foley
2008	Christine Chin
2009	Kihyun Ryoo Bryan Brown
2010	Helen Patrick Panayota Mantzicopoulos Ala Samarapungavan
2011	Daphne Minner Jeanne Century Abigail Jurist Levy
2012	Julie A. Luft Jonah B. Firestone Sissy S. Wong Irasema Ortega Krista Adams EunJin Bang
2013	Edys S. Quellmalz Michael J. Timms Matt D. Silberglitt Barbara C. Buckley
2014	Joseph Taylor Susan Kowalski Christopher Wilson Stephen Getty Janet Carlson
2015	Matthew Kloser

*** Multiple Awardees**

The NARST Outstanding Paper Award

The NARST Outstanding Paper Award was awarded annually for the paper or research report presented at the NARST Annual International Conference that was judged to have the greatest significance and potential in the field of science education. It was awarded annually between 1975 and 2015.

Year	Awardee
1975	John J. Koran
1976	Anton E. Lawson
1977	*NO AWARD*
1978	Rita Peterson
1979	Linda R. DeTure
1980	M. James Kozlow Arthur L. White
1981	William Capie Kenneth G. Tobin Margaret Boswell
1982	F. Gerald Dillashaw James R. Okey
1983	William C. Kyle, Jr. James A. Shymansky Jennifer Alport
1984	Darrell L. Fisher Barry J. Fraser
1985	Hanna J. Arzi * Ruth Ben-Zvi * Uri Ganiel * Russell H. Yeany Kueh Chin Yap Michael J. Padilla
1986	Barry J. Fraser * Herbert J. Walberg * Wayne W. Welch *
1987	Robert D. Sherwood
1988	Barry J. Fraser Kenneth G. Tobin
1989	James J. Gallagher Armando Contreras
1990	Patricia L. Hauslein Ronald G. Good Catherine Cummins
1991	Nancy R. Romance Michael Vitale
1992	Patricia Heller Ronald Keith Scott Anderson
1993	Wolff-Michael Roth
1994	Wolff-Michael Roth Michael Bowen
1995	Wolff-Michael Roth
1996	Nancy J. Allen
1997	*NO AWARD*
1998	Wolff-Michael Roth Reinders Duit Michael Komorek Jens Wilbers
1999	Lynn A. Bryan
2000	Joseph L. Hoffman Joseph S. Krajcik
2001	Allan G. Harrison
2002	Carolyn Wallace Keys Eun-Mi Yang Brian Hand Liesl Hohenshell
2003	Wolff-Michael Roth
2004	Joanne K. Olson * SharonJ. Lynch * Joel Kuipers Curtis Pyke Michael Szesze
2005	Chi-Yan Tsui David Treagust
2006	Leema Kuhn Brian Reiser
2007	Eugene L. Chiappetta Tirupalavanam G. Ganesh Young H. Lee Marianne C. Phillips
2008	Guy Ashkenazi Lana Tockus-Rappoport
2009	Jrene Rahm
2010	Mark W. Winslow John R. Staver Lawrence C. Sharmann
2011	Matthew Kloser
2012	Shelly R. Rodriguez Julie Gess-Newsome
2013	Edward G. Lyon
2014	Ying-Chih Chen Soonhye Park Brian Hand
2015	Lori M. Ihrig Michael P. Clough Joanne K. Olson

*** Multiple Awardees**

Outstanding Master's Thesis Award

This award was established in 1995 to be given annually for the Master's Thesis judged to have the greatest significance in the field of science education. It was last awarded in 2002.

Year	Awardee	Major Professor	Advisor
1995	Moreen K. Travis	Carol L. Stuessy	
1996	Lawrence T. Escalada	Dean A. Zollman	
1997	C. Theresa Forsythe	Jeffrey W. Bloom	
1998	Renee D. Boyce		Glenn Clark
1999	Andrew Gilbert		Randy K. Yerrick
2000	Rola Fouad Khishfe		Fouad Abd-El-Khalick
2002	Laura Elizabeth Slocum		Marcy Hamby Towns

Classroom Applications Award

The Classroom Applications Award was established in 1979. The award was given annually to authors whose papers were presented at the previous NARST Annual International Conference and judged to be outstanding in terms of emphasizing classroom application of research in science education. The award was last presented in 1991.

Year	Awardee
1980	*(Five Equal Awards)*
	Livingston S. Schneider John W. Renner
	Heidi Kass Allan Griffiths
	Ramona Saunders Russell H. Yeany
	Joe Long James R. Okey Russell H. Yeany
	M. James Kozlow Arthur L. White
1981	*(Four Equal Awards)*
	Dorothy L. Gabel Robert D. Sherwood Larry G. Enochs
	Wayne Welch Ronald D. Anderson Harold Pratt
	Mary Ellen Quinn Carolyn Kessler
	P. Ann Miller Russell H. Yeany

Year	Awardee
1982	*(Four Equal Awards)*
	Louise L. Gann Seymour Fowler
	Dorothy L. Gabel Robert D. Sherwood
	Thomas L. Russell
	Joseph C. Cotham
1983	Robert D. Sherwood Larry G. Enochs Dorothy L. Gabel
1984	*(Three Equal Awards)*
	Mary Westerback Clemencia Gonzales Louis H. Primavera
	Kenneth G. Tobin Hanna J. Arzi Ruth Ben-Zvi Uri Ganiel
	Charles Porter Russell H. Yeany

Year	Awardee
1985	*(Three Equal Awards)*
	Dan L. McKenzie Michael J. Padilla
	Margaret Walkosz Russell H. Yeany
	Kevin C. Wise James R. Okey
1986	*(Four Equal Awards)*
	Sarath Chandran David F. Treagust Kenneth G. Tobin
	Darrell L. Fisher Barry J. Fraser
	Dorothy L. Gabel Stanley L. Helgeson Joseph D. Novak John Butzow V. K. Samuel
	Linda Cronin Meghan Tweist Michael J. Padilla

Year	Awardee
1987	Dorothy L. Gabel V. K. Samuel Stanley L. Helgeson Saundra McGuire Joseph D. Novak John Butzow
1988	Uri Zoller Ben Chaim
1989	James D. Ellis Paul J. Kuerbis
1990	Dale R. Baker Michael D. Piburn Dale S. Niederhauser
1991	David F. Jackson Billie Jean Edwards Carl F. Berger

NARST Leadership and Committees

Elections Committee:

Immediate Past President *(Ex Officio)*
(21) **Tali Tal**, Technion, Israel Institute of Technology

Board Liaison
(21) **Alejandro Gallard**, Georgia Southern University

Representative from Ethics and Equity Committee
(21) **Justina Ogodo**, Baylor University

Representative from the International Committee
(21) **Jing Lin**, Beijing Normal University

Committee Leadership
(21) **Regina Suriel**, Chair, Valdosta State University
(22) **Bridget Mulvey**, Co-Chair, Kent State University

Members
(21) **Ibrahim Delen**, USAK University
(22) **Mary Atwater**, University of Georgia
(22) **Jeanna R. Wieselmann** *(graduate student)* University of Minnesota
(23) **Melody Russell**, Auburn University
(23) **Nazan U. Bautista**, Miami University

Equity and Ethics Committee:

Board Liaison
(22) **Bhaskar Upadhyay**, University of Minnesota

Committee Leadership
(21) **Danielle Dani**, Chair, Ohio University
(22) **Justina Ogodo**, Co-Chair, Baylor University

Members
(21) **Sara Raven**, Texas A&M University
(21) **James Nyachwaya**, North Dakota State University
(21) **Tara Monique Nkrumah**, Arizona State University
(22) **Seema Rivera**, Clarkson University
(22) **April Holton**, Arizona State University
(22) **María González-Howard**, The University of Texas at Austin
(23) **Paulette Vincent-Ruz**, University of Michigan

External Policy and Relations Committee:

Board Liaison
(21) **Senay Purzer**, Purdue University

Ex Officio Members
(22) **Eileen Carlton Parsons**, President, University of North Carolina at Chapel Hill
(22) **Helen Schneider Lemay**, Executive Director

Committee Leadership
(22) **Remy Dou**, Chair, Florida International University
(23) **Deb Morrison**, Co-Chair, University of Washington

Members
(21) **Sarah Carrier**, North Carolina State University
(21) **Stefanie Marshall**, University of Minnesota, Twin Cities
(22) **Eugene Judson**, Arizona State University
(23) **Dürdane Bayram-Jacobs**, Eindhoven University of Technology
(23) **Henriette Burns**, Southern Illinois University Edwardsville
(23) **Peter Okebukola**, Lagos State University, Nigeria

Graduate Student Committee:

Ex Officio Member
(22) **Reneé Schwartz**, President-Elect Georgia State University

Committee Leadership
(21) **Christa Haverly**, Chair & Graduate Student Coordinator, Northwestern University
(21) **Theila Smith**, Co-Chair, University of Groningen
(22) **Jordan Henley**, Co-Chair, University of Georgia

Members
(21) **Kathryn Green**, University of Georgia
(21) **Harini Krishnan**, Florida State University
(21) **Preethi Titu**, Kennesaw State University
(21) **Melanie Kinskey**, Sam Houston State University
(21) **Star Sharp**, Pennsylvania State University
(22) **Henry Hane**, Indiana University, Purdue University Indianapolis
(22) **Tim Klavon**, Temple University

General Information

Awards Committee:

Board Liaison
(22) **Noemi Waight**, University of Buffalo

Outstanding Doctoral Research Award
Committee Leadership
(21) **Jay Fogleman**, Chair, University of Rhode Island
(22) **Dana Vedder Weiss**, Co-Chair, Ben Gurion University

Members
(21) **Patricia Bills**, Northern Kentucky University
(21) **Eunjin Bahng**, Iowa State University
(21) **Ellen Granger**, Florida State University
(21) **Danielle Ferguson**, American Institute for Research
(21) **Devasmita Chakraverty**, Washington State University
(22) **Lisa Borgerding**, Kent State University
(22) **Jamie Mikeska**, Educational Testing Service

Early Career Research Award
Committee Leadership
(21) **Erin Furtak**, Chair, University of Colorado, Boulder
(22) **Kate McNeill** Co-Chair), Boston College

Members
(22) **Amelia Gotwals**, Michigan State University
(22) **Anna Danielsson**, Uppsala University
(22) **Judy Dori**, Technion-Israel Institute of Technology
(22) **James Minogue**, North Carolina State University
(23) **Matthew Weinstein**, University of Washington, Tacoma
(23) **Jomo Mutegi**, Indiana University, Purdue University Indianapolis
(23) **Femi Otulaja**, University of the Witwatersrand
(23) **Anton Puvirajah**, University of Western Ontario
(23) **Hsin-Kai Wu**, National Taiwan Normal University

Distinguished Contributions to Science Education through Research Award
Committee Leadership
(21) Maria Varelas, Chair, University of Illinois Chicago
(22) Marissa Rollnick, Co-Chair, University of the Witwatersrand, South Africa

Members
(21) **Julie Luft**, University of Georgia
(21) **Nasser Mansour**, University of Exeter
(21) **Rachel Mamlok-Naaman**, Weizmann Institute of Science
(21) **Sibel Erduran**, Oxford University
(22) **John Falk**, Institute for Learning Innovation
(22) **Okhee Lee**, New York University
(23) **Malcolm Butler**, University of Central Florida

International Committee:

Committee Leadership
(22) **Sonya Martin**, Chair & International Coordinator Seoul National University
(22) **Sara Wilmes**, Co-Chair, University of Luxemburg

Members
(21) **Peter Wulff**, University of Potsdam
(21) **Jing Lin**, Beijing Normal University
(22) **Mathias Ropohl**, University of Duisburg-Essen
(23) **Allison Gonsalves**, McGill University
(23) **Gavin Fulmer**, University of Iowa
(23) **Sheron Mark**, University of Louisville
(23) **Renata de Paula Orofino**, Federal University of ABC

Membership Committee:

Board Liaison
(23) **Brooke Whitworth**, Clemson University

Committee Leadership
(21) **Selina Bartels**, Chair, Valparaiso University
(22) **ReAnna S. Roby**, Co-Chair, Vanderbilt University

Members
(21) **Alison Riley Miller**, Bowdoin College
(21) **Felicia Moore Mensah**, Teachers College, Columbia University
(22) **Shirly Avargil**, Technion–Israel Institute of Technology
(22) **Mark Newton**, East Carolina University
(22) **Sule Aksoy** *(graduate student)*, Syracuse University
(23) **K.C. Busch**, North Carolina State University
(23) **Elizabeth de los Santos**, University of Nevada, Reno

Program Committee:

Eileen Carlton Parsons, Chair, University of North Carolina at Chapel Hill
Reneé Schwartz, Co-Chair, Georgia State University

Ex Officio Member
Helen Schneider Lemay

Members
(21) **Sarah J. Fick**, Washington State University
(21) **Julia Plummer**, Pennsylvania State University
(21) **Ryan Nixon**, Brigham Young University
(21) **Neta Shaby**, Oregon State University
(21) **Lisa Kenyon**, Wright State University
(21) **Anton Puvirajah**, University of Western Ontario
(21) **Michelle Fleming**, Wright State University
(21) **Nidaa Makki**, The University of Akron

(21) **Elon Langbeheim**, Ben-Gurion University
(21) **Cesar Delgado**, North Carolina State University
(21) **Denise M. Bressler**, East Carolina University
(21) **Alexandria Hansen**, Fresno State University
(21) **Idit Adler**, Tel Aviv University
(21) **Carrie Allen**, University of North Texas
(22) **Bahadir Namdar**, Recep Tayyip Erdogan University
(22) **Edna Tan**, University of North Carolina at Greensboro
(22) **Ornit Spektor-Levy**, Bar Ilan University
(22) **Shannon Navy**, Kent State University
(22) **Anne Leak**, High Point University
(22) **Takumi Sato**, Virginia Tech
(22) **Donna Governor**, University of North Georgia
(22) **Ke Li**, University of North Carolina at Chapel Hill
(22) **Terrell Morton**, University of Missouri
(22) **Leigh Ann Haefner**, Penn State Altoona
(22) **Alison Cullinane**, University of Oxford
(22) **Beth Covitt**, University of Montana
(22) **Mercy Ogunsola-Bandele**, National Open University of Nigeria

Publications Advisory Committee:

Board Liaison

(23) **Knut Neumann**, Leibniz Institute for Science and Mathematics Education

Ex Officio Members

(20) **Cynthia Crockett**, NSTA Research Division Director, Harvard University
(22) **Eileen Carlton Parsons,** President, University of North Carolina at Chapel Hill
(25) **Troy Sadler**, *JRST* Editor, University of North Carolina at Chapel Hill
(25) **Felicia Moore Mensah**, *JRST* Editor, Teachers College, Columbia University
Helen Schneider Lemay, Executive Director

Committee Leadership

(21) **Deena Gould**, Co-Chair, University of New Mexico
(23) **Shakhnoza Kayumova**, Co-Chair, University of Massachusetts, Dartmouth

Members

(21) **Heidi Carlone**, Co-Chair, University of North Carolina, Greensboro
(21) **Amanda (Mandi) Berry**, Monash University
(21) **Jeanne Brunner**, University of Massachusetts, Amherst
(22) **Allison Antink-Meyer**, Illinois State University
(22) **Kyungjin Cho**, Pennsylvania State University
(22) **Shuly Kapon**, Technion, Israel Institute of Technology
(22) **Ibrahim H. Yeter**, National Institute of Education (NIE), Nanyang Technological University (NTU), Singapore
(23) **Tina Cheuk**, Stanford University
(23) **Dante Cisterna**, Education Testing Service

Research Committee:

Board Liaison

(21) **Jennifer D. Adams**, University of Calgary

NARST Liaison to NSTA

(21) **Michael Bowen**, Mount Saint Vincent University

Committee Leadership

(21) **Tina Vo**, Chair, University of Nevada, Las Vegas
(22) **Asli Sezen-Barrie**, Co-Chair, University of Maine

Members

(21) **Abdi Warfa**, University of Minnesota
(21) **Carina Rebello**, Purdue University
(21) **Banu Avsar Erumit**, Recep Tayyip Erdogan University
(21) **Patricia Patrick**, Columbus State University
(21) **Kelsey Lipsitz**, University of Missouri, Exploratorium
(22) **Li Ke**, University of North Carolina at Chapel Hill
(22) **Ling L. Liang**, La Salle University
(22) **Yann Shiou Ong**, National Institute of Education, Nanyang Technological University
(22) **Marcus Kubsch**, Kiel University
(22) **S. Selcen Guzey**, Purdue University
(23) **Rouhollah Aghasaleh**, Georgia State University
(23) **Lori Andersen**, University of Kansas
(23) **Narendra Deshmukh**, Tata Institution of Fundamental Research

Website Committee:

Board Liaison

(23) **Christina Schwarz**, Michigan State University

Committee Leadership

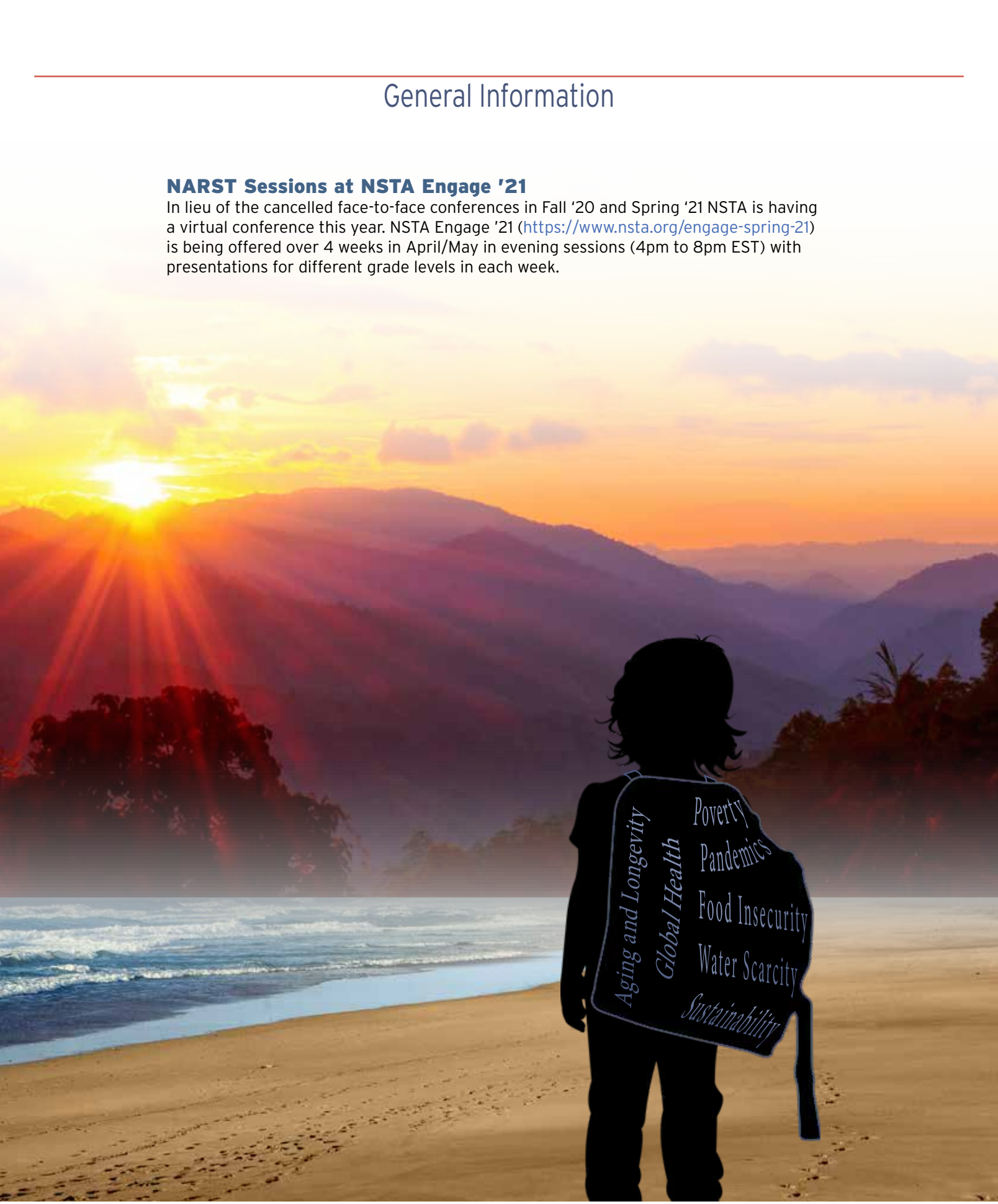
(21) **Katherine Wade-James**, Chair, University of Memphis
(22) **Lisa Lundgren**, Co-Chair, Utah State University

Members

(22) **Minjung Ryu**, Purdue University
(22) **Nazihan Ursavas**, Erdogan University
(23) **Sharona T. Levy**, University of Haifa
(23) **Jaclyn Murray**, Augusta University
(23) **Len Annetta**, East Carolina University

NARST Sessions at NSTA Engage '21

In lieu of the cancelled face-to-face conferences in Fall '20 and Spring '21 NSTA is having a virtual conference this year. NSTA Engage '21 (https://www.nsta.org/engage-spring-21) is being offered over 4 weeks in April/May in evening sessions (4pm to 8pm EST) with presentations for different grade levels in each week.



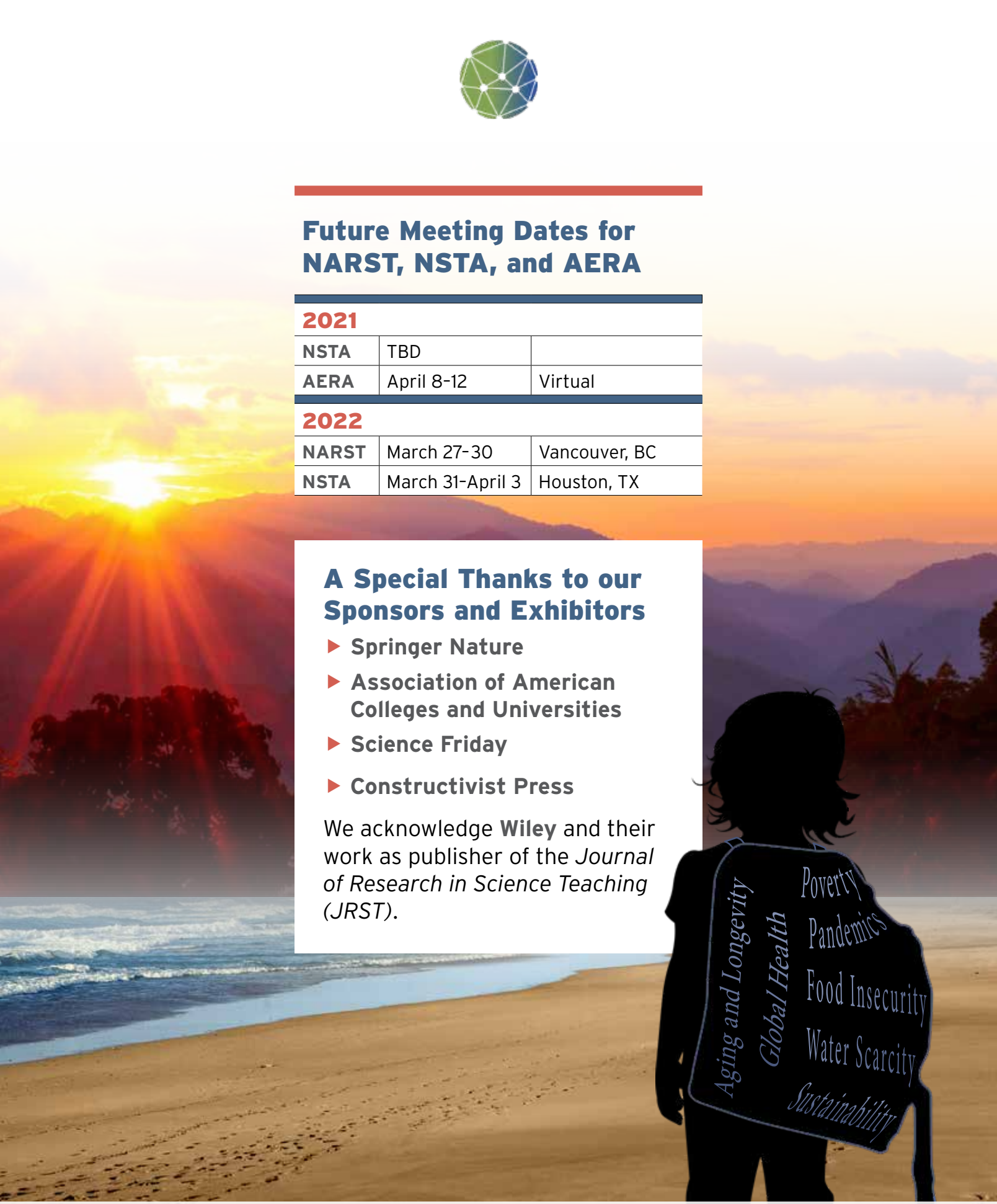
Future Meeting Dates for NARST, NSTA, and AERA

2021		
NSTA	TBD	
AERA	April 8–12	Virtual
2022		
NARST	March 27–30	Vancouver, BC
NSTA	March 31–April 3	Houston, TX

A Special Thanks to our Sponsors and Exhibitors

- **Springer Nature**
- **Association of American Colleges and Universities**
- **Science Friday**
- **Constructivist Press**

We acknowledge **Wiley** and their work as publisher of the *Journal of Research in Science Teaching (JRST)*.



95th NARST International Conference
March 27–30, 2022

UNITY & INCLUSION for Global Scientific Literacy

INVITE as a community. UNITE as a community.

Vancouver, British Columbia, JW Marriott Parq

For a sneak peek at what Vancouver has to offer, visit:
https://www.tripsavvy.com/what-is-vancouver-famous-for-4049389

Schedule at-a-Glance

Please note that this program is subject to change.
Check the addendum posted at the meeting and on the website for updates after the program has been published.

Schedule at-a-Glance

To help you determine your time, here is a tool to help:
https://www.timeanddate.com/worldclock/converter-classic.htm

Wednesday, March 31		
Time (EDT)	**Conference Event**	**Session**
9:30 am - 11:30 am	**NARST Board Meeting**	*Real-Time/Live*
1:30 pm - 3:30 pm	**NARST Board Meeting**	*Real-Time/Live*
6:00 pm- 8:00 pm	**NASRT Board Meeting**	*Real-Time/Live*

Thursday, April 1		
9:30 am - 11:30 am	**NARST Board Meeting**	*Real-Time/Live*
1:30 pm - 3:30 pm	**NARST Board Meeting**	*Real-Time/Live*

Monday, April 5		
8:00 am - 12:00 pm	**Pre-Conference Workshop 1**	*Real-Time/Live*
	Rethinking How You Understand Your Data with R	
	Pre-Conference Workshop 2	
	Early Career Faculty Forum	
12:30 pm - 3:30 pm	**Pre-Conference Workshop 3**	*Real-Time/Live*
	Integrating Computational Thinking (CT) into Elementary Science Online and Face-to-Face: How to Run a Successful PD for Pre-service and In-service Teachers with a Proven Framework, Tech Tools, and Strategies	
12:30 pm - 4:30 pm	**Pre-Conference Workshop 4**	*Real-Time/Live*
	Science Education, a Public Good for The Good of the Public: Indigenous Science Education and Research as Place-Based Knowledge in the Pandemics Era of COVID-19	

Tuesday, April 6		
8:00 am - 12:00 pm	**Pre-Conference Workshop 5**	*Real-Time/Live*
	Pushing the Boundaries: Exploring the Potential of an Online Practice Suite to Support Elementary Science Teachers in Learning How to Engage Students in Argumentation	
	Pre-Conference Workshop 6	
	LARIG Pre-conference Workshop: Empowering Latinx Graduate Students, Early Career Educators and Scholars in Science Education *(Multilingual Workshop)*	
12:30 pm - 4:00 pm	**Pre-Conference Workshop 7**	*Real-Time/Live*
	Equity and Ethics Pre-Conference Workshop	

Schedule at-a-Glance

Wednesday, April 7		
Time (EDT)	**Conference Event**	**Session**
9:15 am – 11:30 am	**Welcome, Plenary Speaker, & Awards Citations**	*Real-Time/Live*
11:30 am – 12:30 pm	Lunch Break	
11:30 am – 1:30 pm	**Networking/Social Concurrent Sessions** Participate in the "Round Robin" Meet the leadership and find out more about three of the following: – Awards Committee – Elections Committee – External Policy and Relations Committee – Program Committee – Research Committee – Website Committee *Please visit committees in 15-minute segments from 11:30 am – 12:15 pm.* *Please join the business meeting of a committee from 12:30 pm – 1:30 pm.*	*Real-Time/Live*
11:30 am – 11:45 am	**Drop-In Committee Visit #1**	*Real-Time/Live*
11:45 am – 12:00 pm	**Drop-In Committee Visit #2**	*Real-Time/Live*
12:00 pm – 12:15 pm	**Drop-In Committee Visit #3**	*Real-Time/Live*
12:30 pm – 1:30 pm	Business Meetings of Committees *(listed above)* *(Except for Elections Committee, scheduled on Friday, April 9th from 8:30 am – 9:30 am)*	*Real-Time/Live*
12:30 pm – 1:30 pm	**Continental and Diasporic Africa in Science Education** Contemporary Methods for Science Education Research	*Real-Time/Live*
1:45 pm – 3:15 pm	**Concurrent Session #1**	*Real-Time/Live*
3:30 pm – 5:00 pm	**Graduate Student Forum**	*Real-Time/Live*
5:00 pm – 6:00 pm	**Mentor-Mentee Session**	*Real-Time/Live*
6:00 pm – 8:00 pm	**Networking/Social Concurrent Sessions** Participate in the "Round Robin" Meet the leadership and find out more about three of the following: – Equity and Ethics Committee – Membership Committee – Publications Advisory Committee – Graduate Student Committee – International Committee *Please visit committees in 15-minute segments from 6:00 pm – 6:45 pm.* *Please join the business meeting of a committee from 7:00 pm – 8:00 pm.*	*Real-Time/Live*
6:00 pm – 6:15 pm	**Drop-In Visit #1**	
6:15 pm – 6:30 pm	**Drop-In Visit #2**	
6:30 pm – 6:45 pm	**Drop-In Visit #3**	
7:00 pm – 8:00 pm	Business Meetings of the Committees *(listed above)*	

Schedule at-a-Glance

Thursday, April 8 – Saturday, April 10		
Time (EDT)	**Conference Event**	**Session**
THURS 8:00 am – FRI 7:00 am	**Poster Session #1**	*23-hour window*
	Poster Viewing & Asynchronous Chat	
FRI 8:00 am – SAT 1:00 pm	**Author-Scheduled 30-minute Q&A Session** *(All Strands)*	*29-hour window*
	Advance Viewing of Pre-recorded Presentation	

Thursday, April 8		
8:00 am – 9:30 am	**Concurrent Session #2**	*Real-Time/Live*
9:45 am – 11:15 am	**Concurrent Session #3**	*Real-Time/Live*
11:30 am – 1:00 pm	**Concurrent Session #4**	*Real-Time/Live*
1:00 pm – 2:00 pm	Lunch Break	
2:00 pm – 3:00 pm	**Concurrent Session #5**	*Real-Time/Live*
	Advanced Viewing of Pre-recorded Sessions, Q&A	
3:15 pm – 4:15 pm	**Latino/a Research Interest Group**	*Real-Time/Live*
3:30 pm – 5:30 pm	**Networking/Social Concurrent Sessions**	*Real-Time/Live*
	Aikido–(and Physics!) Inspired Breathing, Balance, Stretching, and Movement *(duration: 30 min)*	
	The CADASE Social: Intriguing Scenes from Movies and TV Shows *(duration: 45 min)*	
	CADASE Graduate Student Fireside Chat: Navigating Academe with Success *(duration: 60 min)*	
	Knitting Circle *(duration: 60 min) All Levels Welcome*	
	Learning Science in the Schoolyard–Centering Equity *(duration: 60 min)*	
	Let's Escape Together! *(duration: 60 min)*	
	NARST Fellows Award Program *(duration: 45 min)*	
	NARST Has Talent: An April FARSE *(duration: 45 min)*	
	NSF Funding Programs and More *(duration: 120 min)*	
	"PeTagogy": Meeting pets of NARST members *(duration: 30 min)*	
4:15 pm – 5:45 pm	**Publishing, Reviewing, and Writing for *JRST***	*Real-Time/Live*

Schedule at-a-Glance

Thursday, April 8 – Saturday, April 10		
Time (EDT)	**Conference Event**	**Session**
THURS 8:00 am – FRI 7:00 am	**Poster Session #2**	*23-hour window*
	Poster Viewing & Asynchronous Chat	
FRI 8:00 am – SAT 1:00 pm	**Author-Scheduled 30-minute Q&A Session** *(All Strands)*	*29-hour window*
	Advance Viewing of Pre-recorded Presentation	

Friday, April 9		
8:30 am – 9:30 am	**Engineering Education Research Interest Group**	*Real-Time/Live*
	Indigenous Science Knowledge Research Interest Group	
8:30 am- 9:30 am	**Elections Committee Business Meeting**	*Real-Time/Live*
8:30 am – 9:30 am	**Networking/Social Concurrent Sessions**	*Real-Time/Live*
	Art-based Social Meet-Up *(duration: 30 min)*	
	Drop Your Research/Theory/Test Tube Like it's Hot *(duration: 60 min)*	
9:30 am – 10:30 am	**Concurrent Session #6**	*Real-Time/Live*
	Advanced Viewing of Pre-recorded Sessions, Q&A	
10:45 am – 11:45 am	**Concurrent Session #7**	*Real-Time/Live*
	Advanced Viewing of Pre-recorded Sessions, Q&A	
12:00 pm – 1:00 pm	Lunch Break	
12:00 pm – 1:00 pm	**NARST Annual Membership Meeting**	*Real-Time/Live*
1:15 pm – 2:45 pm	**Concurrent Session #8**	*Real-Time/Live*
3:15 pm – 5:30 pm	**Networking/Social Concurrent Sessions**	*Real-Time/Live*
	Among Us Scholars *(duration: 60 min)*	
	Enjoying or Enduring the Process of Tenure during the COVID-19 Pandemic *(duration: 60 min)*	
	Informal Music Sharing/Jamming Networking *(duration: 60 min)*	
	Mindfulness Practices for Stress Relief and Self Care in the Time of COVID *(duration: 90 mins)*	

Schedule at-a-Glance

Thursday, April 8 – Saturday, April 10		
Time (EDT)	**Conference Event**	**Session**
THURS 8:00 am – SAT 1:00 pm	**Author-Scheduled 30-minute Q&A Session** *(All Strands)*	*Real-Time/Live*
	Advance viewing of pre-recorded presentation, author schedule, 30-minute Q&A	

Saturday, April 10		
8:00 am – 9:30 am	**Concurrent Session #9**	*Real-Time/Live*
9:45 am – 10:45 am	**Concurrent Session #10**	*Real-Time/Live*
	Advanced viewing of pre-recorded sessions, Q&A	
11:00 am – 12:00 pm	**Concurrent Session #11**	*Real-Time/Live*
	Advanced viewing of pre-recorded sessions, Q&A	
12:15 pm – 1:00 pm	**President Closing Remarks & 2022 Conference**	*Real-Time/Live*
4:00 pm – 10:00 pm	**NARST Board Meeting**	*Real-Time/Live*

Overview	
Event	**Description**
Pre-Conference Workshops	Interactive working group sessions before the official Conference
Graduate Student Forum	Synchronous opportunity for graduate students to interact and learn
Mentor-Mentee Session	Synchronous opportunity for first attendees to conference and early-career individuals to interact with more seasoned NARST members
Poster Sessions	Traditional poster display activated for a 23-hour window with asynchronous interaction by way of chat during the 23 hours
Author-Scheduled Presentations *(All Strands)*	These slots are scheduled by necessity. Authors pre-record and upload presentations prior to conference and schedule a 30-minute Q&A (analogous to "office hours") with author-designated time and appropriate link posted in the conference program. Participants view the pre-recorded presentation in advance of the "office hours."
Networking/Social Concurrent Sessions	Synchronous opportunities to interact with participants around a theme/topic/activity.
Concurrent Sessions	*Two session types:* – Synchronous sessions in which multiple papers are presented and discussed. – Presentations are pre-recorded and viewed in advance by attendees with only a synopsis and Q&A conducted in real-time.

Program

Please note that this program is subject to change.
Check the addendum posted at the meeting and on the website for updates after the program has been published.

Program

Welcome, Plenary Speaker, & Awards Citations

9:15 am - 11:30 am | *Real-Time/Live*

2021 Conference Welcome

Eileen Carlton Parsons, NARST President

Plenary

Beyond Buzzwords: Reimagining the Default Settings of Science and Society

Keynote Presenter:
Ruha Benjamin, Princeton University

Presenter Introduction:
David Stroupe, Michigan State University

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

Plenary 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

Presider:
Noemi Waight, University of Buffalo

Networking/Social Sessions

11:30 am - 1:30 pm | *Real-Time/Live*

Participate in the "Round Robin"

Please visit committees in 15-minute segments from 11:30 am - 12:15 pm

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)*
11:30 am - 12:30 pm

Research Interest Groups (RIGs) Meetings

Continental and Diasporic Africa in Science Education (CADASE)

12:30 pm – 1:30 pm | *Real-Time/Live*

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

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

12:30 pm – 1:30 pm | *Real-Time/Live*

Presiders:
Robert Talbot, University of Colorado Denver
Joe Taylor, University of Colorado Colorado Springs

At the 2021 Business Meeting, the RIG members will discuss current and future projects and identify folks interested in participating in these projects. We will also discuss RIG leadership positions in preparation for the upcoming election.

CONCURRENT SESSION #1

1:45 pm – 3:15 pm | *Real-Time/Live*

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
Day Greenberg, Michigan State University

Administrative Sponsored Session
Graduate Student Committee

Graduate Student Research Symposium

1:45 pm – 3:15 pm | *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

Program

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 Caushi, 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

Program

Administrative Sponsored Session
Indigenous Science Knowledge Research Interest Group

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

1:45 pm – 3:15 pm | *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

Ethics and Decision-making in Science Education

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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, Univeristy 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

Contexts, Characteristics, and Interactions in Science Education

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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

Program

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

Related Paper Set

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*

Presider:
Eve Manz, Boston University

Dance-STEP: Collective Embodied Science Models and the Particulate Nature of Matter
Chris Georgen, 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)

Curricular Sensemaking and Implementation

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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)

Intersection of Sociocultural Factors and College STEM

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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

Program

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 Sevian, University of Massachusetts, Boston

Strand 6:
Science Learning in Informal Contexts

Youth Centered Informal Science

1:45 pm – 3:15 pm | *Real-Time/Live*

A Mixed Methods Study of Youths' STEM Interests in an After-School Club
Deena Gould, University of New Mexico
Ian Gould, Arizona State University

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
Chang Chia 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

Equity-Driven Approaches Among Pre-service Teachers

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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

Program

Strand 8:
In-service Science Teacher Education

Approaches to PD Supporting Teacher Learning

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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
Cory Buxton, Oregon State University
Talal Alajmi, Oregon State University

Strand 10:
Curriculum and Assessment

NGSS Aligned Assessment and Instruction

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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
Namsoo 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
Cari Herrmann Abell, BSCS Science Learning
George De Boer, American Association for the Advancement of Science

Program

Strand 11:
Cultural, Social, and Gender Issues

Science Identity

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
ReAnna Roby, Vanderbilt University

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

Reconstructing Reality through Simulations to Enable Classroom Enactment of Science Practices

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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

Socioscientific Issues

1:45 pm – 3:15 pm | *Real-Time/Live*

Presider:
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

Program

Changes in NOS Understandings after Engaging in Reflective Discussions and Information Evaluation about Socio-Scientific 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

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
Miri Barak, Technion, Israel Institute of Technology
Tal Yachin, Technion, Israel Institute of Technology

Environmental Science Curriculum Development Inlocal Communities: A Cultural Historical Activity Theory Perspective
Xavier Fazio, Brock University

Strand 15:
Policy, Reform, and Program Evaluation

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

Program

Administrative Sponsored Session
Graduate Student Committee

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.

Administrative Sponsored Session
Membership Committee

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.

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 pm – 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.

Program

POSTER SESSION #1

THURSDAY, 8:00 am - FRIDAY, 7:00 am

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 pre-record their presentations and schedule a 30-minute block (like "office hours") for Q&A. Attendees view the recorded presentations in advance of the Q&A. Scheduled times for Q&A are listed at the end of the conference program on page 120. If not listed, then please consult program addendum/changes.

Administrative Sponsored Session
International Committee

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

6:30 am – 8:00 am | *Real-Time/Live*

Chair:
Sonya Martin, Seoul National University, Republic of Korea

Discussant:
Sara Wilmes, University of Luxembourg, Luxembourg

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
Reneé Schwartz, Georgia State University

CONCURRENT SESSION #2

8:00 am – 9:30 am | *Real-Time/Live*

Administrative Sponsored Session
Awards Committee

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

8:00 am – 9:30 am | *Real-Time/Live*

Presenters:
Noemi Waight, University at Buffalo

Strand 1:
Science Learning: Development of Student Understanding

8:00 am – 9:30 am | *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

Program

Strand 2:
Science Learning: Contexts, Characteristics and Interactions

Community & Social Factors in Identity, Motivation, and Learning

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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 Sevian, University of Massachusetts, Boston

Strand 2:
Science Learning: Contexts, Characteristics and Interactions

Related Paper Set

Studying Contestations of Hegemonic Science Education as Public Good

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
Daniel Morales-Doyle, University of Illinois at Chicago

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)

Engaging Students in Science and Engineering Practices

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

Program

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)

Model-Based Teaching and Learning

8:00 am - 9:30 am | *Real-Time/Live*

Presider:
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)

Scaffolding and Support for College STEM Learning

8:00 am - 9:30 am | *Real-Time/Live*

Presider:
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

Program

Strand 6:
Science Learning in Informal Contexts

From 'Physical to Digital': How Institutions of Informal Science Education Adapt to an Online Presence during the COVID-19 Crisis (and Beyond)

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

Making a Case for Emphasizing Modeling and Engineering

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

Curriculum and Assessment

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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 Sevian, 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

Program

Strand 10:
Curriculum and Assessment

Learning Progression Assessments and Teachers' Classroom Enactments of Curricula

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

Context, Gender, and Guidance

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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 Ebisin, 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

Modeling Tools that Support Thinking and Learning

8:00 am – 9:30 am | *Real-Time/Live*

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

The World as a Lab: Real-Life Data in STEM Projects
Lutz Kasper, University of Education Schwaebisch Gmuend
Patrik Vogt, Institute of Teacher Training, Mainz

Program

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 Anutza Almog, University of Haifa
Anat Yarden, Weizmann Institute of Science

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

Nature of Science in K-12 Education

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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
Reneé Schwartz, Georgia State University

Strand 14:
Environmental Education and Sustainability

Engaging with Socioscientific Issues

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
Bryan Nichols, Florida Atlantic University

Problematizing Intuitive Universals in Socio-Scientific Reasoning: Using Meta-Epistemic Reasoning Practices to Link Mechanisms to Context
John Ruppert, Saint Peter's University
Masiel Infante, Saint Peter's University

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

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 Basak Uygun, Middle East Technical University
Ozgul Yilmaz-Tuzun, Middle East Technical University

Program

CONCURRENT SESSION #3

9:45 am – 11:15 am | *Real-Time/Live*

Administrative Sponsored Session
Publications Advisory Committee

9:45 am – 11:15 am

NSTA's Annual Research Worth Reading Recognition

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

Selected Papers :
Visintainer, T. (2020). "I think at first glance people would not expect me to be interested in science": Exploring the racialized science experiences of high school students of color. *Journal of Research in Science Teaching*, 57(3), 393– 422.

Wieselmann, J.R, Dare, E.A, Ring-Whalen, E.A, & Roehrig, G,H. (2020). "I just do what the boys tell me": Exploring small group student interactions in an integrated STEM unit. *Journal of Research in Science Teaching*, 57(1), 112– 144.

Navy, S.L, Nixon, R.S, Luft, J.A, & Jurkiewicz, M.A. (2020). Accessed or latent resources? Exploring new secondary science teachers' networks of resources. *Journal of Research in Science Teaching*, 57(2), 184– 208

Administrative Sponsored Session
External Policy and Relations Committee

9:45 am – 11:15 am | *Real-Time/Live*

Beyond Policies and Statements: Towards Equity in STEM Education

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

Administrative Sponsored Session
Research Committee

9:45 am – 11:15 am | *Real-Time/Live*

2019 Sandra K. Abell Institute for Doctoral Students

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

9:45 am – 11:15 am | *Real-Time/Live*

Using Assessment to Characterize Student Knowledge

Presider:
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

Program

Mind Wandering of Grade Five Students with High qnd 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-Harthi, Sultan Qaboos University
Abdullah Ambusaidi, Ministry of Education, Oman
Khalid Al-Saadi, Sultan Qaboos University
Mohammed Al-Aghbari, Sultan Qaboos University

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

Eliciting and Supporting Students Doing Science

9:45 am - 11:15 am | *Real-Time/Live*

Presider:
Andy Cavagnetto, Washington State University

Strategies to Manage Uncertainty in Scientific Argumentation
Ying-Chih Chen, Arizona State 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)

Science Education in Preschool

9:45 am - 11:15 am | *Real-Time/Live*

Presider:
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

Program

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

Curriculum Integration

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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)

Innovative Techniques in College STEM Instruction

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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 Sevian, 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

The Role of Informal Science Learning Environments in Supporting Scientific Engagement

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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
Michael Reiss, University of London
Eleni Kyza, Cyprus University of Technology

Program

Strand 7:
Pre-service Science Teacher Education

Coherent and Current Approaches in Science Teacher Preparation

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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

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

Computational Thinking and STEM Integration

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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

Program

Strand 10:
Curriculum and Assessment

Linguistic and Cultural Aspects of Science Curricula

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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
Carolyn Staudt, The Concord Consortium
Dale Cope, Independent Education Consultant
Joyce Massicotte, The Concord Consortium
Nathan Kimball, 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

Physical Sciences and Equity

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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

Program

Strand 12:
Technology for Teaching, Learning, and Research

Using Technology to Improve Students' Scientific Thinking

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
Jonah Firestone, Washington State University, Tri-Cities

CAI on Adaptation in Organisms and Biological Mechanism among Igbo Senior Secondary School Students
Ngozika Mbajiorgu, 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 Ebisin, 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

Inservice Teachers' Needs and Uses of Digital Tools and Resources

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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 Tuvi-Arad, The Open University of Israel
Ron Blonder, Weizmann Institute of Science

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

Acknowledging African American Scientists and Scientific Research

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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
Education in Place and Community

9:45 am – 11:15 am | *Real-Time/Live*

Presider:
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
Ledwina Hungwe, University of the Witwatersrand

The Impact of Place Attachment in Socio-Scientific 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

11:30 am – 1:00 pm | *Real-Time/Live*

Administrative Sponsored Session

11:30 am - 1:00 pm

Strand 6:
Science Learning in Informal Contexts
Learning in the Informal Context

11:30 am – 1:00 pm | *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

Program

Administrative Sponsored Session
Research Committee

Real-Time/Live

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

11:30 am – 1:00 pm | *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

Administrative Sponsored Session
Equity and Ethics Committee

Basu Symposium

11:30 am – 1:00 pm | *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: Re-Envisioning Science Education for Black People during the Early 20th Century
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

Related Paper Set

Engaging Science Teachers in Socio-Scientific Implementation for Global Citizenship

11:30 am – 1:00 pm | *Real-Time/Live*

Science Teachers' Pedagogical Content Knowledge Development during Enactment of Socio-Scientific Curriculum Materials
Dürdane 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

Science Teaching, Learning, & Social Justice

11:30 am – 1:00 pm | *Real-Time/Live*

Presider:
Sameer Honwad, SUNY Buffalo

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

Strand 5:
College Science Teaching and Learning

(Grades 13-20)

Supporting 21st Century Students and Faculty

11:30 am – 1:00 pm | *Real-Time/Live*

Presider:
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
Petra Kranzfelder, University of California Merced
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

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
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

Program

Strand 7:
Pre-service Science Teacher Education

Examining Empathy and Emotions in Science Education

11:30 am – 1:00 pm | *Real-Time/Live*

Presider:
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

Related Paper Set

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 – 1:00 pm | *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

Related Paper Set

Automated Assessment of Argumentation in School Science: Developments and Challenges

11:30 am – 1:00 pm | *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

Teachers and Justice

11:30 am – 1:00 pm | *Real-Time/Live*

Presider:
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

Strand 11:
Cultural, Social, and Gender Issues

Related Paper Set

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

11:30 am – 1:00 pm | *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

Program

Strand 11:
Cultural, Social, and Gender Issues

Storied-Identities as a Lens to Studying Science Identity

11:30 am – 1:00 pm | *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

Related Paper Set

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

11:30 am – 1:00 pm | *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
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

Reimagining Science Education in the Anthropocene

11:30 am – 1:00 pm | *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

Related Paper Set

Models for Place-Based Science Education in Schools

11:30 am – 1:00 pm | *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

Discussion of Models for Place-based Science in School
Déana Scipio, Islandwood Graduate Program

Strand 14:
Environmental Education and Sustainability

Related Paper Set

Supporting Climate and Data Literacy in Rural Communities by Incorporating Authentic Experiences in Formal and Informal Settings

11:30 am – 1:00 pm | *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

11:30 am – 1:00 pm | *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 *(on your own)*
11:30 am – 12:30 pm

CONCURRENT SESSION #5

2:00 pm – 3:00 pm

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

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

Scientific Discourse and Argumentation

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

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

Related Paper Set

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

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and 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)

Elementary Teachers' Agency, Confidence, and Knowledge

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

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

Program

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

Implementing Elementary Science New Curricula

2:00 pm - 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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)

Pedagogical Content Knowledge

2:00 pm - 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Henriette Burns, Washington State University

Biology Teachers' Pedagogical Content Knowledge of Argumentation in China through Rasch Analysis
Yingzhi Zhang, Capital Normal University
Chenyan 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

Program

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

Related Paper Set

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

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Stina Krist, University of Illinois at Urbana, Champaign

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)

Educational Reform for Justice and Access

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Jacquleyn Chini, University of Central Florida

Teaching- and 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 Mcalexender, 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

Program

Strand 6:
Science Learning in Informal Contexts

Social Justice and Citizen Science

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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, Wissneschaft im Diolog, 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

Culture and Language Considerations in Pre-service Programs

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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

Early Childhood and Elementary Pre-serviceTeachers

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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
Gozde 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

Related Paper Set

In-service Teachers Engaging in Science and Engineering Practices

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and 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

Related Paper Set

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

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and 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

Program

Strand 11:
Cultural, Social, and Gender Issues

Culturally Responsive Instruction

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Capitalizing on the Intersections of Pop Culture and Science

2:00 pm – 3:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

Research Interest Groups (RIGs) Meetings

3:15 pm – 4:15 pm | *Real-Time/Live*

Latino/a (LARIG)

Presider:
Regina Suriel, LARIG Chair, Valdosta State University

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.

NETWORKING/SOCIAL CONCURRENT SESSIONS

3:30 pm – 5:30 pm | *Real-Time/Live*

Aikido–(and Physics!) Inspired Breathing, Balance, Stretching, and Movement
(duration: 30 min)

Organizer:
Cathy Cullicott, Arizona State University

We will spend our time together learning and practicing a series of movements we can use to help our bodies and minds prepare for or unwind from too much computer time. Combining movements from Aikido (a Japanese Martial Art), understandings from physics, and some ideas from Tai Chi, we will focus on necks, shoulders, backs, and wrists in particular, but we will also do whole body movements to reconnect with our bodies and help us move more comfortably. We will also do some focused breathing. No experience, ability, or equipment necessary–all are welcome. Looking forward to seeing you on the (virtual) mat!

CADASE Graduate Student Fireside Chat: Navigating Academe with Success
(duration: 60 min)

Organizer:
Olayinka Mohorn, University of Illinois Chicago

The goal of this session is to support doctoral candidates and newly minted graduates with securing careers in the academy. Panelists include early career scholars who will discuss their experiences navigating the academic job market.

The CADASE Social: Intriguing Scenes from Movies and TV Shows
(duration: 45 min)

Organizer:
Shari Watkins, American University

The CADASE Steering Committee will feature members of the CADASE RIG to facilitate the engagement of informal conversations around movies and TV shows that have entertained and intrigued us throughout the COVID-19 pandemic.

Knitting Circle **(all levels welcome)**
(duration: 60 min)

Organizer:
Erin Furtak, University of Colorado Boulder

Wouldn't it be great to just sit and knit? Bring your own yarn and needles–this session will gather knitters new and experienced to create the community that is built when we learn and create together. New knitters can pick up some tips on casting on, and simple stockinette stitches, while experienced knitters can swap ideas and techniques.

Learning Science in the Schoolyard–Centering Equity
(duration: 60 min)

Organizer:
Roberta Howard Hunter, Michigan State University

Come gather with other researchers and practitioners interested in outdoor learning at school. Hear about others' work and share ways in which we can work towards more equitable experiences in the schoolyard. Topics include place-based instruction, building educator capacity, and the impact of remote learning in the pandemic. Bring some tea or coffee and meet new colleagues!

Program

Let's Escape Together!
(duration: 60 min)

Organizer:
Denise Bressler, East Carolina University

Need to escape from your reality for a little while? We will divide up in pairs to try a virtual escape style experience. It's freely available online and partners can simply call each other to communicate. If you escape with time to spare, we can chat about the value of escape experiences for STEM education or we can just celebrate your epic escapes!

NSF Funding Programs and More
(duration: 120 min)

Organizer:
Xiufeng Liu, National Science Foundation

In this session, NSF program officers will describe various funding opportunities in formal and informal STEM education, undergraduate and graduate STEM education, as well as CAREER for junior faculty. They will also describe the standard proposal review process and the merit review criteria. Much time will be for Q&A on various topics ranging from writing competitive proposals, to volunteering to be a proposal reviewer, managing funded programs, and working at NSF as a rotating and permanent program officer. The session will consist of both formal presentations and informal discussion. Pending the interests of attendees and availability of technology, break-out rooms may also take place.

NARST Fellows Award Program
(duration: 45 min)

Organizer:
Noemi Waight, University at Buffalo

This session will introduce and celebrate NARST's first named Fellow(s). The Fellow(s) will have an opportunity to briefly share their work and engage with a vision for developing the NARST Fellows Community. In addition, this session will also provide a forum for the NARST community to learn more about the award program.

NARST Has Talent: An April FARSE
(duration: 45 min)

Organizers:
Meg Blanchard, NC State University

Sherry Southerland, Florida State University
A digital reincarnation of FARSE, this year's "Talent" show will feature a competition of creative 3-minute video products competing for "likes" to make it into the final online showcase sent out via the NARST listserv. A farcical look at academic life through the eyes of our members in the context of COVID-19, pets, children, backyard activities, new hobbies, exercise, musical ventures, and academic pursuits.

"PeTagogy": Meeting pets of NARST members
(duration 30 min)

Organizer:
Sahar Alameh, University of Kentucky

PeTagogy is an informal 30-minute session for NARST members to introduce their pets. Pets include loving dogs, grumpy cats, chickens, horses, lizards, and all the exotic pets one can have! Live pet introductions are encouraged, but pictures and short videos are accepted to show during this live session.

Administrative Sponsored Session
Publications Advisory Committee

Publishing, Reviewing, and Writing for JRST

4:15 pm – 5:45 pm | *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

Program

POSTER SESSION #1

Thursday 8:00 am – Friday 7:00 am

The following 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 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

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

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, Texas Christian University
Saouma Boujaoude, American University of Beirut

When an NGSS-Friendly Genetics Curriculum Unit Goes Online: A Naturalistic Study
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

Translanguaging from the Perspective of Disciplinary Science
Ashlyn Pierson, Ohio State University
Scott Grapin, University of Miami

Strand 3: POSTERS

Engaging Students in PBL in Science Classrooms: The Challenges for Chinese Primary Teachers
Jing Lin, Beijing Normal University
Liang Zeng, Beijing Normal Unversity
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

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

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

Strand 5: POSTERS

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

Program

Strand 6: POSTERS

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 Nevada, Las Vegas
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

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

Program

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?
Büşra Tonyali, University of Duisburg-Essen
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 Restropo Nazar, California State University, Los Angeles
Jose Martinez Hinestroza, Texas State University

POSTER SESSION #2

FRIDAY, 8:00 am – SATURDAY, 7:00 am

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 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.

Author–Scheduled, 30-minute Q&A Sessions #2

Presenters pre-record their presentations and schedule a 30-minute block (like "office hours") for Q&A. Attendees view the recorded presentations in advance of the Q&A. Scheduled times for Q&A are listed at the end of the conference program on page 120. If not listed, then please consult program addendum/changes.

Research Interest Groups (RIGs) Meetings

8:30 am – 9:30 am | *Real-Time/Live*

Engineering Education Research Interest Group (ENE-RIG)

At the 2021 Business Meeting, the RIG members will discuss the following items: a) Updates on membership (100+ members), listserv, website; b) Discussion on NARST strands and involvement of the ENE-RIG; c) Plans for collaborative paper sets, symposiums, and panels; and d) Updates on leadership team, elections, roles, and budget.

Presiders:
Kristina Tank, Iowa State University
Anne Leak, High Point University

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

8:30 am – 9:30 am | *Real-Time/Live*

Art-Based Social Meet-Up

(duration: 30 min)

Organizer:
Katia Kromann Nielsen, University of Copenhagen

This is a short informal session where we can get to know each other in a different way. In the session I will give a brief introduction of art-based-methods and we will then engage in an exercise. The idea is to use art-based methods to experiment with getting to know each other in a fun way despite the distance.

Drop Your Research/Theory/Test Tube Like it's Hot

(duration: 60 min)

Organizers:
Noemi Waight, University at Buffalo
Jennifer Adams, University at Calgary

This session will provide a space for informal community building. It will involve a jam session that will feature an eclectic musical lineup from all over the world. The goal here is to provide a space to connect with other NARST members, decompress, and dance the time away. Since the act of dancing is related to spatial awareness, raises the heart rate, and results in the release of endorphins, we hypothesize that dancing in community will inform positive vibes for NARST'ers.

Program

CONCURRENT SESSION #6

Special Time Slot | **7:15 am – 8:15 am**

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

Strand 5:
College Science Teaching and Learning

(Grades 13-20)

Special Time Slot | **7:15 am – 8:15 am**

Pedagogy and Partnerships for the Modern STEM College Classroom

7:15 am – 8:15 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Emily Walter, California State University, Fresno

Revision as an Essential Step in Modeling Cellular Respiration System Dynamics
Lyrica 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 Instructional 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 am – 8:15 am**

Informal Science Learning in Museums and other Places

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 am – 8:15 am**

Automated Scoring and Machine Learning in Science Assessment

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

9:30 am – 10:30 am

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

Strand 1:
Science Learning: Development of Student Understanding

Multiple Ways of Representing Knowledge

9:30 am – 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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

Program

Strand 1:
Science Learning: Development of Student Understanding

Student Thinking about Genetics and Evolution

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Research of Primary Science Teaching and Learning in China—The Past and the Future

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 2:
Science Learning: Contexts, Characteristics, and Interactions

Interest, Motivation, and Critical Thinking in Science Learning

9:30 am - 10:30 am

Advanced Pre-recorded Viewing & Live Q&A

Presider:
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

Program

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

Engineering Education in the Primary Grades

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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)

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 and 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 Ebisin, 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)

Rethinking STEM College Course Designs

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

Students' and Instructors' Conceptions of Scientific Hypotheses and Predictions: A Case for Closer Scrutiny
Anupriya Karippadath, Purdue University
Perion Sharp, Purdue University
Aya Elhag, 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

Related Paper Set

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 and 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 and Evaluation, Inc.

Strand 7:
Pre-service Science Teacher Education

Identity Development in Science Teachers

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

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

Teacher Engagement and Leadership

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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 and 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
Brian Gane, University of Illinois at Chicago
Nancy Songer, University of Utah
Michelle Newstadt, Gooru.org
Brian Gane, University of Illinois at Chicago

Program

Strand 10:
Curriculum and Assessment

Teacher Observation and Attitudes Towards Science Evaluation

9:30 am – 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Virtual Rehearsal Simulations to Explore Elementary Pre-service Teachers' Scientific Discourse Skills

9:30 am – 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Discussant:
Tammy Lee, East Carolina University

Presenters:
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 12:
Technology for Teaching, Learning, and Research

Teaching and Learning in the College Science Classroom

9:30 am – 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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
Miri Barak, Technion, Israel Institute of Technology
Maya Usher, 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

Program

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

Approaches to Education for Sustainability and Sustainable Development

9:30 am - 10:30 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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
Alex Friedlander, 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

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

10:45 am - 11:45 am

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

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

COVID & Social Justice

10:45 am - 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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
Tammie Visintainer, San José State University

Ideological Practice in Science Learning: Navigating Complex Terrain of Climate and Politics in U.S. 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

Program

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

Teaching Practices

10:45 am - 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 Helding, University of Nebraska-Lincoln

Evoking Meaning and Connection: Using Awe to Teach Science
Julianna Nieuwsma, North Carolina State University
Gail Jones, North Carolina State University
Kathyrn 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

STEM Interest Development

10:45 am - 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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.

Program

Strand 7:
Pre-service Science Teacher Education

Development of Pedagogy and Practice of Pre-service Teachers

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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-Vased 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

Taking Up Socioscientific Issues

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Stephen Witzig, University of Massachusetts, Dartmouth

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

Curricular innovations in High School Biology

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Cari Herrmann Abell, BSCS Science Learning

Measuring the Efficacy of an Approach to Integrating Quantitative Reasoning in High School Biology
Molly Stuhlsatz, BSCS Science Learning
Melissa Kjelvik, 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

Program

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

Strand 10: Curriculum and Assessment

Evaluating Science Identity, Attitudes, and Career Aspirations

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

A Systematic Review of the Conceptual Framework of Attitude Toward Science Instruments
Radu Bogdan Toma, Universidad de Burgos
Jesús Ángel Meneses Villagrá, 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

Program

Strand 11:
Cultural, Social, and Gender Issues

Science Education Research in Culturally and Linguistically Diverse Contexts: Critical Views and Emerging Questions

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presiders:
Sara Wilmes, University of Luxembourg
Christina Siry, 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

STEM Capital

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Related Paper Set

Leveraging Mixed-reality Classroom Simulators for Professional Development to Support Student-centered STEM Learning Environments

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and 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

The Nature of Science & Engineering Practices

10:45 am – 11:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

NARST Membership Meeting

12:00 pm – 1:00 pm

Presider:
Eileen Carlton Parsons, NARST President

Lunch Break *(on your own)*

12:00 pm – 1:00 pm

CONCURRENT SESSION #8

1:15 pm – 2:45 pm | *Real-Time/Live*

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

Program

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 at 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

CBE-Life Science Education
Kimberly Tanner, San Francisco State University
Jeff Schinske, Foothill College

School Science and Mathematics
Bridget Miller, University of South Carolina
Christie Martin, University of South Carolina

Administrative Sponsored Session
Continental and Diasporic Africa in Science Education (CADASE) RIG

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
Catherine Quinlan, Howard University

CADASE Posters

Science Education, A Public Good for the Good of the Public? Research on and for the African Diaspora to Empower, Evoke, and Revolutionize

Applying the Ecosystem Services Framework to Engage African American Undergraduate Students in Environmental Sciences
Mark Dugo, Johnson C. Smith University

Through Rated Responses to Cognitive Resources and Equity: Nigerian Students' Productive Beginnings through Science Inquiry Responses
Mark Akubo, Florida State University
Oluwafunke Ogunya, Florida State University

Collegiate Student Perspectives on Coastal Environmental Conservation
Stanton Belford, Martin Methodist College

eNVision: A Collaborative Redesign of Pre-service Teacher Candidates and Faculty Experiences through a Professional Development School Partnership
Rona Robinson-Hill, Ball State University, Muncie, IN

Program

Administrative Sponsored Session
President

National Academies of Sciences (NAS) Board of Science Education (BOSE) Contribution to Science Education as a Public Good

1:15 pm – 2:45 pm | *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

Social Factors in College Science

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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
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)

Related Paper Set

The Roles and Uses of Crosscutting Concepts in Elementary Teaching

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
Anna Maria Arias, Kennesaw State University

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

Program

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)

Related Paper Set

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

Beliefs and Efficacy Among Pre-service Teachers

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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 Pre-service 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

Handbook of Research on Science Teacher Education

1:15 pm – 2:45 pm | *Real-Time/Live*

Discussant:
Michele Koomen, Gustavus Adolphus College

Program

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

Assessing Student Reasoning in the Context of Systems and Processes

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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 and 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

Whiteness

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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 Nevada, Las Vegas
Bonelli Dobbs, University of Memphis

Hear and Listen: Experiences of Adult Black Women in Science Classes
Reneé 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

Program

Strand 11:
Cultural, Social, and Gender Issues

Motivation and Under-Representation

1:15 pm – 2:45 pm | *Real-Time/Live*

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 Riegle-Crumb, University of Texas at 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

Alternate Avenues of Assessment

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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

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

Education for Environmental Science Literacy

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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

Program

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

Strand 14:
Environmental Education and Sustainability

Designing Learning for Just and Resilient Climate Action

1:15 pm – 2:45 pm | *Real-Time/Live*

Presider:
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

NETWORKING/SOCIAL CONCURRENT SESSIONS

3:15 pm – 5:30 pm | *Real-Time/Live*

Among Us Scholars
(duration: 60 min)

Participants for this session will play the video game "Among us".

Organizer:
Karina Del Carmen Mendez Perez, University of Texas at Austin

Enjoying or Enduring the Process of Tenure during the COVID-19 Pandemic
(duration: 60 min)

Organizer:
Justina Ogodo, Baylor University

This general session is open to all non-tenure, tenure-track professors and postdoctoral fellows. The goals are 1) to socialize and get to know others who are in the tenure process, 2) to use discourse to ease our pent-up stress and emotions, and 3) to amuse, uplift, share, and guide each other on ways to fulfill this self-enamored milestone, which we all hope to achieve. Lastly, it will provide a networking opportunity for collaborative work for those with similar interests.

Informal Music Sharing/Jamming Networking
(duration: 60 min)

Organizer:
Joseph Taylor, University of Colorado, Colorado Springs

The session will start by networking fellow musicians within the NARST community. We will discuss common musical interests and any instruments we play (including vocals). This could lead to collaborations between annual meetings that could lead to fun live performances and or/ sing-a-longs at annual meetings. At the session, if time permits, we might even jam a little.

Mindfulness Practices for Stress Relief and Self Care in the Time of COVID
(duration: 90 mins)

Organizer:
Paula Huffman, University of North Carolina at Chapel Hill
UNC Program on Integrative Medicine

This Mindfulness workshop will:

- Develop strategies for using Mindfulness Techniques that can be practiced anywhere, anytime.
- Practice techniques that help to cultivate the ability to respond from a calmer baseline to daily life events.
- Learn ways to slow the ruminating mind, thereby decreasing catastrophic thinking and its effect on our overall well-being.
- Enhance stress resiliency as we develop techniques for intentionally focusing on positive and pleasurable life events.

POSTER SESSION #2

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

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

Program

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

Supporting Novice STEM Teachers through the Noyce Buddy Program
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

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

Program

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 Kuschmierz, 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

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

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

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

Program

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-Alburquerque, 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 Valparaíso
Sonia Pino, Pontificia Universidad Católica de Valparaíso
Brant Miller, University of Idaho

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 at 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

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 LePretre, 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

Program

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 at 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

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 Kahriman-Pamuk, Mersin University
Gelengul Haktanir, Ankara University

Strand 15: POSTERS

Translating Research into Classroom Practice: Who is Publishing in Science Education Practitioner Journals (SEPJs)?
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

Spectacle and Policy: STEM in the Early Trump Administration
Matthew Weinstein, University of Washington, Tacoma

BASU SCHOLARS POSTERS

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

BASU SCHOLARS POSTERS

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

Program

CONCURRENT SESSION #9

8:00 am – 9:30 am | *Real-Time/Live*

Administrative Sponsored Session
International Committee

ESERA: Crossing Boundaries: Examining and Problematizing Interdisciplinarity in Science Educations

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
Sonya Martin, Seoul National University

Discussant:
Sibel Eduran, University of Oxford

Presenters:
Laura Branchetti, University of Parma, Italy
Olivia Levrini, University of Bologna
Shulamit 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

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

8:00 am – 9:30 am | *Real-Time/Live*

Presenter:
Noemi Waight, University at Buffalo

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

Socio-Scientific Issues-Based Instruction for Scientific Literacy Development

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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)

NGSS Practices and Implementation

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

Program

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

Related Paper Set

Pre-service Teachers' Use of Learning Progressions to Inform Classroom Instruction

8:00 am - 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

Learning and Assessment in Project-based and Problem-based Curricula

8:00 am - 9:30 am | *Real-Time/Live*

Presider:
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 Touitou, Michigan State University
Sarah Maestrales, Michigan State University
Joseph Krajcik, Michigan State University

Program

Strand 14:
Environmental Education and Sustainability

Traditional Ecological Knowledge (TEK): Water Stories, Sustainability, Models, and Evidence

8:00 am – 9:30 am | *Real-Time/Live*

Presider:
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

CONCURRENT SESSION #10

9:45 am – 10:45 am

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

Strand 1:
Science Learning: Development of Student Understanding

Students' Understanding of Physical Science Concepts

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Jennifer Tripp, University at Buffalo

Experience Doesn't Matter but the Direction Does: Differential Accurracy 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 – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Henriette Burns, Washington State University

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

Program

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

Epistemic & Disciplinary Engagement in Middle and Secondary School

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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)

Socioscientific Issues in the Science Classroom

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

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

Student Thinking and Interest in Science

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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)

Teacher Learning through Practice

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Gregory Banks, University of Massachusetts, Boston

Teacher Emphasis and What It Reveals about Chemical Ideas and Practices
Gregory Banks, University of Massachusetts, Boston
Hannah Sevian, 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)

Authentic Learning Inside and Outside the Classroom

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Jorge Solis, University of Texas at San Antonio

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

Program

Establishing a Baseline of Science Communication Skills
Heather Bergan-Roller, Northern Illinois University
Rashmi Shivni, Northern Illinois University
Christin Cline, Northern Illinois University
Morgan Newport, Northwestern University
Shupei Yuan, 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)

Reasoning and Thinking about STEM

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider: **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

Creating in Informal Science

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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, University of Maryland, College Park

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, Calfornia 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

Program

Strand 6:
Science Learning in Informal Contexts

Experiences in Informal Science

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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

Strand 6:
Science Learning in Informal Contexts

Informal Science in Media and Society

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

COVID and Course Design

9:45 am – 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Elizabeth Lewis, University of Nebraska, Lincoln

Emergency Remote Teaching of Science Methods Courses during the COVID-19 Pandemic
Martha Canipe, Northern Arizona University

Ed+gineering 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

Sociocultural Perspectives on Teacher Learning and Classroom Practice

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Jennifer Maguire, Virginia Tech

Opportunities for Reflecting on Opposition to Learning Evolution during a Teacher Training Course
Merav Siani, Weizmann Institute of Science and 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

Using Augmented Reality and Mixed Reality to Enhance Science Learning

9:45 am - 10:45 am

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

A Study of Mixed Realty 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

11:00 am - 12:00 pm

Advance Viewing of Pre-recorded Presentations with 60-minute Real-Time/Live Q&A

Strand 5:
College Science Teaching and Learning

(Grades 13-20)

Buttress and Barriers to Constructing College Cultures of STEM

11:00 am - 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Shana Mcalexander, North Carolina State University

Program

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

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 Huvard, 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

Informal Educator Experiences

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

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

Informal Science Clubs

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
Alpaslan Sahin, Harmony Public Schools

Bridging Formal and Informal Education in an Afterschool Science Club for Children from Low Income Communities
Megan Pham-Quan, University of Toronto
Lydia Burke, 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 Kooken, 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

Development of Pre-service Teacher Knowledge and Practice

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

Strand 7:
Pre-service Science Teacher Education

Expanding the Toolkit for Pre-service Teachers

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 Pre-service Teachers
Rachel Askew, Vanderbilt University

Engaging International Emerging Teachers in Coauthoring 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

Teacher Engagement in Science Practices

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 Opisbo

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

Teacher Self-efficacy and Perceptions

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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

Approaches to STEM Implementation

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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, Greensboro
Jakayla Clyburn, University of North Carolina, 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
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

Curriculum and Assessment in the Context of Physics

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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 Vinitsky-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, LCC
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

Program

Strand 11:
Cultural, Social, and Gender Issues
Students and STEM

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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
Francesca Sen, Youth and Family Services, Santa Barbara YMCA

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
Teacher Leadership and Engagement in PD

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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
STEM Identity

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

STEM Identities, First-Generation College Students, and Family Influence
Megan McGinty, University of Alaska Fairbanks
Laura Carsten Conner, University of Alaska Fairbanks

Program

Developing STEM Identities in Students in the "Big Middle". Connections between Identity and Socioeconomic Level
Carme Grimalt-Álvaro, Universitat Rovira I Virgili
Digna Couso, Crecim-Universitat Autonoma 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

Digital Tools to Support Inservice and Pre-service Teachers' Professional Learning

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

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

Teaching and Learning with Technology through the COVID-19 Pandemic

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Program

Strand 14:
Environmental Education and Sustainability

Learning Out of Doors

11:00 am – 12:00 pm

Advanced Pre-recorded Viewing and Live Q&A

Presider:
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

Pre-service 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

CLOSING SESSION

12:15 pm – 1:00 pm | Real-Time/Live

Presidential Closing Remarks

2022 Conference Information

Author-Scheduled Presentations Day and Time

Day and Time to be determined by authors.

If not listed here, then please consult program addendum/changes.

Science Teachers' Perceptions Regarding Digital Curation as a Personalized Learning Activity that Promotes Professional Learning

Thursday, April 8 | 8:00 am – 8:30 am

Efrat Dayan, Technion, Israel Institute of Technology
Dina Tsybulsky, Technion, Israel Institute of Technology

STEM Teachers' Professional Learning Community during the COVID-19 Pandemic

Thursday, April 8 | 11:30 am – 12:00 pm

Zehavit Kohen, Technion, Israel Institute of Technology
Orit Cohen Nissan, Technion, Israel Institute of Technology

Fostering Transformative Agency in Science Education: Students Imagining Technological Futures

Friday, April 9 | 9:00 am – 9:30 am

Antti Laherto, University of Helsinki
Tapio Rasa, University of Helsinki
Elina Palmgren, University of Helsinki

Author Index

Author Index

Author Index

Author Index

Author Index

Author Index

H

Author Index

Author Index

L

Author Index

Author Index

Author Index

Author Index

Author Index

Author Index

Author Index

Author Index

All elections policies (and other policies) are found on the NARST website https://narst.org/sites/default/files/2021-01/Policies_Procedures_12-20_0.pdf in the NARST Policies and Procedures manual.

NARST
A global organization for improving science education through research

GET INVOLVED

Help NARST achieve its mission

"to help all learners achieve science literacy"

by taking an active role in leadership.

Run for the Board of Directors:

Self-nominate or nominate a colleague

- The Call for Nominations will be emailed to NARST members in **May 2021**.
- Nominees need **10** NARST member endorsements.
  - Collect them at the conference!
  - Note: An email "I support x's nomination" will suffice.
- Complete and submit nomination package by **June 2021** deadline (details included in the Call).

For more details, talk with Board or Elections Committee members

All elections policies (and other policies) are found on the NARST website https://narst.org/sites/default/files/2021-01/Policies_Procedures_12-20_0.pdf in the NARST Policies and Procedures manual.