



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

This document reflects the conference schedule and session details as of March 4, 2022.

Changes requested after that date are not necessarily reflected in this document. Please refer to the addendum. The usual front pages of the conference program are prepared in a separate pdf formatted document. That document contains information on NARST leadership, committees, awardees, sponsors, and the 2023 annual conference.

Changes to this program will be provided in the addendum posted to the 2022 conference website. <https://narst.org/conferences/2022-annual-conference>

DUE TO CONTINUING PROGRAM CHANGES, THERE WILL NOT BE A PRINT VERSION AVAILABLE AT THE CONFERENCE. If you would like a printed program, you will need to download and print the document. Only a printed version of the Schedule at a Glance will be available at the conference.

Please also note that PRESIDERS are listed in a linked document <https://tinyurl.com/NARSTpresider>

Presiders for the in-person/hybrid sessions must be present in-person. Please check the Presider document for assignments.

NARST 2022 Conference Schedule at a Glance

Date/Time (all in Pacific time, unless otherwise noted)	Event	Session format/room
March 21, 2022 8:00 am CENTRAL time	Membership Committee sponsored workshop: NARST Writing Retreat	Virtual
March 24, 2022 8:00 am– 9:00 am PST (11:00 EST)	Membership Committee Welcome Session for New Attendees (virtual)	Virtual
March 25, 2022 9:00 am – 12:00 pm PST	Pre-conference Workshop: An Introduction to Data Science in Science Education Using R	Virtual
May 13, 2022 12:00 pm – 2:00 pm EST Note: This is a post- conference workshop.	YESTEM: Justice-Oriented Pedagogies and Practices for Informal Science Learning and Research	Virtual
Saturday, March 26		
8:00 am – 5:00 pm	NARST Executive Board Meeting #1	Burrard
12:00 pm – 6:00 pm	Conference Registration	Prefunction
Sunday, March 27		
7:30 am – 6:00 pm	Conference Registration	Prefunction
8:00 am– 12:00 pm	NARST Executive Board meeting #1 con't	Burrard
8:00 am – 11:45 am	Pre-Conference Workshops	
8:00 am – 11:45 am	Equity and Ethics Preconference Workshop: Unity and Inclusion for Global Scientific Literacy. Invite as a Community: Unite as a Community.	Hybrid Kitsilano Ballroom A
8:00 am – 11:45 am	Conducting Policy Reviews to Uncover Systemic Barriers into Science Education	In person Kitsilano Ballroom C
8:00 am – 11:45 am	Teaching and Learning Science in a ‘Post-Truth’ Society: New Roles for Socio-Scientific Issues	Hybrid Kitsilano Ballroom D
8:00 am – 11:45 am	LaRIG Pre-Conference Workshop: Community Building for Success: Latinx Graduate Students, Early Career Educators and Scholars in Science Education (Multilingual Workshop)	Hybrid Parq Salon A

8:00 am – 11:45 am	Early Career Faculty Forum	In person Kitsilano Ballroom B
8:00 am – 11:45 am	Indigenous Science Knowledge RIG Pre-Conference Workshop: Indigenous Knowledge for Sustainable Science Education Research	Hybrid Parq Salon B
10:00 am-11:00 am	NARST Welcome Session for New Attendees	Parq Salon C Separate session for virtual
11:00 am –11:45 am	Mentor-Mentee Nexus Virtual participants may schedule sessions with their mentor according to availability using your own communication platform.	Parq Salon C Separate session for virtual
11:45 am– 1:00 pm	Lunch (on your own or with an Ambassador group!)	Explore the city!
11:45 am– 1:00 pm	Graduate Student Networking social	Kitsilano Ballroom D
1:00 pm – 2:45 pm	OPENING SESSION Welcome: Renée Schwartz, NARST President First Nations Land Acknowledgement: Marny Point Opening Keynote Speaker: Dr. Megan Bang, Northwestern University <i>What now?</i> <i>Science education that contributes to just, sustainable, and culturally thriving futures</i>	Hybrid [livestream] Parq Salon DEF
3:00 pm – 4:30 pm	Concurrent Session #1	In person/ virtual
4:45 pm – 6:15 pm	Concurrent Session #2	In person/ virtual
7:00 pm – 9:00 pm	President's Reception and Welcome Celebration	In person Prefunction, Parq Salon DEF
7:00 pm – late night	Online social sessions	Virtual

Monday, March 28		
6:00 am – 7:15 am	Mind and Sole (off-site) This event is not sponsored nor endorsed by NARST)	In person/ virtual
6:30 am – 8:00 am	Breakfast (provided) and online breakfast or cocktail social time	Prefunction, Parq DEF
7:00 am – 8:00 am	RIG business meetings [except for CADASE RIG]	In person/ virtual
	Latino/a RIG [LARIG]	Parq Salon A
	Contemporary Methods for Science Education Research	Parq Salon B
	Engineering Education [ENE-RIG]	Parq Salon C
	Indigenous Science Knowledge [ISK-RIG]	Kitsilano Ballroom A
	Research in Artificial Intelligence-involved Science Education [RAISE]	Kitsilano Ballroom B
	Asian and Pacific Islander Science Education Research [APISER]	Kitsilano Ballroom C
7:30 am – 4:30 pm	Conference Registration	Prefunction
8:00 am – 9:30 am	Concurrent Session #3	In person/ virtual
9:30 am – 10:45 am	Coffee and Committee meetings	In person/ virtual
	Committee	Room
	Awards	Kitsilano D
	Elections	Parq Salon B
	Equity and Ethics	Parq Salon C
	External Policy and Relations	Kitsilano Ballroom A
	Graduate Students	Kitsilano Ballroom B
	International	Kitsilano Ballroom C
	Membership (livestream)	Parq Salon D
	Program [strand coordinators]	Parq Salon A
	Research	Stanley
	Social media, Website, Communications	Cambie
11:00 am – 12:30 pm	Concurrent Session #4	In person/ virtual
12:30 pm - 2:30 pm	Lunch and activity break [on your own]	Explore the city!
1:00 pm – 2:30 pm	CADASE RIG business meeting	Virtual Parq Salon F
2:45 pm – 4:15 pm	Concurrent Session #5	In person/

		virtual
4:30 pm - 5:30 pm	NARST Annual Membership meeting and Community Conversations (soda/snacks)	Hybrid [livestream] Parq Salon E
5:00 pm – 9:00 pm	Workshop Queering science teacher education and research: Toward gender, sex, and sexuality inclusive science teaching practice.	Virtual Parq Salon F
6:00 pm - ??	Online social activities Local activities on your own or with Ambassadors	Have some fun, meet people, explore!
6:30 pm – 8:30 pm	JRST Editorial Team Meeting/Dinner Sponsored by Wiley (by invitation only) CANCELLED	CANCELLED
5:45 pm – 6:45 pm	Graduate Student Forum	Virtual
7:00 pm – 8:00 pm	Sandra K Abell Institute students' reception (by invitation only)	In person

Tuesday, March 29		
7:30 am – 4:30 pm	Conference Registration	Prefunction
7:30 am – 8:45 am	Invited ESERA Symposium sponsored by the International Committee: Socioscientific Argumentation in Science Education Panelists (Virtual) Ute Harms, Leibniz Institute for Science and Mathematics Education (IPN) Carola Garrecht, IPN - Leibniz Institute for Science and Mathematics Education Maria Evagorou, University of Nicosia, Nicosia, Cyprus Nina Christenson, Karlstad University Susanne Walan, Department of Environmental and Life Sciences, Karlstad University, Karlstad, Sweden Pablo Brocos, University of Santiago de Compostela Maria Pilar Jiménez-Aleixandre, Department of Applied Didactics, Universidade de Santiago de Compostela, Santiago de Compostela, Spain Hanno Michel, IPN Kiel Dirk S. Gellermann, Leibniz Institute for Science and Mathematics Education (IPN) Ute Harms, Leibniz Institute for Science and Mathematics Education (IPN)	Hybrid Parq Salon F (livestream)
7:45 am – 8:45 am	CADASE RIG social	Virtual Parq Salon E
8:00 am – 8:50 am	Roundtables (coffee/tea available)	In person/Virtual
8:00 am – 9:00 am	Exhibitor Workshop: Creating interactive presentations and digital posters using Snorkle.io Host: Jonathan Fisher (Snorkle, Inc.) Email: jonathan@snorkle.io Zoom link: https://zoom.us/j/2687045958	Virtual
9:00 am – 10:30 am	Concurrent Session #6	In person/virtual
10:45 am – 11:45 am	Poster Q & A (Concurrent session #7)	In person/virtual
11:45 pm – 12:45 pm	Celebration Lunch Buffet	Prefunction & Parq Salon DEF
12:30 pm – 1:20 pm	NARST Recognitions & Reflections (livestream)	Parq Salon DEF
2:00 pm – 3:30 pm	Concurrent Session #8	In person/virtual
3:40 pm – 5:10 pm	Concurrent Session #9 (coffee/tea/soda)	In person/virtual
5:20 pm – 6:50 pm	Concurrent Session #10	In person/virtual
7:00 pm – ??	Explore the city	
7:15 pm – 10:00 pm	Equity and Ethics Dinner (registration and prepay required)	CANCELLED

Wednesday, March 30		
7:30 am – 11:00 am	Conference Registration	Prefunction
7:30 am – 8:30 am	Committee meetings (coffee/tea available)	Hybrid
	Committee	Room
	Awards	Kitsilano D
	Elections	Parq Salon B
	Equity and Ethics	Parq Salon C
	External Policy and Relations	Kitsilano Ballroom A
	Graduate Students	Kitsilano Ballroom B
	International	Kitsilano Ballroom C
	Membership	Parq Salon D
	Program [strand coordinators]	Parq Salon A
	Research	Stanley
	Social media, Website, Communications	Cambie
8:45 am – 10:15 am	Concurrent Session #11	In person/virtual
10:30 am – 12:00 pm	Concurrent Session #12	In person/virtual
12:00 pm – 1:30 pm	Lunch break (on your own or with an Ambassador group!)	
12:00 pm – 1:15 pm	CADASE Graduate Student social	Virtual Parq Salon F
1:30 pm – 3:00 pm	Concurrent Session #13	In person/virtual
3:10 pm – 4:00 pm	CLOSING SESSION President's Remarks Looking ahead to the 2023 Conference Renée Schwartz, outgoing NARST President Gillian Roehrig, incoming NARST President	Hybrid Parq Salon DEF (livestream)
4:30 pm – 10:00 pm	NARST Executive Board meeting #2	Burrard

Preconference/Postconference workshops occurring at off usual schedule days/time:

Note: You must register for the pre-conference workshops with your advanced conference registration.

Date/Time	Session format/abstract
March 21, 2022, 8AM CENTRAL time NARST Writing Retreat Lead Person(s): Shirley Avargil savargil@technion.ac.il ReAnna Roby reanna.robby@vanderbilt.edu Felicia Mensah fm2140@tc.columbia.edu	VIRTUAL The Writing Retreat organized by the NARST Membership Committee will be a half-day virtual event where members come together to write and get feedback on writing projects as a virtual kick-off for the official conference. The Writing Retreat is a collective space where members write and support each other. Writers with varied experiences 2022 will be present to answer questions and address challenges you are facing in finalizing (or even getting started) on your writing projects, papers, or manuscripts. Additionally, given the hybrid nature of the conference, we will be joined by a number of International scholars with substantial experience publishing in English language journals who will be available for consultation as well.
March 24, 2022 8:00 am – 9:00 am PACIFIC (11:00 EST)	VIRTUAL Membership Committee Welcome Session for New Attendees https://clemsun.zoom.us/j/95687748475 The Welcome Meeting organized by the NARST Membership Committee will be a 1 hour event where new members, first-time attendees, practitioners are provided with conference logistics as well as opportunities to ask questions relevant to navigating the NARST experience. The Welcome Session is a communal space to learn about the functioning of NARST in a space with little to no judgment, while also fostering relationships with their peers. Developed by the Membership Committee, attendees will hear from NARST Leadership and other key constituents who will share about their own relationship to NARST and what keeps them coming back. Additionally, attendees will also be provided with information regarding spotlight sessions and opportunities to get involved with the organization early.
March 25, 2022 11am - 3pm CST (9am to noon PST) An Introduction to Data Science in Science Education Using R Lead persons: Cynthia D'Angelo, cdangelo@illinois.edu	VIRTUAL Data science-involving the use of mathematics and statistics, tools and ideas from computer science, and knowledge of a particular domain-can enable analysts to work with their data more effectively. This workshop is sponsored by the NARST Contemporary Methods Research Interest Group (RIG) and is designed to equip science education researchers with the tools and knowledge to begin to use data science methods. Participants will learn about prior research and techniques for using data science methods in science education research and will understand what a typical data science process entails. Participants will also gain experience reasoning about, running, and understanding the results of code using the statistical programming language R. The use of RStudio Cloud will enable participants to quickly begin to use R without installing R or any R packages (add-ons) prior to the workshop. Furthermore, participants will have the opportunity to begin to carry out their own analyses and can ask targeted questions to guide future work. Finally, this workshop will provide opportunities for attendees to network with others interested in data science methods. Broadly, this workshop will support the

	efforts of NARST members interested in understanding and applying cutting-edge research methods in their work.
<p>May 13, 2022 12:00 – 2:00 PM EST</p> <p>Note that this is a POST-conference workshop.</p> <p>YESTEM: Justice-Oriented Pedagogies and Practices for Informal Science Learning and Research</p> <p>Lead Person(s): Day Greenberg daygr@umich.edu</p>	<p>ONLINE: POST-CONFERENCE</p> <p>This workshop engages participants in new/emerging conceptual frameworks and approaches in support of the design and enactment of justice-oriented pedagogies to enhance Informal Science Learning (ISL) and Research+Practice efforts. Insights for this workshop emerge from long-term research-practice partnerships (RPPs) across informal STEM learning spaces in the US and UK. Frameworks and approaches support researchers, educators, designers, and directors working in informal (out-of-school) STEM learning, towards unity and inclusion for global scientific literacy through the centering of youth, families, and communities. The workshop could be especially helpful for researchers seeking to establish new RPPs with a central focus on justice. Justice-Oriented ISL is an integrated approach to support STEM-agentic lives, so that youth can enact and transform STEM to address issues that matter to them. This work centers on pedagogies that embrace youth as co-learners and necessary partners in the present and future of STEM. Justice-Oriented ISL positions youth as co-owners of STEM spaces (instead of just visitors or guests), to address historical and continued impacts of racism, sexism, and classism on learning and practice. This means design and pedagogical practice towards more equitable power sharing, rethinking what and who counts in STEM. Participants will leave with innovative approaches and concepts to enhance relationship-building, resource-sharing, learning facilitation and pedagogies, institution planning, space design, and program design. Participants will also receive access to a suite of materials and resources, including concept guides, youth-adult interaction strategies, tools to support youth knowledge and practice, and youth feedback measures. This workshop draws from 5 years of longitudinal RPP work involving international surveys (youth and adult) and workshops (adult ISL leaders and staff), critical ethnographic participatory research, and design-based implementation research (DBIR).</p>

SATURDAY, MARCH 26, 2022

Conference Registration

Prefunction area

12:00 pm – 6:00 pm

NARST Executive Board Meeting

Room: Burrard

8:00 am – 5:00 pm

SUNDAY, MARCH 27, 2022

Conference Registration

Prefunction area

7:30 am – 6:00 pm

NARST Executive Board Meeting

Room: Burrard

8:00 am – 12:00 pm

Preconference Workshops

Room: Burrard

8:00 am – 12:00 pm

Note: You must register for the pre-conference workshops with your advanced conference registration.

Preconference Workshops	
Date/Time	Session format/abstract
8:00 – 11:45 am	In person/virtual/hybrid
Equity and Ethics Preconference Workshop: Unity and Inclusion for Global Scientific Literacy. Invite as a Community: Unite as a Community. Room: Kitsilano Ballroom A Lead Organizer Justina Ogoto Justina_ogodo@baylor.edu Presenters: Dr. Saouma BouJaoude, American University of Beirut, boujaoud@aub.edu.lb	HYBRID (in-person and online) Science education researchers have always been concerned with how communities participate in science. Science connects people with the natural world, supports the development of scientific literacy, and provides frameworks for engaging with the opportunities and challenges the world faces today. These goals are increasingly important given the enduring gap in access and opportunities for science learning for an increasingly diverse student population across the globe. In response, the NARST community is now charged with considering how inclusive science education can transform science teaching and learning across multiple and varied, real and virtual contexts to promote a socially just world. Through an equity and ethics lens, pre-conference workshop participants will engage in constructive and meaningful dialogue with leading science education scholars about strategies to develop critical and scientifically literate educators both within and beyond their classroom practice, research, and service. Additionally, we will discuss leveraging our research to involve the community in co-constructing scientific literacy and participation in relevant and important science. The dialogue will center on equity, citizenship, privilege, access in science education, and research between

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<p>Dr. Gregory Clark, The University of Texas at Austin, gbclark@utexas.edu Dr. Meredith Kier, The College of William and Mary, mwkier@wm.edu Dr. Natalie King, Georgia State University, natalieking@gsu.edu Dr. Christina Siry, The Université du Luxembourg, christina.siry@uni.lu</p>	<p>and among workshop participants and the leading science education scholars. The session will be facilitated as a whole and small group discussion. Also, technology integration such as Twitter will provide a platform to foster continuous dialogue during the workshop and throughout the conference using: #NARST/EEC.</p>
<p>Conducting Policy Reviews to Uncover Systemic Barriers into Science Education</p> <p>Lead Organizer: Takumi Sato, takumi@vt.edu</p> <p>Room: Kitsilano Ballroom C</p>	<p>IN PERSON</p> <p>The workshop will engage participants in hands-on experience of reviewing institutional documents that contain policy as related to membership in the science education community. The intent is to diversify the science education community by identifying and advocating for changes to policies that serve to exclude marginalized populations. This includes requirements for entry into science teacher education programs, teacher licensure requirements, graduate program policies and procedures and more. The workshop directly responds to research that indicates persistent problems of underrepresentation of Teachers of Color in US K12 science classrooms (and teaching more broadly) and limited access and opportunities in science learning within underserved communities. The aim is to remove systemic barriers in the science education community as a means to foster inclusive spaces. The workshop facilitators will provide an overview of systemic barriers and strategies for examining policy documents. Participants will be provided time to work collaboratively with each other with support and guidance from the facilitators. The workshop will conclude with the opportunities to draft a plan of action to address potential barriers found within the policy documents.</p>
<p>Teaching and Learning Science in a ‘Post-Truth’ Society: New Roles for Socio-Scientific Issues</p> <p>Lead Organizer: Elena Boldyreva, elena.boldyreva@mail.utoronto.ca</p> <p>Presenters: Dr. Jonathan Osborne, Dr. Troy D. Sadler, Dr. Jim Slotta, Daniel Pimentel, Elena Boldyreva</p> <p>Room: Kitsilano Ballroom D</p>	<p>HYBRID</p> <p>There is an urgent need to address socio-scientific issues (SSI) in the science classroom, such as genome editing, emerging diseases (e.g., COVID-19), climate change, antibiotic resistance, and others. SSI have been shown by a wealth of prior research to offer an excellent context for the development of critical thinking skills about information and resources, exploration of the Nature of Science, scientific argumentation, analysis and collaboration (McNeil & Krajcik, 2008). Moreover, in the last two decades, the volume of information readily available to students has grown exponentially, while the quality of that information has become more difficult for students and teachers to assess due to a lack of gatekeeping and an absence of adequate peer review (i.e., of the scientific information published online). In the current ‘Post-Truth’ era, where scientific reasoning and even the competence of scientists is questioned by the general public (McIntyre, 2018), students must learn how to evaluate information critically, detect bias, and make decisions about whether sources of information are credible. Moreover, SSI offer a rich context for engaging, culturally relevant and inclusive STEM curriculum that supports the NGSS and development of 21st century competencies (Reiser, 2013). This workshop will provide hands-on opportunities for educators to explore relevant theoretical frameworks and pedagogical approaches for integrating SSI within science education. We will focus on creating scientific classroom communities and addressing 21st Century and scientific competencies, such as collaboration, communication, global citizenship, scientific argumentation and the ability to evaluate the credibility of primary and secondary resources.</p>

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<p>LaRIG Pre-Conference Workshop: Community Building for Success: Latinx Graduate Students, Early Career Educators and Scholars in Science Education (Multilingual Workshop)</p> <p>Lead Organizer: Regina Surriel rlsurriel@valdosta.edu</p> <p>Room: Parq Salon A</p>	<p>HYBRID</p> <p>This workshop aims to be a space for Latinx and other culturally and linguistically diverse scholars, educators and graduate students to identify the properties of effective a) mentorships b) research publications and c) tenure and promotion processes from other successfully established scholars in the science education research community. Workshop panelists will present their research and experiences as Latinx in the field of science education to illustrate relevant examples of projects with Latinx peers and students. The session is also designed for Latinx scholars and other culturally and linguistically diverse NARST members to establish supportive relationships with knowledgeable mentors and with each other, thus increasing their repertoire of strategies for successfully navigating academia. The workshop will combine panel sessions where participants can ask questions to senior and emerging scholars, with small group discussion where participants will share their experiences in greater depth and receive more specific advice. The discussions will focus on three areas: 1) advice to get the mentoring you want and becoming an effective mentor, 2) advice on a) career activities to support on-time tenure and promotion or b) successful practices for completing doctoral programs, 3) strategizing writing and publishing about our research with Latinx and/or other populations, and 4) learning how to actively engage in the NARST community. Small group discussions may be conducted in the preferred language of the participants (Spanish, English, or any combination of them). Overall, the workshop aims to provide all participants a safe space for positive and constructive mentoring/community building experiences for doctoral students and career scholars to feel empowered to succeed in their roles as researchers and science teacher educators.</p>
<p>Early Career Faculty Forum</p> <p>Lead : K.C. Busch, Shirly Avargil</p> <p>Kbusch@ncsu.edu Reanna.robby@vanderbilt.edu</p> <p>Room: Kitsilano Ballroom B</p>	<p>IN PERSON</p> <p>The Membership Committee hosts an annual Early Career Faculty Forum. This year the forum will use a panel approach to introduce junior faculty members and post-doctoral fellows to peers, recently promoted colleagues, and prominent scholars. The forum will focus on the nuances of succeeding during the early career years as a faculty member. Our discussions will include issues of developing and maintaining a research agenda (e.g., publications & grant writing), adhering to teaching responsibilities, and effective ways for engaging in meaningful service experiences. In addition, the forum will explore many of the challenges of transitioning into new professional roles and maintaining balance in your life in the process. The Early Career Faculty forum will provide participants with a detailed examination of the many small nuances that impact the successful navigation of early faculty careers in science education. Following the panel, attendees will have the opportunity to participate in round table discussions for more in depth sharing and questioning.</p>
<p>Indigenous Science Knowledge RIG Pre-Conference Workshop: Indigenous Knowledge for Sustainable Science Education Research</p>	<p>HYBRID</p> <p>This workshop will use the lens of Bio-cultural diversity to allow participants to intermingle with Indigenous and First Nations knowledge, people, places, artifacts, language, and culture. Indigenous communities and people face immense challenges in sustaining and preserving their culture and knowledge. These challenges bring issues of loss of traditional lands, practices, resources, and language to threats brought by climate change, COVID-19, public health, and our everyday lives. Since our</p>

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<p>Lead Organizer: Bhaskar Upadhyay bhaskar@umn.edu</p> <p>Room: Parq Salon B</p>	<p>current environmental problems (fires and drought in particular) are directly the result of our human activities, education and educational research have a key role to play in seeking solutions. Indigenous communities also have endured the greatest challenges in their traditional practices and livelihoods as a result of our changing climate. Therefore a core feature of this workshop will involve a guided and engaging dialectic with local Indigenous knowledges and pedagogies with the overarching goal for participants to decolonize their thinking and learn more about the nature of Indigenous practices, values, beliefs, and the deep meanings these have for Indigenous people. This will be followed by roundtables supporting interactive conversations to learn the need for collaborative community-driven work, conceptualize and implement meaningful research in Indigenous settings to enact place-based knowledge and methodologies that supports Indigenous ways of knowing and learning. Further, roundtable discussants will focus on the place for science teaching, teacher preparation and educational research in Indigenous communities including but not limited to ethics, equity, historical and environmental contexts and the roles of place, language, stories, values and practices. Participants will be invited to discuss how Indigenous knowledge and collaboration with Indigenous communities should involve reciprocity so we ensure that the research benefits the people more than the researcher.</p>
<p>NARST Welcome Session for New Attendees 10:00am-11:00am Pacific</p> <p>Lead Organizer: Tugba Yuksel tugbayuksel@gmail.com</p> <p>Room: Parq Salon C</p>	<p>IN-PERSON and a separate ONLINE session (March 24)</p> <p>The Welcome Meeting organized by the NARST Membership Committee will be a 1 hour event where new members, first-time attendees, practitioners are provided with conference logistics as well as opportunities to ask questions relevant to navigating the NARST experience. The Welcome Session is a communal space to learn about the functioning of NARST in a space with little to no judgment, while also fostering relationships with their peers. Developed by the Membership Committee, attendees will hear from NARST Leadership and other key constituents who will share about their own relationship to NARST and what keeps them coming back. Additionally, attendees will also be provided with information regarding spotlight sessions and opportunities to get involved with the organization early.</p>
<p>Mentor-Mentee Nexus 11:00-11:45 in person Virtual participants may schedule sessions with their mentor according to availability using your own communication platform.</p> <p>Lead Organizer: Elizabeth De Los Santos elizabeth.xeng.delossantos@gmail.com</p> <p>Room: Parq Salon C</p>	<p>IN-PERSON and a separate ONLINE session</p> <p>The membership committee hosts an annual Mentor-Mentee Nexus. This 45-minute 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, creating an environment that supports communication among mentors and mentees, and monitors and evaluates mentor and mentee needs with respect to the NARST session. During the session, Mentors provide insight regarding topics of interest to the Mentee by either providing answers to Mentee questions or helping the Mentee identify an appropriate source of information. During the session, Mentees locate their Mentor and in a small group share questions, concerns, and insights with their Mentors and other Mentees.</p>

Lunch (on your own or with an Ambassador group!)
11:45 am-1:00 pm

Graduate Student Networking Social [lunch served]
Kitsilano Ballroom D
11:45 am-1:00 pm

Sunday 3-27-2022

Sunday: March 27, 2022

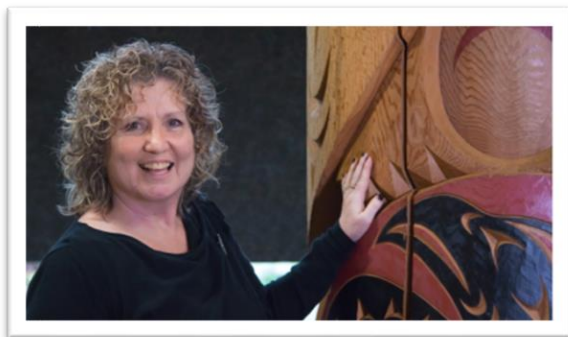
Opening Session & Keynote Address [livestream]

Parq Salon DEF

1:00 pm-2:45 pm

WELCOME: Renée Schwartz, NARST President

Professor of Science Education
Department of Middle and Secondary Education
Georgia State University
Atlanta, Georgia USA



FIRST NATIONS LAND ACKNOWLEDGEMENT

Marny Point, Musqueam elder
The University of British Columbia,
First Nations and Endangered Languages program
Urban Coordinator, NITEP

ʔa: səyəm nə si:yeʔə, ʔəy tə nə ʃxʷqʷeləwən tə ʔa weyəl!
My respected friends and relatives, I feel glad today!

Marny is from the Musqueam band, of the Coast Salish people. Marny would also like to acknowledge UBC resides on the traditional and unceded territory of the Musqueam people. Marny has completed both her degrees: a Bachelor of Education & Masters of Educational Technology and is currently working on her Ph.D. in LLED at UBC. Marny has been the Program Coordinator and is an Instructor in the NITEP On-Campus center, teaching the introductory Indigenous education courses. She is an active member of the UBC/MIB Language Committee and was the First Nations and Endangered Languages Program (FNEL) Instructor, teaching the intermediate level of the Coast Salish traditional Musqueam language course, hən q əmīn əm from 2002 until 2019. She understands how the connection to Indigenous languages; gives value, honour and a sense of identity, which cements Native Indigenous, people in place and culture.

Marny comes from a long line of fisher-people, and she too is an avid fisherwoman – owning and operating her own gillnetter. As her dad and grandfather always did, she harvests sockeye salmon from the Fraser River every summer, in this cultural activity, she is able to share those same teachings on to her own children, connecting them to their traditional language & ways of her people. Marny is actively involved in the education of the Aboriginal youth – she has taught in the elementary grades, been a liaison for her community and neighbouring schools and sits on many committees to ensure the betterment of Indigenous education.

OPENING KEYNOTE ADDRESS



Speaker: Dr. Megan Bang, Northwestern University

What now? Science education that contributes to just, sustainable, and culturally thriving futures

Megan Bang (Ojibwe and Italian descent) is a Professor of the Learning Sciences and Psychology at Northwestern University and is the Senior Vice President at the Spencer Foundation. Dr. Bang studies dynamics of culture, learning, and development across the life course. She is particularly interested in knowledge organization, reasoning, and decision-making about complex socio-ecological systems and their intersections with identity, cultural variation, history and power. She conducts research in schools, informal learning environments, and everyday community contexts. Dr. Bang creates intergenerational place based (field-based) science learning environments and studies teacher practice and student learning in such environments. Further, Dr. Bang has engaged in a range of related scholarship with respect to family and community engagement and leadership. Dr. Bang is a member of the National Academies of Education and she serves on the Board of Science Education at the National Academy of Sciences.

Sunday, March 27, 2022
Concurrent Session # 1
3:00 pm-4:30 pm

Strand 2: Science Learning: Contexts, Characteristics and Interactions
SC-organized paper set-Middle School & NGSS Science Teaching & Learning
3:00 PM-4:30 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

A Longitudinal Study of Middle School Students' Science Task Values (Virtual)

Sufen Chen, Graduate Institute of Digital Learning and Education & Teacher Education Center,
National Taiwan University of Science and Technology, Taiwan

Ssu-Ching Huang, Graduate Institute of Digital Learning and Education, National Taiwan
University of Science and Technology, Taiwan

Pey-Yan Liou, Department of Education, Korea University, Korea

An Exploratory Study to Develop a Framework of Middle School Science Giftedness in NGSS Era

Shari E. Hiltbrand, Texas Tech University

Mihwa Park, Texas Tech University

Examining Middle School Teacher Implementation and Enactment of the NGSS: A Mixed Methods Study

Erik Arevalo, University of California, Santa Barbara

Meghan Macias, University of California, Santa Barbara

Katy Nilsen, WestEd

Ashley Iveland, WestEd

Examining NGSS Scientific Practices in K-12 Science Classrooms (Virtual)

Peter Hu, University of Pittsburgh

Ling L. Liang, La Salle University

Ying-Chih Chen, Arizona State University

Takeshi Terada,

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Admin Symposium-A community of practice contextualized within sociocultural phenomena:

Mitigating teaching and learning of STEM through counter-praxis

3:00 PM-4:30 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Angela M Chapman, University Of Texas Rio Grande Valley

Ariana Garza Garcia

Felicia Rodriguez,

Anthony Bailey,

Juan B. Lazo,

Alejandro J. Gallard, Georgia Southern University

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

SC-organized paper set-Diverse Opportunities for Early Science and Engineering Experiences

3:00 PM-4:30 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

A Mixed Methods Study of Serious Game Design Heuristics that Support Elementary Science Learners

Georgia W Hodges, University of Georgia

Kayla P Flanagan, University of Georgia

Stephanie Eldridge, University of Georgia

Joanna Schneider , University of Georgia

Allan Cohen, University of Georgia

Juyeon Leet ,

Temperature Measurement with Early Elementary Students

Ryan Cain, Weber State University

Victor R Lee, Stanford University

Inspiring Learning Environments—What Preschoolers' Prefer? Do Enriched Environments Enhance Engineering Capabilities? Does Gender Matter? (Virtual)

Ornit Spektor-Levy, Bar-Ilan University

Netta Perry, Bar Ilan University

Taly Shechter, Bar Ilan University

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

Related Paper Set-The Missing Materials in College Science Learning: Intersections of Materiality, Agency, and Disciplinary Inquiry (Virtual)

3:00 PM-4:30 PM, Kitsilano Ballroom A

Discussant: Timothy Atherton, Tufts University

Presider: <https://tinyurl.com/NARSTpresider>

Using Conjecture Mapping to Uncover Sociomaterial Entanglements in Introductory Physics Labs (virtual)

Ian Descamps, Tufts University

Leveraging Material Uncertainty to Support Students' Trajectories of Practice (virtual)

Robert D. Hayes, Tufts University

Julia Gouvea, Tufts University

Aditi Wagh, Massachusetts Institute of Technology

Curating Materials for Epistemic Agency (virtual)

Leslie Atkins Elliott, Boise State University

Shakayla Moran, Boise State University

Developing Disciplinary Relationships in Computational Physics (virtual)

Ezra Gouvea, Tufts University

Brian E Gravel, Tufts University

Timothy Atherton, Tufts University

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Emerging research in Informal Science

3:00 PM-4:30 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

Examining the Nature of Canada's Scientific Literacy Through COVID-19 Tweets

Samantha Jewett, University of Western Ontario

Anton Puvirajah, University of Western Ontario

Mohammad Azzam, Western University

Jingrui Jiang, University of Western Ontario

Native Animals, Native Knowledge? An analysis of zoo portrayal of Indigenous Cultures

Jonathan R Bowers, Michigan State University

Gail Richmond, Michigan State University

The Portuguese Maritime Voyages: the exploration of the history of a city with an App (Virtual)

Cláudia Faria, Instituto De Educação Da Universidade De Lisboa
Elsa Guilherme, Instituto de Educação da Universidade de Lisboa
Joaquim Pintassilgo, Instituto de Educação da Universidade de Lisboa
Maria João Mogarro, Instituto de Educação da Universidade de Lisboa
Ana Sofia Pinho, Instituto de Educação da Universidade de Lisboa
Mónica Baptista, Instituto de Educação da Universidade de Lisboa
Isabel Chagas, Instituto de Educação da Universidade de Lisboa
Cecília Galvão, Instituto de Educação da Universidade de Lisboa

Strand 7: Pre-service Science Teacher Education

Symposium-Building an Elementary Science Teacher Education Community to Advance Equity and Justice

3:00 PM-4:30 PM, Cambie

Discussant: Felicia Mensah, Teachers College, Columbia University

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Christa Haverly, Northwestern University
Terrance Burgess, Michigan State University
Marti Canipe, Northern Arizona University
Tina Cheuk, California Polytechnic State University
Judith A. Cooper-Wagoner, University of Arizona
Amal Ibourk, Florida State University
Thomas J McKenna, Boston University
Meenakshi Sharma, Mercer University
Christina V. Schwarz, Michigan State University
Felicia Moore Mensah, Teachers College, Columbia University
Elizabeth A. Davis, University of Michigan
Kristin Gunckel, University of Arizona

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Exploring challenges of PCK development in pre-service teacher education

3:00 PM-4:30 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Catalyst or Catastrophe: Examining the Influence of the edTPA on Preservice Science Teachers' PCK Development (Virtual)

Matt Reynolds, North Carolina State University
Soonhye Park, North Carolina State University

Examining elementary pre-service teachers' competence of questioning in leveraging students' conceptual understanding (Virtual)

Jianlan Wang, Texas Tech University
Yuanhua Wang, West Virginia University
Yanhong Guo, Texas Tech University
Shawn Kashef, University of Georgia

Examining Pre-Service Physics Teachers' Pedagogical Content Knowledge – A Sequence of Proficiency Levels

Dustin Schiering, IPN – Leibniz Institute for Science and Mathematics Education, Kiel, Germany
Stefan Sorge, IPN – Leibniz Institute for Science and Mathematics Education, Kiel, Germany
Melanie Keller, IPN – Leibniz Institute for Science and Mathematics Education, Kiel, Germany
Knut Neumann, IPN – Leibniz Institute for Science and Mathematics Education, Kiel, Germany

Strand 10: Curriculum and Assessment

Related Paper Set-Bringing researcher perspectives and research-based approaches to the design of instructional materials for broad use

3:00 PM-4:30 PM, Burrard

Discussant: Brian Reiser, Northwestern University

Presider: <https://tinyurl.com/NARSTpresider>

Bringing a Science Education Research Perspective to the Development of Instructional Materials for Broad Use

Daniel C. Edelson, BSCS Science Learning
Brian J. Reiser, Northwestern University
Katherine L. McNeill, Boston College
William R. Penuel, University of Colorado
Shelly LaDoux, The Dana Center

Addressing Tensions Inherent in Using Student Surveys to Make Equitable Decisions about Phenomenon Selection

Zoe E. Buck Bracey, BSCS

Lindsey Mohan, BSCS Science Learning

Jamie D Noll, Northwestern University

Designing middle school science curricula 'by states, for states'

Audrey Mohan, BSCS Science Learning

Michael J. Novak, Northwestern University

Shafiq Chaudhary, New Mexico Public Education Department

Hillary Paul Metcalf, Massachusetts Department of Elementary and Secondary Education

Strand 11: Cultural, Social, and Gender Issues

Symposium-Analytic Approaches to Studying Identity Work Longitudinally

3:00 PM-4:30 PM, Parq Salon D (**livestream** 1)

Discussant: Allison Gonsalves, McGill University

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Alison Mercier, University of Wyoming

David Segura, Beloit College

Zahra Hazari, Florida International University

Heidi B. Carlone, Vanderbilt University

Edna Tan, University Of North Carolina At Greensboro

Lucy Avraamidou, University Of Groningen

Robert H. Tai, University Of Virginia

Louise Archer, UCL Institute of Education

Henriette T. Holmegaard, University Of Copenhagen

Bryan A. Brown, Stanford University

Maria Varelas, University of Illinois Chicago

Daniel Morales-Doyle, University of Illinois Chicago

Geoff Potvin, Florida International University

Pooneh Sabouri, Florida International University

Thomas Head, Florida International University

Joinée Taylor, Florida International University

Benjamin Archibeque, Florida International University

Aerin Benavides, University of North Carolina at Greensboro

Julie Moote, UCL Institute of Education

Katia Bill Nielson, University of Copenhagen

Ene Hoppe, University of Copenhagen

Sunday 3-27-2022

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Belonging and Retention in Postsecondary STEM

3:00 PM-4:30 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Retaining Underrepresented Minorities in STEM Majors: The Role of Mentoring in the First Year
Stacy Olitsky, Saint Joseph's University

What is the Science when Talking Science Identity? Reflections from a Higher Education Biology Perspective.

Katerina P. Günter, Centre for Gender Research, Uppsala University, Uppsala, Sweden

Carolina De Barros Vidor, Department of Education, Uppsala University, Uppsala, Sweden

Annica Gullberg, Teaching in STEM, KTH, Royal Institute of Technology, Stockholm, Sweden

Building Bridges: An Intervention to Improve Academic Outcomes for Underrepresented "Minority" Students in General Chemistry

Natasha H. Johnson, University of Toledo

Hands-On Learning About Inclusion in an Undergraduate Physics Lab (Virtual)

Kim-Alessandro Weber, Leibniz Universitaet Hannover, Institute for Mathematics and Physics Education

Rüdiger Scholz, Leibniz Universitaet Hannover, Institut fuer Quantenoptik

Gunnar Friege, Leibniz Universitaet Hannover, Institute for Mathematics and Physics Education

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Using Representations, Data, and Graphing to Support Concept Development

3:00 PM-4:30 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Supporting middle school students to integrate graph data with physical science content

Phillip A. Boda, University of California, Berkeley

Emily Harrison, University of California, Berkeley

Marcia C. Linn, University of California-Berkeley

Applying visual highlighting techniques to support students' understanding in organic chemistry

Nicole Graulich, Justus-Liebig Universität Giessen

Marc Rodemer, IPN Kiel

Julia Eckhard, Justus-Liebig-University Giessen

Sascha Bernholt, IPN Kiel

The Role of Individual Differences in Working Memory Capacity When Comprehending Visualizations With Relative Data and Seductive Details (Virtual)

Kristine A. Antonyan, University of Florida
Poorya M. Shidfar, University of Florida
Do Hyong Koh, University of Florida
Pavlo D. Antonenko, University Of Florida

Will CTCA Help Students' Understanding of Difficult Concepts In Computer Studies?

Mariyam Pentho Abdulhadi, ACEITSE-Lagos State University
Peter A. Okebukola, ACEITSE-Lagos State University
Fred Awaah, University of Professional Studies Accra
Adekunle Ibrahim Oladejo, ACEITSE – Lagos State University
Deborah Oluwatosin Agbanimu, ACEITSE-Lagos State University

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Exploring literacies in environmental education and education for sustainable development

3:00 PM-4:30 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

A systematic literature review: assessing sustainability literacy

Rolf Saarna, University of Tartu
Anne Laius, University of Tartu

Creative and Digital Pedagogies for Teaching Ocean Literacy: The Ocean Connections Project (Virtual)

Lindsay Hetherington, University of Exeter
Justin S Dillon, University of Exeter
Birgitte Lund Nielsen, VIA University College
Harald Brandt, VIA University College
Maria MJ Malmierca, CESGA

Equipping the Young to Tackle Current Societal Challenges

Giulia Tasquier, University of Bologna
Erik Knain, University of Oslo
Alfredo Jornet, University of Oslo

Fostering Environmental Literacy through Engagement in Self-Regulation Learning Processes

Michal Zion, Bar Ilan University, School of education
Guly Ortal-Ivry, Bar Ilan University, School of education
idit Adler, Tel Aviv University, School of Education

Admin Symposium-Graduate Student Research Symposium

3:00 PM-4:30 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Organizers

Scott Cohen, Georgia State University
Theila Smith, University of Gorningen
Jordan L. Henley, University of Georgia
Helena Aptyka, University of Cologne
Mohammed Estaiteyeh, Western University
Timothy G. Klavon, Black Hills State University
Andrea Reeder, Middle Tennessee State University
Chelsea Sexton, University of Georgia

The graduate students research symposium is for the up-and-coming scholars sharing their work-in-progress studies as they develop their research capacity while working with a mentor. Attendees are encouraged to attend and share inputs with our presenters.

Searching for understanding: How do NOS and science identity intersect for HS students?

Robert Bennett, Georgia State University,

Environmental Service-Learning as University-Community Partnership: Using actor-network theory to examine a new model of engagement

Hannah Cooke, University of Connecticut

Minoritized, Secondary Students and Risk-Taking in STEM Classrooms

Danielle Daniels, University of Rochester

Modeling water quality scientists' participation in science communication

Brenda Guerrero, Florida International University

Exploration of Secondary Science Teacher Candidates' Ideological Shifts in an Initial Teacher Preparation Program

Claudia Hagan, Georgia State University

The Lived Experiences of Graduate and Early Career Black Women in STEM Academia

Lisa Hanson, Middle Tennessee State University

Science Instructors' New Approaches to Teaching During the COVID-19 Pandemic (Virtual)

Olena James, Middle Tennessee State University

Investigating the Experiences of Preservice Teachers of Color in a STEM Focused Teacher Education Program at a Historically White Institution

Sunday 3-27-2022

Victor Kásper, Florida State University

Lessons Learnt from Designing an SDG STEM Club to Increase Awareness about SDGs Among Canadian Youth

Midhat Noor Kiyani, McGill University

Developing and Using Models as Assessments to Inform the Teaching Progression in the Science Classroom

Kristin Mansell, Texas Tech University

Designing for Axiological Engagement: Manifesting Implicit Power Relationships in STEM Research through Embodied Play

Sophia Marlow, University of Calgary

How Science Identities are Formed by Recognition?: Exploring Bangladeshi Women Science Teachers' Challenges and Aspirations

Shamnaz Arifin Mim, McGill University

Collaborating S-T-E-M In-Service Teachers Developing Integrated STEM Teaching

Argyris Nipyrakis, University of Groningen & University of Crete

Black Students' Access to STEM Undergraduate Studies via Transitional Education Programs

Nadia Qureshi, OISE, University of Toronto

Exploring the Coordination of Secondary Science Teachers' Resources Across Their Resource Systems

David Schouweiler, The University of North Carolina at Greensboro

Student Centered Science Classrooms: Dilemmas Faced While Teaching Science Through a Global Pandemic

Jennifer Slavick, West Chester University

Failure and Creativity: The Case to Embrace Both in STEM Education

Elizabeth Stretch, University of Minnesota

Researching race and experience in postsecondary STEM education at a Western Canadian University (Virtual)

Kristal Turner, University of Calgary

Exploring pre-service science teachers' attitudes and beliefs towards gender and sexual diversity-inclusive science teaching

Gary Wright, North Carolina State University

The Figured World of the Introduction of a Justice-Centered Secondary Science Education Program

Yang Zhang, University of Rochester

Administrative Session: Research Committee

Admin Symposium-Global Perspectives from the Handbook of Research on Science Education, Volume III

3:00 PM-4:30 PM, Parq Salon E (**livestream 2**)

Presiders:

Dana L Zeidler, University of South Florida

Judith S Lederman, Illinois Institute of Technology

Introduction and Overview

Dana L Zeidler, University of South Florida

Judith S Lederman, Illinois Institute of Technology

Section I. Theory and Methods of Science Education Research

Section II. Science Learning

Section III. Diversity and Equity in Science Learning

Section IV. Science Teaching

Section V. Curriculum and Assessment in Science

Section VI. Science Teacher Education

Multi-Strand-Virtual Session A

3:00 PM-4:30 PM, Parq Salon F (**livestream 3**)

Teaching and Learning Floating and Sinking: a Metaanalysis (Virtual)

Martin Schwichow, PH Freiburg

Anastasios Zoupidis, Democritus University of Thrace

How Do Students Make Sense of Simultaneous Synthesis Physics Tasks? (Virtual)

Bashirah Ibrahim, Bahrain Teachers College, University of Bahrain

Lin Ding, Ohio State University

Pedagogy in practice: exploring the use of pedagogy course knowledge by learning assistants (Virtual)

Vera Degtiareva, Boston University

Emily C. Allen, Boston University

Andrew Duffy, Boston University

Manher Jariwala, Boston University

Physics Education Curriculum from the decoloniality lens: a Brazilian case study (Virtual)

Carlos Mometti, University of São Paulo

Tanja Tajmel, Concordia University

Mauricio Pietrocola, University of São Paulo

Sunday: March 27, 2022
Concurrent Session # 2
4:45 pm-6:15 pm

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Middle School Science Teaching & Learning

4:45 PM-6:15 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

An Investigation of Teaching and Learning Approaches Influencing Students' Intrinsic Motivation towards Science Learning: A Longitudinal Analysis from Grade 6 to 9

Moonika Teppo, University Of Tartu

Regina Soobard, University Of Tartu

Miia Rannikmae, University Of Tartu

Exploring Student- and Teacher-Level Characteristics on Middle School Students' Engagement in Life Science Classes

Zeynep Gonca Akdemir, Purdue University

Muhsin Menekse, Purdue University

Selcen Guzey, Purdue University

Teaching and Learning Kinematics: A Comparison of two Approaches

Gunnar Friege, University of Hannover Physics Education Group

Ingmar Schneider, University of Hannover Physics Education Group

The Effect of Multi-Faceted Holistic Approach in Science Instruction on Students' Achievements, Preferences, and Needs

Oshra Aloni, Bar-ilan University

Michal Zion, Bar-Ilan University

Ornit Spektor-Levy, Bar-Ilan University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set-Students and teachers' challenges explaining the mechanism of complex systems and suggestions to address them

4:45 PM-6:15 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Using concept maps to evaluate preservice biology teachers' conceptualization of Covid-19 as a complex phenomenon

Tom Bielik, Freie Universität Berlin

Moritz Krell, Freie Universität Berlin
Johannes Jageman,
Dirk Krueger, Freie Universität Berlin
Orit Ben Zvi Assaraf, Ben-Gurion University Of the Negev, Israel

Developing a Coherent Understanding of Biology Through a Complex Systems Lens (Virtual)
Susan Yoon, University of Pennsylvania
Katherine Miller, University of Pennsylvania

Leveraging causal heuristics to scaffold student understanding in dynamic system models (Virtual)
Lynn Stephens, The Concord Consortium
Steve Roderick, The Concord Consortium

Comparing how students' conceptual understanding and computational model explain system mechanisms in time-based phenomena (Virtual)
Emil Eidin, Michigan State University
Jonathan Bowers, Michigan State University

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

SC-organized paper set-Professional Development of Science Teachers

4:45 PM-6:15 PM, Parq Salon D (**livestream 1**)

Presider: Selina L. Bartels, Valparaiso University

Empirically Grounding a Learning Performances Framework for K-5 Students' Modeling Competency Using Evidence-Centered Design
Florian Böschl, University of Leipzig
Tina Vo, University of Nevada- Las Vegas
Cory T. Forbes, University of Texas Arlington
Kim Lange-Schubert, University of Leipzig

Learning to Care for Students as Science Sensemakers: Preservice Elementary Teachers' Noticing and Epistemic Empathy
Ruveyde A. Kaya, Florida State University
Jennifer Schellinger, FSU
Sherry A. Southerland, Florida State University
Kirby Whittington, The University of Utah
Samantha Skrob-Martin, Florida State University

The Role of Responsibility Intellectual Virtues in Science Learning
(*presenting author)
Ronald W Rinehart, University of Northern Iowa
*Mason Kuhn, University of Northern Iowa
Todd Milford, University of Victoria

Sunday 3-27-2022

Utilizing lesson study to lay the foundation for preservice teachers to begin shaping elementary students' scientific literacy

Selina L. Bartels, Valparaiso University

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

SC-organized paper set-Science teaching practices in secondary content areas

4:45 PM-6:15 PM, Parq Salon C

Presenter: <https://tinyurl.com/NARSTpresider>

Assessment of chemistry teacher student's diagnostic competencies in the Simulated Chemistry Classroom (SiCC). (Virtual)

Sascha Wittchen, Freie Universität Berlin

Claus Bolte, Freie Universität Berlin

Nils Machts, Christian-Albrechts-Universität zu Kiel

Capturing a Teacher's Multidimensional and Dynamic Attention to Student Learning in Design-Based Chemistry Education

Hanna Stammes, Delft University of Technology & Radboud University

Ineke Henze, Radboud University

Marc de Vries, Delft University of Technology

Erik Barendsen, Radboud University & Open University

Examining the Relative Effectiveness of CTCA in Improving Secondary School Students' Achievement in Genetics

Israel O. Adebayo, ACEITSE-Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

Adekunle I. Oladejo, ACEITSE-Lagos State University

I am CTCA, and this is my first Attempt in the Physics Class - How Will I perform? (Virtual)

Adekunle Ibrahim Oladejo, ACEITSE-Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

Israel Oludotun Adebayo, ACEITSE-Lagos State University

Gabriel Korede Adeosun, ACEITSE-Lagos State University

Deborah Oluwatosin Agbanimu, ACEITSE-Lagos State University

Franklin U. Onowugbeda, ACEITSE-Lagos State University

Ibukunolu Adebisi Ademola, ACEITSE-Lagos State University

Esther Oluwafunmilayo Peter, ACEITSE-Lagos State University

Olasunkanmi Adio Gbeleyi, ACEITSE-Lagos State University

Fred Awaah, University of Professional Studies Accra

Sunday 3-27-2022

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Engaging youth in STEM through informal learning experiences

4:45 PM-6:15 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

A meta-synthesis on the impact of informal STEM programs on STEM major and STEM career awareness, interest, and engagement

Bobby Habig, American Museum of Natural History

Preeti Gupta, American Museum of Natural History

Jennifer Adams, University Of Calgary

Mandë Holford, Hunter College

Enhancing Gifted Students' Attitudes toward STEM: An Insight from a Research Apprenticeship Program (Virtual)

Shuchen Guo, Nanjing Normal University

Enshan Liu, Beijing Normal University

Cheng Liu, Beijing Normal University

Hailan Wang, Xiangyang No. 5 Middle School

Youth Science Identity and Perspectives of Scientists after Participation in a STEM-based Afterschool Program (Virtual)

Devon M Christman, University of California, Santa Barbara

Kassandra Ortega, University of California, Santa Barbara

Nathalie Paesler, University of California, Santa Barbara

Alexandria Muller, University of California- Santa Barbara

Diana J Arya, University of California, Santa Barbara

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Centering social justice in science teacher education

4:45 PM-6:15 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

"Kinda awful.I spent a lot of time crying":Attending to the Emotions of PSTs of Color

Victor Kásper, Florida State University

Shannon G. Davidson, Florida State University

Lama Jaber, Florida State University

Learning Antiracist and Socially Just STEM Teaching Within an Embedded, Place-Based Model of Teacher Education (Virtual)

Rachael M. Gordon, University of Michigan

STEM Education through Abolitionist Teaching: A Research-Practice Partnership to Support Virtual Microteaching Experiences

Vanessa Louis, Georgia State University
Natalie S. King, Georgia State University

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Cultivating positive dispositions toward science teaching

4:45 PM-6:15 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Attitudes of Preservice Elementary Science Teachers toward iSTEM Teaching: The Role of Adaptive Expertise (Virtual)

Mounir R. Saleh, Bahrain Teachers College, University of Bahrain

Bashirah Ibrahim, Bahrain Teachers College, University of Bahrain

Preservice Science Teachers' Implementation and Self-Efficacy About The Science And Engineering Practices (Virtual)

Fatma Kaya, Middle Tennessee State University

Lisa A. Borgerding, Kent State University

Shannon Navy, Kent State University

Systematic Assessment of Future Primary School Teachers' Interests in Science

Steffen Wagner, Humboldt-Universität zu Berlin

Burkhard Priemer, Humboldt-Universität zu Berlin

Doris Lewalter, Technical University Munich

Strand 8: In-service Science Teacher Education

SC-organized paper set-Impact of Unique Professional Development Foci

4:45 PM-6:15 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Changes in Teacher Thinking about Enactment Influenced by a PD about an NGSS-Aligned Storyline Unit

Nessrine Machaka, University of Illinois At Urbana - Champaign

Stina Krist, University of Illinois at Urbana-Champaign

Creating Unity and Inclusion Through Developing the Research Team Teacher Role

Aline Gjellaj, Dual Language Middle School, New York, NY

Jessica White, Benjamin Syms Middle School, Hampton, VA.

Elaine V Howes, American Museum of Natural History

Jamie Wallace, American Museum of Natural History

Elizabeth Edmondson, Virginia Commonwealth University

*The enactment of professional development principles in a collaborative project between science and RE teachers * presenting author*

Ann Childs, University of Oxford

*Liam Guilfoyle, University of Oxford

Rural Science Teachers' Sensemaking about Teaching' Data Practices to Investigate Authentic Weather Phenomena (Virtual)

Asli Sezen-Barrie, University of Maine

Josephine Louie, Education Development Center

Brianna Roche, Education Development Center

Emily Fagan, Education Development Center

Brian Fitzgerald, Mount Washington Observatory

Kevin Waterman, Education Development Center

Deb Morrison, University of Washington

Strand 10: Curriculum and Assessment

Related Paper Set-Engaging with Curricular Infrastructure to Support Elementary Science Teacher Learning and Identity Development

4:45 PM-6:15 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Curriculum Materials Adoption Processes: Teacher Learning in an Organizational Routine (Virtual, mixed)

Christa Haverly, Northwestern University

Emily Rose Seeber, University of Michigan

Elizabeth A. Davis, University of Michigan

James P Spillane, Northwestern University

Angela Lyle, University of Michigan

Supporting Early Elementary Science and Literacy Teaching: The Synergy of Pedagogical Tools

Amelia Wenk Gotwals, Michigan State University

Amber S. Bismack, Oakland University

Samantha Danzinger,

Arianna Pikus, Michigan State University

Tanya S Wright, Michigan State University

Miranda S. Fitzgerald, University of North Carolina At Charlotte

Collaborative Development of Tools to Address Content-Practice Tensions in Classroom Science Investigations

Eve Manz, Boston University School of Education

Chris Georgen, Boston University

Betsy Beckert,

Sunday 3-27-2022

Supporting Elementary Teachers in Enacting Curricular Reform and Reform-based Science Instruction (Virtual)

Christina Siry, University Of Luxembourg
Sara E. Wilmes, University of Luxembourg
Kerstin Te Heesen, University of Luxembourg

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Black STEM Professionals and STEM Teaching, Learning, and Engagement

4:45 PM-6:15 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Centering Black Scientists' Lived Experiences : A Context for Culturally and Linguistically Embedded Science (Virtual)

Gillian U Bayne, Lehman College of the City University of New York

Mentorship to Combat Loneliness, Bridge Opportunity Gaps, and Fight Underrepresentation in STEM Disciplines (Virtual)

Veeshan Narinesingh, Department of Physics The Graduate Center of The City University of New York

Farrah Simpson, Department of Physics Brown University

Tracy Edwards, Department of Physics Michigan State University

Milena Chakraverti-Wuerthwein, The Harlem Gallery of Science

Exploring Racism in the Undergraduate and Graduate School Choices of Scientists and Engineers: Counterspaces for Black men in S&E (Virtual)

Shari Watkins, American University

Brian McGowan, American University

Strand 12: Technology for Teaching, Learning, and Research

Symposium-Applying epistemic heuristics to characterize student reasoning about mechanisms with computational tools

4:45 PM-6:15 PM, Burrard

Discussant: Christina Krist, University of Illinois, Urbana Champagne

Presider: <https://tinyurl.com/NARSTpresider>

Reasoning about interactions when constructing mechanistic explanations (Virtual)

Michal Haskel-Ittah, Weizmann Institute of Science, Israel

Rami Marely, Weizmann Institute of Science, Israel

Smadar Szekely, Weizmann Institute of Science, Israel

Sunday 3-27-2022

Reasoning about clogging in crowd evacuation through bottlenecks

Elon Langbeheim, Ben-Gurion University of the Negev, Israel

Shani Ben-Hamo, Ben-Gurion University of the Negev, Israel

Stav Shapira, Ben-Gurion University of the Negev, Israel

*Student Use of Epistemic Heuristics at the Intersection of Science and Social Justice (*presenting author)*

Allison Bradford, University of California, Berkeley

Libby Gerard, University of California, Berkeley

*Marcia Linn, University of California, Berkeley

Reasoning about heat transfer while examining the relationships between physical experiment and computer model (Virtual)

Tamar Fuhrmann, Stanford University

Carmel Bar, Weizmann Institute of Science, Israel

Paulo Blikstein, Teachers College, Columbia University

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Innovative approaches in environmental science education

4:45 PM-6:15 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

[Program Name]: Powering the Science Learning Process with Co-Created Citizen Science

Ruth Kermish-Allen, Maine Mathematics and Science Alliance

Alexandria Brasili, Maine Mathematics and Science Alliance

Assessing Elementary Students Ability to Make Informal Observations About Living Organisms Outdoors

Jean-Philippe Ayotte-Beaudet, Université De Sherbrooke

Abdelkrim Hasni, Université de Sherbrooke

Valérie Vinuesa, Université de Sherbrooke

Élise Rodrigue-Poulin, Université de Sherbrooke

Gabriela Quintela Do Carmo, Columbia University in the City of New York

Étienne Gendron, Université de Sherbrooke

Bringing the Outside In and Inside Out: Connecting Socioemotional Learning with Science (Virtual)

Ava Marie Gibler, California Polytechnic State University, San Luis Obispo

Alexis Van Howe, California Polytechnic State University, San Luis Obispo

Jasmine McBeath Nation, California Polytechnic State University, San Luis Obispo

Kurt Holland, California Polytechnic State University, San Luis Obispo

Marine Science, Climate Change, and the NGSS: Lessons Learned from an Initial Round of PD

Lauren Madden, The College of New Jersey

Sunday 3-27-2022

Louise Ammentorp, The College of New Jersey
Nathan Magee, The College Of New Jersey, Physics Department
Graceanne Taylor, Save Barnegat Bay

Administrative Session: Equity And Ethics Committee

Admin Symposium-Jhumki Basu Poster Symposium

4:45 PM-6:15 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Organizers

María González-Howard, University of Texas at Austin
Justina Ogoto, Baylor University
Sara Sallom, University of Balamand, Lebanon
Enrique Suarez, University of Massachussetts, Amherst
Jenny Norman, University of Minnesota

Critical Approaches Leveraging Technology In Science Education

Phillip A. Boda, University of Illinois at Chicago

Towards Liberating Methods: Ethnodance as an Embodied Narrative of Black Students' Science Identity

Mindy J. Chappell, University of Illinois at Chicago

Meaningful Assessment of Engineering Experts' and Teachers' Conceptions of Nature of Engineering

Erdogan Kaya, George Mason University
Ezgi Yesilyurt, Weber State University
Hasan Deniz, University of Nevada Las Vegas

Learning How to Mean Through Multimodality Embedded in Modeling – “Scientifically” Speaking (Virtual)

Ayca K. Fackler, University of Georgia

Exploring Students Mechanistic Reasoning Within the Context of Resource Oriented Instructional Materials

Clausell Mathis, University of Washington
Lisa Goodhew, Seattle Pacific University
Paula Heron, University of Washington

Experiences of prospective and novice science teacher educators during the design of k-12 science methods courses

José Pavez, University of Georgia

Sunday 3-27-2022

Experiences of School Science Coordinators During the COVID-19 Pandemic: An International Perspective

Harleen Singh, Medaille College
Hong H. Tran, University of Georgia
Hatice Ozen-Tasdemir, University of Georgia
Yuxi Huang, University of Georgia
Julie A. Luft, University of Georgia
Brooke A. Whitworth, Clemson University

Machine Learning Scoring Bias on Students that are Underrepresented in STEM (Virtual)
Xiaoming Zhai, University of Georgia

Administrative Session: Research Committee

Admin Symposium-Latinx Science Learners and Scientific Literacy: Successes and Challenges
4:45 PM-6:15 PM, Parq Salon E (**livestream** 2)

Panelists

Regina Suriel, Valdosta State University
Alejandro J. Gallard, Georgia Southern University
Angela Chapman, University Of Texas Rio Grande Valley
Lizette de Robles,
Diego F. Rojas-Perilla, Teachers College, Columbia University
Enrique H Suarez,
Tatiane Russo-Tait, University of Texas At Austin
Diana Camacho, Oregon State University

Multi-Strand-Virtual Session B

4:45 PM-6:15 PM, Parq Salon F (**livestream** 3)

High School Students' Emergent Positions from Science Internships (Virtual)

Pei-Ling Hsu, University Of Texas At El Paso
Dina Thomason, University Of Texas At El Paso

Citizen Science in School: the Case of the Invasion of Wild Boars (Virtual)

Keren Sarah Levy, Technion - Israel Institute Of Technology
Keren Mintz, Technion - Israel Institute Of Technology
Tali Tal, Technion - Israel Institute Of Technology

Writing Science in English at College: Non-Anglophone Students' Participation in Epistemic Practices (Virtual)

Luciana Martiliano Milena, Universidade Federal Do ABC
Danusa Munford, Universidade Federal de Minas Gerais
Priscila C. Fernandes, Universidade Federal de Sao Joao del Rei

Motivations of Scientists and Teachers to Collaborate in School-Based Citizen Science Projects (Virtual)

Osnat Atias, University of Haifa

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

Ayelet Shavit, Technion - Israel Institute of Technology

Yael Kali, University of Haifa

Sunday: March 27, 2022

PRESIDENT'S RECEPTION AND WELCOME BACK CELEBRATION

Prefunction area & Parq Salon DEF

7:15 pm-9:30 pm

Come join the homecoming celebration! We are excited to be together after three long years (yes, the last time NARST had an in-person conference was 2019)! Reconnect with old friends. Make connections with new friends. The NARST community is coming together for an evening of good food and fun. There will be some surprises too!

Substantial appetizers and desserts will be served. Cash bar.



MONDAY, MARCH 28, 2022

Mind and Sole (off-site) (This event is not sponsored nor endorsed by NARST)
6:00 am-7:15 am

Breakfast (provided for in-person attendees) and online breakfast or cocktail social time (as you please)
Prefunction
6:30 am-8:00 am

RIG Business Meetings [Except for CADASE RIG]
7:00 am-8:00 am

NARST Research Interest Groups will meet to review activities of the past year and plans for the upcoming year. Anyone interested in learning more about a RIG is welcome to attend the meetings.

Research Interest Group	Room
Latino/a RIG [LARIG]	Parq Salon A
Contemporary Methods for Science Education Research	Parq Salon B
Engineering Education [ENE-RIG]	Parq Salon C
Indigenous Science Knowledge [ISK-RIG]	Kitsilano Ballroom A
Research in Artificial Intelligence-involved Science Education [RAISE]	Kitsilano Ballroom B
Asian and Pacific Islander Science Education Research [APISER]	Kitsilano Ballroom C

Monday 3-28-2022

Monday, March 28, 2022
Concurrent Session # 3
8:00 am-9:30 am

Strand 1: Science Learning: Development of student understanding

SC-organized paper set-Pedagogical Approaches to Enhance Science Understanding

8:00 AM-9:30 AM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Applying art-based methods to talk with children about nature, technology, and health

Ene Ernst Hoppe, University of Copenhagen

Katia Bill Nielsen, University of Copenhagen

Henriette T. Holmegaard, University Of Copenhagen

Please Mind the Gap: Black Boxes as a Pedagogical Construct in the Biology Classroom

Gur Arie Livni Alcasid, Department of Science Teaching, Weizmann Institute of Science

Michal Haskel Ittah, The Weizmann Institute Of Science

Student Depictions of the Engineering Design Process (Virtual)

Alexandria Muller, University of California- Santa Barbara

Marco Barron, University of California- Santa Barbara

Devon M Christman, UCSB

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

Danielle Boyd Harlow, University Of California At Santa Barbara

The interplay between students' motivational profiles and science learning

Marcus Kubsch, IPN - Leibniz Institute for Science and Mathematics Education

David L. Fortus, Weizmann Institute Of Science

Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

Jeffrey Nordine, Leibniz Institute for Science and Mathematics Education (IPN)

Joseph S. Krajcik, Michigan State University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Science Teaching & Learning during the Pandemic

8:00 AM-9:30 AM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Investigating the Triple Threat of COVID-Necessitated Online Engineering Courses to Diverse Students' Sense of Belonging

Thomas R. Tretter, University of Louisville

Monday 3-28-2022

Brian S Robinson, University of Louisville
Jessica B Buckley, University of Louisville
Alex Hammond, University of Louisville

Reimagining Virtual Participatory Design Research: Supporting Youth's Rightful Presence in a Community Science Project (Virtual)

Rishi Krishnamoorthy, Rutgers University
Edna Tan, University Of North Carolina At Greensboro
Ravit Golan Duncan, Rutgers University
Frieda Reichsman, The Concord Consortium
Sarah Haavind, The Concord Consortium
Tiahna Selby, Rutgers University
Burrell Smithen, Rutgers University
Tasha Austin, Rutgers University

Student emotional engagement through the emergency transition to online learning due to COVID-19 (Virtual)

Emma Wester, Donald Danforth Plant Science Center
Lisa L. Walsh, Donald Danforth Plant Science Center
Kristine Callis-Duehl, Donald Danforth Plant Science Center

Student Interest, Concerns and Information-Seeking Behaviors Related to Covid-19 (Virtual)

Jamie Elsner, University of North Carolina at Chapel Hill
Troy D Sadler, University of North Carolina at Chapel Hill
Laura Zangori, University Of Missouri
Patricia J. Friedrichsen, University Of Missouri–Columbia
Li Ke, University of North Carolina at Chapel Hill

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

SC-organized paper set-Designing and enacting pedagogy for secondary classrooms

8:00 AM-9:30 AM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

Effects of pedagogical interruptions on secondary student interest, engagement, and comprehension of narrative science videos.

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

Monday 3-28-2022

Exploration of Teacher Discursive Claims Enacting Social Justice Pedagogy in 7th grade Science (Virtual)

Fredrica Nash, The George Washington University

The agile educator: investigating science teachers' pedagogical capacity to design subject-specific up-to-date citizenship lessons

Ineke Henze-Rietveld, Delft University of Technology & Radboud University

Erik Barendsen, Radboud University & Open University

Dury Bayram Jacobs, Eindhoven University of Technology

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

SC-organized paper set-Collaboration to Promote Learning

8:00 AM-9:30 AM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Analyzing an Interdisciplinary Education and Science/Engineering Team's Interactions Using Activity Theory (Virtual)

Katherine McCance, North Carolina State University

Stephanie Teeter, NC State University

Margaret R. Blanchard, NC State University

Richard Venditti, NC State University

Engineering Design in Introductory Physics: Undergraduate Students' and Graduate Teaching Assistants' Perceptions (virtual)

Amir Bralin, Purdue University

Thomas Chapman, Purdue University

Jason Morphew, Purdue University

Carina M. Rebello, Purdue University

N Sanjay Rebello, Purdue University

Molecular orbital theory in entry-level university chemistry – A computer-supported collaborative intervention

David J Hauck, TU Dortmund University

Insa Melle, TU Dortmund University

Understanding Scientists,' Engineers,' and Educators' Perceptions of Collaboration and Interdisciplinarity: National Survey Validation and Results (Virtual)

Katherine R McCance, North Carolina State University

Margaret R. Blanchard, NC State University

Monday 3-28-2022

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

SC-organized paper set-Problem Solving and Critical Thinking

8:00 AM-9:30 AM, Parq Salon D (**livestream** 1)

Presider: <https://tinyurl.com/NARSTpresider>

Heartbreak for Underachievement: Perspectives of CTCA on Students' Achievement and Critical Thinking in Computer Studies (Virtual)

Olasunkanmi Adio Gbeleyi, ACEITSE- Lagos State University
Peter A. Okebukola, ACEITSE- Lagos State University
Ibukunolu Adebisi Ademola, ACEITSE-Lagos State University
Franklin U. Onowugbeda, ACEITSE- Lagos State University
Fred Awaah, University of Professional Studies Accra
Esther Oluwafunmilayo Peter, ACEITSE- Lagos State University
Deborah Oluwatosin Agbanimu, ACEITSE-Lagos State University
Adekunle Ibrahim Oladejo, ACEITSE-Lagos State University
Ashimi B. Ganiyyu, Lagos State University
Hussein T. Abdulazeez, Lagos State University

Investigating the effect of context-based teaching on students' science engagement and perceptions of utility value (Virtual)

Ya-Chun Chen, Institute of Education, National Yang Ming Chiao Tung University

Perspectives on generalizability in problem-solving from undergraduate physics students: Influences of a mastery homework approach

Kevin Hall, University of Illinois at Urbana-Champaign
Stina Krist, University of Illinois at Urbana-Champaign
Eric Kuo, University of Illinois at Urbana-Champaign
Joshua Rosenberg, University of Tennessee

Strategies undergraduate students use to solve a volumetric analysis problem before and after instruction. (Virtual)

Ted M. Clark, The Ohio State University
Nicole Dickson-Karn, The Ohio State University

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Innovation and enhancement of science practices

8:00 AM-9:30 AM, Granville I

Presider <https://tinyurl.com/NARSTpresider>

Investigating Preservice Secondary STEM teachers' Reflective Practice in a Microteaching Context (Virtual)

Deepika Menon, University of Nebraska-Lincoln
Rosetta Ngugi, Kennesaw State University

Monday 3-28-2022

Preservice Science Teachers' Descriptions of Simulation-enhanced Inquiry-based Lesson for Asynchronous Learning Environments (virtual)

Ilgin Ozergun, Bogazici University
Sevil Akaygun, Bogazici University

Science and Engineering Practices and Cognitive Demand Present in Preservice Teachers' Planning and Instruction

Donna Governor, University of North Georgia
April Nelms, University of North Georgia

Virtual Rehearsal Simulations as Authentic Practice Spaces for Developing Scientific Discourse Skills

Tammy D. Lee, East Carolina University
Carrie Lee, East Carolina University
Mark H. Newton, East Carolina University
Jennifer Gallagher, East Carolina University
Paul Vos, East Carolina University
Daniel L. Dickerson, East Carolina University
Bonnie B. Glass, East Carolina University

Strand 8: In-service Science Teacher Education

Symposium-The Role of Emotions in Science Teacher Education and Professional Development

8:00 AM-9:30 AM, Parq Salon F (**livestream 3**)

Discussant: Maria Varelas, University Of Illinois At Chicago

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Arnau Amat, University Of Vic
Alberto Bellocchi, Queensland University of Technology
Shannon G. Davidson, Florida State University
Vesal Dini, Tufts University
Lama Jaber, Florida State University
Laura Martin Ferrer, University Of Vic
Rotem Trachtenberg-Maslaton, Ben Gurion University of the Negev
Karin Tsarfati-Shaulov, Ben Gurion University of the Negev
Dana Vedder-Weiss, Ben-Gurion University Of the Negev, Israel
Maria Varelas, University Of Illinois At Chicago

Monday 3-28-2022

Strand 8: In-service Science Teacher Education

Symposium-The Handbook of Research in Science Teacher Education: Current and Future Directions for Research

8:00 AM-9:30 AM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Julie A. Luft, University of Georgia
Gail Jones, North Carolina State University
Sarah J. Carrier, North Carolina State University
David F. Jackson, University Of Georgia
Lauren Madden, The College of New Jersey
Soonhye Park, North Carolina State University
Rachel Mamlok-Naaman, The Weizmann Institute of Science
Jose M. Pavez, University of Georgia

Strand 10: Curriculum and Assessment

Related Paper Set-Research and Practice Perspectives on Developing and Implementing a Three-Dimensional District Biology Assessment

8:00 AM-9:30 AM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

A District Perspective on Developing a Three-Dimensional Science Assessment

Sylvia Scoggin, Washoe County School District
Rebecca Curtright, Washoe County School District
Elizabeth X. De Los Santos, University of Nevada, Reno
Candice R. Guy-Gaytán, BSCS Science Learning

A District Perspective on the Use of Science Assessment Data

Rebecca Curtright, Washoe County School District
Sylvia Scoggin, Washoe County School District
Elizabeth X. De Los Santos, University of Nevada, Reno
Candice R. Guy-Gaytán, BSCS Science Learning

Investigating Teachers' Professional Learning Experiences on an Assessment Development Team

Elizabeth X. De Los Santos, University of Nevada, Reno

Candice R. Guy-Gaytán, BSCS Science Learning
Suzanne Lewis, University of Nevada, Reno

Investigating Students' Reasoning on a Practices-based Exam (Virtual)

Candice R. Guy-Gaytán, BSCS Science Learning
Suzanne Lewis, University of Nevada, Reno

Monday 3-28-2022

Elizabeth X. De Los Santos, University of Nevada, Reno

Strand 11: Cultural, Social, and Gender Issues

Symposium-Indigenizing the Processes of Science and Engineering: Increasing Inclusivity with Implementation of the SEP's

8:00 AM-9:30 AM, Parq Salon E (**livestream** 2)

Discussant: Pauline Chinn, University of Hawaii at Manoa

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Julie Robinson, University of North Dakota
Frank Bowman, University of North Dakota
Bethany Klemetsrud, University of North Dakota
Bhaskar Upadhyay, University of Minnesota
Rebekah Hammack, Montana State University
Paichi Shein, National Sun Yat-sen University
Peresang Sukinarhimi, National Sun Yat-sen University
Tzu-yu Kuo, Institute of Education, National Sun Yat-sen University
Nick Lux, Montana State University
Paul Gannon, Montana State University

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Considering Gender in Higher Education

8:00 AM-9:30 AM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Durability of Systemic Gendering of STEM in College STEM Students' Definitions of a STEM Person (Virtual)

Heidi Cian, Florida International University
Remy Dou, Florida International University

Influence of Active Goals on Attitudes, Intentions, and Academic Behaviors of STEM Women in an Undergraduate Peer Mentoring Program

Jennifer A. Gatz, Stony Brook University
Angela M. Kelly, Stony Brook University
Monica Bugallo, Stony Brook University

Gender Dynamics During Discourses in SCALE-UP Format of Physics Course: An Exploratory Single Case Study

Mark O Akubo, Florida State University and Cornell University
Sherry A. Southerland, Florida State University

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

Admin Symposium-The Unnatural Nature of Science without Norm Lederman: Honoring the Legacy of Dr. Norman Lederman

8:00 AM-9:30 AM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Valarie L. Akerson, Indiana University

Judith S Lederman, Illinois Institute of Technology

Dana L Zeidler, University of South Florida

Renée Schwartz, Georgia State University

Fouad Abd-El-Khalick, University Of North Carolina At Chapel Hill

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Lenses on environmental science educators

8:00 AM-9:30 AM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Assessing Elementary Preservice Teachers' Knowledge, Awareness, Attitude, and Beliefs Toward Environmental Education

Mamta Singh,

*Investigating the Knowledge Bases Science Teachers Use When Considering a Socioscientific Issue (*presenting author)*

Lucas Menke, Drake University

*Jerrid Kruse, Drake University

Kinsey Zacharski, Drake University

Sarah Voss, Drake University

Ohio Secondary Science Teachers' Climate Change Instruction (virtual)

Lisa A. Borgerding, Kent State University

Jennifer Heisler, Kent State University

Breanna Beaver, Kent State University

Understanding How an Environmental Educator Identifies & Thinks about Environmental Issues (Virtual)

Hamza Malik,

Stephen B. Witzig, University Of Massachusetts Dartmouth

Monday 3-28-2022

Elections Committee

Admin Symposium- Leaders Wanted: Envisioning Pathways to NARST Leadership

8:00 AM-9:30 AM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Facilitators

Bridget K. Mulvey, Kent State University
Melody Russell, Auburn University
Mary M. Atwater, University of Georgia
Nazan U. Bautista, Miami University
Jeanne R. Wieselmann, Southern Methodist University

Panelists

Mei-Hung Chiu, National Taiwan Normal University
Malcolm Butler, University of North Carolina at Charlotte
Scott McDonald, Pennsylvania State University
Eileen Parsons, University of North Carolina at Chapel Hill

Administrative Session: Research Committee

Admin Symposium-Sandra K. Abell Institute for Doctoral Students 2021 Poster Symposium

8:00 AM – 9:30 AM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Organizers

Asli Sezen-Barrie, University of Maine
Rouhollah Aghasaleh, Humboldt State University
Sara Tolbert, Te Whare Wananga O Waitaha University of Canterbury
Kathryn Scantlebury, University of Delaware

Phronetic Science: Reflections on the First Virtual SKAIDS in a Social-natural Crisis

Rouhollah Aghasaleh, Humboldt State University
Sara Tolbert, University of Canterbury, New Zealand
Kathryn Scantlebury, University of Delaware, USA

Addressing the diversity issues in Science & Engineering in Ph.D. Programs

Lisa Hanson, Middle Tennessee State University

Be like water: The role of science in social movements towards justice and multi species solidarity

Jenny Tilsen, University of Minnesota

Redefining productive struggle through an asset-based perspective

Clarissa Keen, University of Massachusetts Boston

Design principles for implementing Lesson Study: A professional development model for graduate teaching assistants

Monday 3-28-2022

Nicole Suarez, University of California San Diego and San Diego State University

Questioning the Core Ideas: Approaching NGSS using a Lens of Ecofeminism
Suzanne Poole Patzelt, Montclair State University

Care and Harm in California Science Teacher Preparation Curriculum
Caroline Spurgin, University of California Santa Cruz

Elements of Humanizing Pedagogy in K-8 Science Teacher Preparation (Virtual)
Dan Moreno, University of Arizona

Learning How to Build Knowledge in Science Through Multimodality Embedded in Modeling
Ayca Fackler, University of Georgia

Historicizing Contemporary Access & Equity Discourses in P-12 Engineering Education Curricular Materials (Virtual)
Natalie De Lucca, Vanderbilt University

"Kinda awful.I spent a lot of time crying": Attending to the Emotions of PSTs of Color
Victor Kásper, Florida State University

Pathways of Indigenous Science in Environmental Conservation of Thai Urban society
Waralee Sinthuwa, Faculty of Education, Kasetsart University

Asset-Based Supplemental Chemistry
Klaudja Caushi, University of Massachusetts Boston

The Tensions of Bridging the Culture of Home and School Science through Ethnic Education in an Indigenous Community in Taiwan
Mu-Yin Lin, The University of Georgia

(Re)defining Teacher Perceptions of Student Science Success to Promote Unity and Inclusion in Science Education
Takeshia Pierre, University of Florida

A portrait of Postsecondary STEM Teaching: mixed-method study examining the influence of identity and context
Sule Aksoy, Syracuse University

Multimodal revoicing: Embodied student resources to support students' explanations of science phenomena
Samuel Lee, Boston College

Equity Audit: Why Aren't the Black Students Showing Up?
Dionne Wilson, Florida State University

Monday 3-28-2022

Monday, March 28, 2022
Coffee and Committee Meetings
9:30 am-10:45 am

Get a nice beverage and attend a committee meeting. One of the best ways to get involved with NARST and ensure your voice is heard is to volunteer for committee service. These committee meetings will review the activities of the prior year and look forward to what's to come. A call for committee volunteers will go out to the membership shortly after the conference. Which one interests you most?

Committee	Room
Awards	Kitsilano D
Elections	Parq Salon B
Equity and Ethics	Parq Salon C
External Policy and Relations	Kitsilano Ballroom A
Graduate Students	Kitsilano Ballroom B
International	Kitsilano Ballroom C
Membership	Parq Salon D
Program [strand coordinators]	Parq Salon A
Research	Stanley
Social media, Website, Communications	Cambie

Monday 3-28-2022

Monday, March 28, 2022

Concurrent Session # 4

11:00 am-12:30 pm

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Science Teaching & Learning at the College Level

11:00 AM-12:30 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Undergraduate STEM Majors' Association of K-12 Experiences with their STEM Identities (Virtual)

Remy Dou, Florida International University

Heidi Cian, Florida International University

Group Dynamics: Examining Group Member Roles in Small Group Data-Based Argumentation Tasks in the context of a Large-Lecture Course

Andy Cavagnetto, Washington State University

Nyck Ledezma, Cal Poly Pomona

Archer Harrold, University of Nebraska

Anna Ferroggiaro, Washington State University

Brandon Call, Washington State University

Dana Roach, Washington State University

Lauren Duffy, Washington State University

Jessie Arneson, Washington State University

Erika Offerdahl, Washington State University

Jacob Woodbury, Washington State University

Teaching science while socially distanced: College science laboratory instructors' experiences with synchronous hybrid courses

Laura B. Schneider, St. Mary's College of Maryland; Great Mills High School

Perceiving data as inconsistent with expectations - an important factor for sense-making of experimental results (Virtual)

Burkhard Priemer, Humboldt Universität zu Berlin

Sophia Chroszczinsky, Humboldt Universität zu Berlin

Amy M Masnick, Hofstra University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set-Supporting Anti-Deficit Noticing and Equitable Science Teaching and Learning

11:00 AM-12:30 PM, Parq Salon D (**livestream** 1)

Presider: <https://tinyurl.com/NARSTpresider>

Rearticulating Deficit Language Ideologies with Researchers and Teachers in Elementary Science Professional Development (Virtual)

Ashlyn Pierson, The Ohio State University

Bethany Daniel, Vanderbilt University

Sarah Jaewon Lee, Vanderbilt University

Andrea Wentworth Henrie, Vanderbilt University

Heather J. Johnson, Vanderbilt University

Danielle T. Keifert, University of North Texas

Noel Enyedy, Vanderbilt University

Secondary Pre-service Teachers Becomings: Fostering Anti-deficit Noticing Through Attending To Students' Sense-making Repertoires

David P. Steele, Alder Graduate School of Education

Sophia Jeong, The Ohio State University

Natasha Hillsman Johnson, University of Toledo

Use of Science and Engineering Practices to Create Equitable STEM Learning: Implication For Teachers' Anti-deficit Noticing

Meenakshi Sharma, sharma_m@mercer.edu

Community-based Research as Pedagogy for Strength-based Teacher Education

Adam Bell, University of Washington

Jeff Chandler, University of Washington

Gracie Merrett, University of Washington

Conditions Expanding Opportunities for Pre-service Teachers to Learn in Field Placements

Karin Lohwasser, University of California, Santa Barbara

Caroline Hadley Long, University of Washington

Soo-Yean Shim, University of Illinois

Mark Windschitl, University Of Washington

Tammy Q. Tasker, Western Washington University

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

Symposium-International Collaborative Investigation of Third Grade Students' Understandings of Scientific Inquiry

11:00 AM-12:30 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Judith S. Lederman, Illinois Institute Of Technology
Selina L. Bartels, Valparaiso University
Juan P. Jimenez, Illinois Institute of Technology

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

SC-organized paper set-Student motivation and creativity in secondary science

11:00 AM-12:30 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

A new way to promote creative thinking skills of students: Innovative science learning environments

Ferah Ozer, Bogazici University
Nihal Dogan, Bolu Abant Izzet Baysal University

Adolescents' Motivation and Self-Efficacy in Science Face-to-Face Learning Environments vs. in Distance Learning

Shira Passentin, Weizmann Institute of Science
David L. Fortus, Weizmann Institute Of Science

Variations in the Co-occurrence of Epistemic Agency and Collective Enterprise

Jessica L. Alzen, University of Colorado Boulder
Kelsey D. Edwards, Northwestern University
William R. Penuel, University of Colorado
Brian J. Reiser, Northwestern University
Cynthia Passmore, University of California-Davis
Chris D. Griesemer, University of California Davis
Aliza Zivic, Northwestern University
Christina M Murzynski, Northwestern University
Jason Buell, Northwestern University

Monday 3-28-2022

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Evaluating informal learning interventions

11:00 AM-12:30 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Building Capacity for Collective Evaluation across ISE Centers: A Tested Model for a Collaborative Approach

K. C. Busch, North Carolina State University
Lynn Chesnut, North Carolina State University
Regina Ayala Chavez, North Carolina State University
Kathryn T. Stevenson, North Carolina State University
Lincoln Larson, North Carolina State University
Charles Yelton, North Carolina Museum of Natural Science

Examining Practices and Attitudes about the NSF's Broader Impacts Criterion: A Systematic Literature Review

Stephanie Teeter, NC State University

Spatial Drawing Ability: Informal Learning Experiences

Kimberly Ann Currens, Texas A&M University
Sandra B. Nite, Texas A&M University
Ali Bicer, University of Wyoming
Jihu Lee, Allen Academy
Lila Moseley, Texas State University
Rachael Jones, Texas A&M University

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Connecting science and society in teacher education

11:00 AM-12:30 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

ENACT Project: Promoting Pre-service Science Teachers' Perceptions on Social Responsibility of Scientists and Engineers (Virtual)

Yeonjoo Ko, Ewha Womans University
Hyunju Lee, Ewha Womans University
Jiyeon Hong, Ewha Womans University

Establishing a Community of Practice to Support Elementary Preservice Teachers' Socioscientific Issues-Focused Instruction

Melanie Kinskey, Sam Houston State University
Dana L. Zeidler, University Of South Florida

Monday 3-28-2022

Exploring connections between anxiety and science understanding around Covid-19

Tina Vo, University of Nevada- Las Vegas
Margarita Huerta, University of Nevada- Las Vegas
Heather Dahl, University of Nevada- Las Vegas
Kenneth Varner, University of Nevada- Las Vegas

Preservice science teachers' competences in evidence-based practice – A longitudinal case study

Pascal Pollmeier, Paderborn University
Sabine Fechner, Paderborn University

Strand 8: In-service Science Teacher Education

SC-organized paper set-Tools and Techniques to Understand and Support Teacher Learning

11:00 AM-12:30 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

It's the work that it does, not the object itself: Scientific posters as boundary objects

Shannon G. Davidson, Florida State University
Sherry A. Southerland, Florida State University
Lama Jaber, Florida State University

The types of feedback used by teacher educators in engineering design workshops and their effectiveness

Minyoung Gil, Pennsylvania State University
Matthew Johnson, Pennsylvania State University

Tools for Observing Productive Talk: A Comparison of Two Protocols (RTOP/IQA-SOR)

Patrick J. Enderle, Georgia State University
Claudia Hagan, Georgia State University
Sierra Lynn Morandi, Florida State University
Ryan Coker, Florida State University
Victor Kasper, Florida State University
Danielle M. Vande Zande, Florida State University
Jennifer Schellinger, FSU
Sherry A. Southerland, Florida State University

Using Argumentative Tasks to Promote Out of Field Physics Teachers' Professional Development

David Perl Nussbaum, Weizmann Institute of Science
Edit M. Yerushalmi, Weizmann Institute of Science

Monday 3-28-2022

Strand 8: In-service Science Teacher Education

SC-organized paper set-The Role of Collaboration in Teacher Learning

11:00 AM-12:30 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

A Design-Based Research Methodology Utilizing Conjecture Mapping to Frame Embedded Co-design Cycles

Amanda N. Peel, Northwestern University

Jacob Kelter, Northwestern University

Lexie Zhao, Northwestern University

Michael Horn, Northwestern University

Uri Wilensky, Northwestern University

Experienced Teachers' Thinking about NGSS Classroom Assessment: Resources, Coherences with Instruction, and Shifts through Co-Design

Jennifer Richards, Northwestern University

Olivia D. Masse, Northwestern University

Kevin Cherbow, Florida State University

Miray Tekkumru Kisa, Florida State University

Investigating the Effectiveness of an Innovative Professional Development Program for Inquiry-based Secondary Science Education

Arne Bewersdorff, Technical University of Munich

Armin Baur, Heidelberg University of Education

Markus Emden, Zurich University of Teacher Education

Multimodal Analysis of Science Teachers' Facework During Collaborative Video-Based Learning (Virtual)

Adi Mendler, Ben-Gurion University of the Negev, Israel

Dana Vedder-Weiss, Ben-Gurion University Of the Negev, Israel

Strand 8: In-service Science Teacher Education

Related Paper Set-Centering Place-Based Education for Teaching Science Outdoors in Urban Contexts

11:00 AM-12:30 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Understanding Informal Science Educator Identity as Critical Leverage for Science Teaching & Learning Partnerships (Virtual)

Gail Richmond, Michigan State University

Roberta Hunter, Michigan State University

Eleanor Kenimer, Michigan State University

Monday 3-28-2022

Cultural Historical Activity Theory (CHAT) as a lens for understanding challenges of developing successful formal/informal science education partnerships (Virtual)

Eleanor Kenimer, Michigan State University
Gail Richmond, Michigan State University

The power of virtual platforms to support teacher learning and community development for urban outdoor science teaching (Virtual)

Roberta Hunter, Michigan State University
Irene S. Bayer, Michigan State University
Gail Richmond, Michigan State University

The role of professional learning in the development of questioning (Virtual)

Kara Haas, Michigan State University
Tali Tal, Technion
Gail Richmond, Michigan State University

The role of context in supporting responsive place-based urban science teaching

Tali Tal, Technion
Gail Richmond, Michigan State University
Roberta Hunter, Rutgers University

Strand 10: Curriculum and Assessment

Related Paper Set-Teaching and Learning about COVID-19 in the Midst of the Pandemic

11:00 AM-12:30 PM, Parq Salon E (**livestream 2**)

Justice-Centered STEM Education to Address Pressing Societal Challenges Using the Case of the COVID-19 Pandemic (Virtual)

Okhee Lee, New York University
Todd Campbell, University of Connecticut

Teacher Learning Through Collaborative Curriculum Design During the COVID-19 Pandemic

Troy D Sadler, University of North Carolina at Chapel Hill
Li Ke, University of North Carolina at Chapel Hill
Patricia J. Friedrichsen, University Of Missouri–Columbia
Rebecca Rawson,
Laura Zangori, University Of Missouri

COVID Connects Us: Tensions and Celebrations

Yang Zhang, University of Rochester
April Lynn Luehmann, University Of Rochester

Monday 3-28-2022

Teaching Science During the COVID-19 Pandemic: A National Study of Teacher of Decision Making

Peggy J. Trygstad, Horizon Research, Inc.
Sean Smith, Horizon Research, Inc.

Understanding Minoritized Youth Learning through Social Networks during the COVID-19 Multi-pandemic (Virtual)

Angela Calabrese-Barton, University of Michigan
Francisco Parra, University of Michigan
Frankie Calabrese Barton, Youth Action Council
Grace Rose, Youth Action Council
Devon Riter, University of Michigan
Day W. Greenberg, University of Michigan

Strand 11: Cultural, Social, and Gender Issues

Symposium-Multiplying Perspectives on Racial Equity in STEM Education: Insights from Canada, Netherlands, and the USA.

11:00 AM-12:30 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Sarah Halwany, University of Calgary
Jennifer Adams, University Of Calgary
Terrell R. Morton, University of Missouri - Columbia
Tia C. Madkins, The University of Texas At Austin
Claire Paton, University of Calgary
Nadia Qureshi, University of Toronto
Theila Smith, University of Groningen
Shari Watkins, American University
Kevin Hewitt, Dalhousie University
Maydianne Andrade, University of Toronto
Juliet Daniel, McMaster University
Carl James, York University
ReAnna Roby, Vanderbilt University
Whitney McCoy, Duke University
Kristal Turner, University of Calgary

Monday 3-28-2022

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Critical Race Theory and Other Race Critical Approaches to STEM Education

11:00 AM-12:30 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

A Critical View of STEM Curriculum from the LatCrit Perspective

Gianna Lopez-Colson, University of Texas Rio Grande Valley

Joe De Leon, University of Texas Rio Grande Valley

Roxana Jimenez, University of Texas Rio Grande Valley

Case Studies of Science Teachers' Experiences With a State Law Banning Critical Race Theory

Katherine Wade-Jaimes, University of Nevada

Rachel D. Askew, Vanderbilt University

Re-Constructing the "Black" Box and Making it Transparent for the Future of Science and Technology in Science Education: Towards Equitable, Social Justice Criticality

Noemi Waight, University at Buffalo

Shakhnoza Kayumova, University of Massachusetts-Dartmouth

Jennifer Tripp, University at Buffalo

Feyza Achilova,

*Science Preservice Teachers' Views on Diversity and Race in the Science Classroom (*presenting author)*

Preethi Titu, Kennesaw State University

*Seema Rivera, Clarkson University

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

SC-organized paper set-NOS and Science Pedagogy and instruction

11:00 AM-12:30 PM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

Evaluation of Nature of Science Representations in Biology School Textbooks Using the Family Resemblance Approach (Virtual)

Kristina Fricke, Freie Universität Berlin

Bianca Reinisch, Freie Universität Berlin

Exploring the Articulation of Nature of Science Ideas in Turkish Middle School Science Textbooks

Beyza Okan, Bogazici University

Ebru Kaya, Bogazici University

Monday 3-28-2022

Impacts of Professional Science Experience on Induction Science Teachers' NOS understandings, Pedagogy, and Science Identities

Emily Little, Georgia State University
Robert D. Bennett, Georgia State University
Renée Schwartz, Georgia State University

*Proposed Teacher Competencies to Support Effective Nature of Science Instruction: A Meta-Synthesis of the Literature (Virtual)*Erin

Noushin Nouri, University of Texas Rio Grande Valley
William F McComas, University Of Arkansas

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Making sense of socioscientific issues

11:00 AM-12:30 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

Adjusting the Lens: Elementary Students Sharing and Learning about Climate Change through Photovoice

Imogen R Herrick, University of Southern California
Michael Lawson, Kansas State University
Ananya Matewos, St. Norbert College

Investigating Relationship(s) Between Epistemological Beliefs, Argument Quality and Informal Reasoning in the Context of SSI (Virtual)

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

Moral and ethical development through Socioscientific Holistic Perspectives (SSHHP)

Eric Nolan, Northern Arizona University, Flagstaff

Pre-Service Secondary Science Teachers' Views on Teaching Socioscientific Issues

Jen-Yi Wu, National Taiwan Normal University
Ying-Shao Hsu, National Taiwan Normal University
Wen-Xin Zhang, National Taiwan Normal University

Monday 3-28-2022

Multi-Strand-Virtual Session D

11:00 AM-12:30 PM, Parq Salon F (**livestream** 3)

3D Printing with Preservice Teachers: Implementation, Effects, and Future Directions (Virtual)

Shannon L. Navy, Kent State University

Elena Novak, Kent State University

Visualizing STEM in Pakistan: Insights from a Professional Development for Conceptualizing STEM (Virtual)

Tasneem Anwar, The Aga Khan University

An Investigation of Differences in Students' Interest in STEM Among NGSS and Non-NGSS Implementation (Virtual)

Brienne May, Liberty University

Jillian L. Wendt, University of the District Of Columbia

Michelle Barthlow, Liberty University

Development of Students' Systems Thinking and Problem-solving through Authentic Aerosol Science Research (Virtual)

Jeremy W Melton, National Sun Yat-sen University, Taiwan

Paichi-Pat Shein, National Sun Yat-sen University, Taiwan

Jepry A. Saiful, National Sun Yat-sen University, Taiwan

**Lunch and Activity Break [on your own or with Ambassador group]
12:30 pm-2:30 pm**

**CADASE RIG Business Meeting
Parq Salon F
1:00 pm-2:30 pm**

Monday 3-28-2022

Monday, March 28, 2022
Concurrent Session # 5
2:45 pm-4:15 pm

Strand 2: Science Learning: Contexts, Characteristics and Interactions
SC-organized paper set-Student Experiences in Science Teaching & Learning
2:45 PM-4:15 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

"Do worms have urine?": Resources students draw upon in response to uncertainty in biology laboratories

Sam Skrob-Martin, Florida State University

Alicia Batailles,

Sherry A. Southerland, Florida State University

"Why aren't you listening to me?": Community and Individual roles in students' epistemic agency in science

Jennifer Schellinger, FSU

Katarina Gomez, Florida State University

Lama Z Jaber, Florida State University

Sherry A Southerland, Florida State University

Using Making to Transform the Learning of Physics into a Personally Meaningful Experience

Tal Peer, Technion - Israel Institute of Technology

Shulamit Kapon, Technion - Israel Institute of Technology

Implementing Contextualized Science Curriculum and Instruction in Tanzania: The Practice and Possibilities

Winston E Massam, Assistant Professor - Aga Khan University (Institute for Educational Development, East Africa)

Strand 2: Science Learning: Contexts, Characteristics and Interactions
Related Paper Set-Equity and Justice in Engineering and Science: Centering Black and Latinx culture, language and Identity
2:45 PM-4:15 PM, Parq Salon D (**livestream 1**)

Presider: Okhee Lee, New York University

Latent Class Analysis of Black Families' Access to a Community-Based STEM Program

Natalie S. King, Georgia State University

Zachary Collier, University of Delaware

Monday 3-28-2022

Bridgette G. Johnson, University of Delaware
Melanie Acosta, Florida Atlantic University
Charisse N Southwell, Broward County Public Schools, Fort Lauderdale, Florida

Latinx Students' Sense of Familismo in Undergraduate Science and Engineering

Enrique Lopez, University of Colorado, Boulder
Vincent Basile, Colorado State University
Magnolia Landa-Posas, University of Colorado, Boulder
Kaylee Ortega, University of Colorado, Boulder
America Ramirez, University of Colorado, Boulder

Amplifying the Voices of Multicompetent students in STEM by Centering Justice and Audience Design in Engineering and Science

Greses Pérez, Tufts University
Okhee Lee, New York University

Becoming a Teacher of Engineering as a Racialized Local Contentious Practice (Virtual)

Christopher G. Wright, Drexel University
Rasheda Likely, Kennesaw State University
Mikhail Miller,
Neisha Young, Drexel University
Sinead Meehan, Drexel University

Fifth-Grade Engineering and Language, Culture, and Identity: Lessons Learned by Teacher and Researcher

Claudia Walker, Murphey Traditional Academy, Greensboro, NC
Heidi B. Carlone, Vanderbilt University

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

SC-organized paper set-Strategies for Science and Engineering Education

2:45 PM-4:15 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Elementary Teachers' Verbal Supports during an NGSS-Aligned Unit for Inclusive and General Class Contexts

Sarah C Lilly, University of Virginia
Anne M McAlister, University of Virginia
Jennifer L Chiu, University of Virginia

Monday 3-28-2022

Elementary Science and Engineering Teaching Self-Efficacy: Trends in the Literature and a Research Framework (Virtual)

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

Factors Associated with K-5 Science Teaching Time (Virtual)

Alison Brockhouse, Institute for School Partnership
Maia Elkana, Institute for School Partnership, Washington University in St. Louis
Rachel Ruggirello, Washington University in St. Louis

Teacher Educators and Elementary Teachers Share Goals for Authentic Science and Literacy Integration in the 20th Century Realities of 21st Century Classrooms (Virtual)

Sarah J. Carrier, North Carolina State University
Danielle R Scharen, North Carolina State University

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

SC-organized paper set-Academic Pathways, Persistence, and Science Identity

2:45 PM-4:15 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Becoming a Scientist: Exploring How Critique Supports the Development of Undergraduate Students' Science Identity

Gabrielle Jablonski, Idaho State University
Anna S. Grinath, Idaho State University

Bridge/or Barrier? Institutional Agents Shape Sense of Belonging for First-Generation STEM Students Holding Intersecting Identities

Angela N. Google, University of South Alabama
Jeremiah Henning, University of South Alabama
Grace Sekaya, University of South Alabama
Zachery McMullen, University of South Alabama

Framework for chemistry course redesign to support first generation college student success (Virtual)

Roshni Bano, University of Illinois At Chicago
Minjung Ryu, University of Illinois At Chicago

Predictors of Community College Astronomy Performance

Zachary Richards, Suffolk County Community College and Stony Brook University
Angela M. Kelly, Stony Brook University

Monday 3-28-2022

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Informal learning as a family activity

2:45 PM-4:15 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Activity Design Principles that Support Family-Based Engineering Learning in Early Childhood

Scott A. Pattison, TERC

Gina N. Svarovsky, University Of Notre Dame

Smirla Ramos-Montañez, TERC

Catherine Wagner, University of Notre Dame

Amy Corbett, Metropolitan Family Service

Maria Perdomo, Metropolitan Family Service

Viviana López Burgos, Independent Consultant

Sabrina De Los Santos, TERC

Engaging children and caregivers in engineering design projects: Development of maker workshops and digital tools (Virtual)

Susan Letourneau, New York Hall of Science

David Wells, New York Hall of Science

Sonja Latimore, GBH

Mary Haggerty, GBH

Peter Ciavarella, New York Hall of Science

Lauren Vargas, New York Hall of Science

Daniel Kirk, New York Hall of Science

Lisa Ellsworth, GBH

Melissa Carlson, GBH

Louise Flannery, GBH

Intergenerational Family Learning in Conservation Science

Jonathan Simmons, University of Connecticut

Todd Campbell, University of Connecticut

David M. Moss, University of Connecticut

John Volin, University of Maine

Chester Arnold, University of Connecticut

Laura M Cisneros, University of Connecticut

Cary Chadwick, University of Connecticut

David Dickson, University of Connecticut

Nicole Freidenfelds, University of Connecticut

Monday 3-28-2022

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-The role of noticing in learning to teach science

2:45 PM-4:15 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Elementary Preservice Teachers' Noticing of Scientific Argumentation within Two Online Practice Spaces (Virtual)

Pamela S. Lottero-Perdue, Towson University

Heidi L. Masters, University Of Wisconsin-La Crosse

Jamie N. Mikeska, Educational Testing Service (ETS)

Meredith M. Thompson, MIT

Meredith Park Rogers, Indiana University

Dionne Cross Francis, University of North Carolina at Chapel Hill

Pre-service Teachers Notice Student Thinking. Then What?

Tara Barnhart, Chapman University

Miray Tekkumuru-Kisa, Florida State University

Heather J. Johnson, Vanderbilt University

Supporting Pre-Service Teachers' Attention to All Students' Ideas Using a Learning Progression Approach (Virtual)

Alicia C. Alonzo, Michigan State University

The impacts of content area on novice teacher noticing-a preliminary analysis (Virtual)

Lu Wang, Indiana University Kokomo

Strand 8: In-service Science Teacher Education

SC-organized paper set-Variations in STEM Teachers Changes through Professional Development

2:45 PM-4:15 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Exploring The Sources of Science Teachers' Self-Efficacy

Jessica Gale, Georgia Institute Of Technology - CEISMC

Meltem Alemdar, Georgia Institute Of Technology

Christopher Cappelli, Georgia Institute Of Technology

Trajectories of Adoption and Abandonment After Professional Development in Project-Based Learning (Virtual)

Cesar Delgado, North Carolina State University

Kathryn Green, University of Georgia
Minnie Webster, North Carolina State University

Variable Take-up of Professional Development: How Activity Systems Influence Science Teachers' Enactment of Project-Based Learning

Tess Bernhard, University of Pennsylvania
Amy Guillotte, University of Pennsylvania
Sarah Kavanagh, University of Pennsylvania

Co-Designing to Understand Equity-Focus in Computational Thinking (CT) Integrated Science Curricula (Virtual)

Marissa A. Levy, Northwestern University
Amanda Peel, Northwestern University
Sugat Dabholkar,
Lexie Zhao, Northwestern University
Susan Juhl,
Lauren Levites,
Jacob Mills,
Sally Wu,
Michael Horn, Northwestern University
Uri Wilensky, Northwestern University

Strand 8: In-service Science Teacher Education

SC-organized paper set-Developing Teacher Leaders

2:45 PM-4:15 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Developing and Retaining Mid-Career Science Teachers through a Teacher Leadership Program

Andrea Reeder, Middle Tennessee State University
Fatma Kaya, Middle Tennessee State University
Weiqi Zhao, University of Cincinnati
Melody J Elrod, Middle Tennessee State University
Joshua Reid, Middle Tennessee State University
Greg T Rushton, Middle Tennessee State University
Brett Criswell, West Chester University

Exploring Boundary Spanning as a Theoretical Framework to Design for Science Teacher Leader Professional Learning (Virtual)

Sara C Heredia, The University of North Carolina Greensboro
Michelle Lea Phillips, Exploratorium
Ti'Era D. Worsley, University of North Carolina at Greensboro

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Hadrian Pollard, University of North Carolina at Greensboro
Sarah Stallings, University of North Carolina at Greensboro
Julie Yu, Exploratorium

Impact of Teacher Leadership Skills and Adaptability during Educational Upheaval
Christine R. Lotter, University of South Carolina
Amanda Gonczi, Michigan Technological University

Knowledge, Practices, and Attributes of International Science Coordinators and the Resources They Draw Upon: Supporting Teachers During the COVID-19 Pandemic
Harleen Singh, Medaille College
Hatice Ozen_Tasmedir, University of Georgia
Yuxi Huang, University of Georgia
Hong H Tran, University of Georgia
Julie A Luft, University of Georgia
Brooke A Whitworth, Clemson University

Strand 10: Curriculum and Assessment

SC-organized paper set-Assessment for modeling and reasoning
2:45 PM-4:15 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

Assessing Socio-scientific Systems Thinking for the COVID-19 Pandemic (Virtual)
Eric A Kirk, University of North Carolina at Chapel Hill
Troy Sadler, University of North Carolina at Chapel Hill
Li Ke, University of North Carolina at Chapel Hill
Laura Zangori, University Of Missouri

Exploring Student Reasoning Patterns in the Context of a NGSS-Aligned Assessment Task: The Harvestmen Item (Virtual)
Dante Cisterna, Educational Testing Service
Lei Liu, Educational Testing Service
Aoife Cahill, Educational Testing Service
Devon Kinsey, Educational Testing Service
Xianyang Chen, Educational Testing Service
Yi Qi, Educational Testing Service

Investigation on effect of spatial visualization on scientific modeling in primary and secondary school students (Virtual)
Jing Lin, Beijing Normal University

Letong Zhang, Beijing Normal University
Ping-Han Cheng, National Taiwan Normal University
Chun-Yen Chang, National Taiwan Normal University

Scaffolding Support for Student Modeling in Three Dimensional Assessment Tasks
Kate Henson, University of Colorado
Jason Buell, CU Boulder

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Cultural Approaches to the Teaching and Learning of Science
2:45 PM-4:15 PM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

Improving the Achievement and Problem-solving Skills of Students: How Effective is CTCA in Nuclear Chemistry? (Virtual)

Ibukunolu A. Ademola, ACEITSE-Lagos State University
Peter A. Okebukola, ACEITSE-Lagos State University
Olasunkanmi A. Gbeleyi, ACEITSE-Lagos State University
Adekunle I. Oladejo, ACEITSE-Lagos State University
Franklin U. Onowugbeda, ACEITSE-Lagos State University
Deborah O. Agbanimu, ACEITSE-Lagos State University
Fred Awaah, University of Professional Studies Accra
Esther O. Peter, ACEITSE-Lagos State University
Stella I. Uhuegbu, ACEITSE-Lagos State University
Yetunde A. Mabadeje, ACEITSE-Lagos State University

Teacher Understanding of Funds of Knowledge in the High School Biology Classroom

Molly M. Staggs, University Of South Florida
Karl G. Jung, University Of South Florida
Julie C. Brown, University Of Florida

Underachievement in Difficult Concepts in Biology: Can CTCA be the Way Out?

Francisca A. Allename, ACEITSE- Lagos State University
Peter A. Okebukola, ACEITSE- Lagos State University
Deborah Oluwatosin Agbanimu, ACEITSE- Lagos State University
Franklin U. Onowugbeda, ACEITSE- Lagos State University
Esther Oluwafunmilayo Peter, ACEITSE- Lagos State University

Monday 3-28-2022

Strand 12: Technology for Teaching, Learning, and Research

Related Paper Set-Learning Chemistry in Immersive Virtual Reality: A Spatial Analysis of Students' Collaborative Interactions

2:45 PM-4:15 PM, Parq Salon E (**livestream 2**)

Discussant: Joseph Krajcik, Michigan State University

Presider: Chin-Chung Tsai, National Taiwan Normal University

An Analytical Framework for Spatial Analysis of Students' Interactions in Immersive Virtual Reality (Virtual)

Mihye Won, Curtin University

Dewi Ungu, Curtin University

Henry Matovu, Curtin University

David F. Treagust, Curtin University

Chin-Chung Tsai, National Taiwan Normal University

Mauro Mocerino, Curtin University

Roy Tasker, Western Sydney University

Joseph S. Krajcik, Michigan State University

Students' Construction of Learning Activities to Understand the Formation of Snowflakes with Three Different Modes (Virtual)

Dewi Ungu, Curtin University

Mihye Won, Curtin University

Henry Matovu, Curtin University

David F. Treagust, Curtin University

Chin-Chung Tsai, National Taiwan Normal University

Mauro Mocerino, Curtin University

Roy Tasker, Western Sydney University

Comparative Analysis on the Impact of Scaffolding on Students' Interactions within Immersive Virtual Reality (Virtual)

David F. Treagust, Curtin University

Dewi Ungu, Curtin University

Mihye Won, Curtin University

Henry Matovu, Curtin University

Chin-Chung Tsai, National Taiwan Normal University

Mauro Mocerino,

Roy Tasker, Western Sydney University

Progression of Students' Interactions over Three Immersive Virtual Reality Learning Activities (Virtual)

Henry Matovu, Curtin University

Mihye Won, Curtin University

Dewi Ungu, Curtin University

David F. Treagust, Curtin University

Chin-Chung Tsai, National Taiwan Normal University

Mauro Mocerino, Curtin University

Roy Tasker, Western Sydney University

Monday 3-28-2022

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

SC-organized paper set-NOS and Undergraduate Education

2:45 PM-4:15 PM, Parq Salon F (**livestream** 3)

Presider: Jacob Pleasants, University of Oklahoma

Comparing Undergraduates NOS Views in Traditional vs. Inquiry-Taught Science Course

Alex T. St. Louis,

Hayat Hokayam, Texas Christian University

Development and Validation of a Rubric to Qualify and Quantify Responses to the VNOS Questionnaire

Fouad Abd-El-Khalick, University of North Carolina at Chapel Hill

Ryan Summers, University of North Dakota

Jeanne Brunner, University of Massachusetts Amherst

Jeremy Belramino, University of Illinois - Urbana-Champaign

John Y. Myers, University of Illinois at Urbana-Champaign

Learning to Teach NOS: How do NOS instructional views develop during semester-long NOS course?

Jerrid W. Kruse, Drake University

Isaiah Kent-Schneider, Drake University

Sarah Voss, Drake University

University Biology Students' Sociocultural and NOS Associated Positions About Policymakers' and Scientists' COVID-19 Responses (Virtual)

Alex J Sobotka, Texas A&M University

Ben A Janney, Texas A&M University

Benjamin C Herman, Texas A&M University

Sarah V Poor, Texas A&M University

Aaron Kidd, Texas A&M University

Michael P. Clough, Texas A&M University

Asha Rao, Texas A&M University

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Place, culture, and connection in environmental science education

2:45 PM-4:15 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Are School Gardens Culturally Relevant? Forging Connections Between High School Students and the Community

Mariam Takkouch, Western University

Isha DeCoito, Western University

Monday 3-28-2022

Exploring Sense of Place across Generations: A Case study of a Negev Bedouin Community

Wisam Sedawi, Ben Gurion University

Orit Ben Zvi Assaraf, Ben-Gurion University Of the Negev, Israel

Amane Alatamin, Ben-Gurion University Of the Negev, Israel

Understanding Middle School Students' Connectedness with Nature

Andrea Moeller, University of Vienna

Petra Bezeljak, University of Vienna

Gregor Torkar, University of Ljubljana, Slovenia

Using environmental chemistry to engage students in scientific thinking while affirming their cultural context

Jeffrey Spencer, University of Michigan at Ann Arbor

Danielle N Maxwell, University of Michigan at Ann Arbor

Kaare Sikuaq Erickson, Ikaagun Engagement; Ukpeagvik Inupiat Corporation

Daniel Wall, Iñisagvik College

Linda Nicholas-Figueroa, Iñisagvik College; University of Alaska - Fairbanks

Kerri Pratt, University of Michigan at Ann Arbor

Ginger Shultz, University of Michigan at Ann Arbor

Administrative Session: CADASE RIG

Admin Symposium- Unifying Our Community through Science Education

2:45 PM-4:15 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Organizers

Mary M. Atwater, University Of Georgia

Rona Robinson-Hill, Ball State University

Jonathan Hall, University of West Florida

The CADASE RIG Administrative Session is a 90 minute session that is divided into two parts.

The first part includes a Plenary Presentation of 45 minutes in which Professor Bryan Brown from Stanford University will speak on the topic, "Needing Twice As Good: Culture Matter in

Providing Access to Quality Science Education". The second 45 minutes is the CADASE Poster Presentation hosted by Professor Melody Russell with poster presentations.

Monday 3-28-2022

Monday, March 28, 2022

**NARST Annual Membership meeting and Community
Conversations [livestream]**

**Parq Salon E
4:30 pm-5:30**

We have been through a challenging time. Come hear an update on the current state of NARST. You will hear from the NARST leadership, including a brief overview of the budget and new initiatives. There will be open discussion with members of the Board of Directors and Executive Committee. We want to hear your voice!

Drinks and snacks provided!

**Monday, March 28, 2022
Workshop**

**Parq Salon D [virtual]
5:00 pm-9:00 pm**

5:00pm-9:00 pm Pacific	ONLINE
Queering science teacher education and research: Toward gender, sex, and sexuality inclusive science teaching practice.	As science teacher educators and researchers, we have a responsibility to consistently engage in conversations with pre- and in-service teachers about equity, be prepared to learn and share new language, and reflect on our own implicit biases as we prompt teachers to do the same. With the recent societal increase in conversations around the needs of gender and sexually diverse students comes a greater opportunity to support LGBTQ+ students in all contexts including the science classroom. This workshop focuses on gender-inclusive practices and seeks to be informational, instructional, and transformative. Topics range from supporting LGBTQ+ college students who wish to become teachers to preparing K-12 science teachers to create gender, sex, and sexuality affirming classrooms. Participants can expect to develop an inclusive vocabulary and an understanding of gender-affirming terms, share practical pedagogical tips, and gain some resources to support teacher education on LGBTQ+ inclusivity. The ultimate goal is for science educators to build more complete views of both science and society by developing the tools that address the diversity and fluidity of sex, gender, and sexuality in both human and non-human species. These approaches help support a more full sense of belonging for gender-diverse students in science education and are an important learning focus for all members of society.
Lead Organizer: Stephanie Eldridge	
Presenters: Sonya Martin Sophia Jeong David Steele Jose Manuel Pavez	

Graduate Student Forum
Virtual
5:45 pm-6:45 pm

Admin Symposium-Graduate Student Forum
5:45 PM-6:45 PM, Virtual

Link:

Panelists

Theila Smith, University of Groningen
Inés Mosquera Bargiela, Universidade de Santiago de Compostela
Emily Little, Georgia State University
Samantha Ringl, Alice Lloyd College
Ti'Era D. Worsley, University of North Carolina at Greensboro
Johan Tabora, University of Illinois at Chicago

The Graduate Student 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. In addition, attendees of the forum are given the opportunity to participate in round table discussions with experienced colleagues on academic and career interest matters.

JRST Editorial Team Meeting/Dinner (Sponsored by Wiley)
6:30 pm-8:30 pm Cancelled

Sandra K Abell Institute Students' Reception (By Invitation Only)
7:00 pm-8:00 pm

TUESDAY, MARCH 29, 2022

Virtual Poster Session

7:00 am – 7:30 am

Use this time to have live discussions with presenters of the virtual posters on PlayBackNow.

COFFEE/TEA AVAILABLE [Prefunction]

7:30 – 9:00 AM

International Committee invited ESERA Symposium

Socioscientific Argumentation in Science Education

7:30 AM-8:45 AM, Parq Salon F (livestream 3)

Panelists (Virtual)

Ute Harms, Leibniz Institute for Science and Mathematics Education (IPN)

Carola Garrecht, IPN - Leibniz Institute for Science and Mathematics Education

Maria Evagorou, University of Nicosia, Nicosia, Cyprus

Nina Christenson, Karlstad University

Susanne Walan, Department of Environmental and Life Sciences, Karlstad University, Karlstad, Sweden

Pablo Brocos, University of Santiago de Compostela

Maria Pilar Jiménez-Aleixandre, Department of Applied Didactics, Universidade de Santiago de Compostela, Santiago de Compostela, Spain

Hanno Michel, IPN Kiel

Dirk S. Gellermann, Leibniz Institute for Science and Mathematics Education (IPN)

Ute Harms, Leibniz Institute for Science and Mathematics Education (IPN)

CADASE RIG Social

Parq Salon E (virtual)

7:45 am-8:45 am

Peter A. Okebuka will lead the CADASE Social Event. It will center on (a) African dress and on the science in the way the dress is worn or in the way the fabric is made, (b) some African stories and how Africans got their science, and finally (c) African dance as physical movement and social enjoyment. All attendees are encouraged to wear African garments if they own some.

Roundtable Sessions [hybrid]
8:00 am-8:50 am

There are 11 Roundtable sessions, each with 3-4 papers grouped for in-depth discussion. Each Table group is scheduled in a separate room. Not all the rooms will have a physical table. The presenters may arrange the room as they wish for the session, but please put the room back as it was originally arranged. Each room has a dedicated zoom link for virtual presenters to participate. These sessions are not recorded. These sessions are not livestreamed to the full virtual audience.

TABLE 1: Kitsilano Ballroom A

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Roundtables-Strand 2 Round Table: Argumentation in Science Teaching & Learning I

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Categorizing Classroom-based Argumentation in Elementary STEM Lessons: Applying Walton's Dialogue Theory

Anna Gillespie-Schneider, UGA
Lorraine Franco, University of Georgia
Barbara A. Crawford, University Of Georgia
Yuling Zhuang, University of Georgia
Jonathan Foster, University of Georgia
AnnaMarie Conner, University of Georgia

Challenge in Reasoning about Evolution Acceptance for Muslim Students: The Mechanism of Motivated Reasoning

Rahmi Q. Aini, Kangwon National University
Minsu Ha, Kangwon National University

Examining Science Engagement: Epistemic Operations and Agentic Practices During Argumentation (Virtual)

Vivian A Zohery, University of Maryland - College Park
Ananya Matewos, Saint Norbert College
Lauren Cabrera, Virginia Commonwealth University
Doug Lombardi, University of Maryland, College Park

TABLE 2: Kitsilano Ballroom B

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Roundtables-Strand 2 Roundtable: Argumentation in Science Teaching & Learning II

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Describing changes in Student thinking about evolution in response to inquiry and argumentation-based instruction

Hernan Cofre, Pontificia Universidad Católica de Valparaíso
Francisca Carmona, Pontificia Universidad Católica de Valparaíso
Diego Canales, Pontificia Universidad Católica de Valparaíso
Paola Nuñez, Pontificia Universidad Católica de Valparaíso
Antonia Larrain, Alberto Hurtado University
Claudia Vergara, Alberto Hurtado University

Examining Relevant Evidence Construction as Actor-Network in the Collective Argumentation (Virtual)

Weiwei He, East China Normal University
Sihan Xiao, East China Normal University

Massive Dependence of Science students' answers about Relativity upon the Formulation of the question

Estelle Blanquet, University of Bordeaux
Eric Picholle, CNRS & Université Côte d'Azur

TABLE 3: Kitsilano Ballroom C

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Roundtables-Strand 2 Round Table: Mediating Learning Processes in Science Teaching & Learning

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

The Authoritative-to-Dialogic Spectrum of Facilitation Practices

Carina M Carlos, Tufts University

Vesal Dini, Tufts University

Ira Caspari, Tufts University

The impact of typography in learning materials of science textbook (Virtual)

Rosalie Heinen, University of Münster

Susanne M. Heinicke, University of Münster

Using Student-created Core Idea Maps to Promote Meaningful Learning in Science

Helen Semilarski, Doctoral student

Regina Soobard, Research Fellow of Science Education

Miia Rannikmae, Professor

TABLE 4: Parq Salon A

MIXED STRANDS 1, 3 *Elementary Science*

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

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

Revisiting elementary school students' images of scientists

Jing Lin, Beijing Normal University

Wenting Wei, Beijing Normal University

Ting Yuan, Beijing Normal University

The Impact of Arts-based Science Instruction on Emerging Multilingual Students' Achievement in Elementary Science

Sage Andersen, University of Texas At Austin

Brad Hughes, University Of California, Irvine

Strand 1: Science Learning: Development of student understanding

Planning in Science-Integrated Engineering: Kindergartners' Incorporation of Ideas about Inertia in their Design Plans

Pamela S. Lottero-Perdue, Towson University

John Settlage, UConn

TABLE 5: Parq Salon B

Strand 7: Pre-service Science Teacher Education

Roundtables-Strand 7 Roundtable

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Computational Thinking Integration in STEM Pedagogy by Teacher Candidates (Virtual)

Heather F. Clark, UCLA

Imelda L. Nava, UCLA

Leticia Perez, UCLA

Jaleel Howard, UCLA

Investigating Pre-Service Teachers' Noticing of the Cultural Foundations of Children's Scientific Explanations

Alison Mercier, University of Wyoming

Tierney Hinman, Auburn University

Preparing and Retaining Race-Conscious Science Teachers Through Race, Culture, & Coffee

Stefanie L. Marshall, University of Minnesota- Twin Cities

Jenny Sarah Tilsen, University of Minnesota- Twin Cities

Jessica Forrester, University of Minnesota- Twin Cities

What Does an Undergraduate Research Experience Look Like in STEM Education?

Jennifer A. Wilhelm, University of Kentucky

Molly Fisher, University of Kentucky

TABLE 6: Parq Salon C

Strand 14: Environmental Education and Sustainability
Rounds-Strand 14 Roundtable

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Empirical research on school garden-based learning: A systematic review of the literature

Kathy Cabe Trundle, Utah State University

Rita Hagevik, The University of North Carolina At Pembroke

Incorporation of a Utility-Value Intervention into a Place-Based, Culturally Sustaining General Education Science Course (Virtual)

Michele L. Guannel, University of the Virgin Islands

Olivia Diana, University of the Virgin Islands

Angelisa Freeman, University of the Virgin Islands

Longitudinal effects of nature experiences on middle school students' environmental attitudes, interest and knowledge

Petra Bezeljak, Austrian Educational Competence Center for Biology, University of Vienna

Anna-Lena Neurohr, Austrian Educational Competence Center for Biology, University of Vienna

Andrea Möller, Austrian Educational Competence Center for Biology, University of Vienna

Places of Learning: Case studies on selected learning environments during COVID

David B. Zandvliet, Simon Fraser University

TABLE 7: Burrard

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

Roundtables-Collaboration and science learning in middle grades

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

"What if we explore..." Using Mountain Rescue to Promote Engaged Learning and Collaboration

Denise M. Bressler, East Carolina University

Shane Tutwiler, University of Rhode Island

Amanda Siebert-Evenstone, University of Wisconsin - Madison

Len Annetta, East Carolina University

Jason A. Chen, The College of William & Mary

Developing Scientifically Literate Citizenship: Self-Efficacy Beliefs of an Interdisciplinary Community of Practice (Virtual)

Mandi Collins, University of Nevada, Reno

Elizabeth X. De Los Santos, University of Nevada, Reno

Robert J Quinn, University of Nevada, Reno

Science Teachers' Views on the Integration of Science and Language for Emergent Bilinguals in Sixth-grade Classrooms

Sissy S. Wong, University of Houston

Jie Zhang, University of Houston

Araceli Enriquez-Andrade, University of Houston

Ma Glenda Wui, Ateneo de Manila University

The Effect of Teacher Participation in Multimedia Professional Development on Science Achievement Among Middle-School Students (Virtual)

Victoria J. VanUitert, University of Virginia

Michael J. Kennedy, University of Virginia

Lindsay M. Carlisle, University of Virginia

TABLE 8: Cambie

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

Roundtables-Becoming Scientists: Students' Scientific Practices and Sense of Belonging

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

An Interdisciplinary Approach to Develop Interest for Bioproduct Careers with Historically Underrepresented STEM Undergraduates (Virtual)

Shana L. McAlexander, Duke University

Katherine McCance, North Carolina State University

Margaret R. Blanchard, NC State University

Richard Venditti, NC State University

Building Inclusive Excellence in Undergraduate Science Education through Faculty Learning Communities: A Study of Five Cohorts

Marcelle Siegel, University Of Missouri–Columbia

Yejun Bae,

Terrell Morton,

Courtney Ngai,

Mojtaba Khajeloo,

Swarna Mahapatra,

Ritesh Sharma,

Charles Nilon,

Johannes Schul,

College Students' Sense of Belonging in the STEM Learning Ecosystem: Classroom, Department, and University Culture (Virtual)

Yejun Bae, Carolina University

Marcelle Siegel, University Of Missouri–Columbia

Mojtaba Khajeloo, University Of Missouri

Terrell R. Morton, University of Missouri - Columbia

Charles Nilon, University of Missouri-Columbia

Johannes Schul, University of Missouri-Columbia

Hyejin Shim, University of Missouri-Columbia

Effect of Demographic Factors on the Understanding of Concepts of Evidence: A Mixed Methods Study (Virtual)

Elizabeth Vergis, St. Mary's University, Calgary

Fostering Undergraduate STEM Students' and Teachers' Systems Thinking and Modeling Skills via a Food-Related Mini-Course

Roe Peretz, Technion—Israel Institute of Technology, Haifa 3200003, Israel

Marina Tal, Technion—Israel Institute of Technology, Haifa 3200003, Israel

Effrat Akiri, Technion—Israel Institute of Technology, Haifa 3200003, Israel

Yehudit Judy Dori, Technion—Israel Institute of Technology, Haifa 3200003, Israel

Dov Dori, Technion—Israel Institute of Technology, Haifa 3200003, Israel

TABLE 9: Stanley

MIXED STRANDS 1, 6, 12: *Learning in Contexts*

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Strand 1: Science Learning: Development of student understanding

Experiencing the Emergence of Antibiotics Resistant Bacteria: Students' Understanding of the Nature of Evolution

Bat-Shahar Dorfman, Weizmann Institute of Science

Amir Mitchell, Program in Systems Biology, University of Massachusetts Medical School, Worcester, Massachusetts, United States of America, Program in Molecular Medicine, University of Massachusetts Medical School, Worcester, Massachusetts, United States of America

Orna Dahan, Department of Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel

Anat Yarden, Weizmann Institute Of Science

Strand 6: Science Learning in Informal Contexts

Decisions for Our Future: Learning through Collaborative Civic Decision-Making in a Digital Climate Simulation

Lynne Zummo, University of Utah

Strand 12: Technology for Teaching, Learning, and Research

Using a Simulated Classroom to Prepare Elementary Preservice Teachers During and After the Pandemic

Jamie N. Mikeska, Educational Testing Service (ETS)

Heather Howell, ETS

Devon Kinsey, ETS

TABLE 10: Granville I

Strand 11: Cultural, Social, and Gender Issues

Roundtables-Strand 11: Fostering Inclusion through STEM Leadership, Teaching, and Learning

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

"It's really important to me for kids to get interested in and become aware of the options that are available to them in the STEM": Culturally Responsive School Leadership

Noemi Waight, University at Buffalo

Jennifer Tripp, University at Buffalo

Lorenda Chisolm, Schenectady City School District

Community driven and relational STEM Teacher Leadership: Perceptions of Indigenous Female Teachers

Bhaskar Upadhyay, University of Minnesota

Kamal P Koirala, Tribhuban University, Gorkha Campus, Gorkha, Nepal

Generating an operational framework of gender and sexual diversity (GSD)-inclusive STEM teaching: A systematic literature review

Gary W. Wright, North Carolina State University

Impact of STEM Professionals Engaging with Students in Title One Schools

Sarah K. Guffey, University of South Alabama

Andrea C. Burrows, University Of Wyoming

Andria Schwartz, Quinsigamond Community College

TABLE 11: Granville II

Strand 11: Cultural, Social, and Gender Issues

Roundtables-Strand 11: Structural, Cultural, and Social Factors that Influence Student's STEM Identity and Engagement

8:00 AM-8:50 AM

Presider: <https://tinyurl.com/NARSTpresider>

Employing the Stereotype Content Model's Dimensions of Warmth and Competence to Identify and Categorize the Portrayal of Scientists in Meme-Based GIFs

Richard Velasco, University of Iowa

Yujiro Fujiwara, Texas Tech University

Lee Kenneth Jones, Asia-Pacific International School

Rebecca Hite, Texas Tech University

Examining the STEM career interest of juvenile justice youth using the Social Cognitive Career Theory (Virtual)

Ally Hunter, University of Massachusetts, Amherst

Heather Griller Clark, Arizona State University

Michael Krezmien, University of Massachusetts, Amherst

Sarup Mathur, Arizona State University

Craig Wells, University of Massachusetts, Amherst

*How to Broaden Participation in STEM by Indigenous Islanders (*presenting author)*

Jon Boxerman, WestEd

*Sharon Nelson-Barber, WestEd

Kimberly Nguyen, WestEd

Micro-aggression and impostor phenomenon among racial/ethnic minorities in STEM (Virtual)

Devasmita Chakraverty, Indian Institute of Management Ahmedabad

Tuesday, March 29, 2022

Exhibitor Workshop: Creating interactive presentations and digital posters using Snorkle.io

Virtual
8:00 am-9:00 am

Title: Creating interactive presentations and digital posters using Snorkle.io

Host: Jonathan Fisher (Snorkle, Inc.)

Email: jonathan@snorkle.io

Description:

In this online workshop, we will show you how to use the snorkle.io web app to embed interactive biomedical visualizations, freely available models, and more into MS PowerPoint presentations. We will also show you how to create smoothly zoomable, QR-linked electronic posters that do the same. Feel free to come armed with your own poster files!

Zoom link: <https://zoom.us/j/2687045958>

Tuesday, March 29, 2022
Concurrent Session # 6
9:00 am-10:30 am

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set-Supporting Teachers to Develop Expansive Learning Environments in Science and Engineering

9:00 AM-10:30 AM, Kitsilano Ballroom C

Discussant: <https://tinyurl.com/NARSTpresider>

Toward More Expansive Science Learning for Pre-Service Teachers

Jessica Watkins, Vanderbilt University

Natalie A De Lucca, Vanderbilt University

Centering Racialized Disciplinary Becoming in the Design of Teacher Professional Learning Communities (Virtual)

Christopher G. Wright, Drexel University

Rasheda Likely, Kennesaw State University

Sinead Meehan, Drexel University

Neisha Young, Drexel University

Mikhail Miller, Drexel University

Expanding Science Teacher Learning through Critical Relationality

Eli Tucker-Raymond, Boston University

Maria C. Olivares, Boston University

Brian Gravel, Tufts University

Amon Millner, Olin College of Engineering

Donna Peruzzi, Cambridge Public Schools

Exploring the "Wobbliness" of Teacher Candidates' Deficit and Anti-Deficit Framing

Kirsten K. Mawyer, University of Hawaii

Heather J. Johnson, Vanderbilt University

Elementary Science Teachers' Use of Representations to

Sarah Jaewon Lee, Vanderbilt University

Ashlyn Pierson, The Ohio State University

Danielle T. Keifert,

Andrea Wentworth Henrie, Vanderbilt University

Heather J. Johnson, Vanderbilt University

Déana A. Scipio, IslandWood

Tuesday 3-29-2022

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Technology & Computer Science

9:00 AM-10:30 AM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Exploring the Potency of Culturo-Techno-Contextual Approach on Achievement of Secondary School Students in Computer Networking (Virtual)

Esther O. Peter, ACEITSE-Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

David G. Peter, Lagos State University

Deborah O. Agbanimu, ACEITSE-Lagos State University

Fred A. Awaah, University of Professional Studies, Accra

Franklin U. Onowugbeda, ACEITSE-Lagos State University

Olasunkanmi A. Gbeleyi, ACEITSE- Lagos State University

Adekunle I Oladejo, ACEITSE-Lagos State University

Ibukunolu A. Ademola, ACEITSE-Lagos State University

Imole Samson, Lagos State University

Flowchart and Algorithm as Difficult Concepts in Computer Studies: Can CTCA Come to the Rescue? (Virtual)

Deborah Oluwatosin Agbanimu, ACEITSE-Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

Franklin U. Onowugbeda, ACEITSE-Lagos State University

Esther Oluwafunmilayo Peter, ACEITSE-Lagos State University

Adekunle Ibrahim Oladejo, ACEITSE-Lagos State University

Fred Awaah, University of Professional Studies Accra

Ibukunolu Adebisi Ademola, ACEITSE-Lagos State University

Olasunkanmi Adio Gbeleyi, ACEITSE-Lagos State University

Francisca Ayobami Allename, Lagos State University, Nigeria

Student perceptions of computational thinking practices in a CT-integrated environmental science unit (Virtual)

Lexie Zhao, Northwestern University

Amanda N. Peel, Northwestern University

Michael Horn, Northwestern University

Uri Wilensky, Northwestern University

Will the Culturo-Techno-Contextual Approach Help Students' Understanding of Difficult Concepts in Computer Studies?

Daniel Ayomide Solarin, ACEITSE-Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

Fred Awaah, ACEITSE-Lagos State University

Gamification: Toward the enhancement of self-efficacy in an introductory undergraduate biology laboratory course

David C. Owens, Georgia Southern University

Antonio P. Gutierrez de Blume, Georgia Southern University

Charles B. Hodges, Georgia Southern University

Kim Miles, Georgia Southern University

Cindi Smith-Walters, Middle Tennessee State University

Angela T. Barlow, University of Central Arkansas

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

SC-organized paper set-Coherent learning in NGSS curriculum and classrooms

9:00 AM-10:30 AM, Cambie

Presenter: <https://tinyurl.com/NARSTpresider>

Assessing Coherence Understanding of Energy as a Crosscutting Concept

Avraham Merzel, The Hebrew University of Jerusalem

Yaron LeHAVI, The David Yellin College of Education

Examining Teachers' Attempts to Support Student Motivation in Middle Grades NGSS Classrooms (Virtual)

Katy Nilsen, WestEd

Christopher J. Harris, WestEd

David McKinney, University of Nevada, Las Vegas

Gwen Marchand, University of Nevada, Las Vegas

Influences on NGSS Instruction: Curriculum, Professional Learning, and District Support (Virtual)

Melissa Rego, WestEd

Ashley Iveland, WestEd

Charlie Mahoney, WestEd

Robert F. Murphy,

Christopher J. Harris, WestEd

Responsive instructional design for students' coherence-seeking: Documenting episodes of principled improvisation in storyline enactment

Kevin Cherbow, Florida State University

Tuesday 3-29-2022

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

SC-organized paper set-Inclusive Pedagogy and Student Success

9:00 AM-10:30 AM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Case Study Pedagogy as Inclusive Pedagogy: Entry Points for STEM Faculty to Build Inclusive Classrooms (Virtual)

Ally Hunter, University of Massachusetts, Amherst

Melissa Zwick, Stockton University

Did COVID-19 & Distance Learning Heighten Performance Disparities in General Chemistry? (Virtual)

Ted M. Clark, The Ohio State University

Glenn A Clark, Whirlpool Corporation

Examining Science Teacher Educators' Perspectives of Inclusion (Virtual)

Karen C. Goodnough, Memorial University

Saiqa Azam, Memorial University

Todd Milford, University of Victoria

Christine D. Tippet, University Of Ottawa

When Disaster Strikes: How New Majority Students Navigate STEM During a Global Disruption

Terrell R. Morton, University of Missouri - Columbia

Yejun Bae, University of Missouri

Courtney Ngai, University of Missouri-Columbia

Marcelle Siegel, University Of Missouri-Columbia

Charles Nilon, University of Missouri-Columbia

Ritesh Sharma, University of Missouri-Columbia

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Informal learning centers - Transition during crisis

9:00 AM-10:30 AM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

An adaptive design of a remote SEM authentic outreach activity

Ella Yonai, Weizmann institute of science

Ron Blonder, The Weizmann Institute Of Science

Online Learning in Museums One Year after COVID-19 Closures (Virtual)

Megan Ennes, University of Florida

Amanda Wagner-Pelkey, University of Florida

Perpetuation of privilege: Impacts of low pay on workforce equity and diversity in informal education (Virtual)

Kathryn Rende, North Carolina State University
M. Gail Jones, North Carolina State University
Megan Ennes, University of Florida

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Developing science teacher practices
9:00 AM-10:30 AM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Deep structures of student lesson plans at the end of the university teacher education

Tanja Mutschler, University of Potsdam
David Buschhüter, University of Potsdam
Andreas Borowski, University of Potsdam

How Preservice Secondary Science Teachers Support Sensemaking and Discourse Across Disciplines (Virtual)

Valerie Meier, University Of California - Santa Barbara
John Galisky, University Of California - Santa Barbara
Matthew D. Bennett, University Of California - Santa Barbara
Julie A. Bianchini, University Of California - Santa Barbara

Identifying the seeds of productive science discourse in undergraduate courses for pre-service science teachers

Hadeel Omar Edrees Dabbah, Ben-Gurion University of the Negev
Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev
Ahmad Basheer, Academic Arab College for Education in Israel – Haifa
Naji Kortam, Academic Arab College for Education in Israel – Haifa

Planning vs. Instruction: Analysis of Preservice Secondary Science Teachers' Use of Practices and Crosscutting Concepts (Virtual)

John Galisky, University of California, Santa Barbara
Matthew D. Bennett, UCSB
Julie A. Bianchini, University Of California - Santa Barbara
Sarah Hough, University of California, Santa Barbara
Meghan Macias, University of California, Santa Barbara

Tuesday 3-29-2022

Strand 8: In-service Science Teacher Education

SC-organized paper set-Teacher Learning across Science Disciplines

9:00 AM-10:30 AM, Parq Salon D (**livestream** 1)

Presider: <https://tinyurl.com/NARSTpresider>

A Physics Case Study for Why Teachers Feel In- or Out-of-Field: Looking Beyond Educational Background (Virtual)

Kyla Smith, University of Oxford

Judith Hillier, University of Oxford

Sibel Erduran, University of Oxford

Biology Teachers' Knowledge Considerations and Pedagogical Goals When Designing Dataset Driven Instruction Units

Carmel Bar, Weizmann Institute of Science

Bat-Shahar Dorfman, Weizmann Institute of Science

Anat Yarden, Weizmann Institute Of Science

Capturing Collective Pedagogical Content Knowledge (cPCK) of Evolution for understand how biology teachers develop their personal PCKevo

Claudia Vergara, Alberto Hurtado University

Arlette Bassaber, Pontificia Universidad Catolica de Valparaiso

Paola Nuñez, Pontificia Universidad Catolica de Valparaiso

Beatriz Becerra, Pontificia Universidad Católica de Valparaiso

Harold Hurtado, pontificia Universidad Católica de Valparaíso

David Santibanez, Universidad Finis Terrae

Hernan Cofre, Pontificia Universidad Católica de Valparaíso

Chemistry Teacher Retention, Migration, and Attrition (Virtual)

Martin F Palermo, Stony Brook University

Angela M. Kelly, Stony Brook University

Robert Krakehl, Stony Brook University

Strand 8: In-service Science Teacher Education

SC-organized paper set-Exploring Elements of Elementary Science Teaching

9:00 AM-10:30 AM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Academic Impact for Preschoolers and Kindergarteners of Classroom and Family Science: A Randomized, Control-Group Study (Virtual)

Susanna E. Hapgood, University of Toledo

Joan Kaderavek, University Of Toledo

Peter Paprzycki, University Of Southern Mississippi
Charlene M. Czerniak, University Of Toledo
Scott Molitor, University Of Toledo
Grant Wilson, The University of Toledo
Jeanna Heuring, Keene State College

Elementary teachers' understandings of student cognitive engagement in science through witnessing models of classroom instruction

Patricia S. Bills, Oakland University
Imogen R Herrick, University of Southern California

Reconsidering Touch in an Elementary Science Sensemaking Space

Michelle N Brown, Pennsylvania State University

Strand 10: Curriculum and Assessment

SC-organized paper set-Curriculum and assessment for science learning

9:00 AM-10:30 AM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Cells in Context: Comparing Online vs. In-person Delivery (virtual)

Louisa A Stark, Genetic Science Learning Center - University of Utah
Dina Drits-Esser, Genetic Science Learning Center - University of Utah
Ann E Lambert, Genetic Science Learning Center - University of Utah
Jen C Taylor, Genetic Science Learning Center - University of Utah
Molly Malone, Genetic Science Learning Center - University of Utah
Sheila A Homburger, Genetic Science Learning Center - University of Utah
Kristin E Fenker, Genetic Science Learning Center - University of Utah

Designing Biomimetic Robots: Examining Middle School Students' Knowledge in an Interdisciplinary Environment

Michael Cassidy, TERC
Debra Bernstein, TERC
Gillian Puttick, TERC
Fayette Shaw, Tufts University
Kristen Wendell, Tufts University
Ethan Danahy, Tufts University

Students' Science Learning Interests and Formal Biology Curriculum Emphases: Special Reference to Viruses in the COVID Pandemic Era

Vivien M. Chabalengula, University Of Virginia
Ian Nicolaides, Southern Illinois University

Tuesday 3-29-2022

Three-Dimensional Learning Progression for Supporting Students' Knowledge-in-use Proficiency in High School Project-based Learning Chemistry Curriculum (Virtual)

Peng He, Michigan State University

I-Chien Chen, Michigan State University

Joseph S. Krajcik, Michigan State University

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Cultural Relevance in Science & STEM

9:00 AM-10:30 AM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

A Select Physics Teachers Use of Empathy While Engaging in Culturally Relevant Practices

Clausell Mathis, University of Washington

Sherry A. Southerland, Florida State University

An exploration of Chinese Secondary Chemistry Teachers' Conceptions of Culturally Relevant Science Teaching (Virtual)

Xinying Yin, California State University-San Bernardino

Black women science teachers and anti-racist teaching: An argument for Historically Relevant Science Pedagogy (Virtual)

Alexis Riley, Teacher's College -Columbia University

Felicia Moore Mensah, Teachers College, Columbia University

Cultivating culturally sustaining STEM classrooms: A narrative inquiry case study of a science teacher

Khanh Q. Tran, Purdue University, West Lafayette

Selcen Guzey, Purdue University

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Digital Multimedia and Computational Thinking to Support Science Learning and Teaching

9:00 AM-10:30 AM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

Integrating Computational Thinking and Engineering Practices to Teach STEM: Examining Students' Attitudes About Physical Computing

Tyler S. Love, The Pennsylvania State University, Harrisburg

Julpa Rajyaguru, The Pennsylvania State University, Harrisburg

Tuesday 3-29-2022

Integrating Computational Thinking as Part of Simulation-based Scientific Investigations with Volcanic Hazards and Risk

Christopher Lore, Concord Consortium
Hee-Sun Lee, The Concord Consortium
Amy Pallant, The Concord Consortium

Sensemaking Through Computational Thinking: Images of Computing as a Scientific Epistemic Practice in Teacher Learning (Virtual)

Gozde Tosun, Penn State University
Amy V. Farris, Penn State

Teaching digital multimedia design with eye-tracking – exploring a new teaching approach for student teachers

Axel Langner, Institute of Chemistry Education, Justus-Liebig-University Giessen, Germany
Nicole Graulich, Justus-Liebig Universität Giessen

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

SC-organized paper set-Nature of Science and Higher Education

9:00 AM-10:30 AM, Parq Salon E (**livestream 2**)

Presider: <https://tinyurl.com/NARSTpresider>

How Teachers Used the Covid-19 Pandemic to Teach How Science Works

Jeanne L Brunner, University of Massachusetts Amherst
Ryan Summers, University of North Dakota

Learning in trajectories of participation: Nature of Science and Temporality in the Nature of Scientists (Virtual)

Ashwin Krishnan Mohan, Pennsylvania State University
Gregory J. Kelly, Pennsylvania State University

Re-thinking Science Education Using Non-linear Theories: Implications of Posthumanism on Ethics, Policy, and Practice (Virtual)

Sophia Jeong, The Ohio State University
Kathryn M. Bateman, Temple University
David P. Steele, Alder Graduate School of Education
Brandon Sherman, IUPUI

Strand 15: Policy, Reform, and Program Evaluation

Related Paper Set-Explorations of K-12 Integrated STEM Teaching

9:00 AM-10:30 AM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Discussant: Erin Peters-Burton, George Mason University

The Current State of Integrated STEM Education: Comparing Science Content Areas and Grade-Levels (Virtual)

Emily A. Dare, Florida International University
Joshua A. Ellis, Florida International University
Gillian Roehrig, University of Minnesota
Elizabeth A. Ring-Whalen, St. Catherine University
Erin E. Peters-Burton, George Mason University

Understanding the Relationship between Context and Content Integration (Virtual)

Benny Mart Hiwatig, University of Minnesota Twin Cities
Joshua A. Ellis, Florida International University
Farah Faruqi, University of Minnesota Twin Cities
Khomson Keratithamkul, University of Minnesota Twin Cities
Elizabeth Forde, Florida International University
Gillian Roehrig, University of Minnesota
Erin E. Peters-Burton, George Mason University

Manifestations of Integration in Practice: A Case Study of Three Elementary Teachers' Integration of Engineering and Science (Virtual)

Farah Faruqi, University of Minnesota Twin Cities
Khomson Keratithamkul, University of Minnesota Twin Cities
Gillian Roehrig, University of Minnesota
Erin E. Peters-Burton, George Mason University

Yes, Math is There, but ...: Examining Mathematical Content in Integrated STEM (Virtual)

Elizabeth Forde, Florida International University
Latanya Robinson, Florida International University
Joshua A. Ellis, Florida International University
Emily A. Dare, Florida International University
Erin E. Peters-Burton, George Mason University

Administrative Session: Publications Advisory Committee

Admin Symposium-NARST/NSTA Annual Research Worth Reading Recognition

9:00 AM-10:30 AM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

Organizers

Shakhnoza Kayumova, University of Massachusetts-Dartmouth
Dante Cisterna, Educational Testing Service
Allison Antink-Meyer, Illinois State University
G. Michael Bowen, Mount Saint Vincent University, Halifax, Nova Scotia, Canada

Tuesday 3-29-2022

Cynthia Crockett, Harvard-Smithsonian Center for Astrophysics

Knut Neumann, IPN–Leibniz Institute for Science and Mathematics Education, Kiel, Germany

Join us in congratulating this year's recipients of the NSTA Annual Research Worth Reading award. This award is given to three research groups whose 2021 JRST articles inspire excellent teaching innovations. This year's recipients are:

- Harris, E. M., & Ballard, H. L. (2021). Examining student environmental science agency across school science contexts. *Journal of Research in Science Teaching*, 58(6), 906–934.
- Puntambekar, S., Gnesdilow, D., Dornfeld Tissenbaum, C., Narayanan, N. H., & Rebello, N. S. (2021). Supporting middle school students' science talk: A comparison of physical and virtual labs. *Journal of Research in Science Teaching*, 58(3), 392–419.
- Donovan, B. M., Weindling, M., Salazar, B., Duncan, A., Stuhlsatz, M., & Keck, P. (2021). Genomics literacy matters: Supporting the development of genomics literacy through genetics education could reduce the prevalence of genetic essentialism. *Journal of Research in Science Teaching*, 58(4), 520–550.

Multi-Strand-Virtual Session E

9:00 AM-10:30 AM, Parq Salon F (**livestream** 3)

"I'm too slow to get through Statistics": The Relationship between Statistics Anxiety and Academic Dishonesty (Virtual)

Pnina Steinberger, Orot Israel College of Education

Yovav Eshet, Zefat Academic College

Keren Grinautsky, Western Galilee College

The Importance of Family-level Variables to Evolution-related Perspectives and Careers in Black Undergraduates (Virtual)

Ross H. Nehm, Stony Brook University

Gena C. Sbeglia, Stony Brook University

What science teachers' autobiographies tell us about their own science education and career choices (Virtual)

Mariana Luzuriaga, University of San Andrés

Maria Eugenia Podesta, University of San Andrés

Melina Furman, University of San Andrés

Science Classrooms as Hostile Environments for Black Female Science Teachers (Virtual)

Olayinka Mohorn, Dominican University

Tuesday, March 29, 2022

Poster Q & A (Concurrent session #7)

Prefunction area

10:45 AM - 11:45 AM

In person posters will be displayed on boards in the prefunction area. Presenters will be with their posters for discussion. Virtual posters will be available throughout the conference, with space to post questions and responses.

Strand 1: Science Learning: Development of student understanding

Poster-Strand 1 Poster Session

10:45 AM - 11:45 AM, Poster Space

101

Examining the crosscutting concept of patterns: An initial construct map in the context of ecosystems

Kristin L. Gunckel, University Of Arizona

Daniel L. Moreno, University of Arizona

Sean Tan, University of California Berkeley

Anna McPherson, American Museum of Natural History

Sara J. Dozier, CSU Long Beach

Linda Morell, University Of California, Berkeley

102

Exploring the concept of scientific civic engagement and its role in developing science literacy skills

Jenny M Dauer, University of Nebraska-Lincoln

Irfanul Alam, University of Colorado Boulder

Lisa A Corwin, University of Colorado Boulder

103

Investigating The Effects Of Instructional Support On Students' Inquiry-based Writing In Chemistry

Jan-Martin Österlein, University of Duisburg-Essen

Mathias Ropohl, University of Duisburg-Essen

Sebastian Habig, Paderborn University

Miriam Morek, University of Duisburg-Essen

104

Studies on Visualization in Science Classrooms: A Systematic Literature Review (Virtual)

Mijung Kim, University of Alberta

Qingna Jin, University of Alberta

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Poster-Strand 2 Poster Session

10:45 AM - 11:45 AM, Poster Space

201

Factors Influencing Evolution Acceptance: A Systematic Literature Review and Meta-Analysis

Daniela Fiedler, Department of Biology Education, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

202

Influence of Digital Learning Design Features and Self-Regulation on Students' Behavioral and Emotional Engagement (Virtual)

Daniel Laumann, University of Münster

Julia Welberg, University of Münster

Julian Alexander Fischer, Leibniz Institute for Science Education (IPN) Kiel

Tatjana Steinmann, Leibniz University of Hannover

Susanne M. Heinicke, University of Münster

Susanne Weßnigk, Leibniz University of Hannover

Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

203

Interacting with Luna: Scientific characters and 3rd graders' construction of relationships with Science (Virtual)

Deborah Cotta, Universidade Federal de Minas Gerais

Danusa Munford, Faculdade de Educacao - Universidade Federal de Minas Gerais

Elaine S. França, Centro Pedagógico (1-9 grades school) - Universidade Federal de Minas Gerais

204

Investigating the Ways Students Leverage Lived Experience to Explain Phenomena (Virtual)

Kraig A. Wray, Pennsylvania State University

Amy R. Pallant, The Concord Consortium

Hee-Sun Lee, The Concord Consortium

Scott McDonald, Pennsylvania State University

205

Learning in Multidisciplinary Teams in a Challenge-Based Learning Course (Virtual)

Canan Mesutoglu,

Dürdane Dury Bayram-Jacobs, Eindhoven University of Technology

206

Make or Break Collaborative Disciplinary Engagement in Science: Managing Conceptual Uncertainty in Group Work (Virtual)

Harini Krishnan, Florida State University

Lama Jaber, Florida State University

Sherry A. Southerland, Florida State University

207

Scientists' and Teachers' Perceptions of Costs and Benefits in School-Based Citizen Science (Virtual)

Osnat Atias, University of Haifa

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

Ayelet Shavit, Technion - Israel Institute of Technology

Yael Kali, University of Haifa

208

Seasons in the Sun: Unpacking Seasons Lesson Approaches as Teachers Model Earth-based and Space-based Perspectives

Jennifer A. Wilhelm, University of Kentucky

Merryn Cole, University Of Nevada Las Vegas

Paula Ames, University of Kentucky

Jaden Hayes, University of Kentucky

Samantha Ringl, University of Kentucky

209

Social and material resources mediating young children's engagement in spatial sensemaking during summer engineering camp (Virtual)

Julia Plummer, Pennsylvania State University

Katie Nolan, Pennsylvania State University

210

Student Assertions in Science Discourse Spaces (Virtual)

Lauren Cabrera, Virginia Commonwealth University

Ananya Matewos, Saint Norbert College

Vivian Ali Zohery, University of Maryland - College Park

Doug Lombardi, University of Maryland, College Park

211

Supporting Discussion-based Science Practices for Special Education Students (Virtual)

Grace K. Baker, Penn State University

Emma J. Jacobson, Penn State University

Amy R. Pallant, The Concord Consortium

Hee-Sun Lee, The Concord Consortium

Scott McDonald, Pennsylvania State University

212

Supporting macro-ethical reasoning in college students' collaborative design work (Virtual)

Jennifer Radoff, University of Maryland-College Park

Chandra Turpen, University of Maryland-College Park

Fatima Abdurrahman, University of Maryland-College Park

213

The Impact of COVID-19 Lockdown on Parents and Adolescent Children in Relation to Science Learning

Ella Ofek-Geva, Weizmann Institute of Science

Michal Vinker, Department of Pediatrics and Department of Pediatric Endocrinology and Diabetes, Assuta Ashdod University Medical Center, Ashdod, Israel

Yonatan Yeshayahu, Department of Pediatrics and Department of Pediatric Endocrinology and Diabetes, Assuta Ashdod University Medical Center, Ashdod, Israel

David L. Fortus, Weizmann Institute Of Science

214

Critical pedagogy of place to enhance ecological engagement activities: Expanding "place" beyond the biophysical

Andrea E Weinberg, Arizona State University

Amanda Cicchino, Colorado State University

Meena M. Balgopal, Colorado State University

Laura B. Sample McMeeking, Colorado State University STEM Center

Tuesday 3-29-2022

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

Poster-Strand 3 Poster Session

10:45 AM - 11:45 AM, Poster Space

301

A Case of Revealing Preservice Elementary Science Teachers' Understanding of Models and Modeling Through Reflections (Virtual)

Ayca K Fackler, University of Georgia

302

Assessing Elementary Students' Science Interests and Career Aspirations

M. Gail Jones, North Carolina State University

Katherine Chesnutt, Appalachian State University

Megan Ennes, University of Florida

Daniel Macher, Karl-Franzens-University of Graz

Manuela Paechter, Karl-Franzens-University of Graz

303

Developing Routines for Planning Elementary Science Investigations

Annabel J Stoler, Boston University

Eve Manz, Boston University

Chris Georgen, Boston University

304

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

Elica B. Sharifnia, University of Miami

Daryl Greenfield, University of Miami

305

Exploring the Nature of Challenges Preservice Elementary Teachers Experience about Matter Content and Content Teaching

Jamie N. Mikeska, Educational Testing Service (ETS)

Heena R. Lakhani, University of Washington

Dante Cisterna, Educational Testing Service

306

Science, Language, and Equity Practices: How Teachers Respond to Professional Learning Focused on Epistemic Agency (Virtual)

Emily C. Miller, University of Wisconsin Madison

Emily Reigh, Stanford

Maria C. Simani, University Of California, Riverside

307

Teachers' planned use of place-based stories rooted in students' everyday experiences of natural phenomenon Melissa J. Luna, West Virginia University

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

Poster-Strand 4 Poster Session

10:45 AM - 11:45 AM, Poster Space

401

Critical Discussions in Small Groups to Support the Design of Experiments

Takuya Matsuura, Hiroshima University

Urumi Hayashiuchi, Takehara City Educational Board

402

Innovative STEM curriculum to enhance students' engineering design skills and attitudes toward STEM (Virtual)

Meng-Fei Cheng, National Changhua University of Education

Yu-Heng Lo, National Changhua University of Education

403

Middle School Teachers' Self-efficacy for Teaching Science in a Computationally Rich Environment: A Mixed-Methods Study (Virtual)

Arif Rachmatullah, SRI International

Eric N. Wiebe, North Carolina State University

404

Science Instructional Practices: Comparison of Two Strategies for Students with Learning Disabilities (Virtual)

Gamze Karaer, University of Iowa

Macid Ayhan Melekoglu, Eskisehir Osmangazi University

405

Teachers' Conceptions of Phenomena in the Secondary Science Classroom

Daniel Pimentel, Stanford University

406

The Challenges of Teaching in Charter Schools and How They were Overcome During the COVID-19 Pandemic (Virtual)

Pamela Huff, Doctoral Candidate

Gail Jones, North Carolina State University

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

Poster-Strand 5 Poster Session

10:45 AM - 11:45 AM, Poster Space

501

Cultivating and supporting STEM faculty allyship (Virtual)

Thanh K. Le, Western Washington University

Regina Barber DeGraaff, Western Washington University

Leticia Romo, Chaffey College

502

Design and Outcomes for Computational Interest, Competency Belief, and Anxiety in "Science for Future Presidents"

Sheikh Ahmad Shah, Boston College

David W. Jackson, Boston College and Waltham (MA) Public Schools

503

Exploring of environmental engineering college students' social responsibility and problem solving through the SSI project (Virtual)

Yohan Hwang, Seoul National University

Kongju Mun, Dongduk Women's University

Kyung-Suk Cho, Ewha Womans University

Hyunju Lee, Ewha Womans University

504

Exploring the Perception of College Students in STEM Fields on Social Responsibility of Scientists and Engineers (Virtual)

Hyunju Lee, Ewha Womans University

Yuhyun Choi, Chungnam National University

Seung-Yong Ok, Hankyong National University

Chang-Hoon Nam, Daegu Gyeongbuk Institute of Science & Technology

Sungok Seren Shim, Ball State University

Yohan Hwang, Seoul National University

Yeonjoo Ko, Ewha Womans University

Kyungmi Lee, Ewha Womans University

505

Investigating learning assistants' use of questioning in the online setting of an inquiry-oriented physics course (Virtual)

Jianlan Wang, Texas Tech University

Yuanhua Wang, West Virginia University

Beth Thacker, Texas Tech University

Stephanie Hart, Texas Tech University

506

Preparing Graduate Students for Success: Validating Interdisciplinary Skill Development Needs (Virtual)

Nicole Campbell, Western University

Mohammed Estaiteyeh, Western University

Isha DeCoito, Western University

507

Student Participation and Self-Efficacy in Communities of Practice in Remote Undergraduate Physics Laboratories

Drew Jason Rosen, University of Maine Stony Brook University

Angela M. Kelly, Stony Brook University

508

Supporting New Research on Teaching Professional Development for Graduate Student: Progression and Personal/Professional Benefits (Virtual)

Gili Marbach-Ad, University Of Maryland

Patrick Sheehan, University Of Maryland

Bridgette Heine, University Of Maryland

Grant E. Gardner, Middle Tennessee State University

Judith S. Ridgway, The Ohio State University

Kristen Miller, University of Georgia

Elisabeth Schussler, University Of Tennessee

509

The Interconnectedness of Chemical contents – a Challenge for Teacher Training

Marina Regina Birkenstock, University of Kassel

David S. Di Fuccia, University of Kassel

Strand 6: Science Learning in Informal Contexts

Poster-Strand 6 Poster Session

10:45 AM - 11:45 AM, Poster Space

601

"We're Not that Different": Typologies of Guests' Relationships to Museum Objects via Mechanic Assemblage within a Dinosaur Gallery (Virtual)

Joshua Cruz, Texas Tech University

Rebecca Hite, Texas Tech University

Richard C. Velasco, University of Iowa

602

Peer-to-Peer Seminars: Proposal to Use Peers and Structure to Promote Student Learning at Research Seminars (Virtual)

Elizabeth W Kelley, University of Chicago

603

Social Network Analysis as a Tool to Operationalize Communities of Practice and Document Social Learning

K. C. Busch, North Carolina State University

Lynn Chesnut, North Carolina State University

604

Using Augmented Reality (AR) to Bring the Past to Life in Informal Science Learning

Imogen R Herrick, University of Southern California

Gale Sinatra, University of Southern California

Alana Kennedy, University of Southern California

Benjamin Nye, University of Southern California

Bill Swartout, University of Southern California

Emily Lindsey, The La Brea Tar Pits Museum

Strand 7: Pre-service Science Teacher Education

Poster-Strand 7 Poster Session

10:45 AM - 11:45 AM, Poster Space

701

Impact of Inquiry Lesson Experiences on Development of Preservice Elementary Teachers' Effective Science Teaching Beliefs

Kelsey Beeghly, University of Central Florida

702

Participating in online Teacher Learning Communities as a Tool for Pre-Service Teacher Education (Virtual)

Loucas T. Louca, European University-Cyprus

Theopisti Skoulia, European University-Cyprus

703

Teaching as enactment of habitus: Preparing preservice science teachers for new ways of teaching science (Virtual)

Hildah K. Makori, Iowa State University

704

Understanding Elementary Preservice Teachers' Beliefs about the Importance and Value of the NGSS Science Practices

Elsun Seung, Indiana State University

Vance J. Kite, North Carolina State University

Soonhye Park, North Carolina State University

Aeran Choi, Ewha Womans University

705

Using a PCK lens to capture pre-service science teachers' internalized knowledge of Nature of Science

Louise Lehane, llehane@stangelas.nuigalway.ie

706

Preservice Science Teachers' Informal Reasoning Modes in Two Different Issue Contexts (Virtual)

Nilay Ozturk, Kirsehir Ahi Evran University

Kubra Yolacti-Kizilkaya, Kirsehir Ahi Evran University

Strand 8: In-service Science Teacher Education

Poster-Strand 8 Poster Session

10:45 AM - 11:45 AM, Poster Space

801

Investigating Impacts of Professional Development on High School Physics Teachers' Collaboration and Lesson Planning (Virtual)

James B. Hancock, Alma College

Jack T Poling, Alma College

802

A Cross-Case Analysis of In-Service Science Teacher's Assessment Literacy in Model-Based Teaching

Alexis Gonzalez-Donoso, University of British Columbia

Samia Khan, University of British Columbia

803

An Online Professional Development Community (APTeach): Teacher Perception and Practice (Virtual)

Fatma Kaya, Middle Tennessee State University

Preethi Titu, Kennesaw State University

Siying Jiang, Stony Brook University

Jiecheng Song, Stony Brook University

Steven Berryhill, Middle Tennessee State University

Amanda S. Perez, Carnegie Mellon University

Chinmay Kulkarni, Carnegie Mellon University

Wei Zhu, Stony Brook University

David Yaron, Carnegie Mellon University

Greg Rushton, Middle Tennessee State University

804

Analyzing Teaching Perceptions of Utilizing a District Level Professional Learning Community to Identify Guaranteed Curriculum (Virtual)

Kristin E Mansell,

805

Examine Chinese In-service Science Teachers' Views of Nature of Science

Yang Yang, Beijing Normal University

Qin Yan, Beijing Normal University

Jing Lin, Beijing Normal University

806

Exploration of Epistemic Orientation towards Teaching Science in a Longitudinal Professional Development Study

Sierra L. Morandi, Florida State University
Claudia Hagan, Georgia State University
Ellen M. Granger, Florida State University
Jennifer Schellinger, Florida State University
Sherry A. Southerland, Florida State University

807

Exploring Early Enactment Attempts for Integrating Engineering Design Practices in High School Biology

Jonathan Singer, University of Maryland, Baltimore County
Jacqueline Krikorian, Baltimore City Public Schools
Tory H. Williams, University of Maryland Baltimore County
Christopher Rakes, University of Maryland, Baltimore County
Julie Ross, Virginia Tech

808

Listening to Find Integrated STEM Discourse: Power and Positioning During a Teacher Professional Development STEM Activity (Virtual)

Andria C. Schwartz, University of Wyoming
Andrea C. Burrows, University Of Wyoming

809

Lived Experiences of K-12 Teachers Who Attended Professional Development Hosted By Informal Education Institutions

Vashunda Williams Warren, Dallas Baptist University

810

Professional Development Principles to Advance Socio-scientific Issue-oriented Science Education: The Case of British Columbia.

Travis T. Fuchs, The University of British Columbia
Anthony Clarke, The University of British Columbia

811

Questionnaire Measuring Teachers' Perception of Practical Work in Inclusive Physics Lessons

Laura Sühlig, Department of Physics Education, Goethe University Frankfurt
Katja Hartig, Institute of Psychology, Goethe University Frankfurt
Roger Erb, Department of Physics Education, Goethe University Frankfurt
Albert Teichrew, Department of Physics Education, Goethe University Frankfurt
Jan Winkelmann, University of Education Schwäbisch Gmünd
Holger Horz, Institute of Psychology, Goethe University Frankfurt
Mark Ullrich, Institute of Psychology, Goethe University Frankfurt

812

Science Teachers' Interactions With and Conceptions of Curriculum Use (Virtual)

Byung-Yeol Park, University of Connecticut

Todd Campbell, University of Connecticut

Miriah Kelly, Southern Connecticut State University

Chester Arnold, University of Connecticut

813

Science teaching performance: investigating gender, qualification, and teaching experiences (Virtual)

Hiya M. Almazroa, Princess Nourah Bint Abdulrahman University

Eman M Alrwaythi, Allmam Muhammad Ibn Saud University

Fahad S. Alshaya, King Saud University

814

Teacher's Readiness to Promote Science-related Career Awareness Among Middle School Students

Regina Soobard, University Of Tartu

Ana Valdmann, University Of Tartu

Miia Rannikmae, University Of Tartu

815

Pathways to Critical Practice in Elementary Science Education (Virtual)

Emily Rose Seeber, University of Michigan

Christa Haverly, Northwestern University

Strand 10: Curriculum and Assessment

Poster-Strand 10 Poster Session

10:45 AM - 11:45 AM, Poster Space

1001

Assessing the Inquiry Practices of Teachers in the Philippines (Virtual)

Dennis L. Danipog, National Institute for Science and Mathematics Education Development,
University of the Philippines Diliman

Suzanne Rice, Assessment Research Centre, University of Melbourne

Zhonghua Zhang, Assessment Research Centre, University of Melbourne

1002

Implementation of the ALL for Science Framework Across Three Grade Levels

Nancy Moreno, Baylor College of Medicine

Alana Newell, Baylor College Of Medicine

Lollie Garay, Baylor College of Medicine

Misty Sailors, University of North Texas

1003

Relationships Among Teacher Beliefs About STEAM Education, Perceptions of School Climate, and Enacted Practices.

Jaymie Paige Stein, Fordham University

John Craven, Fordham University

1004

Video-based Instruments as Assessment Tool in Science Teacher Education: A Systematic Literature Review (Virtual)

Yuxi Huang, University of Georgia

Hatice Ozen Tasdemir, The University of Georgia

Strand 11: Cultural, Social, and Gender Issues

Poster-Strand 11 Poster Session

10:45 AM - 11:45 AM, Poster Space

1101

Uncovering Sex and Gender Language in High School Biology Textbooks

Awais Syed, BSCS Science Learning

Dennis Lee, BSCS Science Learning

Monica Weindling, BSCS Science Learning

Sophie Arnold, New York University

Andrei Cimpian, New York University

Catherine Riegle-Crumb, University of Texas

Molly Stuhlsatz, BSCS Science Learning

Brian M. Donovan, BSCS Science Learning

1102

Intervention Highlights the Importance of Career Awareness Promotion on Students' Equal STEM Career Awareness Development

Tormi Kotkas, University Of Tartu

Jack B. Holbrook, University Of Tartu

Miia Rannikmae, University Of Tartu

1103

The new four-letter word, 'race': Exploring Teacher Positions within biology education and critical race theory. (Virtual)

Uchenna Emenaha, The University of Texas at San Antonio

1104

John Henryism: Exploration of Physiological Examination of College STEM, Cumulative Trauma, Allostatic Load.

Douglas Lee Hoston,

Richard Lamb, University at Buffalo

1105

Effectiveness and Inclusivity: determining best physics and astronomy departments for women of colour (Virtual)

Jaimie Lauren Miller-Friedmann, University of Birmingham

Nicola Wilkin, University of Birmingham

1106

Exploring the prevalence of whiteness within science education using duoethnographic methods

Jennifer Jackson, Pennsylvania State University

Jonathan D. McCausland, Pennsylvania State University

1107

Faculty Awareness and Responsiveness to Inclusivity in STEM Classrooms (Virtual)

Grant E. Gardner, Middle Tennessee State University

Olena T James, Middle Tennessee State University

Sarah Bleiler-Baxter, Middle Tennessee State University

Gregory Rushton, Middle Tennessee State University

Fonya Crockett Scott, Middle Tennessee State University

Amanda Heath, Middle Tennessee State University

Theresa Ayangbola, Middle Tennessee State University

1108

Identifying the Methods District Science Coordinators Utilize to Monitor and Promote Equity

Shaugnessy McCann,

Yamil Ruiz,

Brooke A. Whitworth, Clemson University

Julie A. Luft, University of Georgia

1109

Instructor Impact on the Equity of Collaborative Small Groups in a Science Class

Mary Binzley, Grinnell College

Paul Hutchison, Grinnell College

1110

Examining Moments of Liberatory Design Possibility in Youth-centered Engineering Design Practice (Virtual)

Jacqueline Handley, University of Michigan

Strand 12: Technology for Teaching, Learning, and Research

Poster-Strand 12 Poster Session

10:45 AM - 11:45 AM, Poster Space

1201

Applying the eye tracking method to analyze university learners' learning and reasoning behaviors in the Augmented Reality Environment (Virtual)

Fang-Ying Yang, National Taiwan Normal University

Yi-Wen Hung, The Affiliated Senior High School of National Taiwan Normal University

Yuan-Li Liu, National Taiwan Normal University

1202

Automated Assessment of Students' Response to Free-response Items on Particulate Nature of Matter Utilizing AI

Gyeong-Geon Lee, Seoul National University

Jaeyong Lee, Seoul National University

Hun-Gi Hong, Seoul National University

1203

CryptoComics: Design of an Integrative STEM+C Transmedia Curriculum

Pavlo D. Antonenko, University Of Florida

Kara Dawson, University of Florida

Zhen Xu, University of Florida

Do Hyong Koh, University of Florida

Christine Wusylko, University of Florida

Amber Benedict, Arizona State University

Swarup Bhunia, University of Florida

1204

Exploring Science Student Learning Outcomes using Machine Learning Classifications During Online Sessions (Virtual)

Richard Lamb, East Carolina University

Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

1205

Investigating Differential Effects of a Digital 'Ladder of Learning' With Adaptive Support in Chemistry

Michelle Möhlenkamp, University of Duisburg-Essen

Helena Van Vorst, University of Duisburg-Essen

Sebastian Habig, University of Duisburg-Essen

Mathias Ropohl, University of Duisburg-Essen

1206

Scaffolding Scientific Argumentation in a Science Inquiry Unit (Virtual)

Kathryn Rupp, Northern Illinois University

Karyn Higgs, Northern Illinois University

M. Anne Britt, Northern Illinois University

Kathleen Easley, The Learning Partnership

Randi McGee-Tekula, The Learning Partnership

Steven McGee, The Learning Partnership

1207

School Leaders Learning How to Observe Science Teachers Using Equitable Discourse Through Virtual Reality

Len Annetta, East Carolina University

Matthew Militello, East Carolina University

Lynda Tredway, Institute for Educational Leadership

Lawrence Hodgkins, East Carolina University

Ken Simon, Institute for Educational Leadership

Jim Argent, East Carolina University

1208

The Science of Data Visualization Comprehension: Analysis of Seminal Theoretical Frameworks (Virtual)

Kristine A. Antonyan, University of Florida

Pavlo D. Antonenko, University Of Florida

1209

Tracing the Development of a Haptically-enabled Science Simulation (HESSs) for Force and Motion (Virtual)

James Minogue, North Carolina State University

Emily Brunsen, North Carolina State University

Tabitha Peck, Davidson College

David Borland, RENCi

1210

Was that Productive? Exploring Student-Student Verbal Interactions while Engaged with Virtual Learning Environments about Magnetism (Virtual)

Joey D Marion, North Carolina State University

James Minogue, North Carolina State University

Michaela O'Leary, North Carolina State University

Katee Finegan, North Carolina State University

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

Poster-Strand 13 Poster Session

10:45 AM - 11:45 AM, Poster Space

1301

Considering the conceptual role of compassion in socioscientific issues research

David C. Owens, Georgia Southern University

Dana L. Zeidler, University Of South Florida

1302

Developing Pre-Service Teachers' Understanding of the Distinctions Between Science and Engineering

Jacob Pleasants, University of Oklahoma

Jennifer C. Parrish, University of Northern Colorado

Anne Leak, Assistant Professor, High Point University

1303

Exploring the complexity of student-created mind maps, based on science-related core ideas

Helen Semilarski, Doctoral student

Regina Soobard, Research Fellow of Science Education

Jack Holbrook, Professor

Miia Rannikmae, Professor

1304

Moroccan Science Professors' Nature of Science's Understandings and Perceptions on its Instruction for Preservice Teachers

Farnaz Avarzamani, Mary Lou Fulton Teachers College, Arizona State University, Tempe, AZ

Mila Rosa Librea Carden, Mary Lou Fulton Teachers College, Arizona State University, Tempe, AZ

Peter Rillero, Mary Lou Fulton Teachers College, Arizona State University, Tempe, AZ

Florence Hamel, Gary Herberger Young Scholars Academy, Mary Lou Fulton Teachers College, Arizona State University, Tempe, AZ

Tuesday 3-29-2022

Strand 14: Environmental Education and Sustainability

Poster-Strand 14 Poster Session

10:45 AM - 11:45 AM, Poster Space

1401

Ambitious Science Teaching as a way of integrating place-based and systems-literacy learning (Virtual)

Madison Botch, Pennsylvania State University

Amy R. Pallant, The Concord Consortium

Hee-Sun Lee, The Concord Consortium

Scott McDonald, Pennsylvania State University

1402

Exploring 6th-Grade Students Model-Based Reasoning about Energy Flow Between Societal and Earth Systems

Laura Zangori, University Of Missouri

Laura B Cole, University of Missouri

Mohammad Dastmalchi, University of Missouri

1403

Exploring the Potential for Place-Based Ecology Lessons in Middle School Science Classes

Sara L. Salisbury, Middle Tennessee State University

Fonya Crockett Scott, MTSU

1404

Fourth Graders' Knowledge of Energy and Environmental Literacy and Application through Flashlight Design (Virtual)

Heidi Masters, University Of Wisconsin–La Crosse

Vanashri J. Nargund, New Jersey City University

1405

Unite for the environment: Examining the impact a sustainable livelihoods program on pro-environmental behaviors in Ugandan student households near a biodiversity hotspot (Virtual)

Sarah J. Carrier, North Carolina State University

Aimee B Fraulo, North Carolina State University

Corinne Kendall, North Carolina Zoo

Austin Leeds,

Tinka John, UNITE

Elizabeth Folta, North Carolina Zoo

Kristen E Lukas, Cleveland Metro Parks Zoo

1406

Adolescent Framings of Climate Change, Psychological Distancing & Implications for Climate Change Concern and Behavior (Virtual)

Regina Ayala Chavez, North Carolina State University

K. C. Busch, North Carolina State University

Strand 15: Policy, Reform, and Program Evaluation

Poster-Strand 15 Poster Session

10:45 AM - 11:45 AM, Poster Space

1501

Expression of Next Generation Science Standards in Picture Books (Virtual)

Kelly Marie Shepard, Illinois Institute of Technology

1502

Faculty Voices on the Implementation of Science Education Policy in Higher Education-A Case Study

Mercy Ogunsola-Bandele, National Open University Of Nigeria

Bamikole O. Ogunleye, National Open University Of Nigeria

Tuesday, March 29, 2022

Lunch Buffet

Parq DEF & Prefunction area
11:45 am-12:45 pm

Enjoy a lunch of soup, salad, sandwiches, and desserts before we celebrate the 2022 NARST award winners.

NARST Recognitions & Reflections [livestream]
Parq DEF
12:30 pm-1:20 pm

The NARST 2022 Award Winners will be announced. Come share in recognizing these distinguished scholars in areas of Doctoral research, Early Career, NARST Fellows, and the highest honor of NARST Distinguished Contribution to Science Education through Research Award. The Awardees will be presenting on their scholarship in two additional sessions following this ceremony. These sessions will also be livestreamed.

During this session, the NARST President will also provide brief comments on advances within NARST through reflection on “Unity and Inclusion for Global Scientific Literacy: Invite as a Community. Unite as a Community.”

Tuesday, March 29, 2022
Concurrent Session # 8
2:00 pm-3:30 pm

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Theoretical & Literature Review Papers

2:00 PM-3:30 PM, Kitsilano Ballroom A

Presider:

Emotions in Science Learning and Teaching: A Systematic Review (Virtual)

Xiao Chen, East China Normal University

Sihan Xiao, East China Normal University

Fresh Air: Glowing Conspirations Towards Scientific Fluency

Hartley Banack, University of Northern British Columbia (UNBC)

Gerald Tembrevilla, Mount Saint Vincent University

Claire Robson, Adjunct Faculty at Simon Fraser University

Anne Robillard, Graduate Student, Department of Curriculum and Pedagogy, Faculty of Education, UBC

The motivational consequence of pattern-seeking fatigue

Elon Langbeheim, Ben-Gurion University of the Negev

Edit M. Yerushalmi, Weizmann Institute of Science

Transformative Science Education: A Review of Transformative Experience Theory

Kevin J Pugh, University of Northern Colorado

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Distance/online Science Teaching & Learning

2:00 PM-3:30 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Science Teaching Practices and Student Engagement in HyFlex Learning Environments

Hong H. Tran, University of Georgia

Yuxi Huang, University of Georgia

Cheng-Wen (Nuby) He, University of Georgia

Brooke A. Whitworth, Clemson University

Yamil Ruiz, Clemson University

Shaugnessy McCann, University of Georgia

Julie A. Luft, University of Georgia

Tuesday 3-29-2022

Shifting to Distance Learning of Science in China and Israel: A Comparative Study of Students and Teachers

David L. Fortus, Weizmann Institute of Science
Jing Lin, Beijing Normal University
Shira Passentin, Weizmann Institute of Science

The effect of in-person vs. distance learning on the quality of students' learning

Julian A. Fischer, Leibniz Institute for Science Education (IPN) Kiel
Tatjana Steinmann, Leibniz University of Hannover
Daniel Laumann, University of Münster
Susanne Weßnigk, Leibniz University of Hannover
Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

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

SC-organized paper set-Discourse and argumentation in secondary science teaching

2:00 PM-3:30 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Argumentation with Summary Tables in geoscience learning

Brandin M Conrath, Pennsylvania State University
Kathryn M. Bateman, Temple University
Amy R. Pallant, The Concord Consortium
Hee-Sun Lee, The Concord Consortium
Scott McDonald, Pennsylvania State University

Discourse in Inquiry Science Classrooms (DiISC) Version 2.0: Developing a Validity Argument for a Secondary Science Classroom Observation Instrument (Virtual)

Elizabeth B Lewis, University of Nebraska–Lincoln
Lyrica L Lucas, University of Nebraska–Lincoln
Brandon A Holding, University of Nebraska-Lincoln
Amy Tankersley, University of Nebraska-Lincoln
Ana M Rivero, Seattle University
Elizabeth Hasseler, University of Nebraska-Lincoln
Dale R Baker, Arizona State University

Teachers' Instructional Vision and Practices around Promoting Productive Talk in Science Classrooms

Ozlem Akcil Okan, Florida State University
Miray Tekkumru Kisa, Florida State University

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

SC-organized paper set-Collaborative Learning in Remote Contexts

2:00 PM-3:30 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

"It truly benefited me!": Surprising Learning Benefits for Collaborating Education and Engineering Undergraduates During COVID

Kristie S. Gutierrez, Old Dominion University

Jennifer Kidd, Old Dominion University

Min Jung Lee, Old Dominion University

Pilar Pazos, Old Dominion University

Krishna Kaipa, Old Dominion University

Stacie I. Ringleb, Old Dominion University

Orlando Ayala, Old Dominion University

Cyber Peer Led Team Learning (cPLTL) Supports Women in Science, Engineering, Technology, and Mathematics (STEM)

Mariah Claire Maxwell, Syracuse University

Jason R. Wiles, Syracuse University

Exploring the Impact of Peer-to-Peer Interactions on Learning and Course Performance in an Online Environment (Virtual)

Anshuman Swain, University of Maryland, College Park

Marcia Shofner, University of Maryland, College Park

William F Fagan, University of Maryland, College Park

Gili Marbach-Ad, University Of Maryland, College Park

Student In-The-Moment Learning in LA-Facilitated Interactions in Undergraduate Chemistry and Physics Courses

Jessica Karch, Tufts University

Ira Caspari, Tufts University

Tuesday 3-29-2022

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Informal learning in the community

2:00 PM-3:30 PM, Parq Salon D (**livestream 1**)

Presider: <https://tinyurl.com/NARSTpresider>

Measuring Electro Dermal Activity (EDA) to detect and identify emotional engagement during family science activities

Neta Shaby, Ben Gurion University of the Negev

Dana Vedder-Weiss, Ben-Gurion University Of the Negev, Israel

Youth Environmental Science Learning and Agency: a Unifying Lens Across Community and Citizen Science Settings

Ana I. Benavides Lahnstein, Natural History Museum, London, UK

Heidi L. Ballard, University of California, Davis, CA, USA

Maryam Ghadiri Khanaposhtani, University of California, Davis, CA, USA

Julia Lorke, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

Christothea Herodotou, Open University, Milton Keynes, UK

Annie E. Miller, California Academy of Sciences, San Francisco, CA, USA

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

Jessie Jennewein, Natural History Museum of Los Angeles County, CA, USA

Maria Aristeidou, Open University, Milton Keynes, UK

Nashwa Ismail, Open University, Milton Keynes, UK

Youth Participatory Action Research: Positioning Science Learning as and for Community Participation (Virtual)

Steven Worker, University Of California

Martin H. Smith, University Of California

Sally Neas, Graduate Student, University of California, Davis

Car Mun Kok, 4-H Youth Development Advisor, University of California, Agriculture and Natural Resources

Dorina Espinoza, Youth, Families and Communities Advisor, University of California, Agriculture and Natural Resources

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Integrating Engineering into science education

2:00 PM-3:30 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Placing Empathy at the Center of Engineering: Design Thinking Embraced by Preservice Teachers for Engineering Design (Virtual)

Myunghwan Shin, California State University, Fresno

Jane J. Lee, Michigan State University

Tuesday 3-29-2022

The Importance of Enactive Mastery Experiences: Teaching Engineering Self-Efficacy in a Pandemic

Matthew P. Perkins Coppola, Purdue University Fort Wayne

Using Card Sort Epistemic Network Analysis to Explore Preservice Teachers' Ideas about the Nature of Engineering

Jennifer C. Parrish, University of Northern Colorado

Jacob Pleasants, University of Oklahoma

Joshua Reid, Middle Tennessee State University

Bridget K. Mulvey, Kent State University

Erin E. Peters-Burton, George Mason University

Strand 8: In-service Science Teacher Education

SC-organized paper set-Professional Learning for STEM

2:00 PM-3:30 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

How some early-career STEM teachers achieved agency during the COVID-19 pandemic

Meena M. Balgopal, Colorado State University

Elizabeth Diaz-Clark, Colorado State University

Andrea Weinberg, Arizona State University

Laura B. Sample McMeeking, Colorado State University

Diane Susan Wright, Colorado State University

Danielle E. Lin Hunter, Colorado State University

STEM Labs: The Future of Professional Development for Early STEM

Hope K. Gerde, Texas A&M University

Gary E. Bingham, Georgia State University

Melody Kung, Georgia State University

Arianna Pikus, Michigan State University

Hannah Etchison, Georgia State University

What Works in K-12 STEM Professional Development Programs?: A Meta-Analysis of its Impacts on Teachers and Students

Hye Sun You, Arkansas Tech University

Sunyoung Park, California Lutheran University

Minju Hong, University of Georgia

*Teaching Science for Social Justice Using an Identity Framework (*presenting author)*

Katherine Wade-Jaimes, University of Nevada

*Rachel D. Askew, Vanderbilt University

Strand 10: Curriculum and Assessment

SC-organized paper set-Educative features and implementations of NGSS-aligned curricula

2:00 PM-3:30 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Proposing a Framework to Analyze Educative Features in NGSS-aligned Science Curricular Materials (Virtual)

Soo-Yean Shim, University of Illinois at Urbana Champaign

Kevin Hall, University of Illinois at Urbana Champaign

Tania Jarosewich, Consejo Group

Stina Krist, University of Illinois at Urbana-Champaign

Mon-Lin Monica Ko, University of Illinois at Chicago

Barbara Hug, University of Illinois at Urbana-Champaign

Learning to Teach with Storyline Curriculum Materials

Annie Allen, University of Colorado Boulder

Clarissa Deverel-Rico, University of Colorado Boulder

William R. Penuel, University of Colorado Boulder

Carol Pazera, University of Texas Austin

Variation in the Implementation of Educative Curriculum Materials for Teacher Educators in Two Course Contexts (Virtual)

Deborah L. Hanuscin, Western Washington University

Josie C. Melton, Western Washington University

Emily J. Borda, Western Washington University

Jamie N. Mikeska, Educational Testing Service (ETS)

Inequitable opportunities to learn: Frequency of inquiry-based teaching in the United States (Virtual)

Sara J. Dozier, Stanford University

Tuesday 3-29-2022

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Diverse Student Conceptions of Science and Engineering

2:00 PM-3:30 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

A Comparative Case Study Investigating Indigenous/Rural Elementary Students' Conceptions of Community Engineering

Rebekah Hammack, Montana State University

Tina Vo, University of Nevada- Las Vegas

Miracle Moonga, Montana State University

Blake Wiehe, Montana State University

Nick Lux, Montana State University

Paul Gannon, Montana State University

"We think this way as a society!": Community-level Science Literacy among ultra-Orthodox Jews (Virtual)

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology

Lea Taragin-Zeller, Technion - Israel Institute of Technology

Yael Rozenblum, Technion - Israel Institute of Technology

Further Probe into Culture, Context and Scientific Explanations by Biology Students: An African Case Study (Virtual)

Peter A. Okebukola, ACEITSE- Lagos State University

Tunde Owolabi, ACEITSE-Lagos State University

Foluso O Okebukola, LASSED-Lagos State University

Students' Considerations of Epistemic Criteria and Subsequent Tensions in Mixed-gender Engineering Groups (Virtual)

Christina L. Baze, University of Arizona

María González-Howard, University of Texas at Austin

Strand 11: Cultural, Social, and Gender Issues

Symposium-Designing and Implementing Virtual Black STEM Counterspaces to Elevate Black Learners

2:00 PM-3:30 PM, Burrard

Discussant: ReAnna Roby, Vanderbilt University

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Terrell R. Morton, University of Missouri - Columbia

Angela White, North Carolina A&T State University

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Nehemiah Mabry, STEMedia
Justin Shaifer, FascinateSci
Natalie S. King, Georgia State University
Kilan Ashad-Bishop, University of Miami, IndentifySTEM
Kelly Knight, George Mason University
Rachedia Lewis, University of Georgia
Cailisha L. Petty, North Carolina A&T State University
ReAnna S. Roby, Vanderbilt University

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Fostering scientific inquiry through applications of technology

2:00 PM-3:30 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Cutting-edge Evolution Research Made Available to High-school Students: Assessing Students' Views of Scientific Inquiry (Virtual)

Bat-Shahar Dorfman, Weizmann Institute of Science

Amir Mitchell, Program in Systems Biology, University of Massachusetts Medical School, Worcester, Massachusetts, United States of America, Program in Molecular Medicine, University of Massachusetts Medical School, Worcester, Massachusetts, United States of America

Orna Dahan, Department of Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel

Anat Yarden, Weizmann Institute Of Science

Research of Online Scientific Inquiry with/without Computer Simulation on 8th Graders' Performance of Scientific Inquiry

Ren-Jye Chou, Institute of Education National Yang Ming Chiao Tung University

Hsiao-Ching She, Institute of Education National Yang Ming Chiao Tung University

Meng Jun Chen, Institute of Education National Yang Ming Chiao Tung University

Technology-enhanced Inquiry-based Learning: Facilitating Motivation to Learn Science Among Elementary School Students *presenting author

Tamar Ginzburg, Technion - Israel Institute of Technology

*Miri I. Barak, Technion - Israel Institute Of Technology

Tuesday 3-29-2022

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

SC-organized paper set-Sociocultural and socio-scientific issues

2:00 PM-3:30 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Developing Argumentation Skills on Socio-Scientific Issues through Evaluating Digital Sources and Engaging in Reflective Discussions

Shaghig Garo Chaparian, New York University
Saouma B. Boujaoude, American University Of Beirut

Effects of Subsuming Standards-based Objectives within the SSI Framework on Content Acquisition and Global Citizenship

Karrie A. Wikman, University of South Florida

Identifying Evidence of Student Global Discourse in Socioscientific Issues Research

Mary E. Short, The George Washington University

University Biology Students' COVID-19 Decisions: The Interconnected Influence of COVID-19 Science Perceptions and Sociocultural Membership (Virtual)

Benjamin C Herman, Texas A&M University

Michael P Clough, Texas A&M University

Asha Rao, Texas A&M University

Ben Janney, Texas A&M University

Alex Sobotka, Texas A&M University

Sarah Poor, Texas A&M University

Aaron Kidd, Texas A&M University

Strand 14: Environmental Education and Sustainability

Symposium-Preparing Pre-College Students to Solve Emerging Interdisciplinary Problems: Integrating Life Science and Engineering in Classrooms

2:00 PM-3:30 PM, Parq Salon E (**livestream** 2)

Discussant: Emily A. Dare, Florida International University

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Christine M. Cunningham, Pennsylvania State University

Gregory J. Kelly, Pennsylvania State University

Debra Bernstein, TERC

Michael Cassidy, TERC

Selcen Guzey, Purdue University

Tuesday 3-29-2022

Lynn A. Bryan, Purdue University
Nancy B. Songer, University of Utah
Kirby Whittington, The University of Utah
Erin M. Furtak, University Of Colorado
Emily A. Dare, Florida International University

Administrative Session: Publications Advisory Committee
Admin Symposium-Publishing, Reviewing, and Writing for JRST
2:00 PM-3:30 PM, Parq Salon C

Panelists

Felicia Moore Mensah, Teachers College, Columbia University
Troy Sadler, University of North Carolina at Chapel Hill
Li Ke, University of North Carolina at Chapel Hill

The Journal of Research in Science Teaching is the official journal of NARST: A global organization for improving science education through research. As a premier journal in the field with the largest impact factor, we rely on our associate editors, reviewers, and authors to facilitate convincing research consistent with the highest standards of varied theoretical traditions. In this session, we present an overview of important factors in writing and reviewing for JRST. As Editors, Troy Sadler and Felicia Moore Mensah along with Managing Editor Li Ke will explain the processes that JRST uses to facilitate peer review and make publication decisions. This will be an interactive session in which participants are encouraged to ask questions about the journal and its processes and share ideas for improving JRST. Drs. Sadler and Mensah will also provide updates on how they are realizing their vision for JRST through new initiatives, and discuss ways that the NARST community may work together for improving the journal and its outreach and support.

Multi-Strand-Virtual Session F
2:00 PM-3:30 PM, Parq Salon F (**livestream** 3)

Adaptation and Validation of a Questionnaire for Measuring Teachers' Views on Nature of Science (Virtual)

Rachel Takriti, United Arab Emirates University
Hassan H. Tairab, United Arab Emirates University
Sibel Erduran, University of Oxford
Ebru Kaya, Bogazici University
Najwa Alhosani, United Arab Emirates University
Lutfieh M Rabbani, United Arab Emirates University
Iman AlAmirah, United Arab Emirates University

Design of Elementary, Middle School and Secondary Science Methods Courses by Prospective Science Teacher Educators: Contents, Decision Making Process and Challenges (Virtual)

Jose M. Pavez, University of Georgia

Preservice Science Teachers' Implementation and Self-Efficacy About The Science And Engineering Practices (Virtual)

Fatma Kaya, Middle Tennessee State University

Lisa A. Borgerding, Kent State University

Shannon L. Navy, Kent State University

Tuesday, March 29, 2022

Concurrent Session # 9

3:40 pm-5:10 pm

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

SC-organized paper set-Modelling-based curriculum in secondary classrooms

3:40 PM-5:10 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Defining a Research Agenda for OpenSciEd Curriculum Materials

Kevin W. McElhaney, Digital Promise

Anthony Baker, Digital Promise

Babe Liberman, The Opportunity Trust

Zareen Kasad, Digital Promise

Carly Chillmon, Digital Promise

Jeremy Roschelle, Digital Promise

Tina Vo, University of Nevada- Las Vegas

Exploring Secondary Students' Explanations And Ideas On Evolution In A Modelling-based Task

Blanca Puig Mauriz, University of Santiago de Compostela

Noa Ageitos Prego,

Teachers' Use and Adaptation of a Model-based Climate Curriculum: A Three-year Longitudinal Study

Kimberly Carroll Steward, University Of Nebraska - Lincoln

Cory T. Forbes, University Of Nebraska–Lincoln

Mark Chandler , NASS GISS LAB/Columbia University

Tuesday 3-29-2022

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Socioemotional Factors in Science Teaching & Learning

3:40 PM-5:10 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Curriculum-Aligned Instruction and Formative Assessments: Promote Students' Academic and Social-Emotional Learning (Virtual)

I-Chien Chen, Michigan State University

Tingting Li, Michigan State University

Selin Akgun,

Emily C. Adah Miller, University of Wisconsin Madison

Joseph S. Krajcik, Michigan State University

Barbara Schneider, Michigan State University

How do immigrant students' self-theories affect PISA 2018 science achievement in three Anglophone countries?

Sibel KAYA, Kocaeli University

Nurullah Eryilmaz, University of Bath, UK

Dogan Yuksel, Kocaeli University, Turkey

Reducing Anxiety and Promoting Meaningful Learning of Difficult Biology Concepts: Can CTCA be a Fix? (Virtual)

Franklin U. Onowugbeda, ACEITSE – Lagos State University

Peter A. Okebukola, ACEITSE – Lagos State University

Deborah Oluwatosin Agbanimu, ACEITSE – Lagos State University

Fred A. Awaah, University of Professional Studies Accra

Ibukunolu Adebisi Ademola, ACEITSE – Lagos State University

Olasunkanmi Adio Gbeleyi, ACEITSE- Lagos State University

Adekunle Ibrahim Oladejo, ACEITSE – Lagos State University

Esther Oluwafunmilayo Peter, ACEITSE – Lagos State University

Adeleke Micha Ige, ACEITSE – Lagos State University

Science Learning, Theatre, and Practices of Respect: Generative Engagement through Embodying Science in Urban Elementary Classrooms (Virtual)

Rebecca Kotler, University of Illinois at Chicago

Maria Varelas, University Of Illinois At Chicago

Nathan Phillips, University Of Illinois At Chicago

Rachelle Tsachor, University Of Illinois At Chicago

Rebecca Woodard, University Of Illinois At Chicago

Amanda Diaz, University Of Illinois At Chicago

Meghan Rock, University Of Illinois At Chicago

Zachary Sabitt, University Of Illinois At Chicago

Tuesday 3-29-2022

Using ML-PBL Teaching Practices to Support Student Sensemaking and Social-Emotional Learning in Elementary Science Classrooms

Selin Akgun, Michigan State University

I-Chien Chen, Michigan State University

Tingting Li, Michigan State University

Emily C. Miller, University of Wisconsin Madison

Joseph S. Krajcik, Michigan State University

Susan K. Codere, MSU CRETE for STEM

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set-The Influence of Religious Identity in Evolution Education

3:40 PM-5:10 PM, Parq Salon A

Discussant: M. Elizabeth Barnes, Department of Biology, Middle Tennessee State University

Presider: <https://tinyurl.com/NARSTpresider>

The Influence of Religious Identity in Evolution Education - An Introduction to the Related Paper Set

Daniela Fiedler, Department of Biology Education, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

M. Elizabeth Barnes, Department of Biology, Middle Tennessee State University, USA

A 5-year Analysis of the Impact of Religion and Political Views on Acceptance of Evolution (Virtual)

Ryan Dunk, School of Biological Sciences, University of Northern Colorado, USA

Jason R. Wiles, Department of Biology, Syracuse University, USA

Religious Cultural Competence in Evolution Education and its Association with Changes in Student Acceptance of Evolution across the United States

M. Elizabeth Barnes, Department of Biology, Middle Tennessee State University, USA

Hayley Dunlop, Ohio State University Medical School, USA

Julie Roberts, Psychology Department, Northwestern University, USA

K. Supriya, Center for Education Innovation and Learning in the Science, University of California Los Angeles, USA

Sam Maas, School of Life Sciences, Arizona State University, USA

Baylee Edwards, School of Life Sciences, Arizona State University, USA

Yi Zheng, School of Life Sciences, Arizona State University, USA

Sara Brownell, School of Life Sciences, Arizona State University, USA

Evolution Education in Light of the Conception of Religious Science Teachers and Scientists towards Evolution and Religion (Virtual)

Reut Stahi-Hitin, Department of Science Teaching, Weizmann Institute of Science, Rehovot, Israel

Anat Yarden, Department of Science Teaching, Weizmann Institute of Science, Rehovot, Israel

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Daniela Fiedler, Department of Biology Education, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

Sources of Validity Evidence for Evolution Acceptance of Creationists: A Matter of Microevolution and Macroevolution (virtual)

Anna Beniermann, Department of Biology Education, Humboldt-Universität zu Berlin, Berlin, Germany

Alexandra Moormann, Museum für Naturkunde – Leibniz Institute for Research in Evolution and Biodiversity, Berlin, Germany

Daniela Fiedler, Department of Biology Education, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

K. Supriya, Center for Education Innovation and Learning in the Science, University of California Los Angeles, USA

Sam Maas, School of Life Sciences, Arizona State University, USA

Baylee Edwards, School of Life Sciences, Arizona State University, USA

Yi Zheng, School of Life Sciences, Arizona State University, USA

Sara Brownell, School of Life Sciences, Arizona State University, USA

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

SC-organized paper set-Modelling-based curriculum in secondary classrooms

3:40 PM-5:10 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Defining a Research Agenda for OpenSciEd Curriculum Materials (Virtual)

Kevin W. McElhaney, Digital Promise

Anthony Baker, Digital Promise

Babe Liberman, The Opportunity Trust

Zareen Kasad, Digital Promise

Carly Chillmon, Digital Promise

Jeremy Roschelle, Digital Promise

Tina Vo, University of Nevada- Las Vegas

Exploring Secondary Students' Explanations And Ideas On Evolution In A Modelling-based Task

Blanca Puig Mauriz, University of Santiago de Compostela

Noa Ageitos Prego,

Teachers' Use and Adaptation of a Model-based Climate Curriculum: A Three-year Longitudinal Study

Kimberly Carroll Steward, University Of Nebraska - Lincoln

Cory T. Forbes, University Of Nebraska–Lincoln

Mark Chandler , NASS GISS LAB/Columbia University

Tuesday 3-29-2022

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

SC-organized paper set-Faculty Perceptions of Instruction and Teaching Professional Development

3:40 PM-5:10 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

Development of Multidimensional Framework for Exploring Undergraduates' Conceptions of Studying Science: Student and Faculty Perspectives

Angela N. Google, University of South Alabama

Jeremiah Henning, University of South Alabama

Anna S. Grinath, Idaho State University

Grant E. Gardner, Middle Tennessee State University

Limited or Complete? Conceptions of Teaching and Learning for STEM Teaching vs. Research Faculty

Veronika Rozhenkova, University of California, Irvine

Lauren Snow, University of California, Irvine

Brian Sato, University Of California, Irvine

Natascha Trellinger Buswell, University Of California, Irvine

Managing disruptions and dilemmas in online geoscience instruction during the COVID-19 pandemic (Virtual)

Kathryn M. Bateman, Temple University

Brandin Conrath, The Pennsylvania State University

Joy Ham, Temple University

Ellen Altermatt, Utah Education Policy Center

Anne Egger, Central Washington University

Ellen Iverson, Science Education Resource Center - Carleton College

Cathryn Manduca, Science Education Resource Center - Carleton College

Eric Riggs, Humboldt State University

Kristen St. John, James Madison University

Thomas F Shipley, Temple University

Pedagogical Complexity for Engineering Professors: Learning from a Pilot of the SPARK-ENG Professional Learning Program

Mijung Kim, University of Alberta

Janelle McFeetors, University of Alberta

Kerry Rose, University of Alberta

Qingna Jin, University of Alberta

Sreyasi Biswas,

Jason Carey, University of Alberta

Janice Miller-Young, University of Alberta

Marnie Jamieson, University of Alberta

Samer Adeeb, University of Alberta

Tuesday 3-29-2022

Strand 6: Science Learning in Informal Contexts

SC-organized paper set-Leveraging informal learning for formal learning

3:40 PM-5:10 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

Cognitive Load, Transfer, and Instructional Decision Making in Middle School STEM Integration

Angela M. Kelly, Stony Brook University

Monica Bugallo, Stony Brook University

Dioramas as a Place for Play and Early Science Learning: Exploring Teachers' Perspectives and Experiences

Jamie Wallace, American Museum of Natural History

Jenny D. Ingber, American Museum of Natural History

Sue Dale Tunnicliffe, University College London Institute of Education

Navigating Sociocultural Constraints that Influence African American Students' Participation in STEM: Deconstructing STEM Access

Lezly Taylor, Virginia Polytechnic Institute and State University

Brenda R. Brand, Virginia Tech University

George E. Glasson, Virginia Polytechnic Institute and State University

Anza Mitchell, Virginia Tech University

Takumi Sato, Virginia Tech

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Investigating Relationships between PCK Components

3:40 PM-5:10 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Influence of pre-service teachers' interactive use of content-specific knowledge components from students' point of view

Olutosin Solomon Akinyemi, University of the Witwatersrand

Adeniran G Adewusi, university of pretoria

Measuring the effects of scaffolds in a video-based learning environment for pre-service biology teachers

Marie Irmer, Biology Education, LMU Munich

Dagmar Traub, Biology Education, LMU Munich

Maria Kramer, Biology Education, LMU Munich

Christian Förtsch, Biology Education, LMU Munich

Birgit Jana Neuhaus, Biology Education, LMU Munich

Relationships Among Preservice Science Teachers' Discipline-, Domain- and Topic-Specific PCK - An Exploratory Study

Tuesday 3-29-2022

Sarah Voss, Drake University
Jerrid W. Kruse, Drake University
Maryann Huey, Drake University

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Investigating Relationships between PCK Components

3:40 PM-5:10 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Influence of pre-service teachers' interactive use of content-specific knowledge components from students' point of view

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Maria Kramer, Biology Education, LMU Munich
Christian Förtsch, Biology Education, LMU Munich
Birgit Jana Neuhaus, Biology Education, LMU Munich

Relationships Among Preservice Science Teachers' Discipline-, Domain- and Topic-Specific PCK - An Exploratory Study

Sarah Voss, Drake University
Jerrid W. Kruse, Drake University
Maryann Huey, Drake University

Strand 8: In-service Science Teacher Education

SC-organized paper set-Personal Factors Shaping Teacher Growth

3:40 PM-5:10 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Defining Teacher Ownership: A Science Education Case Study to Determine Categories of Teacher Ownership

Ana Valdmann, Scientist
Miia Rannikmaa, Professor
Jack Holbrook, Professor

Self-regulated Learning Professional Development for Science Teachers: A Systematic Literature Review (Virtual)

Daniel K. Capps, University of Georgia

Tuesday 3-29-2022

Hong Tran, UGA
Timothy J. Cleary,

What keeps rural science teachers in rural schools?: Teacher professional resilience
Diane Susan Wright, Colorado State University
Meena M. Balgopal, Colorado State University

A Review of Literature on Professional Learning for Science Teachers of Students with Learning Disabilities in the K-12 Setting
Sahrish S. Panjwani, University of Georgia

Strand 10: Curriculum and Assessment

SC-organized paper set-Methodological approaches to designing science assessment tasks
3:40 PM-5:10 PM, Parq Salon D (**livestream** 1)

Presider: <https://tinyurl.com/NARSTpresider>

Designing for Engineering: A Model for Integrating Engineering and Science NGSS Middle School Benchmark Assessments
Maia K. Binding, UC Berkeley - Lawrence Hall of Science
Lauren Brodsky, The Learning Design Group

Exploring the Comparability of Multiple-Choice and Constructed-Response Versions of Scenario-Based Assessment Tasks
Cari F. Herrmann Abell, BSCS Science Learning
Joseph M. Hardcastle, BSCS
George E. De Boer, American Association for the Advancement Of Science - Project 2061

Mining the Potential of "Wrong Answers" in Item Pairs to Describe Students' Alternative Thinking (Virtual)
Jim A Minstrell, Facet Innovations
Philip Hernandez, Stanford University
Min Li, University Of Washington
Ruth A. Anderson, FACET Innovations, LLC
Maria Araceli Ruiz-Primo, Stanford University
Xiaoming Zhai, University of Georgia
Dongsheng Dong, amazon
Klint Kanopka, Stanford University

Bayesian versus Frequentist Estimation for Item Response Theory (IRT) Models of Interdisciplinary Science Assessment
Hye Sun You, Arkansas Tech University
Seounghun Lee, University of Texas at Austin

Tuesday 3-29-2022

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Gender and Sexual Identity Inclusivity in STEM

3:40 PM-5:10 PM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

Don't forget about the LGBTQIA+: Toward a more robust queer theory in science education

Ashley N. Jackson, University Of Michigan

Darrell Allen, University Of Michigan

Education Research Experiences for Pre-Health Students Enhance Clinical Skills and Develop

Awareness of LGBTQ+ Microaggressions (Virtual)

Laura A Weingartner, University of Louisville School of Medicine

Emily J Noonan, University of Louisville School of Medicine

M. Ann Shaw, University of Louisville School of Medicine

Linda C. Fuselier, University of Louisville

Supporting Secondary Science Teachers' Awareness of Gender Variance and Creation of Gender-Inclusive Lesson Plans

Stephanie S Eldridge, University of Georgia

Georgia Hodges, University Of Georgia

Gender Atypical? Examining the Gender Identities of Women in Engineering (Virtual)

Ursula Nguyen, The University of Texas at Austin

Catherine Riegle-Crumb, University of Texas

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set-Raciolinguistic Perspectives in Science Education

3:40 PM-5:10 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Who gets to sound "like a scientist"? Scientific language as a process of authentication

Quentin C. Sedlacek, Southern Methodist University

Language ideologies in science course materials

Catherine Lemmi, California State University, Chico

Talking beyond science: Deconstructing whiteness and hegemonic language ideologies in preservice science teacher education

Caroline T. Spurgin, UC Santa Cruz

Sara Tolbert, Te Whare Wananga O Waitaha University of Canterbury

Language-as-race: Segregated science education and why it matters for efforts to include 'English learners' today (Virtual)

Tuesday 3-29-2022

Kathryn L. Kirchgasler, University of Wisconsin–Madison
Cynthia T. Baeza, University of Wisconsin–Madison

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Implementing Personalized Digital Platforms to Enhance Student Learning During the Pandemic

3:40 PM-5:10 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Learning Analytics in a Designed Learning Platform During the Covid-19 Pandemic (Virtual)
Michael Adelani Adewusi, Lagos State University (ACEITSE), Ojo

Mobile Learning in the Physics Classroom – Should Students Bring or Schools Provide Smartphones? (Virtual)

Daniel Laumann, University of Münster
Malte Ubben, University of Münster
Susanne M. Heinicke, University of Münster
Stefan Heusler, University of Münster

The influence of a personalized online environment for chemistry teaching and learning on students' outcomes

Ehud Aviran, The Weizmann Institute Of Science
Ron Blonder, The Weizmann Institute Of Science

Using an Adaptive Learning System Teaching Engineering Students: Challenges and Opportunities

Frikkie George, Cape Peninsula University of Technology
Keith R. Langenhoven, University Of the Western Cape
Ekaterina Rzyankina, Cape Peninsula University of Technology

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

SC-organized paper set-Nature of Science in K-12 Education

3:40 PM-5:10 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Middle School Students' Understanding of Nature of Science and Their Metacognitive Awareness

Dilara Goren, Bogazici University
Ebru Kaya, Bogazici University

Structuralist or inferential: Which better helps to understand children comprehension of scientific representations?

Tuesday 3-29-2022

Fernando Flores-Camacho, Universidad Nacional Autónoma de México
Leticia Gallegos-Cázares, Universidad Nacional Autónoma de México

Students' Understandings about Nature of Science and Their Argumentation Skills
Rola Khishfe, American University of Beirut

Teaching K12 Engineering — Educator's Views of Practices, Nature, and Knowledge (Virtual)
Brian D Hartman, Walla Walla University
Randy L. Bell, Oregon State University

Strand 15: Policy, Reform, and Program Evaluation

Related Paper Set-Supporting Expansive Conceptions of Science Teaching and Learning for Equity

3:40 PM-5:10 PM, Parq Salon E (**livestream** 2)

Discussant: Tiffany Neill, Oklahoma State Department of Education

Presider: <https://tinyurl.com/NARSTpresider>

Design Principles, Change Theory, and Infrastructuring Needs for Implementation
Abby Rhinehart, University of Washington
Deb L. Morrison, University Of Washington
Philip L. Bell, University Of Washington
Maya Garcia, Colorado Department of Education
Tiffany Neill, Oklahoma State Department of Education

Science Education Leaders' Sense-making and Noticing for Equity
Riley Ceperich, University of California LA
Trang Tran, University of Colorado Boulder
Yamileth Salinas Del Val, University of Colorado Boulder
Kristen Davidson, University of Colorado Boulder

A Landscape Survey Analysis of the Potential for Equity-focused Science Education across the PK-12 Education System
Philip L. Bell, University Of Washington
Abby Rhinehart, University of Washington Seattle
Melissa Campanella, University of Colorado Boulder

*Supporting Science Teachers in Using Student Experience Data to Support More Equitable Participation in Science Classrooms *presenting authors*
Ali Raza, University of Colorado Boulder
*William R. Penuel, University of Colorado Boulder
*Yamileth Salinas Del Val, University of Colorado Boulder

Tuesday 3-29-2022

Administrative Session: Publications Advisory Committee

Admin Symposium-How to Get Your Research Published in Science Education Journals

3:40 PM-5:10 PM, (100% Virtual)

<https://ets.zoom.us/j/6566675605?pwd=eDBYUTNzelgzN2lYdVNWM1ZoTVpZQT09>

Meeting ID: 656 667 5605

Passcode: 5R@0V

Organizers

Saouma B. Boujaoude, American University Of Beirut

Dante Cisterna, Educational Testing Service

Ibrahim H. Yeter, National Institute of Education, Nanyang Technological University

Journal of Research in Science Teaching (JRST)

Felicia Mensah, Columbia University

Troy Sadler, University of North Carolina Chapel Hill

Science Education

Sherry Southerland, Florida State University

John Settlage, University of Connecticut

School Science and Mathematics (SSM)

Bridget Miller, University of South Carolina

Christie Martin, University of South Carolina

Journal of Science Teacher Education (JSTE)

Geeta Verma, University of Colorado, Denver

Todd Campbell, University of Connecticut

Wayne Melville, Lakehead University

Journal of Science Education and Technology (JSET)

Kent Crippen, University of Florida

Studies in Science Education (SSE) (Virtual)

Lucy Avraamidou, University of Groningen

Justin Dillon, University of Exeter

Science and Education (Virtual)

Sibel Erduran, Oxford University

Cultural Studies of Science Education

Catherine Milne, New York University

Christina Siry, University of Luxembourg

Tuesday 3-29-2022

International Journal of Science Education (IJSE)

Gail Jones, North Carolina State University

Jan van Driel, The University of Melbourne

Research in Science Education (RSE)

Angela Fitzgerald, University of Southern Queensland

Kim Nichols, University of Queensland

Computers and Education

Rachelle S. Heller, George Washington University

Journal of the Learning Sciences

A. Susan Jurow, University of Colorado, Boulder, USA

Jianwei Zhang, University at Albany, State University of New York, USA

Canadian Journal of Science, Mathematics and Technology Education

Doug McDougall, OISE, University of Toronto, Canada

Asia-Pacific Science Education

Sonya Martin, Seoul National University

CBE-Life Science Education

Kimberly Tanner, San Francisco State University

Jeff Schinske, Foothill College

Tuesday 3-29-2022

Administrative Session: Awards Committee

Distinguished Contributions to Science Education through Research Award Panel, A Celebration of NARST Award Recipients: A Discussion of the Future of Science Education
3:40 PM-5:10 PM, Parq Salon F (**livestream** 3)

Presider: Noemi Waight, University at Buffalo

The 2022 recipients of the NARST Distinguished Contributions to Science Education through Research Award will present on their career scholarship.

**DISTINGUISHED CONTRIBUTIONS TO SCIENCE EDUCATION THROUGH
RESEARCH AWARD (DCRA)**

Dr. Fouad Abd-El-Khalick
Dean and Professor of Science Education, School of
Education,
University of North Carolina at Chapel Hill



Dr. M. Gail Jones
Alumni Distinguished Graduate Professor, College of
Education,
North Carolina State University



Tuesday, March 29, 2022
Concurrent Session # 10
5:20 pm-6:50 pm

Strand 1: Science Learning: Development of student understanding

SC-organized paper set-Inscriptions in Science Learning

5:20 PM-6:50 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

A novel method for measuring problem-definition progression of middle schoolers: Use of student artifacts 1

Ferah Ozer, The University of North Carolina at Chapel Hill

Nihal Dogan, Bolu Abant Izzet Baysal University

Narrowing the Gap Between Experiments, Texts and Pictures – Investigation of an Extended Contiguity Principle (Virtual)

Paul Schlummer, Institute of Physics Education (IDP) at the University of Münster

Stefan Heusler, Institute of Physics Education (IDP) at the University of Münster

Daniel Laumann, Institute of Physics Education (IDP) at the University of Münster

Science Notebooks in Preschool Education

Elena Calderón-Canales, Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México.

Leticia Gallegos-Cázares, Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México.

Fernando Flores-Camacho, Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México.

Students' Sensemaking Related to Mathematical Equations in A Biology Classroom (Virtual)

Desi, University of Minnesota

Cuc Vu,

Gillian Roehrig, University of Minnesota

Anita Schuchardt, University of Minnesota

Tuesday 3-29-2022

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Early Childhood & Elementary Science Teaching & Learning

5:20 PM-6:50 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Australian Primary School Students' Understandings about the Nature of Scientific Inquiry

Patricia D Morrell, The University of Queensland

Jana Visnovska, The University of Queensland

Jodie Miller, The University of Queensland

Elementary Teachers' Agency for Teaching Science and Engineering when Working Within and Against School Structures

Alison Mercier, University of Wyoming

Using Photovoice to Understand Children's Experiences and Environmental Science Learning at a Nature Preschool

Laura Dell, University of Cincinnati

Using the Scientific and Engineering Practices Observation Protocol (SciEPOP) to Explore Play-based Early Learning Environments

Alison R. Miller, Bowdoin College

Lauren P. Saenz, Bowdoin College

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

Admin Symposium-Enhancing Science and Engineering in Preschool through Fifth Grade: A National Academies Consensus Study

5:20 PM-6:50 PM, Parq Salon D (**livestream** 1)

Panelists

Elizabeth A. Davis, University of Michigan

Amy Stephens, National Academies of Sciences, Engineering, and Medicine

Heidi B. Carlone, Vanderbilt University

Eve Manz, Boston University School of Education

Carrie Tzou, University of Washington Bothell

Carla Zembal-Saul, Penn State University

Lucy Avraamidou, University Of Groningen

Tia C. Madkins, The University of Texas At Austin

Felicia M. Mensah, Teachers College, Columbia University

Tuesday 3-29-2022

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

SC-organized paper set-Pedagogical content knowledge for secondary science teachers

5:20 PM-6:50 PM, Parq Salon E (**livestream** 2)

Presider: Andrea Moeller, University of Vienna

Investigating a Chemistry Teacher's modeling-PCK in the Periodic Table Modeling-Based Instruction (Virtual)

Ya-Ping Tsao, National Taiwan Normal University Graduate Institute of Science Education
Mei-Hung Chiu, National Taiwan Normal University Graduate Institute of Science Education
Mao-Ren Zeng, National Taiwan Normal University Graduate Institute of Science Education
Yen-Tzu Liao, National Taiwan Normal University Graduate Institute of Science Education
Sin-Yun Syu, National Taiwan Normal University Graduate Institute of Science Education
Li-Ya Wang, National Taiwan Normal University Graduate Institute of Science Education

Pre-Service Biology Teachers' PCK about Scientific Reasoning (Virtual)

Leroy Großmann, Freie Universität Berlin
Merryn Dawborn-Gundlach, University of Melbourne
Jan H. Van Driel, University Of Melbourne
Dirk Krüger, Freie Universität Berlin
Moritz Krell, Leibniz Institute for Science and Mathematics Education (IPN)

The impact of assessment change on teachers' orientations and PCK for high school laboratory practices

Vanessa Kind, Durham University
Helen Cramman, Durham University
Helen F Gray, Durham University

The topic specific PCK of videos on the big idea, "What is chemical equilibrium" (Virtual)

Marissa S. Rollnick, Wits University
Stephen A. Malcolm, University of the Witwatersrand

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

SC-organized paper set-Learning About Science, Engineering and Social Issues

5:20 PM-6:50 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

College Students' Epistemological Beliefs about Medical Science and Trust in Science and Scientists during COVID-19 (virtual)

Lisa A. Borgerding, Kent State University
Bridget K. Mulvey, Kent State University

Engineering students' self-efficacy and civic responsibility in a social innovation curriculum
Tiffanyrose Sikorski, George Washington University
Erica Wortham, George Washington University

Investigating graduate student and instructors' course experiences "Teaching and Learning Science for Social Justice"

Iesha Jackson, University of Nevada- Las Vegas

Tina Vo, University of Nevada- Las Vegas

Sabrina Barakat, UNLV

Nicole J. Thomas, University of Nevada, Las Vegas

Sarah York, UNLV

Abigale Ly, UNLV

Utilizing argument-driven inquiry with scaffolding to improve socioscientific argumentation in undergraduate students (Virtual)

Sarah Krejci, Bethune-Cookman University

Hector N Torres, Bethune-Cookman University

Raphael D Isokpehi, Bethune-Cookman University

Dana L Zeidler, University of South Florida

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Creating spaces and resources for high quality learning in pre-service teacher education

5:20 PM-6:50 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Examining Virtual Rehearsals and Practice Science Teaching as Support Systems for Rural Elementary Teacher Residents

Stephen L. Thompson, University of South Carolina

Amber Adgerson, University of South Carolina

Finding high-quality mentor feedback for science pre-service teachers

Caroline Hadley Long, University of Washington

Mark Windschitl, University Of Washington

Karin Lohwasser, University of California, Santa Barbara

Soo-Yean Shim, University of Illinois

Tammy Q. Tasker, Western Washington University

Learning to Teach During a Pandemic: Preservice Secondary Science and Mathematics Teachers' Use of Resources

Matthew D. Bennett, University of California, Santa Barbara

Valerie Valdez, University of California, Santa Barbara

Cameron Dexter-Torti, University of California, Santa Barbara

Tuesday 3-29-2022

Donald McNish, University of California, Santa Barbara
Liliana Garcia, University of California, Santa Barbara
T. Royce Olarte, University of California, Santa Barbara
Sarah Hough, University of California, Santa Barbara
Sarah A. Roberts, University of California, Santa Barbara
Julie A. Bianchini, University of California, Santa Barbara

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Toward inclusive and just outcomes for diverse learners

5:20 PM-6:50 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Challenges with Inclusive Teaching at Vocational Schools in Germany

Simone Rueckert, University of Duisburg-Essen

Helena Van Vorst, University of Duisburg-Essen

Cultivating Discourse of English Learners During the Enactment of Cognitively Demanding Work

Walter Aminger, University Of California, Santa Barbara Nevada State College

Preservice Teacher Noticing, Interpreting, Responding to Students' Sensemaking Resources for Equitable Access to Science Understanding

Judith A. Cooper-Wagoner, University of Arizona

Kristin L. Gunckel, University Of Arizona

The Paradox of Dedication: Agonistic interviews on preservice science teacher students' choice-narratives

Jeppe Langkjær, University College Copenhagen

Bjørn Friis Johannsen, University College Copenhagen

Maria Rejkjær Holmen, University College Copenhagen

Strand 8: In-service Science Teacher Education

SC-organized paper set-Teacher Learning and Practice during the Pandemic

5:20 PM-6:50 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

Exploring Teachers' Experience and Implementation of the Science and Engineering Practices in Different Instructional Contexts

Cheng-Wen He, University of Georgia

Hong H. Tran, UGA

Yamil Ruiz,

Shaugnessy McCann,

Brooke A. Whitworth, Clemson University

Tuesday 3-29-2022

Julie A. Luft, University of Georgia

Identification and characterization of the essential knowledge domains for online chemistry teaching during Covid-19 pandemic

Itsik Aroch, The Weizmann Institute of Science

Dvora Katchevich, The Weizmann Institute Of Science

Lili Orland-Barak, University of Haifa

Ron Blonder, The Weizmann Institute Of Science

The Experiences of Biology Teacher Coordinators Participating in a VPLC During the COVID-19 Crisis (Virtual)

Odelia Schrire, Technion

Dina Tsybulsky, Technion - Israel Institute Of Technology

Christine Ipsen, DTU

The role of professional learning communities (PLCs) in supporting chemistry teachers during the COVID-19 crisis (Virtual)

Anat Shauly,

Gabriella Shwartz, Dr.

Shirly Avargil, Dr.

Strand 10: Curriculum and Assessment

SC-organized paper set-Teacher collaborative design of three-dimensional performance assessments

5:20 PM-6:50 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

CoFee – Computer-based feedback design for written reflections in pre-service science teacher education

Peter Wulff, University of Potsdam

Lukas Mientus, University of Potsdam

Anna Nowak, University of Potsdam

Andreas Borowski, University of Potsdam

Examining the impact of using pilot data to support teachers in designing high quality three-dimensional performance assessments

Cathy Zozakiewicz, SNAP/SCALE

Jill A. Wertheim, Stanford University

Supporting Teachers' Capacity to Design for Coherent Assessment of Multidimensional Science Learning

Samuel Severance, University of California, Santa Cruz

Guadalupe Martinez, University of California, Santa Cruz

Tuesday 3-29-2022

Teacher Agency in a Responsive Co-Design Process of 3D Performance Assessments

Jill Wertheim, Stanford Center for Assessment, Learning, and Equity (SCALE)

Miray Tekkumru Kisa, Florida State University

Ozlem Akcil Okan, Florida State University

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Innovation in Conceptual and Methodological Research Approaches

5:20 PM-6:50 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Art-based Methods and Signs of Science Capital: Approaching Young Children's Experiences and Relation to Science

Katia Bill Nielsen, University of Copenhagen

Ene Ernst Hoppe, University of Copenhagen

Henriette T. Holmegaard, University Of Copenhagen

Ethnodance as a Critical Identity Tool for Black Students' Science Identity Construction

Mindy J. Chappell, University of Illinois at Chicago

Patchworking Critical and Cultural-Historical Activity Theoretical Analytics for Research in Science Education

Caroline T. Spurgin, UC Santa Cruz

Alexandra I. Race, UC Santa Cruz

Doris B. Ash, University of California Santa CruzC Santa Cruz

Inclusive Science Education: Sheltered Instruction for English Language Learner

Hajira Nusret,

Saiqa Azam, Memorial University Of Newfoundland

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Multimedia, Artificial Intelligence, and Augmented Reality in Teaching and Learning

5:20 PM-6:50 PM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

A Bibliometric Analysis of Trends and Issues in Educational AI

Brian Abramowitz, University of Florida

Minyoung Lee, University of Florida

Pavlo Antonenko, University of Florida

An Eye-Tracking Study On Learning Representations In Organic Chemistry With Dynamic Signals

Tuesday 3-29-2022

In Instructional Videos

Marc Rodemer, IPN - Leibniz Institute for Science and Mathematics Education
Marlit A. Lindner, IPN - Leibniz Institute for Science and Mathematics Education
Julia Eckhard, Justus-Liebig-University Giessen
Nicole Graulich, Justus-Liebig Universität Giessen
Sascha Bernholt, IPN - Leibniz Institute for Science and Mathematics Education

Exploring Teachers' Conceptions of Artificial Intelligence in K-12 Science Education

Brian Abramowitz, University of Florida
Pavlo D. Antonenko, University Of Florida
Stephanie Killingsworth, University of Florida
Bruce MacFadden, University of Florida
Sadie Mills, University of Florida

Topic specific differences in supporting organic chemistry learning augmented reality based (Virtual)

Sebastian Keller, University of Duisburg-Essen
Sebastian Habig, FAU Erlangen-Nürnberg
Stefan Rumann, University Of Duisburg-Essen

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

SC-organized paper set-Nature of Science in Teacher Education

5:20 PM-6:50 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

"It's a lesson with no answer!": Understanding preservice teachers' lesson development using history of science (Virtual)

Wonyong Park, University of Southampton
Sibel Erduran, University of Oxford
Jinwoong Song, Seoul National University
Minchul Kim, Kongju National University

What is Physics? Considering Teachers' Epistemic Beliefs about Physics Knowledge
Ellen Watson, Brandon University

Teaching of NOSI in Outdoor Learning Environments in the Period of Covid-19 Pandemic (Virtual)

Eda Erdas Kartal, Kastamonu University
Gunkut Mesci, Giresun University

Pre-Service Chemistry Teacher's Beliefs regarding the use of Experiments and Nature of Science

Janne-Marie Bothor, University of Kassel
David S. Di Fuccia, University of Kassel

Tuesday 3-29-2022

Strand 15: Policy, Reform, and Program Evaluation

SC-organized paper set-Standards

5:20 PM-6:50 PM, Kitsilano Ballroom B

Presenter: <https://tinyurl.com/NARSTpresider>

Developing a Framework for Identifying Key Innovations in Novel Science Programs: A Learning-by-Making Case Study

Benjamin S Mahrer, WestEd

Gary Weiser, WestEd

Linlin Li, WestEd

Laura Peticolas, Sonoma State University

Lynn Cominsky, Sonoma State University

Searching for Nature of Engineering in the Framework for K-12 Science Education (Virtual)

Hasan Deniz, University of Nevada Las Vegas

Erdogan Kaya, George Mason University

Ezgi Yesilyurt, Weber State University

Private Industry's Push and Pull: Is Computer Science Really for All?

Stefanie L. Marshall, University of Minnesota- Twin Cities

Ain Grooms, University of Iowa

Social Covenants as Contextual Mitigating Factors (CMFs)

Katie L Brkich, Georgia Southern University

Alejandro J. Gallard, Georgia Southern University

Wesley Pitts, Lehman College, CUNY

S. Lizette Ramos, University of Guadalajara

Maria A Rodriguez, University of Texas Rio Grande Valley

Administrative Session: Research Committee

Admin Symposium-Supporting and Advancing Science Education Research Practice through Community Discussions

5:20 PM-6:50 PM, Kitsilano Ballroom D

Panelists

Stanley M. Lo, University of California San Diego

Francesca A. Williamson, Indiana University School of Medicine

Glenn R. Dolphin, Syracuse University

Joe Taylor, University of Colorado Colorado Springs

Scott Cohen, Georgia State University

Jordan L. Henley, University of Georgia

Mohammed Estaiteyeh, Western University

Theila Smith, University of Groningen

Robert M. Talbot, University of Colorado Denver

Administrative Session: Awards Committee

Early Career Research Award [ECRA], Outstanding Dissertation Research Award [ODRA], and NARST Fellows Award Panel: *A Celebration of NARST Award Recipients: A Discussion of the Future of Science Education, Session 2*

5:20 PM-6:50 PM, Parq Salon F (**livestream** 3)

Presider: Noemi Waight, University at Buffalo

Early Career Research Award (ECRA)

Dr. María González-Howard,
Assistant Professor,
The University of Texas at Austin



Dr. Laura Zangori,
Associate Professor,
University of Missouri



Outstanding Doctoral Research Award (ODRA)

Dr. Won Jung Kim,
Assistant Professor,
Santa Clara University



NARST Fellow Award

Dr. Peter A. Okebukola,
Distinguished Professor of Science and
Computer Education,
Lagos State University



Equity and Ethics Dinner (registration and prepay required)
7:15 pm-10:00 pm ~~Canceled~~

Wednesday March 30th

Committee Meetings (if needed) **7:30 am-8:30 am**

Committee	Room
Awards	Kitsilano D
Elections	Parq Salon B
Equity and Ethics	Parq Salon C
External Policy and Relations	Kitsilano Ballroom A
Graduate Students	Kitsilano Ballroom B
International	Kitsilano Ballroom C
Membership	Parq Salon D
Program [strand coordinators]	Parq Salon A
Research	Stanley
Social media, Website, Communications	Cambie

This time is reserved for those committees needing second meeting during the conference.
Committee meetings are open to the membership.

Wednesday, March 30, 2022
Concurrent Session # 11
8:45 am-10:15 am

Strand 1: Science Learning: Development of student understanding

SC-organized paper set-Students' Conceptual Development

8:45 AM-10:15 AM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Certain about uncertainty: quality of students' justifications in comparing data sets

Karel Kok, Humboldt-University

Burkhard Priemer, Humboldt-University

Constructing Science Concept Development: How Design Artifact Changes Reveal Mental Model Changes in Young Children

Christine McGrail, University of Massachusetts Amherst

Jeanne Brunner, University of Massachusetts Amherst

Martina Nieswandt, University of Massachusetts Amherst

How different approaches to science teaching influence vertical knowledge-linking within the concept of energy (Virtual)

Dennis Dietz, Freie Universität Berlin

Claus Bolte, Freie Universität Berlin

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-Equity & Social Justice in Science Teaching & Learning

8:45 AM-10:15 AM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

A Case for Humane Genetics Education: How Students Used Genetics Knowledge to Argue About a Racial Disparity

Dennis M. Lee, BSCS Learning Sciences

Brian M. Donovan, BSCS

Monica Weindling, BSCS Science Learning

Awais Syed, BSCS Science Learning

Equity Considerations in Earth Science Out-of-Field Teaching and Student Performance (Virtual)

Christine P. Schlendorf,

Angela M. Kelly,

Robert Krakehl, Stony Brook University

Multimodal revoicing: Embodied student resources to support students' explanations of science phenomena

Samuel Lee, Boston College
Kevin Cherbow, Florida State University
Katherine L. McNeill, Boston College

Toward a community of civic practice: a case study on service-based experiential learning in support of community driven science engagement

John R. Ruppert, Saint Peter's University
Jennifer Ayala, Saint Peter's University
Yosra Badiei, Saint Peter's University
Masiel C. Infante, Saint Peter's University
Jeanette Wilmanski, Saint Peter's University

Towards an Inclusion of All in Lab Courses – The Case of a Blind Student

Stefanie Lenzer, Institute for Science Education, Leibniz University Hannover
Marvin Roski, Institute for Science Education, Leibniz University Hannover
Andreas Nehring, Institute for Science Education, Leibniz University Hannover

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

Related Paper Set-Elementary Preservice Teachers Learning to Support Equitable Sensemaking
8:45 AM-10:15 AM, Parq Salon C

Discussant:

Presider: <https://tinyurl.com/NARSTpresider>

Elementary Preservice Teachers Investigating Local Phenomena and Problems: Envisioning Opportunities for Equitable Student Sensemaking (Virtual)

Anna Maria Arias, Kennesaw State University
Jessica Stephenson Reaves, Kennesaw State University

An Exploration of Learning Science Subject Matter Knowledge Through Teaching in a Methods Course

Ryan Nixon, Brigham Young University
Sarah J. Fick, Washington State University

Preservice Elementary Teachers' Recognition of Resources Students Bring to Science Learning

Sarah J. Fick, Washington State University
Stephany RunningHawk Johnson, Washington State University

Preservice Elementary Teachers Noticing Features of Classroom Instruction that Support Equitable Sensemaking

Amanda Benedict-Chambers, Missouri State University
Carrie-Anne Sherwood, Southern Connecticut State University
Okhee Lee, New York University

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

SC-organized paper set-Secondary science teachers' learning and noticing of student thinking
8:45 AM-10:15 AM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

An Exploratory Study of the Epistemic Goals of a First-Year Science Teacher
Todd L. Hutner, The University of Alabama

Beyond Excellence In Science Teaching Practice: Virtuosity In Science Teaching And Developing Virtuoso Teachers
Emrah Ozyurek,

Teacher noticing for epistemic agency: What cues teachers to open up space for student sensemaking?

Stina Krist, University of Illinois at Urbana-Champaign
Nitasha Mathayas, Indiana University
Soo-Yean Shim, University of Illinois
Susan B. Kelly, California State University Chico
Dan Voss, Dallas Center-Grimes High School
Nessrine Machaka, University of Illinois At Urbana - Champaign
Elizabeth B. Dyer, University of Tennessee, Knoxville

What Beginning and Experienced Secondary Science Teachers Notice in Videos of Classroom Instruction

Julie A. Luft, University of Georgia
Yuxi Huang, University of Georgia
Shelby Watson, Center for Mathematics and Science Education
Harleen Singh, University of Georgia
Hatice Ozen Tasdemir, The University of Georgia
Brooke A. Whitworth, Clemson University
Yamil Ruiz, Clemson University
Hong Tran, UGA
Shaugnessy McCann, University of Georgia
Cheng-Wen He, University of Georgia

Wednesday 3-30-2022

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

SC-organized paper set-Student Learning in Remote Contexts: Labs and Research

8:45 AM-10:15 AM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

A Meta-Study of Science Laboratories at a Distance

Mercy Ogunsola-Bandele, National Open University Of Nigeria

Dietmar Kennepohl, Athabasca University, Canada

Student Perspectives of Remote Participation in Authentic Research in an Undergraduate Ecology Laboratory Course

Stephen R. Burgin, University Of Arkansas

Adam M Siepielski, University of Arkansas

The Impact of Online STEM Teaching and Learning During COVID-19 on Underrepresented College Students' Self-Efficacy and Motivation (Virtual)

Sami Kahn, Princeton University

Janet Vertesi, Princeton University

The Varied Student Experience with Transitioning to Mandatory Online Chem Lab

Joseph V Watts, University of Florida

Corey A. Payne, University Of Florida

Kent J. Crippen, University of Florida

Lorelie Imperial, University of Florida

Melanie Veige, University of Florida

Strand 6: Science Learning in Informal Contexts

Symposium-Innovative approaches to theorizing and studying family STEM learning

8:45 AM-10:15 AM, Kitsilano Ballroom C

Discussant: Tali Tal, Technion

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Neta Shaby, Ben Gurion University of the Negev

Dana Vedder-Weiss, Ben-Gurion University Of the Negev, Israel

Scott A. Pattison, TERC

Smirla Ramos-Montañez, TERC

Irit Vivante, Ben Gurion University

Lucy R. McClain, Pennsylvania State University

Adam V. Maltese, Indiana University

Amber Simpson, Indiana University

Tali Tal, Technion

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Tools for Assessment in Preservice teacher learning

8:45 AM-10:15 AM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

An Evaluation Proposal for Pre-Service Primary Teachers: Self-Regulation of Learning and Emotions

Francisco José Castillo Hernández, University of Almeria

María Rut Jiménez Liso, University of Almeria

María Martínez Chico, University of Almeria

Rafael López-Gay, University of ALmeri

Are Knowledge and Acceptance of Evolution Aligned among Jewish Religious Preservice Science Teachers? (Virtual)

Merav Siani, Weizmann Institute of Science Herzog College

Anat Yarden, Weizmann Institute Of Science

Investigating Pre-service Science Teachers' Modeling Metaknowledge with Open-Ended Questions and Diagrams

Paul Engelschalt, Humboldt-Universität zu Berlin

Tom Bielik, Freie Universität Berlin

Moritz Krell, IPN - Leibniz Institute for Science and Mathematics Education, Kiel, Germany

Dirk Krüger, Freie Universität Berlin

Annette Upmeier Zu Belzen, Humboldt-Universität zu Berlin

Strand 8: In-service Science Teacher Education

SC-organized paper set-Teachers Working towards Inclusive Classrooms

8:45 AM-10:15 AM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

"I wanted to break the pencil": The Teacher's Role in Reframing Moments of Epistemic Vexation

Claudia Hagan, Georgia State University

Sierra L. Morandi, Florida State University

Victor Kásper, Florida State University

Sherry A. Southerland, Florida State University

Exploring How Engineering Instruction Supports Culturally Relevant Teaching Practices

Amanda M. Gunning, Mercy College

Meghan E. Marrero, Mercy College

Kristen V. Larson, Mercy College

The Interplay Between Scientific Evidence, Diversity and Dialogic Pedagogy
Nasser Mansour, Qatar University

Using Redirections to Examine Responsiveness to Student Thinking in Secondary Science Classrooms
Lauren N. Emery, San Diego State University

Strand 10: Curriculum and Assessment

Symposium-AI-Based Innovative Assessments in Science

8:45 AM-10:15 AM, Parq Salon E (**livestream** 2)

Discussant: Joseph Krajcik, Michigan State University

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Xiaoming Zhai, University of Georgia

Joseph S. Krajcik, Michigan State University

Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

Holly Amerman, University of Georgia

Changzhao Wang,

Marcus Kubsch, IPN - Leibniz Institute for Science and Mathematics Education

Mei-Hung Chiu, National Taiwan Normal University

AUSTIN HEIL, University of Georgia

Gary Weiser, WestEd

Ji Shen, University Of Miami

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Resistance and Resilience of Black Women and Black Students

8:45 AM-10:15 AM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

"Radical Openness and Possibility": Black Women's Resistance Strategies to the Oppressive Culture of STEM

Ekaete Udoh, University of Missouri

Michele Williams, University of Missouri

Terrell R. Morton, University of Missouri - Columbia

Counterstories of Black Women About What it Means to be a STEM Person

Amal Ibourk, Florida State University

Roxanne M. Hughes, Center for Integrating Research and Learning, NHMFL / FL State University

Lauren Wagner, Florida State University

Good Trouble: Interrogating the Definition of Black Resilience in STEM Education
Takeshia Pierre, University of Florida

Creating an Experience of Belonging Within Science: Exploring Science Identity Development in a Counterspace

Ivanna Pengelley, Florida State University

Amal Ibourk, Florida State University

Roxanne M. Hughes, Center for Integrating Research and Learning, NHMFL / FL State University

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Reinforcing and understanding effective instructional methods

8:45 AM-10:15 AM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Advancing Teachers' Geospatial TPACK: Three Universities' Professional Development Initiatives

Kate Popejoy, Popejoy STEM, LLC

Thomas Hammond, Lehigh University

Alec M. Bodzin, Lehigh University

Judith A. Morrison, Washington State University

Molly H. Weinburgh, Texas Christian University

Electrifying STEM Experiences Through Hybrid Teacher Professional Development (Virtual)

Erik J. Schettig, North Carolina State University

Tamecia R. Jones, North Carolina State University

Applying novel methods to characterize an online, science-based affinity space

Lisa Lundgren, Utah State University

Richard T. Bex, University of Florida

Emily Slater, Utah State University

Jennifer E. Bauer, University of Michigan Museum of Paleontology

Adriane R. Lam, Binghamton University SUNY

A. McKenzie Sonderegger, Utah State University

A Systematic Literature Review on the Use of Social Network Analysis in Discourse Studies

Brock Couch, Middle Tennessee State University

Grant E. Gardner, Middle Tennessee State University

Strand 14: Environmental Education and Sustainability

Related Paper Set-Modelling, Assessment, and Promotion of Climate Literacy

8:45 AM-10:15 AM, Parq Salon F (**livestream** 3)

Presider: <https://tinyurl.com/NARSTpresider>

Modelling and Assessing Climate Literacy – Development and Implementation of a Knowledge-in-Use Assessment Instrument (Virtual)

Hanno Michel, IPN - Leibniz Institute for Science and Mathematics Education

Ute Harms, IPN - Leibniz Institute for Science and Mathematics Education

Factors that Influence Learners' Climate Literacy and Conceptions of Climate Change (Virtual)

Nathan A. Quarderer, CIRES; Earth Lab University of Colorado Boulder

The Role of Risk Perception for Students' Climate-Friendly Intentions to Act

Carola Garrecht, IPN - Leibniz Institute for Science and Mathematics Education

Nina Christenson, Karlstad University

Ute Harms, IPN - Leibniz Institute for Science and Mathematics Education

Climate Literacy: What do teachers need to know? – A Delphi Study (Virtual)

Kathryn Leve, IPN - Leibniz Institute for Science and Mathematics Education

Ute Harms, IPN - Leibniz Institute for Science and Mathematics Education

Administrative Session: Equity And Ethics Committee

Admin Symposium-The intersections of 'displacement' and science education: Perspectives across international contexts

8:45 AM-10:15 AM, Stanley

Discussant: Bhaskar Upadhyay, University of Minnesota

Organizers

Sara Salloum, University of Balamand

Justina A. Ogoto, Baylor University

María González-Howard, University of Texas at Austin

Bhaskar Upadhyay, University of Minnesota

Panelists

Alejandro Gallard, Georgia Southern University, USA

Maha Shuyab, Centre for Lebanese Studies at the Lebanese American University, Lebanon

Geeta Verma, University of Colorado Denver, USA

Minjung Ryu, University of Illinois-Chicago, USA

Strand 15: Policy, Reform, and Program Evaluation

SC-organized paper set-Teachers and Training

8:45 AM-10:15 AM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Campus Association as a Predictor of Science Standard Evaluation using Multinomial Logistic Regression

Allison M. Esparza, Texas A&M University

Science Teachers Who Stay: Factors Contributing to Teacher Retention

Dorothy Holley, West Johnston High School

Soonhye Park, North Carolina State University

STEM Professionals in the Classroom and Elementary Teachers' Content Knowledge

Joanne K. Olson, Texas A&M University

Syahrul Amin, Texas A&M University

Jacob Pleasants, University of Oklahoma

The development and validation of the graduate student success survey: A quantitative study

Karen Marie Collier, North Carolina

Margaret R. Blanchard, NC State University

Administrative Session: International Committee

Admin Symposium-Science Education during the COVID-19 Pandemic

8:45 AM-10:15 AM, Parq Salon D (**livestream** 1)

Panelists

Sonya N. Martin, Seoul National University

Mauricio Pietrocola, University of Sao Paulo, Brazil

Ernani Vassoler Rodrigues, Federal University of Esp rito Santo, Brazil

Samuel M. Schnorr, Federal University of Rio de Janeiro, Brazil

Julie Nonnekens, University Medical Center Rotterdam, Netherlands

Saouma B. Boujaoude, American University Of Beirut, Lebanon

Savannah Graham, Texas Christian University, USA

Olivia Levrini, Alma Mater Studiorum, University of Bologna, Italy

Hayat Hokayam, Texas Christian University

Matthew Johnson, Pennsylvania State University, USA

Wednesday, March 30, 2022
Concurrent Session # 12
10:30 am-12:00 pm

Strand 1: Science Learning: Development of student understanding

SC-organized paper set-Students' Reasoning

10:30 AM-12:00 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

6th-graders' decision-making and informal reasoning about de-extinction (Virtual)

Nannan Fan, University of North Carolina at Chapel Hill

Collaborative drawing to enable and enact reasoning-in-action.

Vanessa De Andrade, Institute of Education of University of Lisbon

Yael Shwartz, The Weizmann Institute Of Science

Sofia Freire, Institute of Education of University of Lisbon

Mónica Baptista, Instituto De Educação Da Educação Da Universidade De Lisboa

High School Students' Reasoning about the Immune System in Beirut, Lebanon

Ihsan Ghazal, Texas Christian University

Hayat Alhokayem, Texas Christian University

Using Hurricane Resilience to Foster the Development of Student Understanding of Ecosystems in Puerto Rico (Virtual)

Steven McGee, The Learning Partnership

Randi McGee-Tekula, The Learning Partnership

Noelia Baez Rodriguez, University of Puerto Rico

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Symposium-Teacher change of practice during Project-based science learning enactment: Case studies across diverse contexts.

10:30 AM-12:00 PM, Stanley

Discussant: Samuel Severance, University of California, Santa Cruz

Presider: Joseph S. Krajcik, Michigan State University

Panelists

Miranda S. Fitzgerald, University of North Carolina At Charlotte

Tingting Li, CREATE for STEM Institute

Cory Susanne Miller, Michigan State University

Emily C. Adah Miller, University of Wisconsin Madison

Selin Akgun,
Katy Easley, University of Michigan
Joseph S. Krajcik, Michigan State University
Samuel Severance, University of California, Santa Cruz
Susan K. Codere, MSU CREATE for STEM

Strand 2: Science Learning: Contexts, Characteristics and Interactions
SC-organized paper set-Instructional & Curricular Approaches in Science Teaching & Learning

10:30 AM-12:00 PM, Cambie

Presider: <https://tinyurl.com/NARSTpresider>

Pedagogical Moves That Support Coordinating Communication and Co-Authorship in a Multilingual Science Classroom (Virtual)

Shakhnoza Kayumova, Associate Professor of Science Education at the University of Massachusetts Dartmouth

Akira Harper, PhD Candidate at the University of Massachusetts Dartmouth

Eleanor Richard, PhD Candidate at the University of Massachusetts Dartmouth

Noemi Waight, Associate Professor of Science Education at the University at Buffalo

Impacts of a science teacher's curricular enactment and innovation on students' opportunities for scientific sensemaking

Sage Andersen, University of Texas At Austin

María González-Howard, University of Texas at Austin

Karina D Méndez Pérez, University of Texas At Austin

Instructional Strategies to Manage Scientific Uncertainties for Productive Sensemaking: Exploring Korean and American Classrooms

Heesoo Ha, Center for Educational Research, Seoul National University

Ying-Chih Chen, Arizona State University

Jongchan Park, Arizona State University

Language for scientific sensemaking: Examining a teacher's understandings and instruction for supporting their multilingual students

María González-Howard, University of Texas at Austin

Sage Andersen, University of Texas At Austin

Karina Del Carmen Mendez Perez,

Pre-service Teachers' Motivations to Participate in the Near-Peer Mentoring Program (Virtual)

Ilkem Özdiñç, Bogazici University

Dilara Kara, Bogazici University

Busra Karga, Bogazici University

Gaye Ceyhan, Bogazici University

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

SC-organized paper set-Socio-scientific issues: Assessment and conceptions in diverse contexts

10:30 AM-12:00 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Formative Assessment in Socio-scientific Issues-based Science Lessons: How Teachers do this (Virtual)

Dürdane Dury Bayram-Jacobs, Eindhoven University of Technology

Ineke Henze, Radboud University

Judith Gulikers, Wageningen University & Research

Putting on a 'skeptical hat': Teachers' and students' conceptions of critiquing socioscientific data infographics

Emily Reigh, Stanford

Daniel Pimentel, Stanford University

Bryan A. Brown, Stanford University

Victor Lee, Stanford University

The Intersection of Socioscientific Issues and Classroom Diversity: Affordances and Benefits (Virtual)

Sanlyn Buxner, Planetary Science Institute and the University Of Arizona

Lauren Cabrera, Virginia Commonwealth University

Ananya Matewos, Saint Norbert College

Janelle M. Bailey, Temple University

Using Socioscientific Issues to Promote Middle School Students' Evidence-Based Reasoning and Decision-Making on Hydraulic Fracking

Wardell Anthony Powell, Framingham State University

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

SC-organized paper set-Student Persistence and Well-Being

10:30 AM-12:00 PM, Parq Salon C

Presider: <https://tinyurl.com/NARSTpresider>

Analysis of the Interplay between Study Satisfaction, Content Knowledge and Drop-out Intention in Chemistry Studies

Vanessa Fischer, University of Duisburg-Essen

Bianca Schindeldecker, University of Duisburg-Essen

Elke Sumfleth, University Of Duisburg-Essen

Maik Walpuski, University Of Duisburg-Essen

Effect of a Year-long Career-forward Chemistry Laboratory Curriculum on Persistence of Students Majoring in Engineering (virtual)

Corey A. Payne, University Of Florida

Kent J. Crippen, University of Florida

Going beyond the Content: Impact of a Values Affirmation Writing Exercise on Student Outcomes in an Undergraduate Majors' Biology Course

Emily M. Walter, California State University - Fresno

Micah J. Johnson, California State University - Fresno

Orlando N. Lopez, California State University - Fresno

Glen Martin, California State University - Fresno

Undergraduate Biology Student Perceptions of Wellness Interventions

McKenzie N Jevnikar, NC State University

Colette E Pappas, NC State University

Lisa M Paciulli, NC State University

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

SC-organized paper set-Students' Learning Science and Engineering Practices

10:30 AM-12:00 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

A Model for Facilitating Multidisciplinary Justifications in Engineering Design Challenges

Carina M. Rebello, Purdue University

An investigation of argumentation task framing on students' use of data in introductory biology

Erika Offerdahl, Washington State University

Jessie Arneson, Washington State University

Brett Baerlocher, Idaho State University

Guraustin Brar, Washington State University

Nyck Ledezma, San Louis Obispo

Esperanza Artiles, Central Washington University

Andy Cavagnetto, Washington State University

Drawing-to-Learn in an Undergraduate Herpetology Course: Drawing as a scientific practice to develop Professional Vision

Ashelee Rasmussen, Idaho State University

Charles R. Peterson, Idaho State University

Anna S. Grinath, Idaho State University

When Multimodality Meets Modeling: A Case Study of Preservice Elementary Teachers Building Knowledge in Science (Virtual)

Ayca K. Fackler, University of Georgia

Strand 7: Pre-service Science Teacher Education
SC-organized paper set-On becoming a science teacher
10:30 AM-12:00 PM, Kitsilano Ballroom B

Presider: <https://tinyurl.com/NARSTpresider>

"Seriously... I Want to Teach": Exploring Motivations of Science Majors Pursuing Teaching Careers

Austin Heil, University of Georgia

Julie A. Luft, University of Georgia

An Expanded Understanding of the Influence of Antecedent Socialization on the Choice to Become a Science Teacher

Emma J. Refvem, North Carolina State University

M. Gail Jones, North Carolina State University

Sarah J. Carrier, North Carolina State University

Kathryn Rende, North Carolina State University

Julianna Nieuwsma, NC State University

Tammy D. Lee, East Carolina University

Amy R. Taylor, University Of North Carolina At Wilmington

Development of Teacher Identity: From 'I can teach Science' to 'I can teach STEM' (Virtual)

Saiqa Azam, Memorial University Of Newfoundland

Karen Goodnough, Memorial University Of Newfoundland

Strand 8: In-service Science Teacher Education
SC-organized paper set-Large Scale Investigations Measures of Teacher Learning
10:30 AM-12:00 PM, Parq Salon E (**livestream 2**)

Presider: <https://tinyurl.com/NARSTpresider>

Changes in Teachers' Beliefs and Confidence across Multiple Rounds of Professional Development

Benjamin R. Lowell, Boston College

Katherine L. McNeill, Boston College

Developing Science Teachers Professional Competence in Opened Experimentation – An Intervention Study

Markus Emden, Zurich University of Teacher Education

Arne Bewersdorff, Technical University of Munich

Armin Baur, Heidelberg University of Education

Response Shifts in Measurement of Teacher Growth (Virtual)

Andrea Ash, University of Iowa

Gavin W. Fulmer, University Of Iowa

Strengthening Teachers' Confidence to Mentor Students in STEM Research and Science & Engineering Fair Competitions: PD Models for In-person and Virtual Formats (Virtual)

Julie Angle, Oklahoma State University

Rachel Hartnett, Mount St. Mary's University Emmitsburg, MD

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Structural and Cultural Approaches to Identity and Its Influence

10:30 AM-12:00 PM, Parq Salon D (**livestream** 1)

A Cultural Impostor? Native American Experiences of the Impostor Phenomenon in STEM (Virtual)

Devasmita Chakraverty, Indian Institute of Management Ahmedabad

Cultural and Racial Barriers for International Students of Color in STEM Graduate Programs

Miguel Rodriguez, University of Utah

Ramon Barthelemy, University of Utah

Understanding the Role of Race and Identity Development in Ethnically Diverse Students at an HBCU

Karen Benn Marshall, Oakwood University

Carmen Bucknor, Oakwood University

Sylvia M. James, National Science Foundation

Christyn Byrd, Oakwood University

Would a career in science suit me? Students' self-view in relation to science and STEM career aspirations (Virtual)

Irene Drymiotou, University of Cyprus & University of Groningen

Costas P. Constantinou, University of Cyprus

Lucy Avraamidou, University Of Groningen

Wednesday 3-30-2022

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set-Multi-faceted and Emerging Approaches towards Transforming STEM Teaching, Learning and Research

10:30 AM-12:00 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

Pedagogical/research methodological approaches for analyzing power shifts in science classrooms (Virtual)

Kathleen Schenkel, San Diego State University

Productive tensions: Researching and imagining a more just STEM education with youth researchers

Colin Hennessy Elliott, Utah State University

Challenging dominant science and language ideologies and practices as a 7th grade dual language teacher (Virtual)

Melissa A. Navarro, San Diego State University

Terrance Burgess, Michigan State University

"Simon says learn." Investigating the narrated and practiced science identities of elementary students of color

Uniting technical approaches and diverse communities: Bringing social justice at the forefront of engineering's design considerations (Virtual)

Sebastian Schäfer, Technical University of Munich

Greses Pérez, Tufts University

Swetha Nittala, Stanford University

Sherri D Sheppard, Stanford University

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Using Computational Thinking and Videos to Support Pre-Service and In-Service Teachers

10:30 AM-12:00 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Computational Thinking (CT) Integrated STEM Approach: Early Childhood Pre-Service Teachers' CT Skills

Ayşe Ciftci, Mus Alparslan University

Mustafa S. Topcu, Yildiz Technical University

Learning Effective Explanation Videos in Physics Lessons

Fabian Gabriel Sterzing, Paderborn University

Christoph Kulgemeyer, Paderborn University

Peter Reinhold, Paderborn University

Leveraging Learning Experience Design to Deploy Embedded Video Questions to Support Students' Online Learning Experience

Joseph T. Wong, University of California, Irvine
Natalie Au Yeung, University of California, Irvine
Brad Hughes, University Of California, Irvine

The Power of Context: Factors that Influence Teachers' Implementation of Unplugged CT-Infused Science Lessons (Virtual)

Vance J. Kite, North Carolina State University
Soonhye Park, North Carolina State University

Strand 14: Environmental Education and Sustainability

Related Paper Set-Towards a Sociopolitical Dispositif Prioritizing Ecological Vitality and Social Justice

10:30 AM-12:00 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Among the Possible, the Is and the Ought: Constructs of 'Micro-Sociotechnical Imaginaries' (Virtual)

Majd Zouda, OISE, University of Toronto
Dimitris Tsoubaris, National and Kapodistrian University of Athens
Sarah El Halwany, University of Calgary, Calgary, AB, Canada
Mohammad Nurul-Hassan, OISE, University of Toronto
Minja Milanovic, The Bishop Strachan School, Toronto, ON
Sadia Sahibzada, OISE, University of Toronto
John Lawrence Bencze, University of Toronto

Students' Material-Semiotic Alliances After Power-focused Application-based Learning

John Lawrence Bencze, OISE, University of Toronto
Dave Del Gobbo, Peel District School Board
Sarah El Halwany, University of Calgary, Calgary, AB, Canada
Mohammad Nurul-Hassan, OISE, University of Toronto
Minja Milanovic, The Bishop Strachan School, Toronto, ON
Jasmine Yeung, OISE, University of Toronto
Majd Zouda, University of Toronto

Weaving Art & Science Pedagogies for More Ecologically-vital & Socially-just Dispositifs

Dave Del Gobbo, Peel District School Board, Mississauga, ON, Canada
Sheliza Ibrahim Khan, University of Toronto
Sarah El Halwany, University of Calgary, Calgary, AB, Canada
Majd Zouda, University of Toronto

Minja Milanovic, The Bishop Strachan School, Toronto, ON
Mohammad Nurul-Hassan, OISE, University of Toronto
Mirjan Krstovic, Peel District School Board, Mississauga, ON, Canada
John Lawrence Bencze, OISE, University of Toronto

Teaching with Emotions: Supporting Critical Views on Nature of Science

Sarah El Halwany, University of Calgary, Calgary, AB, Canada
Mohammad Nurul-Hassan, OISE, University of Toronto
Dave Del Gobbo, Peel District School Board, Mississauga, ON, Canada
Sheliza Ibrahim Khan, University of Toronto
Jasmine Yeung, OISE, University of Toronto
Majd Zouda, OISE, University of Toronto
John Lawrence Bencze, OISE, University of Toronto

Applying an Action-Oriented Pedagogy and STEM Teacher Identity: An Autoethnography

Mohammad Nurul-Hassan, OISE, University of Toronto
Sarah El Halwany, University of Calgary, Calgary, AB, Canada
Majd Zouda, University of Toronto
Kristen Schaffer, OISE, University of Toronto
John Lawrence Bencze, University of Toronto

Administrative Session: Research Committee

Admin Symposium-Future Directions for Research on Equitable and Socially Just Assessments in Science and Engineering Education (Virtual)

10:30 AM-12:00 PM, Burrard

Organizers

Asli Sezen-Barrie, University of Maine
Malcolm B. Butler, University of Central Florida
Rouhollah Aghasaleh, Humboldt State University
Sarah J. Fick, Washington State University
Marcus Kubsch, IPN - Leibniz Institute for Science and Mathematics Education
Li Ke, University of North Carolina at Chapel Hill
Yann Shiou Ong, Nanyang Technological University

Panelists

How Could Lack of Alignment Create Inequitable Assessment Systems? (Virtual)

Gavin Fulmer, National Science Foundation, University of Iowa

I am the White assessor: Grappling with dominant paradigms in Framework-aligned formative assessment (Virtual)

Erin Furtak, University of Colorado at Boulder

Wednesday 3-30-2022

Developing Justice-Focused Assessment Tasks: Tensions and Possibilities (Virtual)

William Penuel, University of Colorado at Boulder

Addressing equity from the margins: Outcomes of teacher professional development practice (Virtual)

Sheron Mark, University of Louisville

Engineering Curriculum Design for Equitable Assessments (Virtual)

Christine Cunningham, Pennsylvania State University

Translanguaging as a Linguistically Sustaining Science Formative Assessment Design Framework (Virtual)

Caitlin Fine, Boston College

How do we know? The Implications of Translanguaging for Equitably Assessing Multilingual Students' Science Learning (Virtual)

Enrique Suarez, University of Massachusetts at Amherst

Multi-Strand-Virtual Session C

10:30 AM-12:00 PM, Parq Salon F (**livestream** 3)

Epistemic Empathy: A Resource for Responsive Teaching (Virtual)

Lama Z. Jaber, Florida State University

Shannon G. Davidson, Florida State University

Allison Metcalf, Florida State University

From Practical to Metacognitive Strategy: Meta-epistemic Discourse and Crosscutting Concept Supports in Curriculum

Lori Andersen, University of Hawai'i at Mānoa

Evaluating the Impact of Online Activities Designed to Help High School Students Reason like Chemists (Virtual)

Sierra McCormick, WestEd

Jodi Davenport, WestEd

Anna Rafferty, Carleton College

Jacklyn Powers, WestEd

Sandra Raysor, Carnegie Mellon University

David Yaron, Carnegie Mellon University

Modeling-based Learning in Pre-School Science: Affordances of Different Types of Student-Constructed Models (Virtual)

Loucas T. Louca, European University-Cyprus

Lunch Break (on your own or with an Ambassador group!)
12:00 pm-1:30 pm

CADASE Graduate Student Social
Parq Salon F
12:00 pm-1:30 pm

Concurrent Session # 13
1:30 pm-3:00 pm

Strand 1: Science Learning: Development of student understanding

SC-organized paper set-Modelling in Science Learning

1:30 PM-3:00 PM, Parq Salon D (**livestream** 1)

Presider: Marcus Kubsch, IPN - Leibniz Institute for Science and Mathematics Education

Building a Computational Model of Food Webs: Impacts on Computational and Systems Thinking Skills (Virtual)

Arif Rachmatullah, SRI International

Eric N. Wiebe, North Carolina State University

Mathematical Modelling in Physics Education

Lilach Ayali, Technion - Israel Institute of Technology

Shulamit Kapon, Technion - Israel Institute of Technology

Scaffolding Sociopolitical Dimensions of Climate Change in Diagrammatic Models (Virtual)

Heather F. Clark, UCLA

Darlene Tieu, LAUSD

Leticia Perez, UCLA

Jaleel Howard, UCLA

Students' Conceptual Models in the Context of Air-Quality Learning Unit

Shirly Avargil, Technion - Israel Institute of Technology

Arunika Saxena, Technion Israel Institute of Technology

François G. Amar, University of Maine

Mitchell Bruce, University Of Maine

Wednesday 3-30-2022

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-organized paper set-High school Science Teaching & Learning

1:30 PM-3:00 PM, Cambie

Presenter: <https://tinyurl.com/NARSTpresider>

Exploring the Efficacy of CTCA in Breaking Barriers to Students' Learning of Difficult Concepts in Biology

Imole J. Samson, Lagos State University

Peter A. Okebukola, ACEITSE-Lagos State University

Esther O. Peter, ACEITSE-Lagos State University

David G. Peter, Lagos State University

Deborah Oluwatosin Agbanimu, ACEITSE-Lagos State University

Fred Awaah, University of Professional Studies Accra

Franklin U. Onowugbeda,

Adekunle I. Oladejo, ACEITSE-Lagos State University

Investigating students' context choice in chemistry education

Fabien Güth, University of Duisburg-Essen

Helena Van Vorst, University of Duisburg-Essen

Students' Types of Interest in Physics

Sarah Maria Zoechling,

Julia Woithe, CERN

Sascha M. Schmeling, CERN

Martin Hopf, University of Vienna

Studying girls' achievement outperformance in Oman: An exploration of attitudinal perceptions towards Science and learning

Sulaiman M. Al-Balushi, Sultan Qaboos University

Rashid S Almehrizi, Sultan Qaboos University

Ibrahim S. Al-Harthy, Sultan Qaboos University

Ambusaidi K. Abdullah, Sultan Qaboos University

Khadijah Al-Balushi, Ministry of Education

Moza Al-Balushi, Ministry of Education

Mohammed Al-Aghbari, Sultan Qaboos University

Using Science Historical Short Stories to Impact Students' Science-specific and General Epistemological Beliefs (Virtual)

Jaclyn M. Easter, Grand View University

Jerrid W. Kruse, Drake University

Jesse L. Wilcox, University of Northern Iowa

Wednesday 3-30-2022

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

Related Paper Set-Project-based Learning Contexts for Developing Adaptation Design Principles that Promote Engagement and Equity

1:30 PM-3:00 PM, Parq Salon C

Discussant: Samuel Severance, University of California, Santa Cruz

Presider: Joseph S. Krajcik, Michigan State University

Using Adaptation Design Principles to Support Teacher Agency in Professional Learning

Emily C. Adah Miller, University of Wisconsin Madison

Susan K. Codere, MSU

PBL Adaptation Principles to Support Equitable Science Instruction

Selin Akgun, Create4STEM

Maria Simani, University of California at Riverside

Hilda Makori, Create for STEM at Michigan State University

Employing adaptation design principles to enhance elementary student engagement in modeling (Virtual)

Tingting Li, CREATE for STEM Institute

How can culturally responsive teaching be framed as creative endeavor through adaptation design principles? (Virtual)

Maria C. Simani, University Of California, Riverside

Kathryn Bateman, Create for STEM at Michigan State University

Emily C Miller, University of Wisconsin-Madison

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

SC-organized paper set-STEM integration in secondary science classrooms

1:30 PM-3:00 PM, Granville II

Presider: <https://tinyurl.com/NARSTpresider>

How do excellent STEM teachers design and implement best practice of inquiry-based learning? (Virtual)

Shani Zur, Technion Institue

Tali Tal, Technion

Middle School Teachers and Undergraduate Mentors Collaborating for Culturally Relevant STEM Education

Meredith W. Kier, College of William and Mary

The impact of technical Science in increasing access to Stem education for vocational careers in South Africa

Emmanuel Mushayikwa, University of the Witwatersrand

Magdeline Mmapaseka Stephen, University of Witwatersrand

Using event mapping to investigate secondary master teachers' enactment of Naval STEM tasks

Jeffrey D. Radloff, SUNY Cortland

Dominick Fantacone, SUNY Cortland

Angela Pagano, SUNY Administration

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

SC-organized paper set-Student Success and 21st Century Skills

1:30 PM-3:00 PM, Parq Salon B

Presider: <https://tinyurl.com/NARSTpresider>

Addressing Pre-service Teachers' Misconceptions and Promoting Conceptual Understanding through the Conceptual Change Model.

Johannes Addido, University of Wyoming

*Evaluating Evidence-Based Practices Influencing Graduation and Participation in the STEM Workforce and Graduate Programs *presenting author*

Natalie L Hyslop, University of North Georgia

John Holliday, University of North Georgia

Linda B Purvis, University of North Georgia

*April A Nelms, University of North Georgia

John D Leyba, University of North Georgia

Michael Bodri, University of North Georgia

Improving Self-Reported Measures of 21st Century Skills in an Interdisciplinary Undergraduate STEM Course

Haider Ali Bhatti, Graduate Group in Science and Mathematics Education (SESAME) University of California, Berkeley

Perman Gochyyev, Graduate School of Education University of California, Berkeley

Mark Wilson, Graduate School of Education University of California, Berkeley

Robert J Full, Department of Integrative Biology University of California, Berkeley

Investigating Student Response to Anomalous Data When Analyzing and Interpreting Data

Adrian L Adams, University of Utah, Department of Educational Psychology

Lauren A Barth-Cohen, University Of Utah, Department of Educational Psychology

Jason M May, University of Utah, Department of Physics and Astronomy

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

SC-organized paper set-Undergraduate and Graduate Student Perspectives on Teaching and Learning

1:30 PM-3:00 PM, Kitsilano Ballroom A

Presider: <https://tinyurl.com/NARSTpresider>

Analysis of graduate teaching assistant discourse behaviors and the effects of a professional development intervention (Virtual)

Abdirizak M. Warfa, University of Minnesota

Marin Melloy, University of Minnesota

Biology Teaching Assistants Engagement with Educative Curriculum Materials and Enactment of Rigorous Classroom Discourse

Alyssa Freeman, Idaho State University

Angela Google, Middle Tennessee State University

Zhigang Jia, Middle Tennessee State University

Tina B Carter, Middle Tennessee State University

Anna S. Grinath, Idaho State University

How Physical Science Doctoral Students Involved in Educational Outreach View and Value their Educator Role

Anne M McAlister, University of Virginia

Sarah Lilly, University of Virginia

Jennifer Chiu, University Of Virginia

Relating TAs' Enacted Instruction to their Beliefs about Teaching and Learning in an Introductory Physics Tutorial using CHAT (Virtual)

May Lee, University of Groningen

Michael Bennett, University of Colorado - Boulder

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Using technology and modeling in science teacher education

1:30 PM-3:00 PM, Parq Salon F (**livestream** 3)

Presider: <https://tinyurl.com/NARSTpresider>

Fostering TPACK in Science Teacher Education – Re-Design and Evaluation of a University Course (Virtual)

Lisa Stinken-Rösner, Leuphana University Lüneburg

Knowledge, Practice and Product: Developing Preservice Science Teachers' Modelling Competence

Song Xue, School of Education and Social Work, University of Dundee

Keith Topping, School of Education and Social Work, University of Dundee

Elizabeth Lakin, School of Education and Social Work, University of Dundee

Science Teaching Orientations of Pre-Service Teachers in a Transformative Learning Environment

Duygu Yilmaz Ergul, Gazi University

Mehmet F. Tasar, Gazi University

That's Enough For An Explanation: Pre-Service Teachers Linking Epistemic And Pedagogical Decisions When Developing Models (Virtual)

Maria E. Tellez-Acosta, PhD Student Martin-Luther-Universität Halle-Wittenberg

Scott McDonald, Professor of Science Education. Pennsylvania State University

Andres Acher, Primary Science Education. Fakultät für Biologie, Universität Bielefeld

Strand 7: Pre-service Science Teacher Education

SC-organized paper set-Building preservice teacher self-efficacy and competence in STEM Education

1:30 PM-3:00 PM, Granville I

Presider: <https://tinyurl.com/NARSTpresider>

An Investigation of Pre-Service Teachers' Self-Efficacy Perceptions for STEM Integration (Virtual)

Hamdican Yildirim, Hacettepe University

Sevinc Gelmez Burakgazi, Hacettepe University

Integrating Computational Thinking (CT) in STEM Education: Early Childhood Pre-Service Teachers' CT Teaching Self-Efficacy Beliefs

Mustafa S. Topcu, Yildiz Technical University

Ayşe Ciftci, Mus Alparslan University

Pre-service teachers' learning to infuse engineering indicators into STEM lesson plans (Virtual)

Sevgi Aydin, Van Yuzuncu Yil University

Betul Ekiz Kiran, Tokat Gaziosmanpasa University

Elif Selcan Oztay, Van Yuzuncu Yil University

Strand 8: In-service Science Teacher Education

Symposium-Supporting Teacher Leadership Development: Roles, Growth and Research

1:30 PM-3:00 PM, Kitsilano Ballroom C

Presider: <https://tinyurl.com/NARSTpresider>

Panelists

Emily J. Perry, Sheffield Hallam University

Arthur Eisenkraft, University Of Massachusetts Boston

Amanda M. Gunning, Mercy College

Meghan E. Marrero, Mercy College

Tammy Wu Moriarty, Stanford University, Graduate School of Education

Janet Carlson, Stanford University

Stuart C. Bevins, Sheffield Hallam University

Richard Pountney, Sheffield Hallam University

Josephine Booth, Sheffield Hallam University

Joelle Halliday, Sheffield Hallam University

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Student Engagement Across Intersecting Identities

1:30 PM-3:00 PM, Kitsilano Ballroom D

Presider: <https://tinyurl.com/NARSTpresider>

Ways of Identifying as Other: a longitudinal case study of women of colour in physics (Virtual)

Nicola Wilkin, University of Birmingham

Jaimie Lauren Miller-Friedmann, University of Birmingham

Judith Hillier, University of Oxford

Intersectional Analysis of Advanced Placement Chemistry Enrollment and Performance (Virtual)

Robert Krakehl, Stony Brook University

Martin Francis Palermo, Stony Brook University

Angela M. Kelly, Stony Brook University

Enhancing Performance of Students with Intersectional Identities in Inclusive Science Classrooms via Multimedia Professional Development

Lindsay M. Carlisle, University of Virginia

Victoria VanUitert, University of Virginia

Michael J. Kennedy, University of Virginia

Examining Exclusionary and Inclusionary College Classroom Experiences: Effects on Women in Engineering Majors by Race/Ethnicity

Tatiane Russo-Tait, University of Texas at Austin
Catherine Riegler-Crumb, University of Texas at Austin
Ursula Nguyen, University of Texas at Austin
Katherine Doerr, The University of Texas at Austin

Strand 11: Cultural, Social, and Gender Issues

SC-organized paper set-Approaches to Equitable Science Teaching in K-12 Classrooms

1:30 PM-3:00 PM, Stanley

Presider: <https://tinyurl.com/NARSTpresider>

Connecting Justice-Centered pedagogy to Students' Critical Science Agency in an Elementary and Middle School Science Classroom

Selene Y. Willis, University Of South Florida
Dana L. Zeidler, University Of South Florida

Enhancing STEM Teacher Candidates' Understanding and Implementation of Equity, Diversity, and Inclusion Through Differentiated Instruction

Mohammed Estaiteyeh, Western University
Isha DeCoito, Western University

The Importance of Epistemic Empathy for Equitable and Rigorous Science Teaching

Allison T Metcalf, Florida State University
Shannon G. Davidson, Florida State University
Lama Jaber, Florida State University

Challenges Encountered by Multilingual Learners while Reading to Learn Science: The Role of Intertextuality

Sauoma B. Boujaoude, American University Of Beirut
Sara Salloum, University of Balamand

Strand 12: Technology for Teaching, Learning, and Research

SC-organized paper set-Using digital technologies, simulated teaching, and assessment to support teaching and learning

1:30 PM-3:00 PM, Burrard

Presider: <https://tinyurl.com/NARSTpresider>

TPACK in teacher education - Supporting pre-service teachers' reflections and use of digital technologies in science teaching (Virtual)

Pernilla Nilsson, Halmstad University

Using Simulated Classrooms to Examine How Formative Feedback Impacts Elementary Teachers' Ability to Facilitate Discussions

Jamie N. Mikeska, Educational Testing Service (ETS)
Jonathan Steinberg, ETS
Pamela S. Lottero-Perdue, Towson University
Dante Cisterna, Educational Testing Service

Analysis of Concept Maps for the use in Formative Assessment: Can Machine Learning help?

Tom Bleckmann, Leibniz Universitaet Hannover, Institute for Mathematics and Physics Education
Gunnar Friege, Leibniz Universitaet Hannover, Institute for Mathematics and Physics Education
Wolfgang Gritz, TIB Hannover
Ralph Ewerth, TIB Hannover

Digital Curation as a Pedagogical Approach Promoting Critical Thinking (Virtual)

Rivka Gadot, Technion - Israel Institute Of Technology
Jerusalem College of Technology
The Open University of Israel
Dina Tsybulsky, Technion - Israel Institute Of Technology

Strand 14: Environmental Education and Sustainability

SC-organized paper set-Building competencies for tackling real world problems

1:30 PM-3:00 PM, Parq Salon A

Presider: <https://tinyurl.com/NARSTpresider>

Infusing social responsibility in higher education through education for sustainable development (Virtual)

Heba El-Deghaidy, The American University In Cairo

Theorizing Science-Civic Practices: Youth Adaptation and Remixing of Science Practices within Digital Civic Participation

Lynne Zummo, University of Utah
Emma C Gargroetzi, University of Texas at Austin

The Effectiveness of Education for Sustainable Development in Promoting Students' Action Competence for Sustainability

Daniel Olsson, Environmental and Life Sciences, Karlstad university
Niklas M. Gericke, Department of Environmental and Life Sciences

A Curricular Model to Train Doctoral Students in Interdisciplinary Collaborative Research at the Food-Energy-Water Nexus (Virtual)

Rianna T. Murray, University of Maryland, College Park
Kelsey McKee, University of Maryland, College Park
Amy R Sapkota, University of Maryland, College Park
Stephanie Lansing, University of Maryland, College Park
Gili Marbach-Ad, University Of Maryland, College Park

Admin Symposium-Indigenous science knowledge as social and cultural capital supporting more resilient and sustainable communities

1:30 PM-3:00 PM, Parq Salon E (**livestream** 2)

Presider: Bhaskar Upadhyay, University of Minnesota, <https://tinyurl.com/NARSTpresider>

Panelists

Pauline W. U. Chinn, University of Hawaii at Manoa

Bhaskar Upadhyay, University of Minnesota

David Zandvliet, Simon Fraser

Gayle A. Buck, Indiana UniversityBASu

Julie R. Robinson, University of North Dakota

Rouhollah Aghasaleh, Humboldt State University

Kamal P. Koirala, Tribhuvan University

Closing Session [livestream**]**

Parq Salon DEF
3:10 pm-4:00 pm

Closing Remarks & Looking Ahead

Speakers: Renée Schwartz & Gillian Roehrig

It has been a unique and challenging year for NARST and the NARST leadership. We will close out the conference with remarks from outgoing President Renee Schwartz and gather insights from incoming President, Gillian Roehrig as we look ahead to 2023. You are Invited!

NARST Executive Board Meeting #2
Burrard
4:30 pm-10:00 pm