



97th NARST International Conference | Program
March 17-20, 2024

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97th NARST International Conference



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on the [NARST website](#) for
updates.

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General Information

Information about NARST

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

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

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

Research areas of interest to NARST members include curriculum development and organization, assessment and evaluation, learning theory, teacher education, programs for exceptional students (special needs and talents), equity studies, policy, and methods of teaching.

NARST Mission Statement

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

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

Member Benefits

- Ten issues of the *Journal of Research in Science Teaching (JRST)* are published each volume year. JRST has been ranked as one of the highest quality educational journals according to studies published by War, Holland and Schramm (American Educational Research Journal) and Guba and Clark (Educational Researcher) for the American Educational Research Association (AERA). These authors identified JRST as clearly the top research journal in science education.
- Website, Member Portal and Listserv, allowing access to further information about the Association. You may access this site at: <http://www.narst.org>. There is further information about subscribing to the listserv on this site.
- Opportunities to participate in monthly webinars.

Code of Ethical Conduct

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

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

A. Professional Competence

Science education professionals strive to maintain the highest levels of competence in their work; they recognize the limitations of their expertise; and they undertake only those tasks for which they are qualified by education, training, or experience. They recognize the need for ongoing education in order to remain professionally competent; and they utilize the appropriate scientific, scholarly, professional, technical, and administrative resources needed to ensure honesty and integrity. Science education professionals conduct research, teach, practice, and provide service only within the boundaries of their competence, based on their education, training, supervised experience, or appropriate professional experience. They consult with other professionals when necessary for the benefit of their students, research participants, and clients. They maintain awareness of current scientific, scholarly, and professional information in their fields of activity and undertake continuing efforts to maintain competence in the skills they use. Importantly, professional competence must also include a willingness to accept

and integrate new information and experiences, regardless of the effect that process has on research outcomes.

B. Integrity

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

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

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

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

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

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

Science education professionals carefully avoid discrimination and bias toward individuals and groups based on race, gender, age, religion, ethnicity, nationality, sexual orientation, gender

expression, gender identity, presence of disabilities, educational background, socioeconomic status, or other personal attributes. They refrain from making biased assumptions about others and perpetuating demeaning attitudes and stereotypes. Science education professionals do not accept any forms of discrimination and actively challenge implicit and explicit forms of discrimination.

E. Social Responsibility

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

References

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

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

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

Research Interest Groups (RIGs) Information

Continental and Diasporic Africa in Science Education RIG (CADASE)

The purpose of CADASE RIG is to **(a)** encourage science educators to engage in research aimed at meeting the needs of people of African descent; and **(b)** provide intellectual, professional, and personal space for science educators engaged in such research. This RIG will provide opportunities for science education researchers to integrate the study of culture, ethnicity, gender, race, and social class as lenses for performing critical analyses and evaluations of prevailing theory and practice of science education on the lives of people of African descent. A variety of theoretical and methodological frameworks will be used to address issues in science curriculum, learning, teaching, assessment and evaluation, and policy issues in both K-14 formal and informal venues in different contexts.

Chair: **Mary M. Atwater**
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Secretary: **Shari Earnest Watkins**
shariear@yahoo.com

Treasurer: **Brittany Gavin-Hudson**
bagarvin@gmail.com

LATINO/A RIG (LARIG)

The Latino/a RIG supports social networks that further research agendas regarding Latino/a science learners. LARIG also serves as a support and mentoring alcoba (space) for Latin@s/Latino science educators and others interested in Latin@ science education.

Chair: **Regina L. Suriel**, Valdosta State University
rsuriel@valdosta.edu

Contemporary Methods for Science Education Research

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

Chair: **Robert Talbot**, University of Colorado - Denver
robert.talbot@ucdenver.edu

Co-Chair: **Bina Vanmali**, Arizona State University
bina@asu.edu

Engineering Education RIG (ENE-RIG)

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

Chair: **Anne Emerson Leak**, High Point University
aleak@highpoint.edu

Indigenous Science Knowledge Research Interest Group (ISK-RIG)

The ISK-RIG was set up to showcase and provide support to current and future research works of a growing number of Indigenous Knowledge Systems (IKS) researchers working within indigenous communities throughout the world who are members of NARST. This group includes active members from Africa and the African Diaspora, Alaska, Australia, Canada, Indigenous populations of the Americas, Asia and the Pacific, the Middle East, Thailand, Nordic Regions, New Zealand, Scandinavia, the West and East Indies, etc. The goal is to increase awareness of what indigenous knowledge systems can contribute to research.

Chair: **Bhaskar Upadhyay**, University of Minnesota
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Secretary: **Cikigaq-Irasema Ortega**, University of Alaska, Anchorage
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Treasurer: **Sharon Nelson-Barber**, WestEd
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Research in Artificial Intelligence-Involvement Science Education (RAISE)

This RAISE RIG aims at employing AI to extend the landscape of science education, increase the capacity of all participants in the venture to face worldwide challenges, and significantly address the equity and ethical problems in the world broadly. This RIG will **(a)** support cutting-edge innovations using AI to address learning, teaching, assessment, equity and policy issues in science education; **(b)** communicate the cutting-edge research involving AI to all researchers, practitioners, and policymakers; and **(c)** encourage junior scholars in the field to pursue AI innovations within science education research as it is broadly practiced.

Chair: **Xiaoming Zhai**, University of Georgia
Xiaoming.zhai@uga.edu

Co-Chair: **Kent J. Crippen**, University of Florida
kcrippen@coe.ufl.edu

Asian and Pacific Islander Science Education Research (APISER)

The APRSER RIG will promote diversity, equity, and inclusion in science education research using the lenses relevant to Asian and Pacific Islander cultures, ethnicities, gender, and class, as well as the intersections of these markers. It will also serve as an intellectual network to support and mentor current and future Asian and Pacific Islander scholars within and outside of the United States, including NARST members interested in API related research endeavors.

Dr. Ling Liang
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Lesbian, Gay, Bisexual, Transgender, Queer, Plus Science Education Research Group (LGBTQ +)

This RIG provides opportunities for science education researchers to explore and discuss issues relevant to the LGBTQ+ community related to a wide range of topics including science curriculum, learning, teaching, assessment or evaluation, and policy issues in both K-16 formal and informal educational contexts. RIG members promote diversity, equity, and inclusion in science education and science education research. The LGBTQ+ RIG serves as a peer support, mentoring, and inclusive space for folks who identify as LGBTQ+. The LGBTQ+ RIG provides a formalized space inclusive of queer folk and queer research.

Dr. Colby Toefel-Grehl, Utah State University
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Strand Key

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

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Ryan Nixon
Tara Nkrumah
Samanthia Noble
Eric Nolan
Mohd Syafiq Aiman
Mat Noor
Jeffrey Nordine
Sadie Norwick
Noushin Nouri
Matthew Nyaaba
James Nyachwaya
John O'Meara
Oluwatobi Odeleye
Ella Ofek-Geva
Justina Ogoto
Taiwo Ogundapo
Ozlem Akcil Okan
Peter Okebukola
Adekunle Oladejo
Stacy Olitsky
Yann Shiou Ong
Franklin Onowugbeda
Jonathan Osborne
Kristina Otero
Peter Oyewole
Amy Padolf
Priyanka Parekh
Wonyong Park
Soonhye Park
Meredith Park Rogers
Michelle Parslow
Maya Shivani Patel
Scott Pattison
Kelli Paul
Chris Pavlovich
Melissa Percy
Mandy Peel
Hendrik Peeters
Sharon Pelech
Robyn Pennella
William Penuel
David Perl-Nussbaum
Beatriz Perret
Esther Peter
Verena Petermann

Program Proposal Reviewers

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Erin Peters-Burton	Maryam Saberi	Nancy Staus	Claudia Vergara
Itumeleng Phage	Marc Sager	Florian Stern	Camilo Vergara
Jaai Phatak	Sriparna Saha	Gal Stern	Tina Vo
Andrea Phillips	Adam Sahin	Matt Stewart	Steffen Wagner
Yuri Piedrahita	Emine Sahin	Marta R. Stoeckel	Jennifer Walker
Takeshia Pierre	Ercin Sahin	Annabel Stoler	Yangchunxiao Wang
Ashlyn Pierson	Hardimah Said	Mikayla Strasser	Carol Waters
Arianna Pikus	Merav Saini	Christian Georg Strippel	Maryrose Weatherton
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Wardell Powell	Elvira Schmidt	Mai Lill Suhr	Jeanna Wieselmann
Tharueseane Prasoplarb	Anita Schuchardt	Ryan Summers	Karrie Wikman
LindaPreminger	Melissa Schug	Gina Svarovsky	Jennifer Wilhelm
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Shukufe Rahman	Mohamed Shahat	Èlia Tena	Jingyun Wu
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Abdul Rauf	Katherine Sharp	Gry Thorsen	Xin Xia
Rebecca Rawson	Calli Shekell	Jenny Tilsen	Lin Xiang
Jessica Reaves	Max Sherard	Preethi Titu	Yong Xie
Carina Rebello	Soo Won Shim	Roger Tobin	Shiyu Xu
Emma Refvem	Soo-Yean Shim	Ana-Maria Topliceanu	Shulong Yan
Bianca Reinisch	Mary Short	Hong Tran	Jie Yang
Michael Reiss	Ginger Shultz	Maiza Trigo	Sonia Yeasmin
Ren Rende	Maria Simani	Jennifer Tripp	Elanur Yilmaz Na
Matt Reynolds	Amber Simpson	Peggy Trygstad	Ella Yonai
Danielle Rhemer	Khushbu Singh	Paul Tschisgale	Hyesun You
Jennifer Richards	Harleen Singh	Yu-Jan Tseng	Laura Zangori
Gail Richmond	Judyanto Sirait	Maojen Tseng	Carla Zembal-Saul
Rashida Robinson	Monica Sircar	Hsiao-Lin Tuan	yingzhi zhang
Theresa Robinson	Dimitri Smirnoff	Eli Tucker-Raymond	Molly Zhang
Gillian Roehrig	Patrick Smith	Grace Tukurah	Yang Zhanng
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Triin Rosin	Cody Smith	Uchenna Ugwuoke	Qiu Zhong
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Pooja Roy	Stefan Sorge	Maya Usher	Lynne Zummo
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Rachel Ruggirello	Natalya St Clair	Cansu Başak Uygün	Susan Zwiep
	Alex St. Louis	Katrin Vaino	
		Katherine Vela	

NARST Presidents

1928 W. L. Eikenberry	1953 J. Darrell Barnard	1978 Roger G. Olstad	2002 Norman G. Lederman
1929 W. L. Eikenberry	1954 George G. Mallinson	1979 James R. Okey	2003 Cheryl L. Mason
1930 W. L. Eikenberry	1955 Kenneth E. Anderson	1980 John W. Renner	2004 Charles W. (Andy) Anderson
1931 Elliot R. Downing	1956 W. C. Van Deventer	1981 Stanley L. Helgeson	2005 John R. Staver
1932 Elliot R. Downing	1957 Waldo W. Blanchet	1982 Stanley L. Helgeson	2006 James A. Shymanksy
1933 Francis D. Curtis	1958 Nathan S. Washton	1983 Carl F. Berger	2007 Jonathan F. Osborne
1934 Ralph K. Watkins	1959 Thomas P. Fraser	1984 Ann C. Howe	2008 Penny J. Gilmer
1935 Archer W. Hurd	1960 Vaden W. Miles	1985 Ertle Thompson	2009 Charlene M. Czerniak
1936 Gerald S. Craig	1961 Clarence H. Boeck	1986 David P. Butts	2010 Richard A. Duschl
1937 Walter G. Whitman	1962 Herbert A. Smith	1987 James P. Barufaldi	2011 Dana L. Zeidler
1938 Hanor A. Webb	1963 Ellsworth S. Obourn	1988 Linda DeTure	2012 J. Randy McGinnis
1939 John M. Mason	1964 Cyrus W. Barnes	1989 Patricia Blosser	2013 Sharon J. Lynch
1940 Otis W. Caldwell	1965 Frederic B. Dutton	1990 William G. Holliday	2014 Lynn A. Bryan
1941 Harry A. Carpenter	1966 Milton P. Pella	1991 Jane Butler Kahle	2015 Valarie L. Akerson
1942 G. P. Cahoon	1967 H. Craig Sipe	1992 Russell H. Yeany	2016 Mary M. Atwater
1943 Florence G. Billig	1968 John M. Mason	1993 Emmett L. Wright	2017 Mei-Hung Chiu
1944 Florence G. Billig	1969 Joseph D. Novak	1994 Kenneth G. Tobin	2018 Barbara Crawford
1945 Florence G. Billig	1970 Willard D. Jacobson	1995 Dorothy L. Gabel	2019 Gail Richmond
1946 C. L. Thield	1971 Paul D. Hurd	1996 Barry J. Fraser	2020 Tali Tal
1947 Earl R. Glenn	1972 Frank X. Sutman	1997 Thomas R. Koballa, Jr.	2021 Eileen R. C. Parsons
1948 Ira C. Davis	1973 J. David Lockard	1998 Audrey B. Champagne	2022 Renée Schwartz
1949 Joe Young West	1974 Wayne W. Welch	1999 Joseph S. Krajcik	2023 Gillian Roehrig
1950 N. Eldred Bingham	1975 Robert E. Yager	2000 David F. Treagust	2024 Jomo Mutegi
1951 Betty Lockwood	1976 Ronald D. Anderson	2001 Sandra K. Abell	2025 Jerome Shaw
1952 Betty Lockwood	1977 O. Roger Anderson		

NARST Executive Directors

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

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

JRST Editors

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

Emeritus Members

M. Agin	E. Feher	M. McCarthy Hintz	D. Riechard
H. Andersen	U. Ganiel	A. McCormack	R. Rose
C. Anderson	R. Haney	C. McFadden	D. Schmidt
R. Anderson	H. Hanna	G. Merzyn	M. Sequeira
C. Angell	D. Haury	J. Minstrell	R. Sherwood
D. Ash	S. Helgeson	M. Niaz	J. Shymansky
D. Baker	P. Hewson	O. Norman	E. Simmons
N. Barnea	A. Hofstein	A. Nous	D. Simonis
M. Barnes	J. Holbrook	J. Novak	E. Smith
G. Bartlett	W. Holliday	P. Okebukola	E. Sumfleth
J. Bencze	W. Jaffarian	R. Olstad	J. Swift
G. Berkheimer	P. Joslin	M. Padilla	H. Thier
L. Bethel	J. Kahle	S. Pak	M. Thier
G. Bodner	D. Kennedy	E. Parsons	A. Tiberghien
J. Christopher	G. Krockover	G. Pedemonte	S. Tunnicliffe
J. Clark	J. Lederman	L. Phillips	E. Van Den Berg
B. Crawford	J. Lemke	M. Piburn	R. Walding
H. Dahncke	I. Lindauer	R. Poel	W. Welch
O. De Jong	V. Lunetta	J. Poth	R. Williams
R. Dehaan	J. Mallinson	J. Prather	L. Yore
R. Doran	G. Markle	A. Qadeer	
L. Enochs	R. Mayes	L. Rennie	



NARST Award Recipients

2024 Distinguished Contributions to Science Education through Research Award

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

Year	Awardee(s)		
1986	Anton E. Lawson	2010	Reinders Duit Joseph Krajcik
1987	Paul DeHart Hurd	2011	Norman Lederman
1988	John W. Renner	2012	Charles W. (Andy) Anderson Larry Yore
1989	Willard Jacobson	2013	Dale R. Baker
1990	Joseph D. Novak	2014	Glen Alkenhead Richard Gunstone Frances Lawrenz
1991	Robert L. Shrigley	2015	Richard A. Duschl Meshach Mobolaji Ogunniyi
1992	Pinchas Tamir	2016	Lynn D. Dierking John N. Falk Dana L. Zeidler
1993	Jack Easley, Jr.	2017	Avi Hofstein
1994	Marcia C. Linn	2018	Marissa Rollnick Jonathan Osborne
1995	Wayne W. Welch	2019	Mary M. Atwater Maria Pilar Jiménez-Aleixandre
1996	Carl F. Berger	2020	Judy Dori Saouma Bou Jaoude
1997	Rosalind Driver	2021	Valarie Akerson Greg Kelly
1998	James J. Gallagher	2022	Fouad Abd-El-Khalick Gail Jones
1999	Peter J. Fensham	2023	Franz X. Bogner Okhee Lee
2000	Jane Butler Kahle	2024	Dr. Angela Calabrese Barton Dr. Julie Luft
2001	John K. Gilbert		
2002	Audrey B. Champagne		
2003	Barry J. Fraser		
2004	Robert E. Yager Paul Black		
2005	John C. Clement		
2006	David Treagust		
2007	Kenneth Tobin		
2008	Dorothy Gabel		
2009	Peter W. Hewson Leonie Jean Rennie Wolff-Michael Roth		



NARST Award Recipients

Outstanding Doctoral Research Award

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

Year	Awardee(s)	Advisor(s)
1992	Rene Stofflett	Dale R. Baker
1993	Julie Gess-Newsome	Norman G. Lederman
1994	Carolyn W. Keys	Burton E. Voss
1995	Jerome M. Shaw	Edward Haertel
1996	Christine M. Cunningham	William L. Carlsen
1997	Jane O. Larson	Ronald D. Anderson
1998	Kathleen Hogan	Bonnie K. Nastasi
1999	Fouad Abd-El-Khalick	Norman G. Lederman
2000	Danielle Joan Ford	Annemarie S. Palinscar
2001	Iris Tabak	Brian Reiser
2002	Mark Girod	David Wong
2003	Hsin-Kai Wu	Joseph Krajcik
2004	David L. Fortus	Ronald Marx Joseph Krajcik
2005	Thomas Tretter	Gail M. Jones
2006	Stacy Olitsky	Kenneth Tobin
2007	Julia Plummer	Joseph S. Krajcik
2008	Victor Sampson	Douglas Clark
2009	Lei Liu	Cindy E. Hmelo-Silver
2010	Heather Toomey	Phillip Bell Zimmerman

2011	Jeffrey J. Rozelle	Suzanne M. Wilson
2011	Catherine Eberbach	Kevin Crowley
2012	Melissa Braaten	Mark Windschitl
2013	Lori Fulton	Jian Wang
2014	Daniel Birmingham	Angela Calabrese Barton Anne-Lise Halvorsen
2015	Allison Godwin	Geoffrey Potvin
2016	Anna MacPherson	Jonathan Osborne
2017	Anita Schuchardt	Christian Schunn
2018	Katherine Wade-Jaimes	Renée Schwartz
2019	Anita S. Tseng	Jonathan F. Osborne
2020	Netta Shaby	Orit Ben Zvi-Assaraf
2021	Eben Witherspoon	Christian D. Schunn
2022	Won Jung Kim	Angela Calabrese Barton Alicia Alonzo
2023	Gary William Wright III	Cesar Delgado
2024	Grace P. Carroll K. "Ren" Rende Mendoza	Soonhye Park Carla Johnson



NARST Award Recipients

Early Career Research Award

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

Year	Awardee(s)
1993	Wolff-Michael Roth
1994	Deborah J. Tippins
1995	Nancy B. Songer
1996	Mary B. Nakhleh
1997	Peter C. Taylor
1998	J. Randy McGinnis
1999	Craig W. Bowen Gregory J. Kelly
2000	Angela Calabrese Barton
2001	Julie A. Bianchini
2002	Alan G. Harrison
2003	Fouad Abd-El- Khalick

2004	Grady J. Venville
2005	Randy L. Bell
2006	Heidi Carlone
2007	Bryan A. Brown
2008	Hsin-Kai Wu
2009	Troy D. Sadler
2010	Thomas Tretter
2011	Katherine L. McNeill
2012	Victor Sampson
2013	Alandeom W. Oliveira
2014	Cory Forbes
2015	Benjamin C. Herman
2016	Richard L. Lamb

2017	Ying-Chih Chen David Stroupe
2018	Doug Lombardi
2019	Hosun Kang Eve Manz
2020	Brian Donovan Dana Vedder Weiss
2021	Lama Jaber
2022	Maria González- Howard Laura Zangori
2023	Natalie S. King Christina Krist
2024	K.C. Busch Terrell R. Morton

NARST Fellows Award

The NARST Fellow Program is an award program that honors and recognize excellence in science education research and service. This program promotes and advances the NARST mission in science education, and the role of science education in the local and global community, by designating NARST members as Fellows.

Year	Awardee(s)
2021	Bryan A. Brown
2021	Richard A Duschl
2021	Gillian Roehrig
2022	Peter A. Okebukola
2023	Julie Bianchini
2023	Ron Blonder
2023	Patricia Friedrichsen
2024	Elizabeth Mavhunga
2024	Carla Zembal-Saul
2024	Renee' Schwartz
2024	Christina Schwarz
2024	Lynn Bryan

Excellence in Mentoring Award

Year	Awardee(s)
2024	Janet Carlson



Future NARST Meeting Dates

2025

March 22-25 | Washington, D.C.

2026

April 18-21 | Seattle, WA

2027

March 14-17 | Boston, MA



NARST Award Recipients

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

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

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

*Tie



NARST Award Recipients

The NARST Outstanding Paper Award

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

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

*Tie



NARST Award Recipients

Outstanding Masters Thesis Award

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

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

Classroom Applications Award

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

Year	Awardee(s)				
1980	Livingston S. Schneider John W. Renner	1982 <i>Four Equal Awards</i>	Louise L. Gann Seymour Fowler	1986 <i>Four Equal Awards</i>	Sarath Chandran David F. Treagust Kenneth G. Tobin
	Heidi Kass Allan Griffiths		Dorothy L. Gabel Robert D. Sherwood		Darrell L. Fisher Barry J. Fraser
	Ramona Saunders Russell H. Yeany		Thomas L. Russell		Dorothy L. Gabel Stanley L. Helgeson Joseph D. Novak John Butzow V. K. Samuel
	Joe Long James R. Okey Russell H. Yeany		Joseph C. Cotham		Linda Cronin Meghan Tweist Michael J. Padilla
	M. James Kozlow Arthur L. White	1983	Robert D. Sherwood Larry G. Enochs Dorothy L. Gabel		
1981	Dorothy L. Gabel Robert D. Sherwood Larry G. Enochs	1984 <i>Three Equal Awards</i>	Mary Westerback Clemencia Gonzales Louis H. Primavera	1987	Dorothy L. Gabel V. K. Samuel Stanley L. Helgeson Sandra McGuire Joseph D. Novak John Butzow
	Wayne Welch Ronald D. Anderson Harold Pratt		Kenneth G. Tobin Hanna J. Arzi Ruth Ben-Zvi Uri Ganiel		
	Mary Ellen Quinn Carolyn Kessler		Charles Porter Russell H. Yeany		
	P. Ann Miller Russell H. Yeany	1985 <i>Three Equal Awards</i>	Dan L. McKenzie Michael J. Padilla	1988	Uri Zoller Ben Chaim
			Margaret Walkosz Russell H. Yeany	1989	James D. Ellis Paul J. Kuerbis
			Kevin C. Wise James R. Okey	1990	Dale R. Baker Michael D. Piburn Dale S. Niederhauser
				1991	David F. Jackson Billie Jean Edwards Carl F. Berger

NARST Standing Committees

Awards Committee	
Final Year	Board Liaison
2025	Amelia Wenk Gotwals Michigan State University
Outstanding Doctoral Research Award	
Final Year	Subcommittee Leadership
2024	Julia Plummer (Chair) Penn State University
2025	David C. Owens (Co-Chair) University of Montana
Members	
2024	Jayma Koval Georgia Tech University
2024	Michal Zion Bar Ilan University, Israel
2025	Eunjin Bahng Iowa State University
2025	Maia Elkana Washington University in St. Louis
2025	Guopeng Fu East China Normal University
2025	Nilay Ozturk Kirsehir Ahi Evran University
2025	Annabel Stoler Boston University
2026	Mindy Chappell Portland State University
2026	Colby Tofel-Grehl Utah State University
2026	David Stroupe Michigan State University
2026	Dina Tsybulsky Technion
2026	Noemi Waight University at Buffalo
2027	Julianne Wenner Clemson University

Early Career Research Award	
Final Year	Subcommittee Leadership
2024	Doug Larkin (Chair) Montclair State University
2025	Bridget Miller (Co-Chair) University of South Carolina
Members	
2024	Eleanor Abrahms University of Massachusetts Lowell
2025	Ben Herman Texas A&M University
2025	Christine Lotter University of South Carolina
2025	Erin Peters-Burton George Mason University
2026	Heidi Cian Florida International University
2026	Juan Diaz Mount Aloysius College
2026	Katherine Doerr Malmo University, Sweden
2026	Uchenna Emenaha University of Texas at San Antonio
2026	Laura Zangori University of Missouri

NARST Standing Committees

Awards Committee (cont.)	
Distinguished Contributions to Science Education Through Research	
Final Year	Subcommittee Leadership
2024	Xiufeng Liu (Chair) University of Buffalo
2025	Mei-Hung Chiu (Co-Chair) National Taiwan University
Members	
2024	Valarie Akerson Indiana University
2024	Dana Zeidler University of South Florida
2025	Mei-Hung Chiu National Taiwan Normal University
2025	Justin Dillon Exeter University, UK
2025	Kathy Trundle Utah State University
2026	Saouma BouJaoude American University of Beirut, Lebanon
2026	Carla Johnson NC State University
2026	Gail Jones NC State University
NARST Fellow Award	
Final Year	Subcommittee Leadership
2024	Lama Jaber (Chair) Florida State University
2025	Enrique Suarez (Co-Chair) University of Massachusetts, Amherst
Members	
2024	Julie Luft University of Georgia
2025	Senay Purzer Purdue University
2025	Lezly Taylor Virginia Polytechnic Institute and State University
2026	Helena Aptyka Institute for Biology Education
2026	Laura B. Schneider Great Mills High School

Elections Committee	
Final Year	Representative from Ethics and Equity Committee
2025	Regina McCurdy Georgia Southern University
Representative from the International Committee	
2024	Lucia Vazquez-Ben Universidad da Coruña, Spain
Committee Leadership	
2025	David Crowther (Chair) University of Nevada, Reno
2026	Nazan U. Bautista (Co-Chair) Miami University
Members	
2024	Holly Kennedy Amerman University of Georgia
2024	Miri Barak Technion
2024	Hernán Cofré Mardones Pontificia Universidad Católica de Valparaíso, Chile
2025	Carina Rebello Purdue University-Main Campus
2026	Angela Chapman University of Texas Rio Grande Valley
2026	Tim Klavon Black Hills State University
Board Member Liaison	
2024	Scott McDonald Penn State University

NARST Standing Committees

Equity and Ethics Committee

Final Year	Committee Leadership
2025	Justice T. Walker (Chair) University of Texas at El Paso
2025	Regina McCurdy (Co-Chair) Georgia Southern University
Members	
2024	Phillip Boda University of California, Berkeley
2024	Ebru Eren Trinity College of Dublin, Ireland
2024	Erdogan Kaya George Mason University
2024	David Steele Alder Graduate School of Education
2025	Marsha E Simon University of West Georgia
2026	Iliana De La Cruz Texas A&M University
2026	ReAnna Roby Vanderbilt University
Board Member Liaison	
2025	Sharon Nelson-Barber WestEd

External Policy and Relations Committee

Final Year	Committee Leadership
2024	Durdane Bayram-Jacobs (Chair) Eindhoven University of Technology
2025	Ellen Granger (Co-Chair) Florida State University
Members	
2024	Andy Cavagnetto Washington State University
2024	Xavier Fazio Brock University, Canada
2024	Francesca Williamson Butler University
2025	Sara Raven Texas A&M University
2026	Christina Baze The University of Texas at Austin

2026	Brittany Gavrin Hudson University of Mary Washington
2026	Mark Meszaros Carolina Biological Supply Company
Board Liaison	
2024	Senay Purzer Purdue University

Graduate Student Committee

The Graduate Student Committee is composed of graduate student members appointed by the President-elect. The committee is chaired by the Graduate Student Representative, a non-voting (ex-officio) liaison to the NARST Board. A Board Director is appointed to serve as an ex officio advisor to the committee.

Final Year	Graduate Student Coordinator
2026	Jennifer Bateman (Chair) Clemson University
Committee Leadership	
2024	Ti'Era Worsley (Co-Chair) University of North Carolina -Greensboro
Members	
2024	Justin Andersson University of Nebraska-Lincoln
2024	Sabrina Stanley University of Alabama
2024	Jared TenBrink University of Michigan-Ann Arbor
2024	Zhongyan Zhang University of Leeds
2025	Deborah Cotta Universidade Federal de Minas Gerais, Brasil
2025	Savannah Graham Texas Christian University
2025	Beyza Okan Bogazici University
2025	Amy Padolf Florida International University
2025	Mutiara Syifa The Ohio State University
2025	Johan Tabora University of Illinois at Chicago

NARST Standing Committees

International Committee	
Final Year	International Coordinator
2025	Mercy Ogunsola-Bandele (Chair) National Open University of Nigeria
Committee Leadership	
2024	Hayat Hokayem (Co-Chair) Texas Christian University
2025	Ranu Roy (Co-Chair) Amity University Kolkata, India
Members	
2024	Lucía Vázquez Ben Universidad da Coruña (Spain).
2024	Irene Drymiotou University of Cyprus and University of Groningen
2024	Lee Kenneth Jones Texas Tech University
2024	Stefan Sorge IPN Leibniz Institute for Science and Mathematics Education, Germany
2024	Claudia Vergara Alberto Hurtado University, Chile
2025	Nuri Balta Suleyman Demirel University
2025	Aerin W. Benavides University of North Carolina Greensboro
2025	Jose Pavez University of Georgia
2025	Imran Tufail University of Waikato
2026	Estelle Blanquet University of Bordeaux - France
2026	Arif Rachmatullah SRI International

Membership Committee	
Final Year	Committee Leadership
2025	Mihwa Park (Chair) Texas Tech University
2025	Melanie Linskey (Co-Chair) Sam Houston State University
2026	Joi Merritt (Co-Chair) James Madison University
Members	
2024	Robert Bennett Georgia State University
2024	Tugba Yuksel Recep Tayyip Erdogan University
2025	Harini Krishnan Florida State University
2025	Melanie Linskey Sam Houston State University
2025	Harleen Singh University of Georgia
2026	Jonathan Bowers Michigan State University
2026	Grant Gardner Middle Tennessee State University
Board Liaison	
2026	S. Selcen Guzey Purdue University

NARST Standing Committees

Program Committee	
Final Year	Committee Leadership
2024	Jomo Mutege (Chair) Old Dominion University
2025	Jerome Shaw (Co-Chair) University of California, Santa Cruz
Members	
2024	Julie Bianchini University of California, Santa Barbara
2024	Tejaswini Dalvi University of Massachusetts, Boston
2024	Amal Ibourk Florida State University
2024	Karl Jung University of South Florida
2024	Kathryn Kirchgasser University of Wisconsin-Madison
2024	Richard Lamb East Carolina University
2024	Felicia Leammukda St. Cloud State University
2024	Elizabeth Lewis University of Nebraska-Lincoln
2024	Patricia Patrick Columbus State University
2024	Jacob Pleasants Oklahoma University
2024	Wardell A. Powell Framingham State University
2024	Anita Schuchardt University of Minnesota

2024	Neta Shaby Ben Gurion University of the Negev
2024	Xiaoming Zhai University of Georgia
2025	Allison Antink-Meyer Illinois State University
2025	Quentin Biddy University of Colorado
2025	Narendra Dadarao Deshmukh Homi Bhabha Centre for Science Education
2025	Daniela Fiedler Leibniz Institute for S&M Education
2025	Peng He Michigan State University
2025	Sophia Jeong University of Georgia
2025	Anne Emerson Leak University of California, Santa Barbara
2025	Jing Lin Beijing Normal University
2025	Jamie N. Mikeska ETS
2025	Emily Adah Miller University of Georgia
2025	Tara Nkrumah Arizona State University
2025	Rebecca Swanson University of Nebraska-Lincoln
2025	Preethi Titu Kennesaw State University
2025	Yang Yang Qingdao University

NARST Standing Committees

Publications Advisory Committee	
Final Year	Committee Leadership
2024	Lindsay Lightner (Chair) Washington State University Tri-Cities
2025	Tina Vo (Co-Chair) University of Nevada, Las Vegas
Members	
2024	Jana Bouwma-Gearhart Oregon State University
2024	Kent Crippen University of Florida
2024	Emily Dare Florida International University
2024	Hui Jin Educational Testing Service
2024	Carla Johnson North Carolina State University
2025	Cesar Delgado North Carolina State University
2025	Li Ke University of North Carolina Chapel Hill
2025	Linda Morell UC Berkeley
2026	Mohammad Azzam Western University
2026	Midhat Noor Kiyani McGill University
2026	Eli Tucker-Raymond Boston University
Board Liaison	
2026	Shiang-Yao Liu National Taiwan Normal University

Research Committee	
Final Year	Committee Leadership
2024	Natalie King (Chair) Natalie King
2025	Bryan H. Nichols (Co-Chair) Florida Atlantic University
Members	
2024	Jana Bouwma-Gearhart Oregon State University
2024	Jessica Karch Tufts University
2024	Mi'Kayla Newell Georgia State University (Grad Student)
2024	Peter Wulff University of Potsdam, Germany
2025	Liam Guilfoyle University of Oxford
2025	James Nyachwaya North Dakota State University
2025	Mina Sedaghatjou Rowan University
2025	Karen Woodruff Kean University
2025	Ezgi Yesilyurt Weber State University
2026	Alexander Bohn Northern Virginia Community College
2026	Saramma Chandy Mumbai University
2026	Michael Giamellaro Oregon State University
2026	Colby Tofel-Grehl Utah State University
2026	Carrie-Anne Sherwood Southern Connecticut State University
2026	Stephen B. Witzig University of Massachusetts Dartmouth
Board Liaison	
2024	Malcolm Butler University of North Carolina, Charlotte

NARST Standing Committees

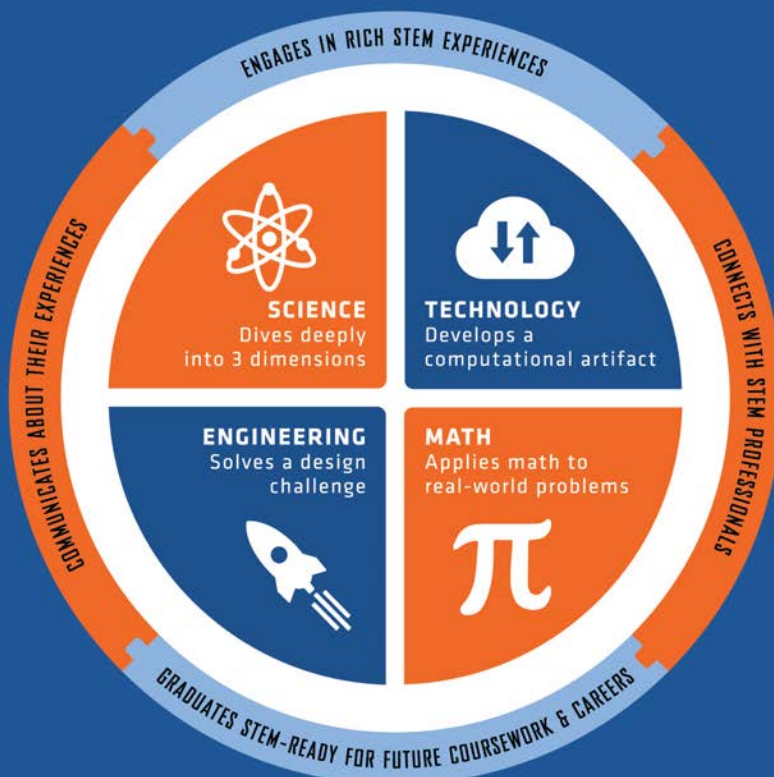
Social Media, Website and Communications Committee	
Final Year	Committee Leadership
2025	Ryan Cain (Chair) Weber State University
2026	Gary Weiser (Co-Chair) Teacher College, Columbia University
Members	
2024	Stanton Belford University of Tennessee Southern
2024	Amy Voss Farris Penn State University
2024	Mark Newton East Carolina University
2024	Stephanie Teeter North Carolina State University

2025	Anna Maria Arias Kennesaw State University
2025	Sarah Frodsham Oxford Brookes University
2025	Won Jung Kim Santa Clara University
2026	Marti Canipe Northern Arizona University
2026	Suzanne Poole Patzelt Montclair State University
2026	Steven Worker University of California, Agriculture and Natural Resources
Board Liaison	
2026	Patrick Enderle Georgia State University

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Sponsorship Program for Graduate Student Memberships

NARST members gave generously to sponsor graduate student memberships this year through the Graduate Student Sponsorship Program initiative. This program was started in response to needs of our graduate student community. Because graduate students may sometimes obtain assistance from their universities to attend the NARST conference, their NARST membership is usually not covered. While \$60 may not sound like a lot of money, to a graduate student on an extremely limited budget, \$60 is a lot.

Aligned with NARST's commitment to support the graduate student community, through donations to the GSSP, NARST was able to offer partial or full financial assistance toward joining the organization.

Last year (2022), with the \$1,200 donated since the start of the program, we were able to provide financial assistance (partial or full) to 26 graduate students to become NARST members.

NARST Recognizes and Thanks this Year's Graduate Student Sponsors:

Meg Blanchard

Kathryn Hayes

Lisa Martin-Hansen

Felicia Mensah

Jonathan Osborne

Brian Reiser

Christina Schwarz

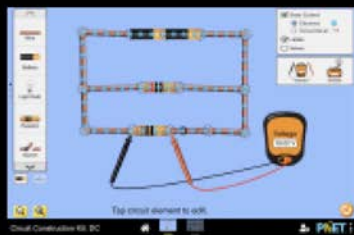
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AI-Powered Video Platform for Research & Teacher Coaching



What is Vosaic AI?

Vosaic AI is an innovative new tool that enhances teacher coaching and improves video analysis for academic research. It utilizes one of the most robust Large Language Models (LLMs) on the market to analyze videos and give time-stamped feedback based on custom prompts.

What are the benefits of Vosaic AI

INSTANT FEEDBACK

Vosaic AI analyzes video transcripts using a variety of pre-set or custom prompts, giving you immediate, time-stamped feedback you can use to adjust your practice in real time.

FAST ANALYSIS

Whether you want a general summary of a video or time-stamps of specific behaviors, Vosaic AI can provide both before you even hit “play.”

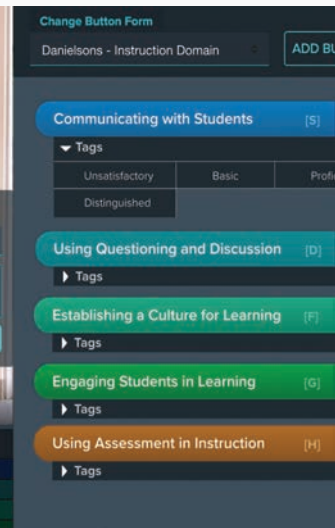
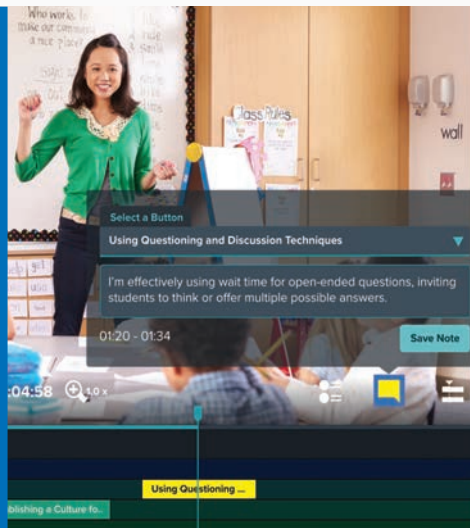
SUPER EASY TO USE

Vosaic AI follows the popular prompt-and-response pattern that many users are already familiar with from ChatGPT, Google, and other popular tools.

How it works?

Vosaic automatically transcribes videos and identifies different speakers—giving you an instant talk analysis.

From there, you can prompt Vosaic AI to give you feedback by asking questions like, “Which domains of Danielson’s framework for teaching are used?” and Vosaic AI will respond with clickable time-stamped comments for you to review.



Beyond AI

Vosaic is the only cloud-based platform that helps you **code videos using moments with duration**, so you’re only a click away from reviewing clips of practice and not just freeze frames with comments.

ADDITIONAL BENEFITS INCLUDE:

- ✓ Simple video recording & uploading
- ✓ Secure access & sharing
- ✓ Free user seats for blind coding
- ✓ Custom video coding
- ✓ Automated transcribing
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- ✓ IRR analysis and reporting
- ✓ World class support via chat, email, or phone

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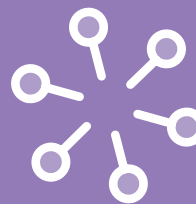
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 Contact Claudia Acuna
Editor, Science Education

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OR

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Use the QR Code to set up a time to chat with a member of the SeeMeTeach team, either at the conference, or post-conference.



NARST 2025 Conference Theme

Prepared by Jerome M. Shaw

In Praise of Science Teachers: Essential Partners in Researching, Reframing, and Reforming Science Learning

The year 2025 brings NARST's 98th Annual International Conference. With our 100th anniversary rapidly approaching, now is an opportune time to reflect on a critical component of our organizational identity: science teachers. Many of us recall the historical genesis of the acronym NARST as standing for the National Association for Research in Science Teaching. There is no science teaching without science teachers.

For this conference, let us centralize, emphasize, and praise the work science teachers do that enables and inspires our efforts as science education researchers. Inherent in this theme is an inclusive understanding of the

terms science teaching, science teachers, and science education researchers. Science teaching is taken to include engineering education and the diverse ways in which we as humans engage in and contribute to both disciplines. Likewise, science teaching is not limited to formal brick-and-mortar or digital settings. In addition to professional educators, science teachers include parents, families, and other community members. Many of these same folks can and should play integral roles in the research process.

When we gather in the greater Washington, DC area, let us give voice to the myriad ways in which science teachers (writ large) contribute to researching, reframing, and reforming science teaching and learning. Bearing in mind throughout NARST's ultimate goal of helping all learners achieve science literacy.

NCSE: Safeguarding Sound Science for Over 40 Years

The National Center for Science Education ensures students get the accurate and effective science education they deserve.

Supporting Teachers

We provide professional learning to help teachers resolve common misconceptions their students may have about climate change, evolution, and the nature of science.

Catalyzing Action

We vigilantly monitor efforts to interfere with the accurate teaching of science and mobilize local communities and educators to respond effectively when problems arise.

Investigating Science Education

We produce high-quality research relevant to understanding and improving science education, especially with regard to socially but not scientifically controversial topics.

Did you know? NCSE is available to help PIs develop and implement outreach as part of the broader impacts portion of grant projects. For more information, email: media@ncse.ngo.



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98th

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In Praise of Science Teachers:
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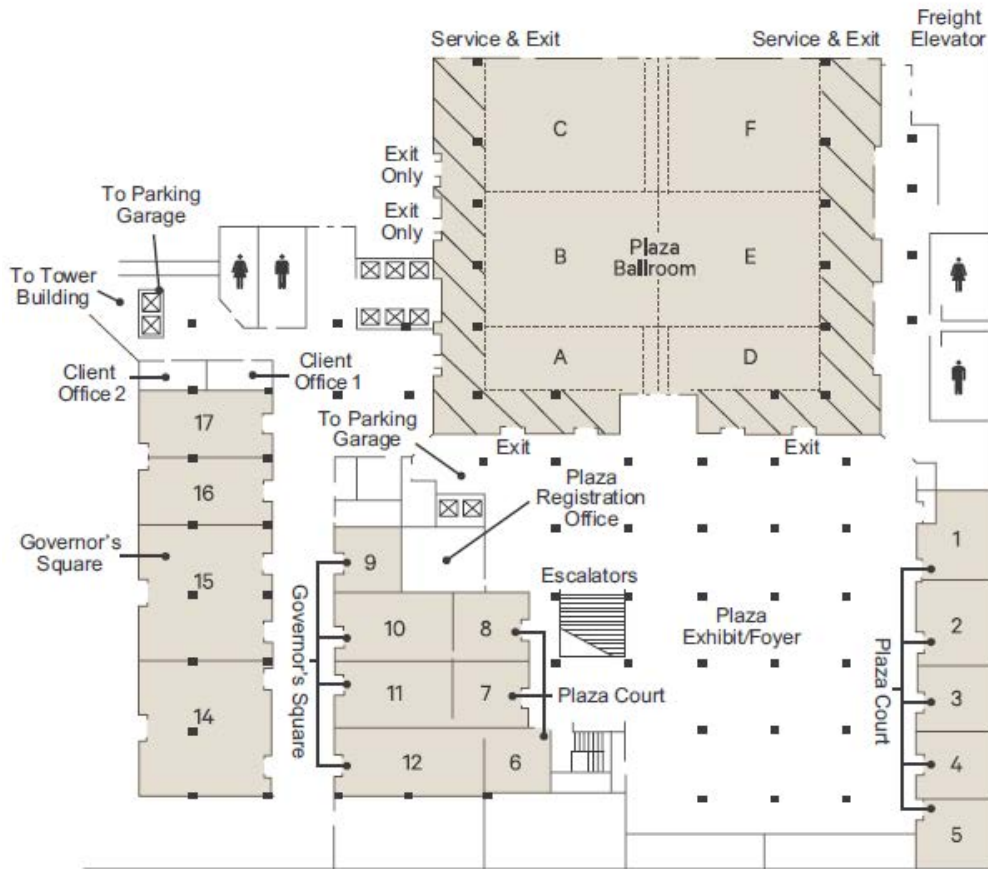
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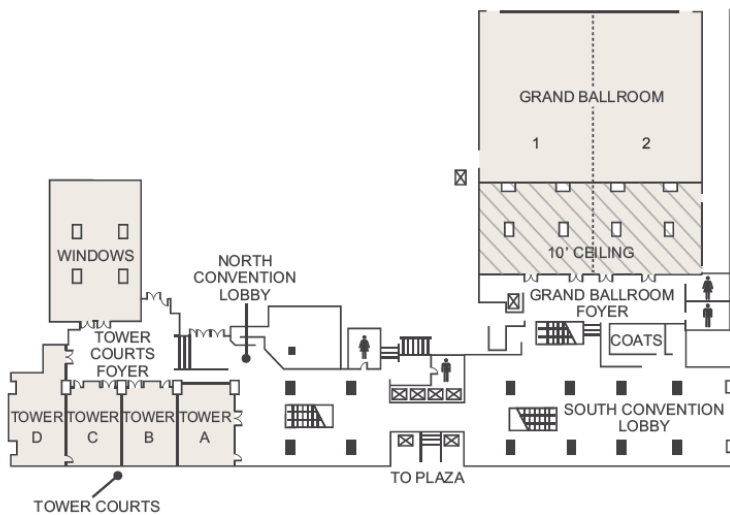
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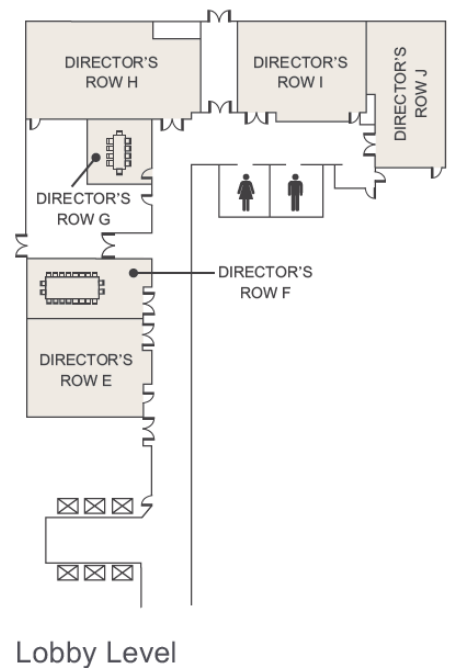
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DIRECTOR'S ROW



8 MARCH 2024

Virtual Conference Day

Plenary Session

Presidential Welcome to the Virtual Conference Day

8-Mar-24, 7:00 AM-7:20 AM

Location: Zoom A

Social Event

Meet and Greet

8-Mar-24, 7:20 AM-7:40 AM

Location: Zoom A

Strand 2: Science Learning: Contexts, Characteristics and Interactions Related Paper Set

Developing Critically Caring Science Classrooms

8-Mar-24, 7:45 AM-8:45 AM

Location: Zoom A

"It Makes You Feel Like You've Actually Been, Like, Heard": Care in Collective Sensemaking

Jason Buell*, Northwestern University, USA

Yang Zhang, Northwestern University, USA

Chris Griesemer, University of California Davis, USA

Jessica Alzen, University of Colorado Boulder, USA

Kelsey Edwards, Northwestern University, USA

Cindy Passmore, University of California Davis, USA

William Penuel, University of Colorado Boulder, USA

Brian Reiser, Northwestern University, USA

A Systematic Review of Theories of Caring in Science Education

Christina Krist, University of Illinois Urbana-Champaign, USA

Enrique Suarez*, University of Massachusetts Amherst, USA

Care and Risk in a Fifth-Grade Science Classroom

Annabel Stoler*, Boston University, USA
Eve Manz, Boston University, USA

"It's Difficult to Separate My Feelings": Exploring a Preservice Teacher's Wrestling with Relationality

Allison Metcalf*, Florida State University, USA

Lama Jaber, Florida State University, USA

Shannon Davidson, University of Alabama, USA

Multi-Strand Stand-Alone Paper Set 1

8-Mar-24, 7:45 AM-8:45 AM

Location: Zoom B

Strand 12: Technology for Teaching, Learning, and Research

A Theoretical Framework to Evaluate AI-Based Information Technologies for Critical Engagement With Science: A Proposition

Inbal Klein-Avraham*, Technion - Israel Institute of Technology, Israel

Esther Greussing*, Technische Universität Braunschweig, Germany

Monika Taddicken, Technische Universität Braunschweig, Germany

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

Strand 11: Cultural, Social, and Gender Issues

Reframing Equitable Physics Education from the Lens of Marginalized Family: An Ethnographic Study

Izzah Mardhiya Mohammad Isa*,
Universiti Teknologi Malaysia, Malaysia
Muhammad Abd Hadi Bunyamin,
Universiti Teknologi Malaysia, Malaysia
Fatin Aliah Phang, Universiti Teknologi
Malaysia, Malaysia

Strand 7: Pre-service Science Teacher Education

Effects of Opportunities to Learn on Pre-Service Science Teacher Knowledge and Beliefs

David Letloenyane*, University of the Free
State, South Africa
Loyiso Jita, University of the Free State,
South Africa

Strand 8: In-service Science Teacher Education

Examining a Boundary-Spanning Case Study Within a School-University Partnership That Supports Science Teacher Professional Development

Maiza de Albuquerque Trigo*, University
of Luxembourg, Luxembourg
Christina Siry, University of Luxembourg,
Luxembourg
Thierry Frentz, Ministry of Education,
Luxembourg

Roundtable Discussions

8-Mar-24, 9:00 AM-10:00 AM

Location: Zoom A Breakout Rooms

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Impostor Phenomenon and Belongingness Among Science Faculty: An Exploratory Study

Devasmita Chakraverty*, Indian Institute
of Management Ahmedabad, India

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

A Qualitative Exploration of Latina Professors' Impostor Phenomenon in STEM

Devasmita Chakraverty*, Indian Institute
of Management Ahmedabad, India

Strand 1: Science Learning: Development of student understanding

Work-in-progress Roundtable

Understanding Obstacles to Conceptualizing, Transforming, and Analyzing Multidimensional Datasets

A Lynn Stephens*, The Concord
Consortium, USA
Natalya St. Clair, The Concord Consortium,
USA
Daniel Damelin*, The Concord
Consortium, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Work-in-progress Roundtable

The Emotional Impact of Science Textbook Images: Creating an Affective Science Image Dataset

Isabella DeRegis*, Towson University, USA
Brian Miller, Towson University, USA

Strand 14: Environmental Education and Sustainability

Work-in-progress Roundtable

Engaging in Socioscientific Issues with Scientists' Disagreement: The Case of Nuclear Wastewater Release Controversy

Won Jung Kim*, Santa Clara University, USA

Junhwan Ahn*, Santa Clara High School, USA

Strand 14: Environmental Education and Sustainability

Roundtable

High School Science Students' Visions of Mobilization of Their TechnoSocial Values

J. Lawrence Bencze*, OISE, University of Toronto, Canada

Dave Del Gobbo, Peel District School Board, Canada

Majd Zouda, OISE, University of Toronto, Canada

Sarah El Halwany, Université de l'Ontario français, Canada

Sheliza Khan, University of Toronto, Canada

Conzalo Guerrero, IOE, University College London, United Kingdom

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Factors Affecting Science Academic Achievement among ESLs: A Meta-Synthesis of the Literature

Thalia Juarez*, University of Texas Rio Grande Valley, USA

Brian Gabrysch*, University of Texas Rio Grande Valley, USA

Strand 6: Science Learning in Informal Contexts

Bringing Middle School Students and Scientist Together: Perceived Value of Science Communication Meetings

Melike Hanedar, Bogazici University, Turkey

Ipek Paksoy, Bogazici University, Turkey

Gaye Ceyhan*, Bogazici University, Turkey

Strand 8: In-service Science Teacher Education

Supporting Science Teachers in the Design and Enactment of Socioscientific Issues and Model-Based Learning

Benzegul Durak*, Düzce University, Turkey

Mustafa Topçu*, Yıldız Technical University, Turkey

Multi-Strand Stand-Alone Paper Set 2

8-Mar-24, 9:00 AM-10:00 AM

Location: Zoom B

Strand 8: In-service Science Teacher Education

Physics Teachers' Belief System: Beliefs of Knowledge, Teaching, Learning, and Science

Ozden Sengul*, Bogazici University, Turkey

Poster Session

8-Mar-24, 10:15 AM-11:15 AM

Location: Zoom A Breakout Rooms

Colorado Science Education Research

Reliability Analysis of Psychological Measures related to STEM Persistence in Undergraduate Students

Rena Kirkland*, Adams State University, USA

Aaron Montoya, Adams State University, USA

Marlene Garcia Araiza, Adams State University, USA

Strand 11: Cultural, Social, and Gender Issues

School-Level Earth Science Enrollment as a Mediator of Demographic Predictors of Earth Science Performance

Christine Schlendorf*, Farmingdale State College, USA

Angela Kelly, Stony Brook University, USA

Robert Krakehl, Stony Brook University, USA

Strand 14: Environmental Education and Sustainability

K-12 Science Teachers' Awareness and Use Regarding Climate Change Educational Resources From U.S. National Parks

Breanna Beaver, Youngstown State University, USA

Lisa Borgerding*, Kent State University, USA

Shannon Navy, Kent State University, USA

Edward Bolden, Kent State University, USA

Strand 6: Science Learning in Informal Contexts

Comunidad de Ciencia: Latina Girls' Interactions with their Parents during Family Problem-Based Learning Science Activities

Katherine Short-Meyerson*, University of Wisconsin Oshkosh, USA

Peter Rillero*, Arizona State University, USA

Margarita Jimenez-Silva, University of California Davis, USA

Cameron Bilardello, University of Wisconsin-Madison, USA

Strand 8: In-service Science Teacher Education

How Autonomy and Support Impact the Implementation of New STEM Frameworks and Teacher Retention Intentions

Jenna Zietowski*, Saint Joseph's University, USA

Strand 11: Cultural, Social, and Gender Issues

Ultra-orthodox women's choice of STEM studies and career

Ruth Edri, Technion - Israel Institute of Technology, Israel

Shani Goldstein*, Technion - Israel Institute of Technology, Israel

Shahaf Yoel, Technion - Israel Institute of Technology, Israel

Yehudit Dori, Technion - Israel Institute of Technology, Israel

Strand 12: Technology for Teaching, Learning, and Research

Orchestrating Learning Communities Across Three Social Planes with Learning Community Technologies

Dana Gnesdillo*, University of Wisconsin, USA

Michael Tissenbaum, University of Illinois Urbana-Champaign, USA

Xuesong Cang, University of Wisconsin, USA

Litong Zeng, University of Illinois Urbana-Champaign, USA

Shafagh Hadinezhad, University of Illinois Urbana-Champaign, USA

Samantha Baker, University of Wisconsin, USA

Diane Gengler, University of Wisconsin, USA

Sadhana Puntambekar, University of Wisconsin, USA

Strand 12: Technology for Teaching, Learning, and Research

Physics Experiments Using Self-Made Applications for Smartphone and the Philosophical Significance

Akira Adachi*, Osaka Institute of Technology, Japan

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

Analysis of Primary Science Education in the United States Through the Lens of Practitioner Literature

Farnaz Avarzamani*, Arizona State University, USA

Samira Golshani, Islamic Azad University, Iran, Islamic Republic of

Ying-Chih Chen, Arizona State University, USA

Strand 1: Science Learning: Development of student understanding

Identifying Student Idea Trajectories in a Science-Based Social Justice Unit

Troy Wilson*, University of California, Berkeley, USA

Allison Bradford, University of California, Berkeley, USA

Libby Gerard, University of California, Berkeley, USA

Marcia Linn, University of California, Berkeley, USA

Strand 14: Environmental Education and Sustainability

Secondary School Science Students' Visions of Growing Personal Dispositifs

J. Lawrence Bencze*, OISE, University of Toronto, Canada

Dave Del Gobbo, Peel District School Board, Canada

Strand 8: In-service Science Teacher Education

A Design-based Course for STEM Teaching and Learning in Pakistan

Tasneem Anwar*, Aga Khan University, Pakistan

Multi-Strand Stand-Alone Paper Set 9
8-Mar-24, 10:15 AM-11:15 AM
Location: Zoom B

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Attitudes Toward Science among Grades 5 through 12 Students: Response Profiles, Background, and Future Intentions

Siqi Shen*, Shanghai Jiao Tong University, China

Ryan Summers*, University of North Dakota, USA

Shuai Wang*, Shanghai Jiao Tong University, China

Strand 10: Curriculum and Assessment

Developing an Evaluation Rubric for Planning and Assessing SSI-Based STEAM Programs in Science Classrooms

Ha My Anna Mang*, Macquarie, Australia

Hye-Eun Chu*, Macquarie, Australia

Sonya Martin, Seoul National University, Republic of Korea

Chan-Jong Kim, Seoul National University, Republic of Korea

Strand 7: Pre-service Science Teacher Education

Effect of Adaptive Expertise in Math/Science Teaching on Preservice Teachers' Attitudes Toward iSTEM Teaching

Mounir Saleh*, University of Bahrain, Bahrain

Bashirah Ibrahim, University of Bahrain, Bahrain

Ernest Afari, University of Bahrain, Bahrain

Strand 7: Pre-service Science Teacher Education

Effectiveness of Online Science Laboratory Course on Pre-Service Science Teachers' Efficacy Beliefs and Epistemological Beliefs

Ozgul Yilmaz-Tuzun, Middle East Technical University, Turkey

Cansu Basak Uygun*, Middle East Technical University, Turkey

Ceren Baser-Kanbak, Middle East Technical University, Turkey

Coskun Aykut, Middle East Technical University, Turkey

MID-DAY BREAK

8-Mar-24, 11:15 AM-12:15 PM

Location: Zoom A

Multi-Strand Stand-Alone Paper Set 3

8-Mar-24, 12:15 PM-1:15 PM

Location: Zoom A

Strand 8: In-service Science Teacher Education

Focused on Our Children's Future: Supporting and Studying Socially Responsible Science Education Through Professional Development

Travis Fuchs*, Crofton House School, Canada

Yuen Sze Tan, University of British Columbia, Canada

Strand 6: Science Learning in Informal Contexts

Evaluating the Credibility of Online Sources: The Case of Climate Change Misinformation in Three Languages

Shakke Dabran- Zivan*, Faculty of Education in Science and Technology,

Technion – Israel Institute of Technology, Israel

Ayelet Baram-Tsabari, Faculty of Education in Science and Technology, Technion – Israel Institute of Technology, Israel

Rebecca Kunze, Institute of Science Education, Leibniz University, Germany

Soraya Kresin, Institute of Science Education, Leibniz University, Germany

Alexander Büssing, Institute of Science Education, Leibniz University, Germany

Strand 6: Science Learning in Informal Contexts

Exploring the Role of Psychological Distance in Scientists' Climate Change Outreach

Rebecca Ward*, North Carolina State University, USA

Melissa Jones, North Carolina State University, USA

Katy May, North Carolina State University, USA

Strand 8: In-service Science Teacher Education

Effects of Meta-Strategic Training Program for Relational Reasoning Skills on In-Service Biology Teachers' Expertise Level

Vered Alboher Agmon*, Alexandru Ioan Cuza, University of IAȘI, Romania

Multi-Strand Stand-Alone Paper Set 4

8-Mar-24, 12:15 PM-1:15 PM

Location: Zoom B

Strand 7: Pre-service Science Teacher Education

Negotiating Dilemmatic Spaces: Preservice Teachers' Challenges as They Learn to Assess Science Learning

Frances Edwards*, University of Waikato, New Zealand

Strand 8: In-service Science Teacher Education

Facilitating Science Discourse and Argumentation: Teacher Participation and Learning in Professional Development

Florencia Gomez Zaccarelli*, Pontificia Universidad Catolica de Chile, Chile

Victoria Arriagada Jofre, Pontificia Universidad Catolica de Chile, Chile

Jocelyn Gaete-Cornejo, Pontificia Universidad Catolica de Chile, Chile

Strand 10: Curriculum and Assessment

Development and Validation of Biology Test for Senior High School STEM Students

Glen Mirabete*, De La Salle University, Philippines

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

Demystifying the Myths of Early Childhood Teachers' Engagement with Sustainability Practices

Lacey Peters*, Hunter College, CUNY, USA

Janette Habashi*, University of Oklahoma, USA

Victoria Damjanovic*, Northern Arizona University, USA

Ingrid Anderson, Portland State University, USA

Multi-Strand Stand-Alone Paper Set 5

8-Mar-24, 1:30 PM-2:30 PM

Location: Zoom A

Strand 8: In-service Science Teacher Education

CT+CRT+Science: Pathways to Integration in Elementary Teachers' Lesson Plans

Jeremy Bernier*, Arizona State University, USA

Kristina Kramarczuk, University of Maryland, USA

Ebony Terrell Shockley, University of Maryland, USA

Francheska Figueroa, Arizona State University, USA

Lin Yan, Arizona State University, USA

Yue Xin, University of Maryland, USA

Janice Mak, Arizona State University, USA

Man Su, Universität des Saarlandes, Germany

Diane Ketelhut, University of Maryland, USA

Brian Nelson, Arizona State University, USA

Strand 8: In-service Science Teacher Education

Science Teachers' Sensemaking of and Approaches to Artificial Intelligence Integrated Science Teaching

Won Jung Kim*, Santa Clara University, USA

Arif Rachmatullah*, Stanford Research Institute, USA

Strand 11: Cultural, Social, and Gender Issues

Views on STEM (Education) in an Elite School: A 'Platonic Legacy'

Majd Zouda*, University of Toronto, Canada

Strand 7: Pre-service Science Teacher Education

Promoting Science Preservice Teachers' Competencies through Phenomenon-Based Science Instruction: The Lotus Effect Activity

Noushin Nouri*, The University of Texas Rio Grande Valley, USA

Maryam Saberi, Ministry of education, Islamic Republic of Iran

Samira Bahrami, Farhangian University, Islamic Republic of Iran

Somayeh Samari, Ministry of education, Islamic Republic of Iran

Multi-Strand Stand-Alone Paper Set 6

8-Mar-24, 1:30 PM-2:30 PM

Location: Zoom B

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

Role of Diagrams in Simultaneous Synthesis Physics Problem-Solving

Bashirah Ibrahim*, Bahrain Teachers College, University of Bahrain, Bahrain

Lin Ding, The Ohio State University, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Fostering Scientific Argumentation Through Tablet-based Interactive Technological Engagement

Yingzhi Zhang*, Capital Normal University, China

Pengcheng Shan, Capital Normal University, China

Strand 7: Pre-service Science Teacher Education

Investigation of Pre-Service Teachers' Knowledge of Atmosphere Related

Environmental Problems and their Systems Thinking Skills

Aylin Çam*, Muğla Sıtkı Koçman University, Muğla, Turkey

Harika Arslan, Düzce University, Turkey

Multi-Strand Stand-Alone Paper Set 7

8-Mar-24, 2:45 PM-3:45 PM

Location: Zoom A

Strand 11: Cultural, Social, and Gender Issues

Difficulty Gap in Students' Achievement, Creativity and Anxiety in ICT: Can CTCA Be a Bridge?

Henry Okorie*, Lagos State University, Nigeria

Peter Okebukola, Lagos State University, Nigeria

Adekunle Oladejo, Lagos State University, Nigeria

Juma Shabani, Doctoral School, University of Burundi, Burundi

Deborah Agbanimu, Lagos State University, Nigeria

Strand 12: Technology for Teaching, Learning, and Research

Adopting a Human-In-The-Loop Approach to Detect Persistence Types in a Guided Science Inquiry Environment

Shuo Feng*, School of Education, Shanghai Jiao Tong University, China

Maohua Wang, Shanghai Municipal Education Commission, China

Shuai Wang, School of Education, Shanghai Jiao Tong University, China

Siqi Shen, School of Education, Shanghai Jiao Tong University, China

Strand 14: Environmental Education and Sustainability

Disaster Risk Reduction Education Literature Review and Proposed Research Agenda

Douglas Lownsbery*, Independent Researcher, USA

Strand 15: Policy, Reform, and Program Evaluation

Physical Science Enrollment and Performance as Predictors of Graduation and Mediators of Socioeconomic Status

Jon Hatzfeld*, Stony Brook University, USA
Robert Krakehl, Stony Brook University, USA

Angela Kelly, Stony Brook University, USA

Multi-Strand Stand-Alone Paper Set 8

8-Mar-24, 2:45 PM-3:45 PM

Location: Zoom B

Strand 15: Policy, Reform, and Program Evaluation

Embracing Mortality: Integrating Death Education into the K-12 Science Curriculum for Holistic Science Literacy

Rachel Ruggirello*, Washington University in St. Louis, USA

Sonya Martin*, Seoul National University, Democratic People's Republic of Korea

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

Shaping Perspectives: Contrasting Student Framing in Evolutionary Research Between Computer-based Labs and Wet Labs

Dhanya Attipetty*, University of Minnesota, USA

Lily Dodge, University of Minnesota, USA

Anita Schuchardt, University of Minnesota, USA

Catherine Kirkpatrick, University of Minnesota, USA

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

Characteristics and Strategies

Implementing Computer Science in Elementary Science Classrooms: An Elementary Teacher's Perceptions Over Four Years

Sarah Lilly*, University of Virginia, USA

Eric Bredder, University of Virginia, USA

Anne McAlister, University of Virginia, USA

Jennifer Chiu, University of Virginia, USA

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

Exploring the Nature of Science Conceptions of University Science Professors Using the Family Resemblance Framework

Rana Baddour*, American University of Beirut, Lebanon

Saouma BouJaoude, American University of Beirut, Lebanon

Plenary Session

Wrapping up!

8-Mar-24, 3:45 PM-4:20 PM

Location: Zoom A

17 MARCH 2024

Research Committee

Pre-Conference Workshop

Uncovering the Hidden Curriculum of DRK-12 Awards: Tips and Tools for Writing Successful NSF Grant Proposals

17-Mar-24, 8:00 AM-11:45 AM

Location: Governor's Square 10

*Uncovering the Hidden Curriculum of
DRK-12 Awards: Tips and Tools for Writing
Successful NSF Grant Proposals*

ORGANIZERS

Terrell Morton, University of Illinois
Chicago, USA

Lani Horn, Vanderbilt University, USA

Equity And Ethics Committee

Pre-Conference Workshop

Re-emphasizing the Roles of “Social” and “Cultural” in Science Learning

17-Mar-24, 8:00 AM-11:45 AM

Location: Governor's Square 11

*Re-emphasizing the Roles of “Social” and
“Cultural” in Science Learning*

ORGANIZERS

David Steele, Alder Graduate School of
Education, USA

PANELISTS

David Steele, Alder Graduate School of
Education, USA

Gary Wright, University of Missouri, USA

Justice Walker, University of Texas at El
Paso, USA

Julie Bianchini, University of California-
Santa Barbara, USA

Alejandra Frausto Aceves, Northwestern
University, USA

Daniel Morales-Doyle, University of Illinois-
Chicago, USA

Bridget Mulvey, Kent State University, USA

Catherine Quinlan, Howard University,
USA

Troy Sadler, University of North Carolina,
USA

Dana Zeidler, University of South Florida,
USA

Indigenous Science Knowledge (ISK- RIG)

Pre-Conference Workshop

Indigenous STEM Education: Perspectives from the Pacific Islands, the Americas and Asia

17-Mar-24, 8:00 AM-11:45 AM

Location: Governor's Square 12

*Indigenous STEM Education: Perspectives
from the Pacific Islands, the Americas and
Asia*

ORGANIZERS

Sharon Nelson-Barber, WestEd, USA

PANELISTS

Jerry Lipka, University of Alaska, Fairbanks,
USA

Dora Andrew-Ihrke, University of Alaska,
Fairbanks, USA

Bhaskar Upadhyay, University of
Minnesota, USA

David Zandvliet, Simon Fraser University,
Canada

Janice Mak, Arizona State University, USA

Paichi Shein, National Sun Yat-sen
University, Taiwan

Peresang Sukinarhimi, National Sun Yat-
sen University, Taiwan

Lenora Crabtree, University of North Carolina, Charlotte, USA
Pauline Chinn, University of Hawai'i, Mānoa, USA

Membership Committee

Sponsored Session

Mentor/Mentee Nexus

17-Mar-24, 8:00 AM-9:00 AM

Location: Governor's Square 15

Mentor/Mentee Nexus

ORGANIZERS

Harini Krishnan, Genetic Science Learning Center, University of Utah, USA
Grant Gardner, Middle Tennessee State University, USA

Membership Committee

Sponsored Session

Early Career Forum

17-Mar-24, 9:10 AM-10:10 AM

Location: Governor's Square 15

ORGANIZERS

Joi Merritt, James Madison University, USA
Harleen Singh, California State University Stanislaus, USA

Membership Committee

Sponsored Session

Welcome Session

17-Mar-24, 10:20 AM-11:20 AM

Location: Governor's Square 15

ORGANIZERS

Melanie Kinskey, Sam Houston State University, USA

Robert Bennett, Georgia State University, USA

Mihwa Park, Texas Tech University, USA

PANELISTS

Melanie Kinskey, Sam Houston State University, USA

Robert Bennett, Georgia State University, USA

Mihwa Park, Texas Tech University, Texas, USA

Research Committee

Pre-Conference Workshop

Conducting High-Quality Education

Research in Science for the Rest of Us

17-Mar-24, 8:00 AM-11:45 AM

Location: Governor's Square 16

*Conducting High-Quality Education
Research in Science for the Rest of Us*

ORGANIZERS

Leigh Ann DeLyser, CSforALL, USA
Isabella Gransbury, North Carolina State University, USA
Monica McGill, CSEdResearch.org, USA
Jennifer Rosato, National Center for Computer Science Education, USA

PANELISTS

Isabella Gransbury, North Carolina State University, USA

Monica McGill, CSEdResearch.org, USA

Leigh Ann DeLyser, CSforALL, USA

Jennifer Rosato, National Center for Computer Science Education, USA

Research Committee
Pre-Conference Workshop
Using the Science and Engineering Practices Observation Protocol (SciEPOP) to Identify Children's Engagement with Science and Engineering in Early Learning Environments

17-Mar-24, 8:00 AM-11:45 AM

Location: Governor's Square 17

Using the Science and Engineering Practices Observation Protocol (SciEPOP) to Identify Children's Engagement with Science and Engineering in Early Learning Environments

ORGANIZERS

Alison Miller, Bowdoin College, Brunswick, ME, USA

PANELISTS

Alison Miller, Bowdoin College, USA

Laura Saenz, Bowdoin College, USA

Hildah Makori, Bowdoin College, USA

Katahdin Cook, Maine Mathematics and Science Alliance, USA

Lisa Kenyon, Maine Mathematics and Science Alliance, USA

Rachel Larimore, Samara Early Learning, USA

Committee Meeting
NARST Board of Directors Meeting

17-Mar-24, 8:00 AM-11:45 AM

Location: Directors Row E

Research Committee
Pre-Conference Workshop
Integrating ChatGPT in Science Teacher Education and Science Education Research: Improving Curriculum, Pedagogy, Research and Equity in Science

17-Mar-24, 8:00 AM-11:45 AM

Location: Plaza Court 1

Integrating ChatGPT in Science Teacher Education and Science Education Research: Improving Curriculum, Pedagogy, Research and Equity in Science

ORGANIZERS

Mehmet Aydeniz, The University of Tennessee, Knoxville, USA

Michael Stone, Public Education Foundation, Chattanooga, TN, USA

PANELISTS

Mehmet Aydeniz, The University of Tennessee, Knoxville, USA

Michael Stone, Public Education Foundation, Chattanooga, TN, USA

Research Committee
Pre-Conference Workshop
Using Network Analysis to Analyze Scientific Knowledge Structures and Transition Data

17-Mar-24, 8:00 AM-11:45 AM

Location: Plaza Court 3

Using Network Analysis to Analyze Scientific Knowledge Structures and Transition Data

ORGANIZER

Jennifer Cromley, University of Illinois, USA

Research Committee
Pre-Conference Workshop
***Broader Impacts-Driven
Dissemination: Benefiting Society
Beyond Presentations and
Publications***

17-Mar-24, 8:00 AM-11:45 AM

Location: Plaza Court 4

*Broader Impacts-Driven Dissemination:
Benefiting Society Beyond Presentations
and Publications*

ORGANIZERS

Deborah Hanuscin, Western Washington
University, USA

Natalie King, Georgia State University, USA

C. Michael Bowen, Mount St Vincent
University, Canada

Research Committee
Pre-Conference Workshop
***Using Novel Instructional Materials to
Improve Students' Mis/disinformation
Detection and Socioscientific
Decision-making***

17-Mar-24, 8:00 AM-11:45 AM

Location: Plaza Court 5

*Using Novel Instructional Materials to
Improve Students' Mis/disinformation
Detection and Socioscientific Decision-
making*

ORGANIZERS

Benjamin Herman, Texas A&M University,
USA

PANELISTS

Benjamin Herman, Texas A&M University,
USA

Michael Clough, Texas A&M University,
USA

Sarah Poor, Texas A&M University, USA

Ben Janney, Texas A&M University, USA

Asha Rao, Texas A&M University, USA

Tamara Powers, Texas A&M University,
USA

Joanna Goodey Pellois, Texas A&M
University, USA

Research Committee
Pre-Conference Workshop
***How to Use AI and Center People in
Science Education Research***

17-Mar-24, 8:00 AM-11:45 AM

Location: Plaza Court 6

*How to Use AI and Center People in
Science Education Research*

ORGANIZERS

Marcus Kubsch, Freie Universität Berlin,
Germany

PANELISTS

Marcus Kubsch, Freie Universität Berlin,
Germany

Kristina Krist, University of Illinois Urbana-
Champaign, USA

Peter Wulff, Heidelberg University of
Education, Germany

Joshua Rosenberg, University of
Tennessee, Knoxville, USA

Kevin Hall, University of Illinois Urbana-
Champaign, USA

Eugene Cox, University of Illinois Urbana-
Champaign, USA

Chris Palaguachi, University of Illinois
Urbana-Champaign, USA

Paul Tschisgale, IPN – Leibniz Institute for
Science and Mathematics Education,
Germany

**International Journal of Science
Education**

Pre-Conference Workshop

Publishing in Science Education

Journals and Tips to Help You

Succeed

17-Mar-24, 10:00 AM-11:45 AM

Location: Plaza Court 2

*Publishing in Science Education Journals
and Tips to Help You Succeed*

ORGANIZERS

Ron Blonder, Weizman Institute, Israel

M. Gail Jones, North Carolina State
University, USA

PANELISTS

Ron Blonder, Weizman Institute, Israel

M. Gail Jones, North Carolina State
University, USA

Vanessa Kind, University of Leeds, United
Kingdom

Graduate Student Committee

Social Event

Graduate Student Luncheon

17-Mar-24, 11:45 AM-1:00 PM

Location: Governor's Square 15

Graduate Student Luncheon

ORGANIZER

Jennifer Bateman, Clemson University,
USA

Plenary Session

Presidential Welcome

17-Mar-24, 1:00 PM-1:30 PM

Location: Plaza Ballroom ABC/DEF

Keynote Address

Monsanto's Past and Our Food

***Future: Considerations for Science
Education***

17-Mar-24, 1:30 PM-2:45 PM

Location: Plaza Ballroom ABC/DEF

*Monsanto's Past and Our Food Future:
Considerations for Science Education*

Bartow Elmore*, The Ohio State University,
USA

Strand 1: Science Learning:

**Development of student
understanding**

SC-Organized Paper Set

Learning Progression and

Disciplinary Core Ideas

17-Mar-24, 3:00 PM-4:30 PM

Location: Plaza Court 2

*Learning Progression of Students'
Reasoning about Life Cycles*

Hayat Hokayem*, Texas Christian
University, USA

Ihsan Ghazal*, Texas Christian University,
USA

Savannah Graham*, University of Houston,
USA

*Students' Ideas About Air Pollution: A
Learning Progression for the Primary and
Secondary School*

Èlia Tena*, Universitat Autònoma de
Barcelona (UAB), Spain

Caterina Solé, Universitat Autònoma de Barcelona (UAB), Spain

Digna Couso, Universitat Autònoma de Barcelona (UAB), Spain

Extracting Student Mastery of Force and Motion Attributes Using Cognitive Diagnosis Model

Maria Veronica Torralba*, De La Salle University, Philippines

Talaue T., De La Salle University, Philippines

Developing a Three-Dimensional Learning Progression for the Thermal Energy at Middle School Science

Mao-Ren Zeng*, Michigan State University CREATE for STEM Institute, USA

He Peng*, Michigan State University CREATE for STEM Institute, USA

Mingchun Huang, Michigan State University CREATE for STEM Institute, USA

Namsoo Shin, Michigan State University CREATE for STEM Institute, USA

Jonathan Bowers, Michigan State University, USA

Joseph Krajcik, Michigan State University CREATE for STEM Institute, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-Organized Paper Set

Technology: Programming and Computational Thinking

17-Mar-24, 3:00 PM-4:30 PM

Location: Plaza Court 4

Current Research Trends of Computational Thinking in the Context of STEM Education

Yurdagül Bogar*, Oslo Metropolitan University, Norway

Jari Lavonen, University of Helsinki, Finland

Promoting Meaningful Learning of Programming Language: Should we trust CTCA?

Esther Peter*, Lagos State University, Nigeria

Peter Okebukola, Lagos State University, Nigeria

Juma Shabani, Université du Burundi, Burundi

David Peter, Lagos State University, Nigeria

Deborah Agbanimu, Lagos State University, Nigeria

STEM Activities Integrated with Computational Thinking (CT): Early Childhood Children' CT Skills

Nazlı Ülker Hançer, Sinop University, Turkey

Mustafa Topçu*, Yıldız Teknik University, Turkey

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

Characteristics and Strategies

SC-Organized Paper Set

Elementary STEM Integration

17-Mar-24, 3:00 PM-4:30 PM

Location: Plaza Court 3

Integrated STEM in Elementary Schools: Critical Aspects to Consider

Carol Waters*, University of Houston-Clear Lake, USA

"This is My Best STEM Class": Practicing STEM from Educators with Different Professional Experiences

Qiu Zhong*, Indiana University Bloomington, USA

Conghui Liu*, Indiana University Bloomington, USA

Adam Maltese, Indiana University
Bloomington, USA

*Community-Based Engineering
Education in Elementary Schools: A Multi-
Case Study in Rural Communities*

Tugba Boz*, Purdue University, USA

Rebekah Hammack*, Purdue University,
USA

Nicholas Lux, Montana State University,
USA

Paul Gannon, Montana State University,
USA

*Discourse and Creativity in Early
Childhood Engineering*

Mia Williams*, University of Wyoming, USA

Alison Mercier*, University of Wyoming,
USA

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

SC-Organized Paper Set

Modelling Curriculum for Learning

17-Mar-24, 3:00 PM-4:30 PM

Location: Plaza Court 5

*“Fail Faster”: How a Teacher Supported
Students With Testing and Debugging
Computational Models*

Jonathan Bowers*, Michigan State
University, USA

Emil Eidin, Michigan State University, USA

*How Can Science Teacher's Discourse Be
Like?: Discursive Strategies in a Modelling-
Based Classroom*

Camilo Vergara-Sandoval*, Universidad de
O'Higgins, Chile

Víctor López*, Universitat Autònoma de
Barcelona, Spain

Digna Couso*, Universitat Autònoma de
Barcelona, Spain

*Integrating a New Computational
Modeling Curriculum Into High School
Science Classrooms*

Jacqueline DeLisi*, Education
Development Center, USA

Beatriz Perret, Education Development
Center, USA

Suhina Minocha, Education Development
Center, USA

Irene Lee, Education Development Center,
USA

Kirsten Peterson, Education Development
Center, USA

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

SC-Organized Paper Set

Graduate Students in STEM

Education

17-Mar-24, 3:00 PM-4:30 PM

Location: Plaza Court 6

*International Graduate Students as STEM
Role Models for High School Students*

Ana-Maria Topliceanu*, North Carolina
State University, USA

Katherine McCance, University of Texas at
San Antonio, USA

Jennifer Sollinger, North Carolina State
University, USA

Margaret Blanchard, North Carolina State
University, USA

*The Impact of Teaching Professional
Development on STEM Graduate Student
Teaching Outcomes: A Meta-Analysis*

Grant Gardner*, Middle Tennessee State
University, USA

Alyssa Freeman, Middle Tennessee State
University, USA

Chelsea Rolle, Middle Tennessee State
University, USA

Kadence Riggs, Middle Tennessee State University, USA

The Relationship of Graduate Teaching Assistants' Perceived Autonomy with Their Pedagogical Discontentment, Self-Efficacy, and Practices

Alyssa Freeman*, Middle Tennessee State University, USA

Grant Gardner, Middle Tennessee State University, USA

Chelsea Rolle, Middle Tennessee State University, USA

Kadence Riggs, Middle Tennessee State University, USA

Georgia Sroka, Middle Tennessee State University, USA

Tom Brinthaup, Middle Tennessee State University, USA

Empowering Graduate Teaching Assistants in STEM: Role of Collaborative Action Research in Professional Agency Development

Abdul Rauf*, University of Illinois Chicago, USA

Minjung Ryu, University of Illinois Chicago, USA

Strand 6: Science Learning in Informal Contexts

Related Paper Set

Engaging Rural and Tribal Communities in Culturally Responsive Research and Evaluation on Informal Science Learning

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 10

Indigenous Logic Model Development: Fostering Collaborative Engagement and Cultural Relevance

Anne Gold*, University of Colorado, USA

Nancy Maryboy, Indigenous Education Institute, USA

David Begay, Indigenous Education Institute, USA

Shelly Valdez, Native Pathways, USA

Jill Stein, Reimagine Research Group, USA

Megan Littrell, University of Colorado, USA

Kathryn Boyd, University of Colorado, USA
Christine Okochi, University of Colorado, USA

Brigitta Rongstad Strong, University of Colorado, USA

Engaging Library Visitors in Dialogues around Informal Learning about Water and Community Connections

Megan Littrell*, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Christine Okochi, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Kathryn Boyd, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Anne Gold, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Daniela Pennycook, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Mia McCormick, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

August Mrakuzic, Cooperative Institute for Research in Environmental Sciences Education and Outreach, USA

Colorado Science Education Research

Water Meaning Maps: Diving Deeper Into Rural Library Visitors' Connections With Water in the Southwest

Christine Okochi*, CIRES, University of Colorado Boulder, USA

Megan Littrell, CIRES, University of Colorado Boulder, USA

Kathryn Boyd, CIRES, University of Colorado Boulder, USA

Anne Gold, CIRES, University of Colorado Boulder, USA

Engaging Communities and Adapting Informal Learning Research and Evaluation Methods to Rural Library Settings

Kathryn Boyd*, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Megan Littrell, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Christine Okochi, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Jill Stein, Reimagine Research Group, USA

Shelly Valdez, Native Pathways, USA

Anne Gold, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Brigitta Rongstad Strong, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Annamarie Schaecher, Cooperative Institute for Research in Environmental Sciences Education & Outreach, USA

Tamara Grybko, Reimagine Research Group, USA

Todd Campbell*, University of Connecticut, USA

Ron Gray, Northern Arizona University, USA

Yue Bai*, University of Connecticut, USA

Stefani Chase*, Northern Arizona University, USA

Pre-Service Science Teachers' Perception of Mathematical Equations as Scientific Models Across Scientific Disciplines

FangFang Zhao*, Beijing Normal University, China

Jie Yang, Beijing Normal University, China

Modeling the Interplay Between Creativity and Knowledge through Pre-Service Science Teachers' Creative Instructional Design Practices

Alper Durukan*, Van Yuzuncu Yil University, Turkey

Jale Cakiroglu, Middle East Technical University, Turkey

Sevgi Aydin Gunbatar, Van Yuzuncu Yil University, Turkey

Examining Changes in Representations in Prospective Elementary Teachers' Explanatory Models in a Content-Focused Course

Alexandria Call*, Northern Arizona University, USA

Martha Canipe*, Northern Arizona University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Understanding the Use of Models and Representations in Science Learning and Teaching

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 16

The Iterative Design of a Model-Based Inquiry Planning Tool for Preservice Science Teachers

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Teacher Sensemaking in Professional Development Contexts

17-Mar-24, 3:00 PM-4:30 PM

Location: Directors Row H

Sensemaking of District Provided Curriculum: How Teachers Adapt Resources in their Own Context

Joe DeLuca*, University of Georgia, USA

Julie Luft, University of Georgia, USA

Ella Yonai, University of Georgia, USA

Professional Learning to Support Elementary Teachers' Systems Thinking

Jennifer Maeng, University of Virginia, USA

Amanda Gonczi*, Michigan Technological University, USA

Ruohan Liu, University of Virginia, USA

Robert Handler, Michigan Technological University, USA

"Taking Action to Make Change": Capturing Science Teachers' Conceptions of Content Critique

Matthew Wilsey*, Stanford University, USA

Monica Sircar*, Stanford University, USA

Moments of Dissonance in a Professional Learning Community Toward Culturally and Linguistically Sustaining Science Teaching

Victor Leos*, University of Colorado Boulder, USA

Melissa Braaten, University of Colorado Boulder, USA

Loraine Glidewell, University of Colorado Boulder, USA

Partnering With Teachers to Localize a Climate Learning Experience for Students

Lindsey Mohan*, BSCS Science Learning, USA

Emily Harris, BSCS Science Learning, USA

Candice Guy-Gaytan, BSCS Science Learning, USA

Audrey Mohan, BSCS Science Learning, USA

Betty Stennett, BSCS Science Learning, USA

Supporting Teachers in the Selection of Meaningful Phenomena for Assessment Design.

Sara Cooper*, University of Colorado, USA

Abraham Lo, BSCS Science Learning, USA

Examining Teachers' Multimodal Customizations to Support Multilingual Students' Equitable Sensemaking.

Samuel Lee*, Boston College, USA

Katherine McNeill, Boston College, USA

Examining What Phenomena Matter to Students in a Customizable Unit

Candice Guy-Gaytàn*, BSCS Science Learning, USA

Awais Syed, BSCS Science Learning, USA

Emily Harris, BSCS Science Learning, USA

Lindsey Mohan, BSCS Science Learning, USA

Strand 10: Curriculum and Assessment

Related Paper Set

Partnering with Teachers to Customize Curriculum and Assessment for Meaningful Student Learning

17-Mar-24, 3:00 PM-4:30 PM

Location: Directors Row J

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Teacher Education: Teacher Knowledge, Beliefs, Persistence

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 17

Understanding the Conceptualisations of Coherence in Science Instruction and Teacher Education – A Systematic Literature Review

Mathias Ropohl, University of Duisburg-Essen, Germany

Stefan Sorge*, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Ibrahim Delen, Usak University, Turkey

Robert Evans, University of Copenhagen, Denmark

Kalle Juuti, University of Helsinki, Finland

Jari Lavonen, University of Helsinki, Finland

Pernilla Nilsson, Halmstad University, Sweden

Dustin Schiering, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Matthias Stadler, University of Bergen, Norway

Jeffrey Nordine, University of Iowa, USA

Understanding Estonian Science Teachers' Beliefs About Teaching and Assessment of Scientific Competences

Triin Rosin*, University of Tartu, Estonia

Katrin Vaino, University of Tartu, Estonia

Regina Soobard, University of Tartu, Estonia

Miia Rannikmäe, University of Tartu, Estonia

A Case Study of Biology Teachers' Persistence to Implement Reform Curriculum

Elizabeth de los Santos*, University of Nevada, Reno, USA

Kathleen Stylen*, Washoe County School District, USA

Faith Osgard*, Washoe County School District, USA

Suzanne Lewis*, University of Nevada, Reno, USA

Sylvia Scoggin*, Washoe County School District, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Critical Race Theories: Recovering Counterstories and Grappling with Slow Violence Across STEM and Teacher Education

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 14

We Missed A Step: Recovering Black Participation in Science Education

Tiffany Butler*, George Mason University, USA

Whiteness, Slow Violence and the Enclosure of STEM Pathways

Jennifer Adams*, University of Calgary, Canada

Preeti Gupta, The American Museum of Natural History, USA

Rachel Chaffe, The American Museum of Natural History, USA

Mahmoud Abouelkheir, The American Museum of Natural History, USA

Jahneal Francis, Northeastern University, USA

Educating Preservice Teachers While Black and White: Science as White Property in Teacher Education

Jonathan McCausland*, New Mexico Highlands University, USA

Jennifer Jackson*, Pennsylvania State University, USA

*Race in Teacher Educator Preparation:
The Black Doll White Doll Experiment
Becomes Personal*

Felicia Mensah*, Teachers College,
Columbia University, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

*Transforming Science Education:
LGBTQIA+ Perspectives, Queer
Theories, and Gender-Inclusive
Approaches*

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 12

*"You're a girl": Queer Students and
Teachers, Violence, and Science Education
after COVID-19*

Matthew Weinstein*, University of
Washington - Tacoma, USA

Alysa Schafer, Tacoma School District, USA

*The Science Classroom as a Gendered
Space and the Consequences for Learning
Science*

Cry Thorsen*, University of Copenhagen,
Denmark

Henriette Holmegaard, University of
Copenhagen, Denmark

Lene Madsen, University of Copenhagen,
Denmark

*Affirming Queerness in Biology: Teaching
Diversity Not Cisheteronormativity*

Aramati Casper*, Colorado State
University, USA

Beth Wittmann, Colorado State University,
USA

Ollie Turner, Colorado state university, USA

Elliot Batta, Colorado State University, USA

Kelly Lane, University of Minnesota - Twin
Cities, USA

Sarah Eddy, University of Minnesota - Twin
Cities, USA

*(TRANS)forming LGBTQ- and Gender-
Inclusive Science Education*

Ren Rende*, University of Nebraska at
Omaha, USA

Carla Johnson*, North Carolina State
University, USA

Strand 12: Technology for Teaching, Learning, and Research

Related Paper Set

*Challenges of Using AI for Evaluation
of Knowledge-in-use Assessments*

17-Mar-24, 3:00 PM-4:30 PM

Location: Governor's Square 15

*Rubric Development for AI Scoring of
NGSS Learning Progression-Based
Scientific Models To Support Individual
Opportunity To Learn*

Leonora Kaldaras*, University of Colorado
Boulder, USA

Tingting Li, Michigan State University, USA

Kevin Haudek, Michigan State University,
USA

Joseph Krajcik, Michigan State University,
USA

*Utilizing Deep Learning AI to Evaluate
Scientific Models: Overcoming the
Challenges*

Tingting Li*, Michigan State University,
USA

Leonora Kaldaras, University of Colorado
Boulder, USA

Kevin Haudek, Michigan State University,
USA

Joseph Krajcik, Michigan State University,
USA

Improving Machine Scoring Performance with Unbalanced Training Dataset

Xinyu He*, University of Georgia, USA
Xiaoming Zhai, University of Georgia, USA
Peng He, Michigan State University, USA
Ehsan Latif, University of Georgia, USA

Using Generative AI to Automatically Identify Students' Three-Dimensional Understanding in an NGSS-Aligned Learning Progression

Peng He *, Michigan State University
CREATE for STEM Institute, USA
Namsoo Shin, Michigan State University
CREATE for STEM Institute, USA
Joseph Krajcik, Michigan State University
CREATE for STEM Institute, USA

Strand 13: History, Philosophy, Sociology, and Nature of Science
SC-Organized Paper Set
K-12 Teaching and Learning
17-Mar-24, 3:00 PM-4:30 PM
Location: Plaza Court 1

Student-Led Participatory Science Curriculum Encourages Science Identity Development in High School Students

Charlie Blake*, Southern Illinois University
Edwardsville, USA
Andreia Dexheimer*, Southern Illinois
University Edwardsville, USA
Carol Colaninno, Emory University, USA
Candice Johnson, Southern Illinois
University Edwardsville, USA
Adriana Martinez, Southern Illinois
University Edwardsville, USA
Benjamin Greenfield, University of
Southern Maine, USA
Sharon Locke, Southern Illinois University
Edwardsville, USA
Georgia Bracey, Southern Illinois
University Edwardsville, USA

Developing a Contextual Questionnaire to Investigate Middle Students' View on the Nature of Science

Jie Yang*, Beijing Normal University, China
Sisi Han, Capital Normal University, China
Fangfang Zhao, Beijing Normal University, China

How do Science Teachers Transform their Understanding of Scientific Methods to their Teaching?

Busra Aksoz*, Bogazici University, Turkey
Ebru Kaya, Bogazici University, Turkey

Experiences that Teachers Attribute to the Development of their Epistemic Beliefs about Science Knowledge

Ellen Watson*, Brandon University, Canada
Sarah Ragoub*, University of Manitoba, Canada

Strand 14: Environmental Education and Sustainability
SC-Organized Paper Set
Place-Base Education
17-Mar-24, 3:00 PM-4:30 PM
Location: Governor's Square 11

Environmental Education: Solutions-Based Pedagogy to Avoid SuperDoom

Brandl Rayelynn*, Montana Technological
University, USA
Chris Pavlovich*, Montana Technological
University, USA

Place-Based Education in Diverse Urban Communities: The Case of Israel

Miri Yemini*, Technion, Israel

Promoting Scientific Literacy and Nature of Science in International Communities through Place-Based Socioscientific Issues Context

Daniel De Jesús*, Texas A&M University, USA

Benjamin Herman*, Texas A&M University, USA

Kira Delmore, Texas A&M University, USA

Impact of Interdisciplinary Integrated STEAM Garden-Based Curriculum on Students' Knowledge, Self-Efficacy, and Attitudes

Katherine Vela*, Utah State University, USA

Douglas Weber, Utah State University, USA

Rita Hagevik, University of North Carolina-Pembroke, USA

Michelle Parslow*, Utah State University, USA

Kathy Cabe Trundle, Utah State University, USA

Laura Wheeler, Brigham Young University, USA

Strand 15: Policy, Reform, and Program Evaluation
SC-Organized Paper Set
Examining Teacher and Student Outcomes in STEM Learning Contexts
17-Mar-24, 3:00 PM-4:30 PM
Location: Directors Row I

Examining Advanced STEM Course Enrollment and Performance Trends in New Jersey Across District Factor Groups

Brian Baldwin*, Kean University, USA

Brandon Barbieri, Kean University, USA

Does Attending a Selective STEM High School Influence College Outcomes?

Jamie Elsner*, University of North Carolina at Chapel Hill, USA

William Zahran, University of North Carolina at Chapel Hill, USA

Isai Garcia-Baza, University of North Carolina at Chapel Hill, USA

Daniel Klasik, University of North Carolina at Chapel Hill, USA

Krissi Hewitt, North Carolina School of Science and Mathematics, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

A Comparison of Retained vs. Non-Retained Novice Science Teachers in Four U.S. States From 2007-2018

Douglas Larkin*, Montclair State University, USA

Khadjia Ahmed, Montclair State University, USA

Suzanne Patzelt, Touro University, USA

Mayra Muñoz, Montclair State University, USA

Colorado Science Education Research
Supporting Three-Dimensional Curriculum, Instruction, and Assessment Through a Ten-Year Research-Practice Partnership

Erin Furtak*, University of Colorado, USA

Samantha Duwe, Aurora Public Schools, USA

Colorado Science Education Research Symposium
BSCS Then and Now: Advancing High Quality Science Education for All Learners
17-Mar-24, 4:45 PM-6:15 PM
Location: Governor's Square 10

BSCS Then and Now: Advancing High Quality Science Education for All Learners

Chris Wilson*, BSCS Science Learning, USA

Cari Herrmann Abell*, BSCS Science Learning, USA

Jody Bintz, BSCS Science Learning, USA

Abraham Lo, BSCS Science Learning, USA

Lindsey Mohan, BSCS Science Learning, USA

Jean Flanagan, BSCS Science Learning, USA

Candice Guy-Gaytán, BSCS Science Learning, USA

Diego Rojas, BSCS Science Learning, USA

Jeffrey Snowden, BSCS Science Learning, USA

Betty Stennett, BSCS Science Learning, USA

Sherry Hsi, BSCS Science Learning, USA

Engineering Education (ENE-RIG)

Sponsored Session

Applying an Engineering Education Lens to Today's Socio-Scientific/Socio-Technical Realities: Public Health, Socioeconomic Inequality, Climate Change, Artificial Intelligence and Beyond

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 16

Applying an Engineering Education Lens to Today's Socio-Scientific/Socio-Technical Realities: Public Health, Socioeconomic Inequality, Climate Change, Artificial Intelligence and Beyond

ORGANIZERS

Monica Cardella, Florida International University, USA

Pamela Lottero-Perdue, Towson University, USA

PANELISTS

John Settlage, University of Connecticut, USA

Christopher Wright, Drexel University, USA

Greses Pérez, Tufts University, USA

Senay Purzer, Purdue University, USA

ESERA

Sponsored Session

Re-imagining Science Education in Post-Pandemic Worlds & Uncertain Futures

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 17

Re-imagining Science Education in Post-Pandemic Worlds & Uncertain Futures

ORGANIZERS

Giulia Tasquier, University of Bologna, Italy

Lucy Avraamidou, University of Groningen, Netherlands

PANELISTS

Mauricio Pietrocola, University of Sao Paulo, Brazil

Olivia Levrini, University of Bologna, Italy

Digna Couso, Universitat Autònoma de Barcelona, Spain

Strand 1: Science Learning:

Development of student understanding

Symposium

Learning Progression Analytics: Analyzing student learning for the individualized development of competence

17-Mar-24, 4:45 PM-6:15 PM

Location: Plaza Court 2

Learning Progression Analytics: Analyzing student learning for the individualized development of competence

Marcus Kubsch*, Freie Universität, Germany

Berrit Czinczel*, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Jannik Lossjew*, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Tobias Wyrwich*, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Ute Harms, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Daniela Fiedler, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Nikol Rummel, Ruhr-Universität Bochum, Germany

Hendrik Drachslar, DIPF, Germany

Ulrike Cress, IWM, Germany

Knut Neumann, IPN – Leibniz Institute for Science and Mathematics Education, Germany

The Role of Knowledge and Perspective-taking in Students' Performance of Socioscientific Argumentation

Shih-Yeh Chen*, National Taichung University of Education, Taiwan

Shiang-Yao Liu, National Taiwan Normal University, Taiwan

Middle School Students' Informal Reasoning Quality, Attitudes Toward Socioscientific Issues and Motivation to Learn Science

Büsra Manay, Science Teacher, Turkey

Özgül Yılmaz Tüzün*, Middle East Technical University, Turkey

Exploring and Expanding the Frontiers of Socioscientific Issues

Dana Zeidler*, University of South Florida, USA

Troy Sadler*, University of North Carolina at Chapel Hill, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-Organized Paper Set

Socioscientific Issues

17-Mar-24, 4:45 PM-6:15 PM

Location: Plaza Court 4

Students' Socio-scientific Systems Thinking: The Role of Systems Mapping, Causal Reasoning, and Content Knowledge

Nannan Fan*, University of North Carolina at Chapel Hill, USA

Eric Kirk, University of North Carolina at Chapel Hill, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

Heewoo Lee, University of North Carolina at Chapel Hill, USA

Linyu Yu, University of North Carolina at Chapel Hill, USA

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

SC-Organized Paper Set

Early Childhood Science Practices

17-Mar-24, 4:45 PM-6:15 PM

Location: Plaza Court 3

Playing in Science: Exploring Play-Based Science Learning Across Different Preschool Models

Kathleen Mahoney*, University of Massachusetts, USA

Jeanne Brunner*, University of Massachusetts, USA

Rethinking Early Years Environmental Science Education, Pedagogy, and Approaches in Response to Climate Change

Peter Oyewole*, Kent State University, USA

Head Start Teachers' Understanding of Science and How it Relates to Classroom Science Practices

Arianna Pikus*, Texas A&M, USA

Hope Gerde, Texas A&M, USA

Christina Schwarz, Michigan State University, USA

Kyung Sook Lee, University of Alaska Fairbanks, USA

Laurie Van Egeren, Michigan State University, USA

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies
SC-Organized Paper Set
Discourse-based Learning
17-Mar-24, 4:45 PM-6:15 PM
Location: Plaza Court 5

What Kinds of Argumentation Dialog Types are Useful?

Shuang Xu, East China Normal University, China

Xiao huang*, Zhejiang Normal University, College of Education, China

Sibel Erduran, University of Oxford,, United Kingdom

Mengzhuang Zheng, Zhejiang Normal University, China

Learning the Ropes: How Do Mentors Support Students Through the Scientific Publication Process?

Tanya Bhagatwala, Emory University, USA

Trisha Minocha, Emory University, USA

Sarah Fankhauser*, Oxford College of Emory University, USA

Using Questions to Reach Across Disciplines in a Middle School Integrated STEM Investigation

Lori Klukowski*, Middle Tennessee State University, USA

Ryan Jones, Middle Tennessee State University, USA

Fonya Scott, Middle Tennessee State University, USA

Investigating Teacher Questioning During Scaffolded Lessons for Evaluating Alternative Scientific Explanations

Janelle Bailey*, Temple University, USA

Lorraine Ramirez Villarin, University of North Georgia, USA

Donna Governor, University of North Georgia, USA

Strand 6: Science Learning in Informal Contexts
SC-Organized Paper Set
Pedagogy in Science Museums
17-Mar-24, 4:45 PM-6:15 PM
Location: Plaza Court 6

When Science Museums Re-Imagined Their Communication and Educational Roles: Responses to the Covid-19 Pandemic

Ana Maria Navas Iannini*, Simon Fraser University, Faculty of Education, Canada

Erminia Pedretti, University of Toronto, Ontario Institute for Studies in Education (OISE), Canada

Learning Talk and Museum Signage at an Informal Science Exhibit

Jefferson Ramsey*, UNC Chapel Hill, USA

Leah Metcalf*, UNC Chapel Hill, USA

Slki Lim, UNC Chapel Hill, USA

Mengyi Mao, UNC Chapel Hill, USA

Janice Anderson, UNC Chapel Hill, USA

Jill Hamm, UNC Chapel Hill, USA

Dual Role Science Museum Educators:

Fun = Engagement = Learning

Patricia Patrick*, Columbus State

University, USA

Monique Lester, Columbus State

University, USA

Revisiting Distance Learning in Museums

Three Years After Covid-19 Closures

Megan Ennes*, University of Florida, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Approaches of Preservice Teachers

Developing Self-efficacy for STEM

Learning and Teaching

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 16

Exploring Preservice Teachers'

Computational Thinking (CT) and Self-

Efficacy through Scaffolding Plugged and

Unplugged CT Activities

Jeffrey Radloff*, SUNY Cortland, USA

Bridget Miller, University of South

Carolina, USA

Development of Integrated STEM

Teaching Self-Efficacy Among Elementary

Preservice Teachers

Jeanna Wieselmann*, Southern Methodist

University, USA

Deepika Menon, University of Nebraska -

Lincoln, USA

Sarah Haines, Towson University, USA

Sumreen Asim, Indiana University

Southeast, USA

Amanda Koch, Independent Contractor,

USA

Derek Cox, University of Nebraska -

Lincoln, USA

Investigating Preservice Elementary

Teachers' STEM Teaching Self-Efficacy and

Goal Orientation

Derek Cox*, University of Nebraska-

Lincoln, USA

Deepika Menon, University of Nebraska-

Lincoln, USA

Jeanna Wieselmann, Southern Methodist

University, USA

Assessing Preservice Teachers

Understanding of Computational

Thinking using Science Lesson Plans

Line Saint-Hilaire*, Queens College, CUNY,

USA

Anna Malyukova, Queens College, CUNY,

USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Science Teachers' Identity

Development

17-Mar-24, 4:45 PM-6:15 PM

Location: Directors Row J

Science Teacher Identity Research: A

Scoping Literature Review

Xiufeng Liu*, University at Buffalo, State

University of New York, USA

Yanfeng Zhai, Capital Normal University,

China

Examining the Role of Instructional

Coaching on Elementary Teachers'

Science Teacher Identity Development

Dionne Cross Francis*, University of North

Carolina, USA

Andrea Phillips*, Indiana University, USA

Anina Mahmud*, University of North

Carolina, USA

Meredith Park Rogers*, Indiana University,

USA

Being Science Teachers: Co-Constructing Identities In Science Instructional Coaching Conversations

Catherine Bhatena*, Indianapolis Public Schools, USA

Exploring Elementary Teaching Efficacy Differences Between Life and Physical Science

Doug Ball*, Utah State University, USA

Colby Tofel-Grehl, Utah State University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Teachers' Content and Pedagogical Content Knowledge

17-Mar-24, 4:45 PM-6:15 PM

Location: Directors Row H

Unraveling Empirically Supported Factors Contributing to Pedagogical Content Knowledge Development: A Systematic Analysis of Literature

Soonhye Park*, North Carolina State University, USA

Kennedy Chan*, The University of Hong Kong, Hong Kong

A model for developing teachers' Contemporary Content Knowledge (CCK)

Ron Blonder*, Weizmann Institute of Science, Israel

Mapping the Development and Deployment of Teachers' PCK and Instructional Practices After Modeling Instruction PD

Matt Reynolds*, North Carolina State University, USA

Laura Chalfant, North Carolina State University, USA

Grace Carroll, North Carolina State University, USA

Elsun Seung, Indiana State University, USA

Soonhye Park, North Carolina State University, USA

Amanda Hall, North Carolina State University, USA

Elizabeth Kluckman, North Carolina State University, USA

Scott Ragen, North Carolina State University, USA

Jason Painter, North Carolina State University, USA

Personal and Enacted PCK for Teaching Earth Science: A Case Study of an Elementary-School Teacher

Claudia Vergara*, Universidad Alberto Hurtado, Chile

Kasandra Navarrete, Universidad Alberto Hurtado, Chile

Carolina Cartes, Universidad Alberto Hurtado, Chile

Hernan Cofre, Pontificia Universidad catolica de Valparaiso, Chile

Paola Nuñez, Pontificia Universidad catolica de Valparaiso, Chile

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Families Matter: Family Learning as a Central Component to Equity in STEM Education

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 14

Recognizing Black Family Members as Partners in STEM Education

DeLean Tolbert Smith*, University of Michigan-Dearborn, USA

Monica Cardella*, Florida International University, USA

Considering the Family-Centric STEM Identity Development Model to Support Inclusivity in Designing STEM Learning Experiences

Remy Dou*, Florida International University, USA

Heidi Cian, MMSA, USA

Agentic Interest Pathways: Understanding How Families Shape Their Own Interest Development to Inform STEM Equity

Scott Pattison*, TERC, USA

Smirla Ramos Montañez*, TERC, USA

Viviana López Burgos, TERC, USA

Cina Svarovsky, University of Notre Dame, USA

Annie Douglass, Oregon Museum of Science and Industry, USA

Julie Allen, Mt. Hood Community College Head Start, USA

Catherine Wagner, University of Notre Dame, USA

STEM Fam: Fostering Rightful Familial Presence in Middle School STEM

Angela Calabrese Barton*, University of Michigan, USA

Edna Tan, University of North Carolina at Greensboro, USA

Wisam Sidawi, University of Michigan, USA

Francisco Para Camacho, University of Michigan, USA

Virginia Swindell, University of North Carolina at Greensboro, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Identity and Gender: Student Portraiture, Teacher Perspectives, and Pursuing Equity

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 12

Meaningful Classroom Engagement for Cultivating STEM Identity: Exploring High School Student Perceptions Through Portraiture

Elizabeth Saville*, UBC Okanagan, Canada
Using Storied Identities to Uncover Science Teachers' Identities in Science After an RET

Suzanne Patzelt*, Touro University, USA

Gender Difference in the Attitude of Students to Computer Studies: Can CTCA Bridge the Gap?

Chinyere Ikpah*, Lagos State University-ACEITSE, Nigeria

Rasheed Sanni, Lagos State University-ACEITSE, Nigeria

Peter Okebukola, Lagos State University-ACEITSE, Nigeria

Deborah Agbanimu, National Open University of Nigeria, Nigeria

Franklin Onowugbeda, Lagos State University-ACEITSE, Nigeria

Towards Gender Equity in Science Learning and Achievement: Measuring the Catalytic Effects of Culturo-Techno-Contextual Approach

Adekunle Oladeje*, Lagos State University, Nigeria

Peter Okebukola, Lagos State University, Nigeria

Juma Shabani, University of Burundi, Burundi,

Ibiyinka Ogunlade, Ekiti State University, Ado-Ekiti, Nigeria,

Ademola Ibukunolu, Lagos State University, Nigeria

Deborah Agbanimu, Lagos State University, Nigeria

Franklin Onowugbeda, Lagos State University, Nigeria

Strand 12: Technology for Teaching, Learning, and Research
SC-Organized Paper Set
Concerns of Using Technology in Science Education
17-Mar-24, 4:45 PM-6:15 PM
Location: Governor's Square 15

The Use of Educational Technology in Inquiry-based Elementary Science Education: A Systematic Review
Minji Yun*, University of Florida, USA
Kent Crippen, University of Florida, USA

Is Classroom Technology Centering Students? A Review of Research on Digitally-Mediated Science Instruction from 2012-2022
Tess Bernhard*, University of Pennsylvania, USA

Towards Integrating Computational Agent-based Modeling Practices with Three-dimensional NGSS Learning
Aditi Wagh*, MIT, USA
Luke Conlin, Salem State University, USA
Daniel Wendel, MIT, USA
Emma Anderson, MIT, USA
Ilana Schoenfeld, MIT, USA

Supporting AI literacy in K-12 Science Education: Raising Critical Consciousness towards Ethical AI
Selin Akgun*, Michigan State University, USA
Hee Rin Lee, Michigan State University, USA

Kahyun Choi, Indiana University Bloomington, USA

Joseph Krajcik, Michigan State University, USA

Strand 13: History, Philosophy, Sociology, and Nature of Science
SC-Organized Paper Set
Knowledge Into Practice
17-Mar-24, 4:45 PM-6:15 PM
Location: Plaza Court 1

Specifying the Refined Consensus Model: An Argument for Biology-Specific Collective Pedagogical Content Knowledge
Sophie-Luise Müller*, Freie Universität, Germany
Daniela Mahler, Freie Universität, Germany

PCK of NOS: Approach to the Collective PCK of Expert Biology Teachers in NOS Teaching
Paola Nuñez*, Pontificia Universidad Católica de Valparaíso, Chile
Claudia Vergara, Universidad Alberto Hurtado, Chile
Carolina Parraguez, Pontificia Universidad Católica de Valparaíso, Chile
David Santibañez, Universidad Finnis Terrae, Chile
Hernan Cofre, Pontificia Universidad Católica de Valparaíso, Chile

Pedagogy of Practice Approach to Teaching Nature of Science to In-Service Teachers
Anna Pshenichny-Mamo*, Technion – Israel Institute of Technology, Israel
Haya Ben Simon, Technion – Israel Institute of Technology, Israel
Dina Tsybulsky*, Technion – Israel Institute of Technology, Israel

**Strand 14: Environmental Education
and Sustainability**

SC-Organized Paper Set

Climate Change Education

17-Mar-24, 4:45 PM-6:15 PM

Location: Governor's Square 11

*Psychological Distance to Climate
Change: Science Teachers' and Scientists'
Use of Visual Representations*

M. Gail Jones*, NCSU, USA

Julianna Nieuwsma, NCSU, USA

Rebecca Ward, NCSU, USA

Madeline Stallard, NCSU, USA

Kathleen Bordewieck, NCSU, USA

Amber Meeks, NCSU, USA

Tanzimul Ferdous, NCSU, USA

Kimberly Ideus, NCSU, USA

*Children's Understanding of Climate
Change*

Mijung Kim*, University of Alberta, Canada

Qingna Jin*, Cape Breton University,
Canada

*Climate Superheroes: Impact of a STEAM
Camp on Preschool Children's Ideas about
Climate-Friendly Actions*

Lisa Borgerding*, Kent State University,
USA

Breanna Beaver, Youngstown State
University, USA

*Developing a Model of Climate Change
Literacy Based on the Systematic
Literature Review*

Helin Semilarski*, University of Tartu,
Estonia

Helen Semilarski, University of Tartu,
Estonia

*Pre-Service Biology Teacher Beliefs about
Climate Change Education*

Veronika Winter*, University of Vienna,
Austria

Andrea Moeller, University of Vienna,
Austria

Alexander Buessing, Leibniz University
Hannover, Germany

Niklas Gericke, Karlstad University,
Sweden

Social Event

***Early Career Faculty Institute Meet-
up***

17-Mar-24, 6:15 PM-7:00 PM

Location: Directors Row I

Early Career Faculty Institute Meet-up

ORGANIZERS

Julie Luft, University of Georgia, USA

Angela Calabrese Barton, University of
Michigan, USA

Social Event

***Presidential Welcome Reception and
Dance***

17-Mar-24, 7:00 PM-10:00 PM

Location: Plaza Ballroom ABC/DEF

18 MARCH 2024

Social Event

Mind & Sole Denver! "5280 - Let's Run Mile High!"

18-Mar-24, 6:30 AM-8:00 AM

Location: Off Site

ORGANIZER

Angela Calabrese Barton, University of Michigan, USA

RIG Business Meeting

Asian and Pacific Islander Science Education Research [APISER] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 17

RIG Business Meeting

Latino/a RIG [LARIG] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 1

RIG Business Meeting

Contemporary Methods for Science Education Research Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 2

RIG Business Meeting

Engineering Education [ENE-RIG] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 3

RIG Business Meeting

Indigenous Science Knowledge [ISK-RIG] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 4

RIG Business Meeting

Research in Artificial Intelligence-involved Science Education [RAISE] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 5

RIG Business Meeting

LGBTQ+ RIG Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 6

LGBTQ+ RIG Business Meeting

RIG Business Meeting

Continental and Diasporic Africa in Science Education [CADASE] Business Meeting

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 7

RIG Business Meeting
*Interested in forming a
Computational Thinking in Science
Education RIG?*

18-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 8

Roundtables Session 1

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Ballroom ABC/DEF

**Colorado Science Education Research
Roundtable**

*Supporting Computationally-Rich Science
Instruction: Conceptual Models for CT-
Integrated Science Curriculum and
Professional Learning*

Gregory Benedis-Grab*, CU Boulder, USA

Quentin Biddy, CU Boulder, USA

Srinjita Bhaduri, CU Boulder, USA

Jennifer Jacobs, CU Boulder, USA

Alexandra Gendreau Chakarov, CU
Boulder, USA

Jeffrey Bush, CU Boulder, USA

Tamara Sumner, CU Boulder, USA

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

*Dissecting Dialogue: A Proposed
Integrated Framework for Analyzing
Student Discourse in Science Classrooms*

Benny Mart Hiwatig, University of
Minnesota, USA

Abdi Warfa*, University of Minnesota, USA

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

*Elementary Science Teaching: Toward the
Goal of Scientific Literacy*

Valarie Akerson*, Indiana University, USA

Selina Bartels*, Valparaíso University, USA

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

*Civic Science: Developing Scientific
Literacy for Marginalized Students
through Community Engagement*

E. Woo*, Michigan State University, USA

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

*Citizen Science as Means to Support
Understanding of Cultural Heritage.*

Zoubaida Dagher*, University of Delaware,
USA

**Strand 14: Environmental Education
and Sustainability
Work-in-progress Roundtable**

*Role of Basic Sciences in Creating
Awareness among School Students &
Student-Teachers about Single Use
Plastics*

Narendra Deshmukh*, Homi Bhabha
Centre for Science Education, TIFR, India

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

*Development and Validation of an
Instrument Investigating Elementary
Teachers' Sense of Agency for Science
Instruction*

Alison Mercier*, University of Wyoming,
USA

Anica Miller-Rushing*, University of Maine, USA

Jennifer Haddad Lingle, University of North Carolina at Greensboro, USA

**Strand 2: Science Learning: Contexts, Characteristics and Interactions
Work-in-progress Roundtable**

Writing for Identity? Exploring the Motivation of Pre-College Students to Participate in Science Publication.

Sarah Fankhauser*, Oxford College, USA

**Strand 2: Science Learning: Contexts, Characteristics and Interactions
Work-in-progress Roundtable**

Influence of Summer Research Experiences on High School Students Science Identity

Nidaa Makki*, The University of Akron, USA

Katrina Halasa*, Akron Public Schools, USA

Kristin Koskey*, Drexel University, USA

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

Exposing a Hidden Reality, What Middle School Students Said About Their Lived Elementary Science Experiences.

Tryna Knox*, SMU, USA

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

Reading for Science: The Use of Scientific Literary Materials in Primary Schools

Fay Lewis*, University of the West of England, United Kingdom

Jane Carter*, University of the West of England, United Kingdom

Juliet Edmonds, University of the West of England, United Kingdom

Ann Alston, University of the West of England, United Kingdom

Stephanie Sargeant, University of the West of England, United Kingdom

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

Using Teaching Debriefs to Explore the Emerging Science Teaching Identity of a Veteran Elementary Teacher

Terrance Burgess*, Michigan State University, USA

**Strand 5: College Science Teaching and Learning (Grades 13-20)
Work-in-progress Roundtable**

Data-Informed Teaching: An Examination of Faculty Use of Student Data

Dashboards for Classroom Instruction

Veronika Rozhenkova*, University of California Irvine, USA

Maryam Eslami, University of California Irvine, USA

Celine Crooks, University of California Irvine, USA

Brian Sato, University of California Irvine, USA

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

Situational Interest and Perceived Relevance in Physics Learning Modules

Rauno Neito*, University of Tartu, Estonia

Elisa Vilhunen, University of Helsinki, Finland

Jari Lavonen, University of Helsinki, Finland

Kaido Reivelt, University of Tartu, Estonia

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

Interdisciplinary Assessment of Student Thinking About Variability Across Mathematics and Science Classes in Middle School

Fonya Scott*, Middle Tennessee State University, USA

Ryan Jones, Middle Tennessee State University, USA

Lori Klukowski, Middle Tennessee State University, USA

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

Assessing Pedagogical Content Knowledge for Data Fluency for Middle School STEM Teachers

Rasha Elsayed*, WestEd, USA

Nicole Wong*, WestEd, USA

Leticia Perez*, WestEd, USA

Kirsten Daehler*, WestEd, USA

Pai-rou Chen, WestEd, USA

Corynn Del Core, WestEd, USA

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

Case Study - Training STEM High School Teachers to Integrate Engineering through Gamification

Leslie Brown*, Utah State University, USA

Marissa Tsugawa, Utah State University, USA

Strand 14: Environmental Education and Sustainability Roundtable

The Woolly Bully: Increasing Students' Science Identities by Tracking the Hemlock Woolly Adelgid

Tara Goodhue*, University of Massachusetts, Lowell, USA

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

Intersectionality of Race and STEM Contents in Two High School Biology Teachers' Classrooms

Bhaskar Upadhyay*, University of Minnesota, USA

Patricia Avery, University of Minnesota, USA

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

In Search of a New Perspective in Exploration of the Persistent P-12 STEM Achievement Gap

Wardell Powell*, Framingham State University, USA

Angela Chapman*, University of Texas Rio Grande Valley, USA

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

Student Motivation to Learn and Pursue Careers in Science

Erica Meyers, Kasson- Mantorville Public Schools ISD 204, USA

Bonnie Boyd*, Independent School District 196, USA

Felicia Leammukda, Saint Cloud State University, USA

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

Exploring A Promising Path Forward: Teacher Engagement with “Civic Science Education”

Maggie Demarse*, Michigan State University, USA

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

How Do Teachers in Rural Alaska Make Space for Community Cultural Wealth in the Classroom?

Ginger Shultz*, University of Michigan, USA

Jeffrey Spencer, University of Michigan, USA

Archer Harrold, University of Michigan, USA

Safron Milne, University of Michigan, USA

Danielle Maxwell, University of Michigan, USA

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

A Scientific Laboratory-Based Course Aimed at Improving the Scientific Attitudes and Skills of Non-Science Majors

Brian Rempel, University of Alberta, Canada

Sheryl Gares, University of Alberta, Canada

Ellen Watson*, Brandon University, Canada

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

Interactions within Cohorts of STEM Majors from Minoritized Groups: The Potential for Changing STEM Climate
Stacy Olitsky*, Saint Joseph's University, USA

Strand 5: College Science Teaching and Learning (Grades 13-20) Work-in-progress Roundtable

Investigating the Role of Representational Competence and Spatial Ability in Learning With Chemical Representations

Sebastian Nickel*, FAU Erlangen-Nürnberg, Germany

Steffen Brockmüller, FAU Erlangen-Nürnberg, Germany

Sebastian Habig, FAU Erlangen-Nürnberg, Germany

Strand 5: College Science Teaching and Learning (Grades 13-20) Work-in-progress Roundtable

Implementing and Evaluating Professional Development for Science Faculty that Impacts Student Learning of Science

Peter Cormas*, Pennsylvania Western University, USA

Louise Nicholson*, Pennsylvania Western University, USA

Min Li, Pennsylvania Western University, USA

Elizabeth Steiner, RAND Corporation, USA

Sy Doan, RAND Corporation, USA

Strand 5: College Science Teaching and Learning (Grades 13-20) Work-in-progress Roundtable

Assessing Metacognitive Monitoring in Evolution Understanding

Rahmi Aini*, Middle Tennessee State University, USA

M. Elizabeth Barnes, Middle Tennessee State University, USA

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

Work-in-progress Roundtable

STEM Undergraduate Research Students' Self-Efficacy and Their Learning Practices Within a Multi-Institutional Collaborative Research Community

Hyoung Joon Park*, Oregon State University, USA

Jana Bouwma-Gearhart, Oregon State University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Professional Development Design and Implementation to Foster Planning for Culturally Responsive Engineering Experiences

Christopher Irwin*, Florida International University, USA

Darryl Dickerson*, Florida International University, USA

Joshua Ellis*, Louisiana State University, USA

Daniel Adeniranye, Florida International University, USA

Brak Berhane, Florida International University, USA

Andrew Green, Florida International University, USA

Berry Lamy, Florida International University, USA

Nicholas Oehm, Florida International University, USA

Equity and Ethics Committee

Sponsored Session

Jhumki Basu Scholars Symposium

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 10

Jhumki Basu Scholars Symposium

ORGANIZERS

Regina McCurdy, Georgia Southern University, USA

Alexandria Muller, University of California-Santa Barbara, USA

David Steele, Alder Graduate School of Education, USA

Marsha Simon, University of West Georgia, USA

PANELISTS

Sule Aksoy, City University of New York, USA

Roshni Bano, University of Illinois, Chicago, USA

Haider Ali Bhatti, University of California, Berkeley, USA

Henriette Burns, Southern Illinois University Edwardsville, USA

Alia Hamdan, University of Arizona, USA

Mwenda Kudumu, North Carolina State University, USA

Gozde Tosun, Penn State University, USA

Alexandria Muller, University of California, Santa Barbara, USA

Ren Rende, University of Nebraska at Omaha, USA

Jenny Tilsen, University of Minnesota, USA

Hamza Malik, University of Massachusetts, Dartmouth, USA

Teresa Massey, Georgia State University, USA

Khanh Tran, Purdue University, USA

Carol Waters, University of Houston-Clear Lake, USA

**Strand 1: Science Learning:
Development of student
understanding
SC-Organized Paper Set
*Models and (Computational)
Modeling*
18-Mar-24, 8:15 AM-9:45 AM
Location: Governor's Square 17**

Interconnecting Modeling, System Thinking, and Disciplinary Core Ideas Using Computational System Modeling.
Emil Eidin*, University of Wyoming, USA
Jonathan Bowers, Michigan State University, USA

A Microanalytic Knowledge Analysis of Middle Schoolers' Ideas About Modeling
Eric Kirk*, University of North Carolina at Chapel Hill, USA
Troy Sadler, University of North Carolina at Chapel Hill, USA
Zhen Xu, University of North Carolina at Chapel Hill, USA
Jamie Elsner, University of North Carolina at Chapel Hill, USA
Li Ke, University of Nevada Reno, USA
Laura Zangori, University of Missouri Columbia, USA

Metamodeling Knowledge and Engagement in Modeling Practices: The Role of Content Knowledge
Paul Engelschalt*, Humboldt-Universität zu Berlin, Germany
David Fortus, The Weizmann Institute of Science, Israel
Dirk Krüger*, Freie Universität Berlin, Germany
Annette Upmeier zu Belzen, Humboldt-Universität zu Berlin, Germany

Mechanistic Reasoning in Group Drawing: The Case of Collaborative Gestures.
Vanessa De Andrade*, Universidade de Lisboa, Portugal
Yael Schwartz, Weizmann Institute of Science, Israel
Sofia Freire, Universidade de Lisboa, Portugal
Monica Baptista, Universidade de Lisboa, Portugal

**Strand 2: Science Learning: Contexts, Characteristics and Interactions
SC-Organized Paper Set
COVID-19, Viruses, and Vaccines
18-Mar-24, 8:15 AM-9:45 AM
Location: Directors Row E**

An Exploratory Study of Students' Prior Experiences and Concepts of Viruses and Vaccines
Madeline Stallard*, NC State University, USA
Gail Jones*, NC State University, USA
Julianna Nieuwsma, NC State University, USA
Kathleen Bordewieck, NC State University, USA

Teaching During the COVID Pandemic: K-12 Science Teachers Tell Their Stories
Lauren Harper*, Horizon Research, Inc., USA
Peggy Trygstad*, Horizon Research, Inc., USA
Anna Bruce, Horizon Research, Inc., USA
Patrick Smith, Horizon Research, Inc., USA

The Impacts of the COVID Pandemic on Science Teachers and their Teaching
Peggy Trygstad*, Horizon Research, Inc., USA
Laura Craven, Horizon Research, Inc., USA

Patrick Smith*, Horizon Research, Inc.,
USA

*Exploring the State of Creativity in an
Online Physics Learning Environment
During the Covid-19 Pandemic*

Fredyrose Ivan Pinar*, De La Salle
University, Philippines

*Motivating Science Learning When
Shifting from Face-to-Face to Distance
Learning: Comparing Teachers' and
Students' Perspectives*

Shira Passentin*, Weizmann Institute of
Science, Israel

David Fortus, Weizmann Institute of
Science, Israel

**Strand 4: Science Teaching — Middle
and High School (Grades 5-12):
Characteristics and Strategies
SC-Organized Paper Set
Inquiry-based Science Teaching
18-Mar-24, 8:15 AM-9:45 AM
Location: Plaza Court 1**

*The Science Education Research Trends in
Indonesian Secondary Schools: A
Systematic Review and Bibliometrics
Study*

M Muchson*, Western Michigan
University, USA

William Cobern, Western Michigan
University, USA

Muhammad Saefi, Universitas Islam
Maulana Malik Ibrahim Malang, Indonesia

*Leveraging Classroom Community to
Encourage a Collective Enterprise of
Building Science Ideas*

Jessica Alzen*, University of Colorado
Boulder, USA

Kelsey Edwards*, Northwestern University,
USA

Jason Buell, Northwestern University, USA
Chris Griesemer, University of California
Davis, USA

Cynthia Passmore, University of California
Davis, USA

William Penuel, University of Colorado
Boulder, USA

Brian Reiser, Northwestern University, USA

*Enhancing High-School Student's
Scientific Competency in Evaluating and
Designing Scientific Inquiry Through Peer-
Reviewed Guided Inquiry*

Yu-Jan Tseng*, National Sun Yat-sen
University, Taiwan

Huann-shyang Lin, National Sun Yat-sen
University, Taiwan

*Instructional Approaches in AP and
Introductory High School Science Courses
& Their Relations to PCK*

Robin Bulleri*, North Carolina State
University, USA

Soonhye Park, North Carolina State
University, USA

**Strand 5: College Science Teaching
and Learning (Grades 13-20)
SC-Organized Paper Set
Educator Development and STEM
Teaching
18-Mar-24, 8:15 AM-9:45 AM
Location: Plaza Court 6**

*Developing Educator Identity in
Engineering: A Pilot Case Study with
Graduate Teaching Assistants (GTA)*

Qingna Jin*, Cape Breton University,
Canada

Gokce Akcayir*, University of Alberta,
Canada

Kristian Basaraba*, University of Alberta,
Canada

Duncan Buchanan*, University of Alberta,
Canada

Marnie Jamieson*, University of Alberta,
Canada

Mijung Kim*, University of Alberta, Canada

Janelle McFeetors, University of Alberta,
Canada

Kerry Rose*, University of Alberta, Canada

*STEM Faculty Professional Development:
Measuring the impact on College Student
STEM Course Grades*

Lynn Tashiro, Sacramento State, USA

Mary McCarthy Hintz*, Sacramento State,
USA

Sabrina Solanki, Univeristy of California
Irvine, USA

Judith Kusnick, Sacramento State, USA

De-Laine Cyrenne*, Sacramento State,
USA

*Physics Professors' Pedagogical Decisions
and Adoption of Research-Based
Instructional Strategies*

Christy Metzger*, University of Delaware,
USA

*Investigating Faculty Engagement in
Developing Citizen/community Science
Course Projects Utilizing a Socioscientific
Issues-Based Approach*

Stephen Witzig*, University of
Massachusetts Dartmouth, USA

Hamza Malik, University of Massachusetts
Dartmouth, USA

Rachel Stronach, University of
Massachusetts Dartmouth, USA

Kathryn Kavanagh, University of
Massachusetts Dartmouth, USA

Robert Gegear, University of
Massachusetts Dartmouth, USA

Strand 6: Science Learning in Informal Contexts

SC-Organized Paper Set

Learning in Science Museums

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 4

*Promoting Inclusive Visits using Virtual
Reality to a Museum of Natural History for
Autistic Families*

Darby Drageset, University of Florida, USA

Yu-Chia (Irene) Kao, University of Florida,
USA

Nigel Newbutt, University of Florida, USA

Kent Crippen*, University of Florida, USA

*Creating Science Learning Spaces:
Lessons Learned from a Museum Science
Program*

Jacqueline Horgan*, Teachers College
Columbia University, USA

Felicia Mensah, Teachers College
Columbia University, USA

*Students' Conceptual Knowledge, but Not
Their Interest, Help Make Use of a Socio-
Scientific Museum Exhibition*

Melanie Keller*, IPN - Leibniz Institute for
Science and Mathematics Education,
Germany

Sarah Kellberg, IPN - Leibniz Institute for
Science and Mathematics Education,
Germany

Jeffrey Nordine, University of Iowa, USA

Doris Lewalter, LMU Ludwig Maximilians
Universität, Germany

*A Hopeful Future: Knowledge and
Ideological Resources for Learning at an
Innovative Museum Exhibit*

Lynne Zummo*, University of Utah, USA

Benjamin Janney, University of Utah, USA

Carrie Schultz, University of Utah, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Approaches to Assessments across STEM Disciplines

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 2

Research Strategies and Assessments of Online Source Credibility by Pre-Service Chemistry Teachers

Dennis Dietz*, Freie Universität Berlin, Germany

Arne Petter, Freie Universität Berlin, Germany

Claus Bolte, Freie Universität Berlin, Germany

Reflection on Physics Teaching – a Comparison of a Performance Assessment and a Multiple-Choice Assessment

Anna Weißbach*, University Bremen, Germany

Christoph Kulgemeyer, University Bremen, Germany

Considering Multiple Sources of Validity Evidence to Address Challenges in Developing PCK Multiple-Choice Items

Tobias Lieberei*, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Leroy Großmann, Freie Universität Berlin, Germany

Virginia Welter, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Dirk Krüger, Freie Universität Berlin, Germany

Moritz Krell, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Research and Insights on Approaches About Preservice Science Teacher Education Frameworks

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 3

Establishing Common Ground in Empirical Research on Science Teachers' Lesson Planning: A Scoping Review

Leroy Großmann*, Freie Universität Berlin, Germany

Maren Koberstein-Schwarz, Universität Hildesheim, Germany

Daniel Scholl, Universität Siegen, Germany

Dirk Krüger, Freie Universität Berlin, Germany

Anke Meisert, Universität Hildesheim, Germany

Making Beyond the University Classroom: Lessons from Preservice Teachers

Participating in a Mobile Making Program

Myunghwan Shin*, California State University, Fresno, USA

Alexandria Hansen*, California State University, Fresno, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Connections Between Teachers' Epistemic Beliefs and Instruction

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 12

Science Teachers' Beliefs About Teaching and Learning Science Contents and Scientific Practices

Verena Petermann*, Justus Liebig
University Giessen, Germany

Andreas Vorholzer, Technical University of
Munich, Germany

Claudia von Aufschnaiter, Justus Liebig
University Giessen, Germany

*Shifting Epistemic Authority in Science
Education: Understanding Teacher
Transitions in Knowledge Generation
Environments*

Jale Ercan-Dursun*, The University of
Alabama, USA

Jee Suh, The University of Alabama, USA

Ercin Sahin, The University of Iowa, USA

Brian Hand, The University of Iowa, USA

Gavin Fulmer, The University of Iowa, USA

*Exploring Relationships Among Science
Teachers' Pedagogical Content
Knowledge, Epistemic Orientations, and
Implementation of Model-Based Teaching*

Grace Carroll*, North Carolina State
University, USA

Soonhye Park, North Carolina State
University, USA

Matt Reynolds, North Carolina State
University, USA

Amanda Hall, North Carolina State
University, USA

Laura Chalfant, North Carolina State
University, USA

Scott Ragan, North Carolina State
University, USA

Jason Painter, North Carolina State
University, USA

*Tackling the Epistemic and Dialogic
Aspects of Interdisciplinary
Argumentation Among Science Teachers*

David Perl-Nussbaum*, Weizmann
Institute of Science, Israel

Baruch Schwarz, The Hebrew University of
Jerusalem, Israel

Edit Yerushalmi, Weizmann Institute of
Science, Israel

Strand 8: In-service Science Teacher Education

Related Paper Set

Curriculum-Based Professional Learning: Multiple Approaches to Working with Teachers of Diverse Student Groups

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 14

*Professional Learning Design to Enhance
Elementary Teacher's Pedagogical Design
Capacity to Adapt Curriculum Materials*

Katahdin (Kate) Cook Whitt*, Maine
Mathematics and Science Alliance, USA

Lisa Kenyon, Maine Mathematics and
Science Alliance, USA

*Curriculum-Based Professional
Development for Integrating Science and
Language with Multilingual Learners*

Alison Haas, New York University, USA

Okhee Lee*, New York University, USA

Abigail Schwenger, New York University,
USA

Scott Grapin, University of Miami, USA

*Sustained Professional Learning to
Promote Teaching Elementary Science in
Large Urban Schools*

Cory Susanne Miller*, Michigan State
University, USA

Joseph Krajcik*, Michigan State University,
USA

*Professional Learning to Support Teachers
Customization of Middle School Science
Curriculum to Support Equitable
Sensemaking*

Katherine McNeill*, Boston College, USA

Renee Affolter, Boston College, USA

Benjamin Lowell, New York University, USA

Austin Moore, Boston College, USA

Maria Moreno Vera, Boston College, USA

Samuel Lee, Boston College, USA

Strand 10: Curriculum and Assessment & Colorado Science Education Research

Related Paper Set

Building from Strengths and Attending to Context: Supporting Rural Science Teachers' Learning

18-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row H

Lessons Learned from Designing 5D Professional Learning for Rural Science Teachers

Abraham Lo*, BSCS Science Learning, USA

Annie Allen, University of Colorado, Boulder, USA

Kevin Cherbow, BSCS Science Learning, USA

Sara Cooper, University of Colorado, Boulder, USA

Loraine Glidewell, University of Colorado, Boulder, USA

Cari Herrmann Abell, BSCS Science Learning, USA

Keelin O'Connor, University of Colorado, Boulder, USA

William Penuel, University of Colorado, Boulder, USA

Opportunities and Challenges in Designing Phenomena-Based Tasks Rooted in Student-Identified Community Issues

Keelin O'Connor*, University of Colorado, Boulder, USA

William Penuel, University of Colorado, Boulder, USA

Kerri Wingert, University of Colorado, Boulder, USA

A Comparative Case Analysis of Rural Teachers' Experience with 5D Professional Learning

Loraine Glidewell*, University of Colorado Boulder, USA

Kerri Wingert, University of Colorado Boulder, USA

Annie Allen, University of Colorado Boulder, USA

Jennifer Jacobs, University of Colorado Boulder, USA

Investigating the Impact of a 5D Professional Learning Course on Rural Teachers' Assessment Practices

Cari Herrmann Abell*, BSCS Science Learning, USA

Abraham Lo*, BSCS Science Learning, USA

Kevin Cherbow, BSCS Science Learning, USA

Sara Cooper, University of Colorado Boulder, USA

April Gardner, BSCS Science Learning, USA

Keelin O'Connor, University of Colorado Boulder, USA

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Moving Towards Equity and Racial Justice

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 5

Colorado Science Education Research

Moving Genetics Education Beyond Mendel Can Reduce Racial Prejudice

Brian Donovan, BSCS Science Learning, USA

Monica Weindling*, BSCS Science Learning, USA

Dennis Lee, BSCS Science Learning, USA

Awais Syed, BSCS Science Learning, USA

Developing Measures of Scientific Self-Perceptions and Interest in Elementary Students Historically Underrepresented in STEM

Kristin Gagnier*, AnLar, USA

Steven Holochwost, Lehman College, the City University of New York, USA

Melissa Ceren, The Graduate Center, the City University of New York, USA

Kelly Fisher, AnLar, USA

An Analysis of Socially Relevant, Justice-Oriented Approaches in Highly-Rated NGSS-Designed Science Curriculum Materials

Monica Sircar*, Stanford University, USA

Pre-Service Teachers' Misconceptions of Culturally Relevant Pedagogy Assessed Via Q-Methodology

Ebonee Maxey*, University of Georgia, USA

Mary Atwater, University of Georgia, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Cultivating Science Identities: Recognizing Family Contributions in Nurturing Curiosity and Navigating Transitions

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 11

Building on Curiosity to Support Youth Science Identity Development Through Caregiver-Child Conversations

Nicole Villa*, Florida International University, USA

Remy Dou, Florida International University, USA

Heidi Cian, MMSA, USA

Amy Padolf, Fairchild Tropical Botanic Garden, USA

Kavita Mitapalli, MN Associates, Inc., USA

Transition Into Upper Secondary Science and Mathematics as a Young Muslim Woman With Immigrant Background

Emilie Gertz*, Department of Science Education, Denmark

Fostering STEM Interest and Identity in the "STEM in our Lives" Project

Cory Buxton*, Oregon State University, USA

Diana Crespo Camacho, Oregon State University, USA

Barbara Ettenauer, Oregon State University, USA

Karla Hale, Western Oregon University, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Reflecting on Tensions in Centering Community Knowledge and Desettling Onto-Epistemic Hierarchies

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 15

'Whose Knowledge Counts?': Reflections on Participatory Design Principles to Enable Transformative Learning in Science Education.

Deborah Dutta*, Institute of Rural Management Anand, India

Geetanjali Date, Maharashtra State Faculty Development Academy, India

Sugat Dabholkar*, Rutgers University, USA

Kilo: A Model of Community Centered Integrated Science and Data Science Learning.

Colby Tofel-Grehl*, Utah State University, USA

Tyler Hansen, Utah State University, USA

Exploring the Potential of Indigenous Science Knowledge for a Culturally Enriched Elementary Climate Education Curriculum

Mohd Syafiq Aiman Mat Noor*, University of Leeds, United Kingdom

Roslinawati Roslan, Universiti Brunei Darussalam, Brunei Darussalam

Hardimah Said, Universiti Brunei Darussalam, Brunei Darussalam

Marlizayati Johari, Universiti Brunei Darussalam, Brunei Darussalam

Navigating Intersections of Westernized STEM Education and Indigenous Perspectives in Oceania

Tobias Irish*, University of Hawaii at Hilo, USA

Joseph Genz*, University of Hawaii at Hilo, USA

Monique Storie*, University of Guam, USA

Strand 11: Cultural, Social, and Gender Issues

Symposium

The Arts' Roles in Centering Equity, Justice, and Liberation Vis-A-Vis Science Knowledge and Identity Construction

18-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 16

The Arts' Roles in Centering Equity, Justice, and Liberation Vis-A-Vis Science Knowledge and Identity Construction

Maria Varelas*, University of Illinois Chicago, USA

Dionne Champion*, University of Florida, USA

Folashade Solomon*, TERC, USA

Mindy Chappell*, Portland State University, USA

Maria Kolovou*, University of Miami, USA

Nathan Mitchell*, University of Wisconsin-Madison, USA

Rebecca Kotler, University of Illinois Chicago, USA

Ronan Rock*, University of Illinois Chicago, USA

Ayesha Qazi-Lampert, University of Illinois Chicago, USA

Brezhnev Batres, University of Illinois Chicago, USA

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

SC-Organized Paper Set

Post-Secondary Nature of Science

18-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row J

Explicit Incorporation of the Nature of Science in an Undergraduate Science Content Course: Action Research

Esther Kataate Namakula*, Indiana University, USA

Valarie Akerson, Indiana University, USA

Understanding the Nature of Engineering: Insights from Faculty and Practicing Engineers via open-ended VNOE-B Questionnaire

Erdogan Kaya*, George Mason University, USA

Ezgi Yesilyurt*, Weber State University, USA

Hasan Deniz*, University of Nevada, Las Vegas, USA

**Strand 14: Environmental Education
and Sustainability**

Related Paper Set

***Considerations for Doing Climate
Change Education Work Across
Different Contexts, Spaces, and
Settings***

18-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 7

*Developing School-Wide Climate Justice
Curriculum in a Progressive Context:*

Affordances of a Social-Ecological Lens

Kathryn Hayes*, CSU East Bay, USA

Emily Harris, BSCS, USA

Eric Nolan, CSU East Bay, USA

Peter Hiester, Cesar Chavez Middle School,
USA

Karina Garbesi, CSU East Bay, USA

*Professional Learning in, for, and with
Ethics of Care to Foster Just Climate
Change Teaching*

Deb Morrison*, University of Washington,
USA

Amal Ibourk*, Florida State University, USA

*Co-Transformation of Schoolyard
Landscapes and Curriculum: A Pilot Study
of Emergent Climate Change Teaching
Practices*

Kathryn Lanouette*, William & Mary, USA

Meredeth Dash, Alliance for the
Chesapeake Bay, USA

*Using Co-Design to Infrastructure Climate
Justice Education Across a State-level
Teacher Education Network*

Phil Bell*, University of Washington, USA

Kelsie Fowler*, University of Washington,
USA

Deb Morrison*, University of Washington,
USA

Nancy Price*, University of Washington,
USA

**Strand 14: Environmental Education
and Sustainability**

SC-Organized Paper Set

***Socioscientific Issues in Secondary
Science Curriculum***

18-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row I

*Designing and Evaluating a Teaching
Module on Socio-scientific Topics within
the 10th-grade Ecology Unit*

Mustafa CAKIR*, Marmara University,
Turkey

Funda Karaer, Ministry of National
Education, Turkey

*Teaching Argumentation with Energy-
related Socio-scientific Issues: The World
Café Approach*

Shiang-Yao Liu*, National Taiwan Normal
University, Taiwan

Meng-Chin Lee, National Taiwan Normal
University, Taiwan

*Perspectives for Science Curriculum-
Making in the Anthropocene*

Xavier Fazio*, Brock University, Canada

Todd Campbell*, University of
Connecticut, USA

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

Sponsored Session

***Unifying Our Community:
Implementing Science Education for
the Best of Us***

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 10

*Unifying Our Community: Implementing
Science Education for the Best of Us*

ORGANIZERS

Rona Robinson-Hill, Ball State University,
USA

Jonathan Hall, California State University,
San Bernardino, USA

PANELISTS

Rona Robinson-Hill, Ball State University,
USA

Shari Watkins, American University, USA

Olayinka Mohorn-Mintah, University of
Memphis, USA

Equity And Ethics Committee

Sponsored Session

***Connecting Science to Every
Student's Lived Experiences:
Promoting Equitable Science
Learning through Diverse Contexts
and Perspectives***

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 11

*Connecting Science to Every Student's
Lived Experiences: Promoting Equitable
Science Learning through Diverse
Contexts and Perspectives*

ORGANIZERS

Regina McCurdy, Georgia Southern
University, USA

Dominick Fantacone, State University of
New York - Cortland, USA

Alexandria Muller, University of California -
Santa Barbara, USA

Marsha Simon, University of West Georgia,
USA

PANELISTS

Jessica Norberto, Fundação Cecierj, Brazil

Noah Feinstein, University of Wisconsin -
Madison, USA

Terrance Burgess, Michigan State
University, USA

Scott Cohen, Georgia State University, USA

Strand 1: Science Learning:

**Development of student
understanding**

Related Paper Set

***Evolution Education for the Rest of
Us: Obstacles and Educational
Approaches for Teaching and
Learning***

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 17

*Preparing the Ground: Introducing
Variation and Inheritance in Plants to
Kindergarten Children With a Storybook*

Isabell Adler*, IPN - Leibniz Institute for
Science and Mathematics Education,
Germany

Daniela Fiedler, IPN - Leibniz Institute for
Science and Mathematics Education,
Germany

Ute Harms, IPN - Leibniz Institute for
Science and Mathematics Education,
Germany

*Evolution in Their Everyday Lives:
Qualitative Results of a College Biology
Expectancy Value Theory Intervention*

Lisa Borgerding*, Kent State University, USA

Mark Kershner, Kent State University, USA

Barbara Currey, Kent State University, USA

Adepeju Prince, Kent State University, USA

Kristina Nieves, Kent State University, USA

A Quasi-Experimental Study of the Differential Impacts of Explanation Construction vs. Critique on Evolution Learning

Evan Abreu*, Stony Brook University, USA

Gena Sbeglia, San Diego State University, USA

Ross Nehm, Stony Brook University, USA

Boosting Diagnostic Competence in Evolution Using Chatbots in Classroom Simulations: Insights Into an Explorative Study

Daniela Fiedler*, IPN Kiel, Germany

Daniel Schönle, Furtwangen University, Germany

Christoph Reich, Furtwangen University, Germany

Ute Harms, IPN Kiel, Germany

Strand 2: Science Learning: Contexts, Characteristics and Interactions **Related Paper Set**

Challenges and Tensions in Reframing Science Education in Professional Learning Settings

18-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row E

Reframing “Users” in the Creation of NGSS-aligned Curriculum Materials

McKenna Lane*, University of Illinois Urbana Champaign, USA

Challenges and Opportunities in Using Rubrics to Develop Sustainability Focused Curriculum Units

Julia Poel*, Teachers College, Columbia University, USA

Nicholas Leonardi*, University of Illinois Urbana-Champaign, USA

Barbara Hug*, University of Illinois Urbana-Champaign, USA

How Teachers Make Sense of Multiple Ways of Knowing in Science

Pooja Roy*, University of Illinois Urbana-Champaign, USA

Nicholas Leonardi*, University of Illinois Urbana-Champaign, USA

Barbara Hug*, University of Illinois Urbana-Champaign, USA

Customizing Curriculum for Greater Relevance: Tensions and Challenges

Yang Zhang*, Northwestern University, USA

Jason Buell, Northwestern University, USA

Brian Reiser, Northwestern University, USA

Kelsey Edwards, Northwestern University, USA

Secondary Pre-Service Science Teachers’ Conceptualization of Responsive Teaching: Perceptions of Constraints

Nessrine Machaka*, University of Illinois at Urbana-Champaign, USA

Christina (Stina) Krist*, University of Illinois at Urbana-Champaign, USA

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

SC-Organized Paper Set

Technology and Computer Science in Elementary Classrooms

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 1

Teachers' Use of ChatGPT to Analyze and Interpret Students' Assessment Responses: A Pilot Study

Hui Jin*, Georgia Southern University, USA
David Owens*, University of Montana, USA
Brian Riordan, Cisco, USA

Elementary Teachers' Use of Computational Thinking To Expand Students' Reflection and Epistemic Engagement in Science

Christina Schwarz*, Michigan State University, USA
Wanjoo Ahn, Michigan State University, USA
Aman Yadav, Michigan State University, USA
Zac Opps, Michigan State University, USA

Strand 5: College Science Teaching and Learning (Grades 13-20)
SC-Organized Paper Set
Student Perspectives of Laboratory Experiences

18-Mar-24, 10:00 AM-11:30 AM
Location: Plaza Court 6

Undergraduate Students' Views of Experimental Physics in Remote and In-Person Laboratories

Luciana Lombardo*, Stony Brook University, USA
Angela Kelly, Stony Brook University, USA

Exploring the Competency in Scientific Argumentation of Undergraduate Students in an Asynchronous Online Physics Laboratory

Yuri Piedrahita Uruena*, Purdue University, USA
Carina Rebello*, Toronto Metropolitan University, Canada
N Rebello*, Purdue University, USA

Investigating Impact of Identities on Perspectives of Failure of Students in Course-Based Undergraduate Research Experiences

Sandhya Krishnan*, University of Colorado - Boulder, USA
Lisa Corwin, University of Colorado - Boulder, USA

Strand 6: Science Learning in Informal Contexts
Symposium
Participatory Research in Informal Science Education

18-Mar-24, 10:00 AM-11:30 AM
Location: Governor's Square 14

Participatory Research in Informal Science Education

Neta Shaby*, University of Southampton, United Kingdom
Ran Peleg*, University of Southampton, United Kingdom
Molly Shea*, University of Washington, USA
Meghna Nag Chowdhuri*, University College London, United Kingdom
Louise Archer*, University College London, United Kingdom
Edna Tan*, University of North Carolina at Greensboro, USA
Ti'Era Worsley, University of North Carolina at Greensboro, USA
Virginia Swindell, University of North Carolina at Greensboro, USA
Wisam Sedawi, University of Michigan, USA
Angela Calabrese Barton, University of Michigan, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Approaches to Exploring Preservice Learning and Teaching

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 2

Pre-Service Middle School Teachers Lead Discussions in a Simulated classroom: Toward Epistemologically Responsive Science Teaching

Daniel Levin*, University of Maryland, USA
Ethan Carpenter*, University of Maryland, USA

Katerina Gorlenko*, University of Maryland, USA

Tomoka Ogawa*, University of Maryland, USA

J Mesiner*, University of Maryland, USA

Preparing Preservice Science Teachers to Enact Responsive Teaching Using a Video- and Practice-Based Teaching Intervention

Kennedy Chan*, The University of Hong Kong, Hong Kong

Preservice Secondary Teachers' Beliefs about Reformed and Student Centered Teaching: A Comparison of Two Cases

Adam Bennion*, Brigham Young University, USA

Ryan Nixon*, Brigham Young University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Research in Approaches to Teacher Preparation

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 3

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

Claudia Hagan*, Georgia State University, USA

Colorado Science Education Research

Impacting Preservice Teachers' Classroom Practice Through the Development of Coherent Science Teacher Education Experiences

Kevin Cherbow*, BSCS Science Learning, USA

Abraham Lo*, BSCS Science Learning, USA

Cari Herrmann Abell, BSCS Science Learning, USA

Karen Askinas, BSCS Science Learning, USA

Betty Stennett, BSCS Science Learning, USA

Shifting Teacher Preparation for Three-Dimensional Science: Using a Networked Improvement Community to Support Faculty Learning

Corinne Lardy*, California State University Sacramento, USA

Michelle Sinapuelas*, San Francisco State University, USA

Michele Korb, California State University East Bay, USA

The Role of Connection-Making and Deeper Learning in Preservice Secondary Science Teachers' Classrooms and Preparation

Matthew Bennett*, UC Santa Barbara, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Investigations of Teachers' Professional Vision

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 12

Investigating the Relationship Between Science Teachers' Professional Vision of NGSS Practice and Their Implementation

Yuxi Huang*, University of Georgia, USA

Joseph Deluca, University of Georgia, USA

Hong Tran, University of Georgia, USA

José Pavez, Western Illinois University, USA

Julie Luft, University of Georgia, USA

Brooke Whitworth, Clemson University, USA

Teacher Appreciation of Analysis as an Instructional Use of Big Ideas

Daniel Capps*, University of Georgia, USA

Jonathan Shemwell, University of Alabama, USA

The Complex Learning of Science Teachers Within Their Districts: Teachers' Perspectives

Julie Luft*, University of Georgia, USA

Ella Yonai, University of Georgia, USA

Joe DeLuca, University of Georgia, USA

Hatice Ozen, University of Georgia, USA

Elizabeth Ayano, University of Georgia, USA

Yuxi Huang, University of Georgia, USA

Jennifer Bateman, Clemson University, USA

Brooke Whitworth, Clemson University, USA

Connections between Instructional Vision and Rigor Related to Teachers' Support of Students' Productive Science Talk

Patrick Enderle*, Georgia State University, USA

Ruveyde Kaya, Florida State University, USA

Norris Boyd, Florida State University, USA

Sierra Morandi, Florida State University, USA

Elif Ozulku, Florida State University, USA

Danielle Rhemer, Florida State University, USA

Ozlem Akcil Okan, Florida State University, USA

Sherry Southerland, Florida State University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

New Teachers' Resilience and Retention

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 7

Why do Teachers Stay?: A Cross-Case Study of U.S. Novice Secondary Science Teacher Retention

Douglas Larkin*, Montclair State University, USA

Suzanne Patzelt, Touro University, USA

Mayra Muñoz, Montclair State University, USA

Khadija Ahmed, Montclair State University, USA

Liz Carletta, Montclair State University, USA

Manar Hussein, Montclair State University, USA

Exploring the New Science Teacher Practices that Reflect a Growth Mindset.

Elizabeth Ayano*, University of Georgia, USA

Adepeju Prince, Kent State University, USA

Julie Luft, University of Georgia, USA

Shannon Navy, Kent State University, USA

Ella Yonai, University of Georgia, USA

Contextual Factors and Homegrown Early Career Science Teachers

Adepeju Prince*, Kent State University, USA

Shannon Navy*, Kent State University, USA

Kelly Kulp, University of Georgia, USA

From Challenge to Coping: Exploring Resilience Trends and Strategies Among Newly Hired Science Teachers

Jose Pavez*, Western Illinois University, USA

Ella Yonai, University of Georgia, USA

Shannon Navy, Kent State University, USA

Julie Luft, University of Georgia, USA

Adepeju Prince, Kent State University, USA

Lisa Borgerding, Kent State University, USA

Bo Idsardi, Eastern Washington University, USA

Strand 10: Curriculum and

Assessment

Symposium

What Next for Science Standards?

NGSS 2.0?

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 4

What Next for Science Standards? NGSS 2.0?

Jonathan Osborne*, Stanford University, USA

Andy Zucker*, Independent Scholar, USA

Daniel Pimentel*, University of Alabama, USA

Peta White*, Deakin University, Australia

Douglas Allchin*, University of Minnesota, USA

Penny Noyce*, Independent Scholar & Publisher, USA

Strand 10: Curriculum and

Assessment

Related Paper Set

A Partnership to Advance Earth Science Across Biology, Chemistry, and Physics in a Large District

18-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 5

Centering the Local to Advance a District's Earth Science Teaching Goals Through Research-Practice Partnership

Alan Berkowitz*, Cary Institute of Ecosystem Studies, USA

Lauren Browning, George Washington University, USA

Beth Covitt, University of Montana, USA

Karen Draney, University of California Berkeley, USA

Kevin Garner, Baltimore City Public Schools, USA

Jonathon Grooms, George Washington University, USA

Angela Hood, Cary Institute of Ecosystem Studies, USA

Smriti Mehta, University of California Berkeley, USA

Edmund Mitzel, Jr., Baltimore City Public Schools, USA

Carolyn Parker, American University, USA

Understanding Teachers' Perspectives to Help Shape Responsive Partnership and Collaborative Work on Problems of Practice

Lauren Browning*, George Washington University, USA

Beth Covitt, University of Montana, USA

Jonathon Grooms*, George Washington University, USA

Angela Hood, Cary Institute of Ecosystem Studies, USA

Alan Berkowitz, Cary Institute of Ecosystem Studies, USA

Centering Science Assessment Resources and Practices to Mediate Discourse in Collaborative Professional Learning

Jonathon Grooms*, George Washington University, USA

Lauren Browning*, George Washington University, USA

Beth Covitt, University of Montana, USA

Angela Hood, Cary Institute of Ecosystem Studies, USA

Edmund Mitzel, Jr., Baltimore City Public Schools, USA

Alan Berkowitz, Cary Institute of Ecosystem Studies, USA

Co-creating an Assessment System to Meet Teacher and Student Requirements in a Large, Urban District

Beth Covitt*, University of Montana, USA

Jessica Bean, University of California, USA

Lauren Browning, George Washington University, USA

Karen Draney, University of California, USA

David Fischer, Cary Institute of Ecosystem Studies, USA

Kevin Garner, Baltimore City Public Schools, USA

Jonathon Grooms, George Washington University, USA

Smriti Mehta, University of California, USA

Edmund Mitzel, Baltimore City Public Schools, USA

Alan Berkowitz, Cary Institute of Ecosystem Studies, USA

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Centering Multilingual Students' Language Resources and Dynamic Sensemaking Practices in Science Education Research

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 16

How Does Translanguaging/Trans-semiotising Support Students Grappling with Uncertainty When Planning Scientific Investigations?

Souhaila Nassar*, Boston University, USA

Eve Manz, Boston University, USA

Developing a Multimodal Assessment System for Science Sensemaking in Elementary Classrooms

Genelle Diaz-Silveira*, Boston University, USA

Eve Manz, Boston University, USA

Enactment of Translanguaging Formative Assessment Designs and Consequences for Multilingual Learners' Science Sensemaking

Caitlin Fine*, Metropolitan State University of Denver, USA

Melissa Braaten, University of Colorado Boulder, USA

Conceptualizing and Measuring Pedagogical Content Knowledge of Language for Scientific Sensemaking
María González-Howard*, The University of Texas at Austin, USA

Sage Andersen, The University of Texas at Austin, USA

Karina Méndez Pérez, The University of Texas at Austin, USA

Carla Robinson, The University of Texas at Austin, USA

Using Historical Storytelling to Amplify the Voice of Multilingual Learners In High School Science Classrooms

Hosun Kang*, University of California Irvine, USA

Paola Rosenberg, Anaheim Union High School District, USA

Erik Cobian-Mejia, Anaheim Union High School District, USA

Stephen Skoropad*, University of California Irvine, USA

Racial and Socioeconomic School District Segregation and Secondary Science Outcomes

Christopher Cioffi*, Stony Brook University, USA

Angela Kelly*, Stony Brook University, USA

The School-to-Prison Pipeline: Teacher's Perspectives

Maizie Dyess*, University of Nevada, Las Vegas, USA

Modelling Equity in Science Education: German Street Schools' Approach to Rightful Presence

Matthias Fischer*, Heidelberg University of Education, Germany

Angela Calabrese Barton, University of Michigan, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Recontextualizing Science Education: Reckoning with Wicked Problems and Structural Injustices

18-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 15

Navigating Wicked Problems through intersecting science education and culture: Insights from Ukraine, Estonia, Turkey, Bangladesh

Tapashi Binte Mahmud Chowdhury*, University of Tartu, Estonia

Miia Rannikmäe*, University of Tartu, Estonia

Jack Holbrook*, University of Tartu, Estonia

Maryna Zaluzhna*, Zaporizhzhia National University, Ukraine

Bulent Cavas*, Dokuz Eylül University, Turkey

Strand 12: Technology for Teaching, Learning, and Research

SC-Organized Paper Set

Technology for Science Learning 1

18-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row H

Analyzing the Performance of Chemistry Students and ChatGPT on Acid-Base Calculations

Ted Clark*, The Ohio State University, USA

Mapping New Possibilities in Elementary Science: Expansive Data, Participatory Digital Map Making, and Science Argumentation

Kathryn Lanouette*, William & Mary, USA

Sarah Van Wart, University of North Carolina, Asheville, USA

Tapan Parikh, Cornell Tech, USA

Connecting Representational Levels by Using Augmented Reality (AR) During Chemical Hands-on Experiments – a Mixed-Methods Study

Hendrik Peeters*, Paderborn University, Germany

Sebastian Habig, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Sabine Fechner, Paderborn University, Germany

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

The Nature of Engineering: Exploring Key Questions to Move Research Forward

18-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row J

The Nature of Engineering: Exploring Key Questions to Move Research Forward

Jacob Pleasants*, University of Oklahoma, USA

Allison Antink-Meyer*, Illinois State University, USA

Sevgi Aydin-Gunbatar*, Yuzuncu Yıl University, Turkey

Cillian Roehrig*, University of Minnesota, USA

Miriam Barak*, Technion, Israel

Sibel Erduran*, Oxford University, United Kingdom

Hasan Deniz, University of Nevada, Las Vegas, USA

Erogan Kaya*, George Mason University, USA

Ezgi Yesilyurt, Weber State University, USA

Strand 14: Environmental Education and Sustainability

SC-Organized Paper Set
Education for Sustainable Development

18-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row I

Evaluating Student Engagement in Climate Change Education: A Novel Approach to Measuring Environmental Science Agency

Jeffrey Snowden*, BSCS Science Learning, USA

Brian Donovan, BSCS Science Learning, USA

Lindsey Mohan, BSCS Science Learning, USA

Emily Harris, BSCS Science Learning, USA

Fostering Learners' Action Competence to Deal With the Global Environmental Issue of Insect Decline

Peter Lampert, Karlstad University, Sweden

Daniel Olsson*, Karlstad University, Sweden

Niklas Gericke, Karlstad University, Sweden

Hope and Ecological Identity: Exploring Pathways from Inner to Sustainable Development

Jhu-Chun Yang*, National Sun Yat-sen University, Taiwan

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

Participatory Photography with Urban Middle School Students: Their Connectedness to and Perceptions of Nature

Andrea Moeller*, University of Vienna, Austria

Petra Bezeljak Cerv, University of Vienna,
Austria
Bruce Johnson, University of Arizona, USA

Social Event

Awards Luncheon

18-Mar-24, 11:15 AM-1:15 PM

Location: Plaza Ballroom ABC/DEF

Keynote Address

Building A Technology Future for the Rest of Us

18-Mar-24, 1:15 PM-2:00 PM

Location: Plaza Ballroom ABC/DEF

Building A Technology Future for the Rest of Us

Charlton McIlwain

Contemporary Methods RIG

Sponsored Session

Epistemic Network Analysis (ENA): A Tool for Providing Nuanced Perspectives in STEM Education Research

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 11

Epistemic Network Analysis (ENA): A Tool for Providing Nuanced Perspectives in STEM Education Research

ORGANIZERS

Glenn Dolphin, University of Calgary,
Canada

Robert Talbot, University of Colorado
Denver, USA

Joseph Taylor, University of Colorado,
Colorado Springs, USA

Stanley Lo, UC San Diego, USA

Francesca Williamson, University of
Michigan, USA

Brock Couch, University of New
Hampshire, USA

PANELISTS

M. Shane Tutwiler, University of Rhode
Island, USA

Reagan Siggard, Utah State University,
USA

Denise Bressler, DB Engagements, Inc.,
USA

Amanda Peel, New Mexico State
University, USA

Shifath Bin Syed, Texas Tech University,
USA

Mark H. Newton, East Carolina University,
USA

Latino/a RIG (LARIG)

Sponsored Session

Latinx Science Education Scholarship in Formal and Informal Contexts

18-Mar-24, 2:00 PM-3:30 PM

Location: Plaza Court 2

Latinx Science Education Scholarship in Formal and Informal Contexts

ORGANIZERS

Angela Chapman, UTRGV, Edinburg, TX,
USA

Alejandro Gallard, Georgia Southern
University, USA

PANELISTS

Miriam Ortiz, UTRGV, Brownsville, TX, USA

Uma Ganesan, UTRGV, Brownsville, TX,
USA

Joe DeLeon, UTRGV, Edinburg, TX, USA

Liliana Garcia, UCSB, Santa Barbara, CA,
USA

Angela Chapman, UTRGV, Edinburg, TX,
USA

**Strand 2: Science Learning: Contexts,
Characteristics and Interactions
SC-Organized Paper Set
*Attitudes, Motivation, and
Engagement*
18-Mar-24, 2:00 PM-3:30 PM
Location: Directors Row H**

*Perceived Competence and Choice as
Predictors of Students' Intrinsic Motivation*
Moonika Teppo*, University of Tartu,
Estonia
Regina Soobard, University of Tartu,
Estonia
Miia Rannikmäe, University of Tartu,
Estonia
Priit Reiska, Tallinn University, Estonia
*Measuring Interest During a Student Lab
Visit: A Question of Situation or
Disposition?*
Xenia Schäfer*, Friedrich-Alexander-
Universität Erlangen-Nürnberg, Germany
Sebastian Habig, Friedrich-Alexander-
Universität Erlangen-Nürnberg, Germany

*Learning From Highly Relevant Topics:
Students Interest and Engagement*
Natasha Segal*, Wiezmann, Israel
David Fortus, Wiezmann, Israel

*Engineering Integration in Elementary
Classrooms*

Christa Haverly*, Northwestern University,
USA
Alexandre Brunet, Northwestern
University, USA
Elizabeth Davis*, University of Michigan,
USA

*Culturally Sustaining and Responsive
Education in Elementary Science Teacher
Education: Developing Preservice
Teachers' Critical Consciousness*

Tia Madkins*, The University of Texas at
Austin, USA
Sonnur Ozturk, The University of Texas at
Austin, USA
Allison Skerrett, The University of Texas at
Austin, USA
*Supporting Preservice Teachers Shift Their
Focus Beyond the Content by Pursuing
Equity Through Participatory Science*
Terrance Burgess*, Michigan State
University, USA

*Civic Science Education in Pursuit of
Scientific Literacy: A Sustainable Path for
Elementary Science Education*
Maggie DeMarse*, Michigan State
University, USA
E. Woo*, Michigan State University, USA

**Strand 3: Science Teaching — Primary
School (Grades preK-6):
Characteristics and Strategies
Related Paper Set
*"The truth is, there's just no time":
Embracing Interdisciplinary
Approaches to Elementary Science*
18-Mar-24, 2:00 PM-3:30 PM
Location: Plaza Court 4**

**Strand 4: Science Teaching — Middle
and High School (Grades 5-12):
Characteristics and Strategies
SC-Organized Paper Set
Life Science Teaching and Learning
18-Mar-24, 2:00 PM-3:30 PM
Location: Governor's Square 17**

Conjectural Anticipation and the Animating Power of Big Ideas for Agency in Science Learning

Jonathan Shemwell*, University of Alabama, USA

Daniel Capps, University of Georgia, USA

Testing a Design-Oriented Cross-Domain Teaching Process as a Learning Opportunity for Acquiring Biological Knowledge

Markus Reiser*, University of Education Weingarten, Germany

Martin Binder, University of Education Weingarten, Germany

Holger Weitzel, University of Education Weingarten, Germany

Can the Culturo-Techno-Contextual Approach (CTCA) Dissolve Barriers to Learning Variation and Evolution?

Rose Agholor*, Science Education Consultant, USA

Peter Okebukola, Lagos State University, Nigeria

Franklin Onowugbeda, Lagos State University, Nigeria

Adekunle Oladejo, Lagos State University, Nigeria

Juma Shabani, University of Burundi Doctoral School, Burundi

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

SC-Organized Paper Set

Understanding Impacts of Identity and Experiences

18-Mar-24, 2:00 PM-3:30 PM

Location: Plaza Court 5

Does Religious Identity Impact the Efficacy of Evolution Instruction With Cultural Competence?

Rahmi Aini*, Middle Tennessee State University, USA

Baylee Edwards, Arizona State University, USA

Sara Brownell, Arizona State University, USA

M. Elizabeth Barnes, Middle Tennessee State University, USA

Are Experiences and Trajectories of Black Students Impacted by the Relationship Between Religion and Science?

Elizabeth Barnes*, Middle Tennessee State University, USA

Angela Google*, University of Rhode Island, USA

Julie Park, University of Maryland, USA

Keon McGuire, Arizona State University, USA

Robert Palmer, Howard University, USA

Am I Represented? Validation of an Instrument to Assess Undergraduate Representation in STEM Courses

Hai Nguyen*, University of Missouri-Columbia, USA

Marcelle Siegel, University of Missouri-Columbia, USA

Megan Hirni, University of Missouri-Columbia, USA

Strand 6: Science Learning in Informal Contexts

Symposium

Exploring Emotions in Informal Science Learning

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 16

Exploring Emotions in Informal Science Learning

Luisa Massarani*, Brazilian Institute of Public Communication of Science and

Technology; Casa de Oswaldo Cruz,
Fiocruz, Brazil

Neta Shaby*, University of Southampton,
United Kingdom

Nancy Staus*, Oregon State University,
USA

Shawn Rowe*, Oregon State University,
USA

Graziele Scalfi*, Brazilian Institute of Public
Communication of Science and
Technology; Casa de Oswaldo Cruz,
Fiocruz, Brazil

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Exploring Knowledge and Nature of Science in Preservice Teacher Education

18-Mar-24, 2:00 PM-3:30 PM

Location: Plaza Court 1

*Preservice Teachers' Views on Astronomy
Through the Lens of Science Storybooks*

Julia Plummer*, The Pennsylvania State
University, USA

Andrea Ragonese*, The Pennsylvania
State University, USA

*Pre-service Teachers and Socioscientific
Issues: Their Views and Creation of Issues-
Based Science Lessons*

Savannah Graham*, University of Houston,
USA

Hayat Hokayem, Texas Christian
University, USA

*Elements and Rationale in Nature of
Science for Preservice Teacher Training:
Towards Enhanced Instruction*

Olalekan Badmus*, University of the Free
State, South Africa

Loyiso Jita*, University of the Free State,
South Africa

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Research and Insights on Approaches About Preservice Teachers' Disciplinary Engagement and Instructional Practices

18-Mar-24, 2:00 PM-3:30 PM

Location: Plaza Court 3

*Preservice Elementary Teachers'
Rationales and Methods for Modifying
Opportunities for Student Sensemaking in
Science Curricula*

Amy Ricketts*, California State University,
Long Beach, USA

Korb Michele*, California State University,
East Bay, USA

*Intersections of Sensemaking, Teaching
Practices, and Equity and Justice:
Comparing Two Elementary Teacher
Education Programs*

Amber Bismack*, Oakland University, USA

Patricia Bills, Oakland University, USA

Boyun Kim, Oakland University, USA

*Preservice Teachers' Understanding of
Instructional Practice Related to the NGSS
SEPs: Impact of the Toolkit*

Youngjin Song*, California State University
Long Beach, USA

Thao Tran, California State University East
Bay, USA

Young Ae Kim*, Defense Language
Institute Foreign Language Center, USA

Lisa Martin*, California State University
Long Beach, USA

Michele Korb, California State University
East Bay, USA

Supporting Scientific Sensemaking Through NGSS and Disciplinary Language: Case Studies of Preservice Secondary Science Teachers

John Galisky*, UC Santa Barbara, USA
Valerie Meier, UC Santa Barbara, USA
Matthew Bennett, UC Santa Barbara, USA
Julie Bianchini, UC Santa Barbara, USA

Strand 8: In-service Science Teacher Education

Related Paper Set

Science Teacher Learning with Organizational Contexts

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 10

(Re)Negotiations and the Relational Politics of Space within a Research-Practice Partnerships

Katherine Ayers*, St. Jude Children's Research Hospital, USA
Robyn Pennella, St. Jude Children's Research Hospital, USA

Widening Our Lens: Developing Insights From Elementary Science Professional Learning Using an Institutional Frame
Michelle Brown*, The Pennsylvania State University, USA

Carla Zembal-Saul*, The Pennsylvania State University, USA

Viewing Science Teacher Learning and Curriculum Enactment Through the Lens of Theory of Practice Architectures
Xavier Fazio*, Brock University, Canada
Stephen Kemmis, Charles Sturt University - Wagga Wagga Campus, Australia
Jessica Zugic, Brock University, Canada

Making Sense of Reform Incoherence in a No-Excuses Charter Network

William Lindsay*, University of Colorado Boulder, USA
Valerie Otero, University of Colorado Boulder, USA

From Codesign to Co-Adaptation: The Evolution of Professional Learning Across a Long-Term Research Practice Partnership

Quentin Biddy*, University of Colorado Boulder, USA
Jessie Nixon, Weber State University, USA
Srinjita Bhaduri, University of Colorado Boulder, USA
Jennifer Jacobs, University of Colorado Boulder, USA
Mimi Recker, Utah State University, USA
Jeffrey Bush, University of Colorado Boulder, USA

Organizational Sensemaking During Curriculum Implementation: The Dilemma of Agency, Role of Collaboration, and Discipline-Specific Leadership
Benjamin Lowell*, New York University, USA

Sarah Fogelman, Boston College, USA
Katherine McNeill, Boston College, USA

Co-evolution of Teachers' Collective Inquiry and Classroom Practice with Contextual Supports After the Grant Ended

Soo-Yean Shim*, Seoul National University, Republic of Korea
Jessica Thompson, University of Washington, USA

Course-Based Teacher Professional Communities (with District and Union Support) at the Center of Three-Dimensional-Science Teaching
Christie Morrison Thomas*, Michigan State University, USA

"It's Just a Hot Mess": Engaging Teachers' Critical Consciousness in Science Professional Learning
Emily Adah Miller*, University of Georgia, USA
Emily Reigh*, University of California, Santa Cruz, USA
Ayca Fackler*, University of Missouri, USA
Maria Simani*, University of California, Riverside, USA

Examining the Affordances of Practical Measures of Science Teacher Learning
Eleanor Anderson, University of Pittsburgh, USA
Jennifer Richards*, Northwestern University, USA

Curriculum Design and Improvement: Integrating AI Concepts and Societal Problems in a Secondary Science Module
Yue Bai*, University of Connecticut, USA
Todd Campbell*, University of Connecticut, USA
Sybille Legitime, University of Connecticut, USA
Derek Aguiar, University of Connecticut, USA
Megan Staples, University of Connecticut, USA
Jacqueline Corricelli, West Hatford Public Schools, USA

Structuring Educative Curriculum Materials in an Issues-Based Unit
Rebecca Lesnefsky*, University of North Carolina, USA
Troy Sadler, University of North Carolina, USA
Zhen Xu, University of North Carolina, USA
David Fortus, Weizmann Institute of Science, Israel

Strand 10: Curriculum and Assessment
SC-Organized Paper Set
Addressing SocioScientific Issues across Curriculum and Assessments
18-Mar-24, 2:00 PM-3:30 PM
Location: Plaza Court 7

Developing a Measure to Assess Students' Understanding and Reasoning about Issues of Socioscientific Relevance
Eric Schoute*, University of Maryland, USA
Janelle Bailey*, Temple University, USA
Gale Sinatra, University of Southern California, USA
Carla McAuliffe, Institute for Global Environmental Strategies, USA

Strand 10: Curriculum and Assessment
SC-Organized Paper Set
Middle School: Curriculum Impact on Student Learning and Engagement
18-Mar-24, 2:00 PM-3:30 PM
Location: Plaza Court 6

Developing a Three-Dimensional Learning Progression for Properties and Structure of Matter at Middle School Level
Mingchun Huang*, Michigan State University, USA
Peng He, Michigan State University, USA
Mao-Ren Zeng, Michigan State University, USA
Namsoo Shin, Michigan State University, USA

Jonathan Bowers, Michigan State University, USA

Joseph Krajcik, Michigan State University, USA

Collect, Analyze Interpret, Oh My! 7th grade students' Intended Engagements in the OpenSciEd Curriculum

Amanda Garner*, University of Tennessee, USA

Hanhui Bao*, University of Tennessee, USA

Joshua Rosenberg, University of Tennessee, USA

Fostering Quantum Understanding: Crafting, Applying, and Assessing A Science Curriculum for Middle School

Zeynep Akdemir*, Purdue University, USA

Nicholas Dang, Purdue University, USA

Muhsin Menekse, Purdue University, USA

Middle School Space Science Education: An Investigation of Self-Efficacy, Content Knowledge, and STEM Career Interests

Kristina Otero*, University of Central Florida, USA

Glenda Gunter, University of Central Florida, USA

Debbie Hahs-Vaughn, University of Central Florida, USA

The Impact of Racialized Ideologies on Latino/a/x/é Engineering Students at Emerging HSIs

Joel Mejia*, The University of Texas at San Antonio, USA

Justice-oriented Engineering Design: Latinx/é/a/o Students Finding Inspiration in their Community Resources

Greses Pérez*, Tufts University, USA

Ymbar Polanco Pino, Tufts University, USA

Clara Mabour, Tufts University, USA

G.R. Marvez, Tufts University, USA

Building Meaningful Education with Engineering to Foster Care and Relationality

Brian Gravel*, Tufts University, USA

Eli Tucker-Raymond*, Boston University, USA

Cara Hovhennessian*, Malden Public Schools, USA

Chris Fitzpatrick*, Malden Public Schools, USA

Amon Millner, Olin College of Engineering, USA

Maria Olivares, Boston University, USA

"Not in this Class:" Examining Space, Power, & Identity in the Context of HS Engineering

Christopher Wright*, Drexel University, USA

George Schafer, Drexel University, USA

Monet Harbison, Drexel University, USA

Sinead Meehan, Drexel University, USA

Tajma Cameron, Drexel University, USA

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Considering Black and Latinx/é Experiences in Engineering and Science Learning Environments for Justice & Equity

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 14

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

***Language in Science Education:
Examining Translanguaging and
Unsettling Raciolinguistic Hierarchies***

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 12

Equity for Whom? Examining Multilingual Learners' Language Practices Across Asset-Oriented Science and Engineering Education Research

Karina Méndez Pérez*, University of Texas at Austin, USA

María González-Howard, University of Texas at Austin, USA

Sage Andersen, University of Texas at Austin, USA

Interactions in a Multilingual Science Classroom in Lebanon

Christelle Fayad*, Texas Christian University, USA

Hayat Hokayem*, Texas Christian University, USA

A Qualitative Look at Raciolinguistic Ideologies Among Preservice Science and Math Teachers

Maricela Leon, Southern Methodist University, USA

Quentin Sedlacek*, Southern Methodist University, USA

Catherine Lemmi, California State University Chico, USA

Kimberly Feldman, University of Maryland Baltimore County, USA

Raciolinguistic Hierarchies of U.S. Science Education: Why Hindsight Matters for Translanguaging Today

Kathryn Kirchgasser*, University of Wisconsin–Madison, USA

Diego Román*, University of Wisconsin–Madison, USA

Strand 12: Technology for Teaching, Learning, and Research

SC-Organized Paper Set

Use Technology in Science Education Research

18-Mar-24, 2:00 PM-3:30 PM

Location: Governor's Square 15

Integrating Artificial Intelligence-Based Methods Into Qualitative Science Education Research – a Case for Computational Grounded Theory

Paul Tschisgale*, Leibniz Institute for Science and Mathematics Education, Germany

Peter Wulff, Heidelberg University of Education, Germany

Marcus Kubsch, Freie Universität Berlin, Germany

An Examination of the Use of Large Language Models to Aid Analysis of Textual Data

Robert Tai*, University of Virginia, USA

Lillian Bentley*, University of Virginia, USA

Xin Xia*, University of Virginia, USA

Jason Sitt, University of Virginia, USA

Sarah Fankhauser*, Oxford College of Emory University, USA

Ana Chicas-Mosier, University of Kansas, USA

Barnas Monteith, THInc AI Group, USA

Exploring Real-Time Engagement in Data Practices: Insights from Learning Analytics in Secondary Science Investigations

Britt Miller*, George Mason University, USA

Erin Peters-Burton*, George Mason University, USA

Use of Neurocognitive Data to Evaluate Text Summarization of Science Content
Richard Lamb*, East Carolina University, USA

Zachary Pugh, North Carolina State University, USA

Amal Hashky, University of Florida, USA

Surbhi Rathore, University of Rhode Island, USA

Wenyuan Wang, University of North Carolina Chapel Hill, USA

K Kosiur, Department of Defense, USA

Mamoun Margini, University of Florida, USA

Strand 15: Policy, Reform, and Program Evaluation

SC-Organized Paper Set

Exploring the Role and Views of Varied Stakeholders in Science Teaching and Learning

18-Mar-24, 2:00 PM-3:30 PM

Location: Directors Row I

Examining the Alignment of Elementary Science Specialist and Principal Beliefs about Teaching and Learning Science

Melissa Pearcy*, Washington State University, USA

Danielle Malone*, Washington State University, USA

Rachel Larson*, Washington State University, USA

'I'm Just a Parapro': The Role of Science Paraprofessionals when Elementary Science is Undervalued

Stefanie Marshall*, Michigan State University, USA

Understanding Parents' Perspectives on Climate Change Education

Lauren Madden*, The College of New Jersey, USA

Arti Joshi, The College of New Jersey, USA

Margaret Wang, SubjecttoClimate, USA

Julia Turner, SubjecttoClimate, USA

State Board of Education Expertise in the Development of High School Science Standards

Allison Esparza*, Texas A&M University, USA

Joanne Olson*, Texas A&M University, USA

Publications Advisory Committee Sponsored Session

Publishing, Reviewing, and Writing for JRST

18-Mar-24, 3:45 PM-5:15 PM

Location: Governor's Square 11

Publishing, Reviewing, and Writing for JRST

ORGANIZERS

Felicia Mensah, Teachers College, Columbia University, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-Organized Paper Set

Nature-based, Community-based, and Inquiry-based Practices

18-Mar-24, 3:45 PM-5:15 PM

Location: Directors Row H

"Science Doesn't Have to Be Scary": The Accessibility of Doing Nature-Based Science

Steph Dean*, Clemson University, USA

Andrew Gilbert, George Mason University, USA

Jim Lane*, Mahtomedi High School, USA

Paul Bocko, Antioch University, USA

Does a Nature-Based Preschool Curriculum Address NGSS Science & Engineering Disciplines and Practices? a Case Study

Jennifer Gallo-Fox*, University of Delaware, USA

Ariadni Kouzeli, University of Delaware, USA

The Hidden Work: A Collaborative Self-Study Approach to Planning Projects for Community-Based Informal STEM Program

Ti'Era Worsley*, The University of North Carolina at Greensboro, USA

Matthew Fisher, The University of North Carolina at Greensboro, USA

Learning Coherence in Inquiry: Supporting Pre-Service Teachers with Inquiry-Based Investigations Tool

Ibrahim Delen*, Usak University, Turkey
Salih Uzun, Usak University, Turkey

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies
SC-Organized Paper Set
Physical Science Teaching and Learning

18-Mar-24, 3:45 PM-5:15 PM

Location: Governor's Square 17

Student, Teacher, and School-Level Predictors of AP Chemistry Performance in U.S. High Schools

Martin Palermo, Stony Brook University, USA

Robert Krakehl, Stony Brook University, USA

Angela Kelly*, Stony Brook University, USA

9th Grade Students' Knowledge and Self-Efficacy When Learning to Explain Energy Changes in Chemical Reactions.

Nabeh Alatawna*, Ben-Gurion University, Israel

Elon langbeheim*, Ben-Gurion University, Israel

Drawing Meaning from Student-Generated Drawings: Characterising Chemistry Teachers' Noticing

Hanna Stammes*, Radboud University, Netherlands

Lesley de Putter, Eindhoven University of Technology, Netherlands

Teaching Particle Physics to Promote Critical Thinking

Farahnaz Sadidi*, Technische Universität Dresden, Germany

Gesche Pospiech, Technische Universität Dresden, Germany

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

SC-Organized Paper Set

Exploring Sense, Trust and Belonging

18-Mar-24, 3:45 PM-5:15 PM

Location: Governor's Square 10

Examining the Relationship Between Autonomy and Sense of Belonging Among Aspiring Healthcare Providers

Joey Marion*, North Carolina State University, USA

Soonhye Park, North Carolina State University, USA

Exploring Student Trust in Science by the Tentative Nature of Science, and Epistemological Beliefs

Asghar Gill*, Western Michigan University, USA

Betty Adams, Western Michigan University, USA

Ramakrishna Guda, Western Michigan University, USA

William Cobern, Western Michigan University, USA

Anum Khushal, University Of Nebraska, USA

Exploring Undergraduate Students' Momentary Anxiety in Introductory Biology Classes with Intensive Longitudinal Methods

Maryrose Weatherton*, University of Tennessee Knoxville, USA

Joshua Rosenberg, University of Tennessee Knoxville, USA

Elisabeth Schussler, University of Tennessee Knoxville, USA

Alex Lishinski, University of Tennessee Knoxville, USA

Socio-metacognition: Examining How High Stress Environment Reshapes Interactions

Carolina Alvarado, California State University, Chico, USA

Thanh Lê, Western Washington University, USA

Estefania Orozco-Franco*, California State University, Chico, USA

Strand 5: College Science Teaching and Learning (Grades 13-20)
SC-Organized Paper Set
Mathematics in Science Classrooms
18-Mar-24, 3:45 PM-5:15 PM
Location: Plaza Court 7

Ships in the Night: Mathematics and Science Sensemaking in Four Chemistry Classrooms

Desi*, University of Minnesota - Twin Cities, USA

Gillian Roehrig, University of Minnesota - Twin Cities, USA

Anita Schuchardt, University of Minnesota - Twin Cities, USA

Instructional Sequence Matters: Problem-Solving First Approach Leads to Superior Transfer Learning Outcomes in Introductory Biology

Cheng-Wen He*, University of Georgia, USA

Logan Fiorella, University of Georgia, USA

Paula Lemons, University of Georgia, USA

Characterizing the Learning Environment for Quantitative Reasoning Skills in Undergraduate Biology

Anum Khushal*, University of Nebraska, Lincoln, USA

Lyrice Lucas, University of Nebraska, Lincoln, USA

Robert Mayes, Georgia Southern University, USA

Brian Couch, University of Nebraska, Lincoln, USA

Joseph Dauer, University of Nebraska, Lincoln, USA

Students' Understanding of Rate of Change Within a Graphical Representation of Population Growth

Brock Couch*, University of New Hampshire, USA

Melissa Aikens, University of New Hampshire, USA

Sydney Blakc, University of New Hampshire, USA

Christi Donatelli, University of New Hampshire, USA

Nigar Altindis, University of Alabama, USA

Strand 6: Science Learning in Informal Contexts
SC-Organized Paper Set
Engaging Youth in Interest-based Science Learning Contexts
18-Mar-24, 3:45 PM-5:15 PM
Location: Governor's Square 16

Cosplaying Scientists Use Theoretically-Based Science Communication Techniques at Comic Cons

Lisa Lundgren*, Utah State University, USA
Kadie Kunz*, Utah State University, USA
Emily Slater*, Utah State University, USA
Man Zhang, Utah State University, USA

High School Science and Engineering Fairs: Science for Everyone

Frederick Grinnell*, UT Southwestern Medical Center, USA
Simon Dalley, Southern Methodist University, USA
Joan Reisch, UT Southwestern Medical Center, USA

Supporting Youth STEM Learning and Growth Mindsets Through Baseball-Themed Activities in Informal Education Settings

Christina Baze*, Northern Arizona University, USA
Sanlyn Buxner, University of Arizona, USA
Seneca Miller, University of Arizona, USA
Erin Turner, University of Arizona, USA
Ricardo Valerdi, University of Arizona, USA

Exploration of Play as a Vital Strategy to STEM Literacy

Sue Tunnicliffe*, University College London, United Kingdom
Adekunle Oladejo, Lagos State University, Ojo, Nigeria
Peter Okebukola, Lagos State University, Ojo, Nigeria

Ibiyinka Ogunlade, Ekiti State University, Nigeria
Juma Shabani, University of Burundi, Doctoral School, Burundi
Rose Agholor, Lagos State University, Ojo, Nigeria
Deborah Agbanimu, Lagos State University, Ojo, Nigeria

Strand 7: Pre-service Science Teacher Education
SC-Organized Paper Set
Exploring Various Components Within Preservice Teacher Education
18-Mar-24, 3:45 PM-5:15 PM
Location: Plaza Court 4

Influence of Pre-Service Teachers' Interactive Use of Content-Specific Knowledge Components From Students' Point of View

Olutosin Solomon Akinyemi*, University of the Witwatersrand, South Africa

Elementary Education Majors' Grades in General Education Courses: Comparisons with Other Majors

Ryan Nixon*, Brigham Young University, USA
Elizabeth Bailey, Brigham Young University, USA

Course Modalities: Challenges and Benefits in Preservice Teacher Science Content Courses from Instructors and Students

Preethi Titu*, Kennesaw State University, USA
Jessica Reaves*, Kennesaw State University, USA
Anna Arias, Kennesaw State University, USA
Soon Lee, Kennesaw State University, USA

*Developing a Learning Progression-based
Module For Preservice Elementary
Teachers: A Pilot Study*

James Hancock II*, Alma College, USA

Amanda Harwood, Alma College, USA

Jessie Store, Alma College, USA

Julie Christensen, Michigan State
University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

*Research Approaches Investigating
Mentoring, Discourse patterns, and
Science Core teaching Practices*

18-Mar-24, 3:45 PM-5:15 PM

Location: Plaza Court 3

*Science Pre-Service Teachers' Experience
with Mentor Teachers during Teaching
Practice*

Tafirenyika Mafugu*, University of the Free
State, South Africa

*The Critical Role of Mentoring for
Preservice Science Teachers: Relational,
Developmental, and Contextual
Dimensions*

Maria Rivera Maulucci*, Barnard College,
Columbia University, USA

Julie Contino, American Museum of
Natural History, USA

*A Study on Discourse Patterns in
Secondary Science Classroom Based on
Lag Sequential Analysis*

Xinhao Song*, Beijing Normal University,
China

Yixuan Liu, Beijing Normal University,
China

Yuanyuan Fang, The Second High School
Attached To Beijing Normal University,
China

Jianxin Yao, Beijing Normal University,
China

Chunmi Li, Beijing Normal University,
China

*Emerging Themes in a Study Around
Science Core Teaching Practices:*

Examining Two Universities' Coursework
Dominick Fantacone*, SUNY Cortland,
USA

Elizabeth Edmondson*, Virginia
Commonwealth University, USA

Elaine Howes, American Museum of
Natural History, USA

Jamie Wallace, American Museum of
Natural History, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

*Innovative Models of Teacher
Professional Development*

18-Mar-24, 3:45 PM-5:15 PM

Location: Plaza Court 5

*Decomposing Teacher Response -
Elementary Science Noticing within an
Interactive Model of Professional Learning*

Linda Preminger*, California State
University East Bay, USA

Kathryn Hayes, California State University
East Bay, USA

Dawn O'Connor, Alameda County Office of
Education, USA

*Critical Dialogue and Positive Evaluation
in Peer/Other Video-Based PD: The
Complex Role of Facework*

Miriam Babichenko, Ben Gurion
University of the Negev, Israel

Dana Vedder Weiss*, Ben Gurion
University of the Negev, Israel

Catalyzing Change: A Comparative Study of Science Teacher Professional Development Models and Influence on Instruction

Sierra Morandi*, Florida State University, USA

Elif Ozulku*, Florida State University, USA

Sherry Southerland, Florida State University, USA

Patrick Enderle, Georgia State University, USA

Teacher-Student Co-Learning: A Hybridization of Teacher Professional Learning With Student Out-of-School Learning

Xornam Apedoe*, University of San Francisco, USA

Andrew Barham, University of San Francisco, USA

Megan Fu, University of San Francisco, USA

Katherine Nielsen, University of California San Francisco, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Professional Developments' Impact on Teachers and/or Students

18-Mar-24, 3:45 PM-5:15 PM

Location: Plaza Court 2

Untangling the Effects: A Meta-Analysis Examining the Impact of Professional Development Programs for Science Teachers

Hyesun You*, The University of Iowa, USA

Sunyoung Park, California Lutheran University, USA

Minju Hong, University of Arkansas, USA

Alison Warren, The University of Iowa, USA

Mentorship and Professional Development in Science Education: A Self-Determination Theory Framework for Understanding Teachers' Perspectives

Mayra Marquez-Mendez*, University of Nevada Las Vegas, USA

Adjoa Mensah*, University of Nevada Las Vegas, USA

Tina Vo, University of Nevada Las Vegas, USA

Impact of an Online STEM Professional Development Program for K-3 Teachers on Student Outcomes

Kadir Demir*, Georgia State University, USA

Ryan Duckett, University of Toledo, USA

Christopher Wojciechowski, University of Toledo, USA

Charlene Czerniak, University of Toledo, USA

Susana Hapgood, University of Toledo, USA

Joan Kaderavek, University of Toledo, USA

Strand 10: Curriculum and Assessment

Related Paper Set

Curriculum Materials Adaptations: What Teachers Attend to and the Changes They Make

18-Mar-24, 3:45 PM-5:15 PM

Location: Plaza Court 6

Un/making Curriculum Materials: Teachers' Localized Adaptations of Curriculum Materials in Context

Emily Seeber*, University of Michigan, USA

Christa Haverly*, Northwestern University, USA

Elizabeth Davis*, University of Michigan, USA

Flexible Tool or Verbatim Script?:

Teachers' Framing and Uses of Educative Features in Curricular Materials

Soo-Yean Shim*, Seoul National University, Republic of Korea

Christina Krist, University of Illinois Urbana-Champaign, USA

Kevin Hall, University of Illinois Urbana-Champaign, USA

Mon-Lin Monica Ko, University of Colorado Boulder, USA

Tania Jarosewich, Censeo Group, USA

Barbara Hug, University of Illinois Urbana-Champaign, USA

Preservice Elementary Science Teachers' Strategies for Expanding What Counts as Science

Jessica Bautista*, University of Michigan, USA

Elizabeth Davis, University of Michigan, USA

"Oh Yeah, That Has Happened to Me": A Teacher's Strategic Adaptation of a Phenomenon

Nicholas Leonardi*, University of Illinois Urbana-Champaign, USA

Barbara Hug*, University of Illinois Urbana-Champaign, USA

Christina Krist, University of Illinois Urbana-Champaign, USA

Re-Tooling NGSS-aligned Curricula to Promote Agency, Ownership and Relevance

Kerri Wingert*, Good Question Research, LLC, USA

Barbara Hug*, University of Illinois Urbana-Champaign, USA

Monlin Monica Ko, University of Colorado Boulder, USA

Christina Krist, University of Illinois Urbana-Champaign, USA

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Engaging Advanced Quantitative Techniques in STEM Education in Pursuit of Justice

18-Mar-24, 3:45 PM-5:15 PM

Location: Governor's Square 14

Measuring Justly in Mostly White Schools: A Case for Psychometric Effect Coding

Phillip Boda*, University of Illinois Chicago, USA

George Sirrakos, Kutztown University of Pennsylvania, USA

Lisa Frye, Kutztown University of Pennsylvania, USA

Joleen Greenwood, Kutztown University of Pennsylvania, USA

Society's Educational Debts in Biology, Chemistry, and Physics: Race, Gender, and Class

Ben Van Dusen*, Iowa State University, USA

Jayson Nissen, Nissen Education Research and Design, USA

Odis Johnson, John Hopkins University, USA

Active Engagement Strategies in Undergraduate Calculus: Learning How to Sustain Success for URM STEM Majors

Zenaida Aguirre Munoz*, University of California, Merced, USA

Mayya Tokman, University of California, Merced, USA

Lalita Oka, California State University, Fresno, USA

Keith Thompson, University of California, Merced, USA

Erica Rutter, University of California, Merced, USA

Khang Tran, California State University,
Fresno, USA

Lei Yue, University of California, Merced,
USA

*How Measures of High School STEM
Orientation Predict College Enrollment.
Monitoring Equity in Science
Opportunities.*

Vandeen Campbell*, Rutgers University,
Newark, USA

Jiwon Hwang, California State University,
Los Angeles, USA

Jessica Zulawski*, Newark Board of
Education, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

*Refusing Damage-Centered
Narratives in Postsecondary STEM
Education: Resistance, Thriving, and
Desire*

18-Mar-24, 3:45 PM-5:15 PM

Location: Governor's Square 12

*Science Education for Us: Black Males
Exercising Resistance to Matriculate
through STEM Education*

Takeshia Pierre*, University of Florida, USA

Jomo Mutegi*, Old Dominion University,
USA

*Utilizing an Asset-Based Lens to Examine
How Women of Color Thrive in STEM*

Anina Mahmud*, University of North
Carolina, USA

Dionne Cross Francis*, University of North
Carolina, USA

Pavneet Kaur Bharaj, California State
University, USA

Kerrie Wilkins-Yel, University of
Massachusetts, USA

Aishwarya Shridhar, University of
Massachusetts, USA

Dionne White, Indiana University, USA

*"I Just Got Lucky": Multiply Marginalized
Students' Experiences with Mentorship in
the Medical Education Trajectory*

Candice Kim*, Stanford Graduate School
of Education, USA

*Desire-Based Research for Alternative
World-Building: Possibilities and Tensions
for Research in STEM Education*

sarah El Halwany*, Université de l'Ontario,
Canada

Kristal Turner*, University of Calgary,
Canada

Kristen Schaffer, Mount Royal University,
Canada

Jennifer Adams*, University of Calgary,
Canada

Strand 12: Technology for Teaching, Learning, and Research

SC-Organized Paper Set

*Assessment of Science Learning
Through Technology*

18-Mar-24, 3:45 PM-5:15 PM

Location: Directors Row E

*Using Machine Learning to Predict the
Productivity of Learning Trajectories in a
Digitally Enhanced Classroom*

Marcus Kubsch*, Freie Universität,
Germany

Adrian Grimm, IPN – Leibniz Institute for
Science and Mathematics Education,
Germany

Sebastian Gombert, DIPF, Germany

Nikol Rummel, Ruhr -Universität Bochum,
Germany

Hendrik Drachsler, DIPF, Germany

Knut Neumann, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Identification of Science Assessment Item Disengagement Through Analysis Using Psychophysiological Measurement

Richard Lamb*, East Carolina University, USA

Knut Neumann, IPN, Germany

Norah Almusharraf, Prince Sultan University, Saudi Arabia

Douglas Hoston, SUNY Buffalo State College, USA

Assessing Student Errors in Experimentation Using Large Language Models: A Comparative Study with Human Raters

Arne Bewersdorff*, Technical University of Munich, Germany

Kathrin Seßler, Technical University of Munich, Germany

Armin Baur, University of Education Heidelberg, Germany

Enkelejda Kasneci, Technical University of Munich, Germany

Claudia Nerdel, Technical University of Munich, Germany

Assessment in Educational Makerspaces

Harmony Jones*, University of West Fl, USA

John Pecore*, University of West Fl, USA

Nature of Scientific Inquiry and Argument-Driven Inquiry: The Views of Pre-Service Teachers on Climate Change

Gülüzar EYMUR*, Giresun, Turkey

Sümeyye Erenler, Recep Tayyip Erdogan University, Turkey

Pinar Çetin, Bolu Abant İzzet Baysal University, Turkey

Analysing Students' Multimodal Representations of Nature of Scientific Practices and Scientific Methods

Kason Ka Ching Cheung*, University of Oxford, United Kingdom

Sibel Erduran, University of Oxford, United Kingdom

Alis Oancea, University of Oxford, United Kingdom

Clarifying Vision 1.5: The Essence of Science

Judith Lederman*, Illinois Institute of Technology, USA

Valarie Akerson, Indiana University, USA

Selina Bartels, Valparaiso University, USA

Renee Schwartz, Georgia State University, USA

"It's what I have always been taught." Undergraduate Science Students' Views about Scientific Inquiry

Renee Schwartz*, Georgia State University, USA

Heidi Turcotte, Georgia State University, USA

Aihanh Maasen, Georgia State University, USA

Strand 13: History, Philosophy, Sociology, and Nature of Science
SC-Organized Paper Set
Scientific Inquiry and Shifting Views
18-Mar-24, 3:45 PM-5:15 PM
Location: Plaza Court 1

**Strand 14: Environmental Education
and Sustainability**
SC-Organized Paper Set
Climate Justice in Science Education
18-Mar-24, 3:45 PM-5:15 PM
Location: Directors Row J

*Assessing the First Year of the
Environmental Justice STEMM Leadership
Academy*

Rachel Gisewhite*, University of Southern
Mississippi, USA

Jennifer Walker, University of Southern
Mississippi, USA

David Holt, University of Southern
Mississippi, USA

*The Current State of Climate Justice-
Related Research in Science Education
and Its Implications*

Hong Tran*, University of Georgia, USA

Emily Adah Miller, University of Georgia,
USA

Ajay Sharma, University of Georgia, USA

Shweta Lahiri, University of Georgia, USA

Julie Luft, University of Georgia, USA

Joseph DeLuca, University of Georgia, USA

Elizabeth French, University of Georgia,
USA

*Community Organizing for Climate
Change and Environmental Justice
Instruction at the School District Level*

Helen Fitzmaurice*, UC Berkeley, USA

Michelle Hoda Wilkerson, UC Berkeley,
USA

**Strand 14: Environmental Education
and Sustainability**
SC-Organized Paper Set
***Collective Learning as a Solution to
Environmental Challenges***
18-Mar-24, 3:45 PM-5:15 PM
Location: Directors Row I

*Evaluating Biological Accuracy and
Problem-Solving Utility: Biomimicry
Frameworks for Interdisciplinary
Innovation and Education*

Dimitri Smirnoff*, University of Minnesota,
USA

Anita Schuchardt, University of Minnesota,
USA

Gillian Roehrig, University of Minnesota,
USA

Emilie Snell-Rood, University of
Minnesota, USA

*Education for Sustainable Development
through Socioscientific Issues: Pre-service
Teachers' Pedagogical Design Capacity*

Tuba Stouthart*, Eindhoven University of
Technology, Netherlands

Dury Bayram, Eindhoven University of
Technology, Netherlands

Jan van der Veen, Eindhoven University of
Technology, Netherlands

*Exploring Collective Learning in an
Environmental Movement in India using
the Community of Practice Framework*

Aparajita Rajwade*, North Carolina State
University, USA

K.C. Busch, North Carolina State
University, USA

*Exploring Narratives as a Tool for
Fostering Transformation Toward
Sustainability Through Science Education*

Giulia Tasquier*, University of Bologna,
Italy

Erik Knain, University of Oslo, Norway

Alfredo Jornet, University of Gerona, Spain

Hanna Rokenes, University of Oslo,
Norway

Poster Session A

18-Mar-24, 5:30 PM-6:15 PM

Location: Plaza Foyer

Strand 1: Science Learning: Development of student understanding

*Argumentation in Elementary School,
from Evidence and Models*

Roger Tobin*, Tufts University, USA

Sara Lacy, TERC, USA

Sally Crissman, TERC, USA

Strand 1: Science Learning: Development of student understanding

*What Predicts Scientific Literacy:
Revealing Influential Factors and Group
Comparisons via a Machine Learning
Model*

Hyesun You*, The University of Iowa, USA

Minju Hong, University of Arkansas, USA

Li Zhu, The University of Iowa, USA

Zhenhan Fang, The University of Iowa,
USA

Strand 1: Science Learning: Development of student understanding

*Challenges in Latent Variables Test
Development based on the concept of
Energy*

Lauri Kõlamets*, The University of Tartu
Institute of Chemistry, Estonia

Heili Kasuk, University of Tartu, Estonia

Jack Holbrook, University of Tartu, Estonia

Rachel Mamlok-Naaman, Weizmann
Institute of science, Israel

Strand 1: Science Learning: Development of student understanding

*Post-Secondary Students' Concepts of
Elasticity: The Iron and Rubber Dilemma*

Md Nazmuzzaman Shifat*, Harvard
University, USA

S M Hafizur Rahman, University of Dhaka,
Bangladesh

Strand 1: Science Learning: Development of student understanding

*From Anxiety to Empowerment: The Role
of Error Beliefs in Mathematics Learning*
Xingfeiyue Liu*, The Ohio State University,
USA

Eric Anderman, The Ohio State University,
USA

Lynley Anderman, The Ohio State
University, USA

Tzu-Jung Lin, The Ohio State University,
USA

Michael Glassman, The Ohio State
University, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

*Media and Information in Science
Lessons: An Analysis of Discursive
Interactions in a Brazilian Classroom*

Ludmila Kelles, Universidade Federal de
Minas Gerais, Brazil

Nathan Lima, Universidade Federal do Rio
Grande do Sul, Brazil

Luiz Franco*, Universidade Federal de
Minas Gerais, Brazil

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

Characteristics and Strategies

Teaching and Learning Sequences on the Floating and Sinking Phenomenon: An Evidence-Based Comparison

Francisco Castillo Hernández*, University of Groningen, Netherlands

María Jiménez-Liso, University of Almería, Spain

Digna Couso, Autonomous University of Barcelona, Spain

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

A Dual Case Study of Science Teachers' who Implemented Self-Regulated Learning in their Classrooms

Boaz Hadas*, Technion, Israel

Avivit Arvatz, Technion, Israel

Rotem Waitzman, Charles E. Smith High School for the Arts, Israel

Yehudit Dori, Technion, Israel

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

Embodied Cognition: Unknown by Teachers but Used Surprisingly Often in Class

André Meyer*, Leibniz University Hannover, Germany

Gunnar Friege, Leibniz University Hannover, Germany

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

A Systematic Literature Review of Teaching Approaches in Advanced Placement Science Courses

Robin Bulleri*, North Carolina State University, USA

Soonhye Park, North Carolina State University, USA

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

Factors Affecting Science Teaching in STEM: A Systematic Review

Heba EL-Deghaidy*, American University in Cairo, Egypt

Zahrah Almasabi, Najran University, Saudi Arabia

Hamdan Alamri, King Saud University, Saudi Arabia

Maha Albogami, King Saud University, Saudi Arabia

Nidhal Alahmad, King Saud University, Saudi Arabia

Saeed Alshamrani, King Saud University, Saudi Arabia

Abdo Almufti, King Saud University, Saudi Arabia

Nasser Mansour, Qatar University, Qatar

Abdulaziz Alfayez, King Saud University, Saudi Arabia

Fahad Alshaya, King Saud University, Saudi Arabia

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

Iterative Modeling of Earth's Interior for Conceptual Change in Middle School Earth Science

Melissa Olson*, Texas Tech University, USA

Jocelyn Miller, Texas Tech University, USA

Gina Childers, Texas Tech University, USA

Kristie Gutierrez, Old Dominion University, USA

Jin Kyeong Jung, Texas Tech University, USA

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

Exploring the Impacts of Educative Model-Based Biology Instructional Materials on Teacher Outcomes

Cari Herrmann Abell*, BSCS Science Learning, USA

Jeffrey Snowden, BSCS Science Learning, USA

Molly Stuhlsatz, BSCS Science Learning, USA

Brian Donovan, BSCS Science Learning, USA

Cynthia Passmore, UC Davis School of Education, USA

Christopher Wilson, BSCS Science Learning, USA

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

Pragmatic Model Building: A 4D Socially Enacted Understanding of Celestial Mechanics

Michael Leary*, University of Georgia, USA

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

Data Fluency Landscape Analysis: Identifying Strengths, Needs, and Resources for Data-Rich Instruction in Earth Science

Nicole Wong*, WestEd, USA

Rasha Elsayed, WestEd, USA

Kirsten Daehler*, WestEd, USA

Katy Nilsen, WestEd, USA

Svetlana Darche, WestEd, USA

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

Impact of a Forum for Chemistry and Math Introductory Course Instructors – a Professional Development Model.

Oluwatobi Odeleye*, West Virginia University, USA

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

Examining Students' Peer-to-Peer Questions During an In-Class Collaborative Activity: Trends and Outcomes.

James Nyachwaya*, North Dakota State University, USA

Soren Miller, St> Olaf College, USA

Tarah Dahl, North Dakota State University, USA

Krystal Grieger, North Dakota State University, USA

Strand 6: Science Learning in Informal Contexts

Community Dimensions of STEM Learning at Science Fiction Conventions: Communities of Practice & Modes of Belonging

Rebecca Hite*, Texas Tech University, USA

Gina Childers*, Texas Tech University, USA

Kania Greer, Georgia Southern University, USA

Samanthia Noble, Texas Tech University, USA

Olivia Kuper, Texas Tech University, USA

Strand 6: Science Learning in Informal Contexts

Belonging in Science: Perspectives from High School Students

Linda Morell*, University of California, USA

Strand 7: Pre-service Science Teacher Education

Reevaluating FOCIS Survey with Pre-service Elementary Teachers: CFA on Latent Constructs of Discovering and Making

Lillian Bentley*, University of Virginia, USA
Xin Xia, University of Virginia, USA

Strand 7: Pre-service Science Teacher Education

Making Space for Repertoires, Community Resources, and Sensemaking with Elementary Science Teacher Candidates

Mutiara Syifa*, The Ohio State University, USA

Ashlyn Pierson*, The Ohio State University, USA

Sophia Jeong*, The Ohio State University, USA

Andrea Henrie*, The Ohio State University, USA

Strand 7: Pre-service Science Teacher Education

Effect of Teacher Preparation Program on Science Teachers' Use of Academic Language Development Strategies

Rachel Benzoni*, University of Nebraska-Lincoln, USA

Elizabeth Lewis, University of Nebraska-Lincoln, USA

Strand 7: Pre-service Science Teacher Education

Pre-Service Teachers' Orientations to the Role of Student Thinking in Instruction across the Two-Worlds Pitfall

Ryan Coker*, Florida State University, USA

Lama Jaber, Florida State University, USA

Sherry Southerland, Florida State University, USA

Strand 8: In-service Science Teacher Education

Toward a Framework for Equity-Focused STEM Teacher Leadership

Matthew Kloser*, University of Notre Dame, USA

Michael Szopiak, University of Notre Dame, USA

Catherine Wagner, University of Notre Dame, USA

D'Anna Pynes, University of Notre Dame, USA

Gina Svarovsky, University of Notre Dame, USA

Strand 8: In-service Science Teacher Education

Incoherence in Administrators'

Perceptions of Elementary Engineering Education and Teacher Professional Development Needs

Danielle Rhemer*, Florida State University, USA

Minjung Lee, Old Dominion University, USA

Kristie Gutierrez*, Old Dominion University, USA

Jennifer Kidd, Old Dominion University, USA

Strand 8: In-service Science Teacher Education

Science Professional Learning that Offers Growth in Engineering Self-Efficacy for Rural School Elementary Teachers

John Galisky*, UC Santa Barbara, USA

Meghan Macias*, WestEd, USA

Ashley Iveland*, WestEd, USA

Martha Inouye, University of Wyoming, USA

Rebekah Hammack, Purdue University, USA

Julie Robinson, University of North Dakota, USA

Cathy Ringstaff, WestEd, USA

Ryan Summers, University of North Dakota, USA

Strand 10: Curriculum and Assessment

Evaluation of NGSS Practices Curricular Integration: How Many, How Much, and How Often?

Amanda Peel*, New Mexico State University, USA

Steven McGee, The Learning Partnership, USA

Strand 10: Curriculum and Assessment

Promoting Model-informed Reasoning Through Engagement with Multiple Models

Jamie Elsner*, University of North Carolina at Chapel Hill, USA

Eric Kirk, University of North Carolina at Chapel Hill, USA

Zhen Xu, University of North Carolina at Chapel Hill, USA

Laura Zangori, University of Missouri, USA

Li Ke, University of Nevada Reno, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

Strand 10: Curriculum and Assessment

Evaluating a Genetics Unit from a Science Identity Perspective

Sarah Fogelman*, Boston College, USA

Maria Moreno Vera*, Boston College, USA

Katherine McNeill*, Boston College, USA

Strand 10: Curriculum and Assessment

Assessing Middle School Chemistry Concepts Using Pictorial and Verbal Multiple-Choice Questionnaires

Einat Ben Eliyahu*, Ben Gurion University of the Negev, Israel

Eylon Langbeheim, Ben Gurion University of the Negev, Israel

Strand 10: Curriculum and Assessment

Mediation among Epistemic Orientation and Epistemic Tools on Teacher Implementation of Knowledge Generation Approaches

Gavin Fulmer*, NWEA, USA

Amanda Duffey*, University of Iowa, USA

Brian Hand, University of Iowa, USA

Jee Kyung Suh, University of Alabama, USA

Strand 11: Cultural, Social, and Gender Issues

Designing for Low-High Spaces in White Science Teacher Education

Jonathan McCausland*, New Mexico Highlands University, USA

Strand 11: Cultural, Social, and Gender Issues

Student Outcomes through Culturally and Linguistically Responsive Science Instruction: A Systematic Review

Niki Koukoulidis*, University of Florida, USA

Julie Brown*, University of Florida, USA

Strand 11: Cultural, Social, and Gender Issues

Teachers' Views and Response to Equity Issues at Higher Education Science Classroom in Bangladesh

S M Hafizur Rahman*, Institute of Education and Research (IER), University of Dhaka, Bangladesh

Sonia Yeasmin*, Institute of Education and Research (IER), University of Dhaka, Bangladesh

Strand 11: Cultural, Social, and Gender Issues

Queerness in STEM: A Review of National Science Foundation (NSF) Research Grants

George Schafer*, Drexel University, USA

Strand 11: Cultural, Social, and Gender Issues

Centering Biodiversity: Queering Sex Determination in a Developmental Biology Course

Aramati Casper*, Colorado State University, USA

Brandon Hylton, Colorado State University, USA

Deborah Garrity, Colorado State University, USA

Strand 12: Technology for Teaching, Learning, and Research

Science Practices Innovation Notebook: A Framework for Inclusion

Erin Peters-Burton*, George Mason University, USA

Timothy Cleary, Rutgers University, USA

Peter Rich, Brigham Young University, USA

Anastasia Kitsantas, George Mason University, USA

Brittany Miller, George Mason University, USA

Hong Tran, Purdue University, USA

Haley McKeen, George Mason University, USA

Strand 12: Technology for Teaching, Learning, and Research

Student Attributions for Success and Failure in General Chemistry Found in an Online Metacognitive Intervention

Ted Clark*, The Ohio State University, USA

Strand 12: Technology for Teaching, Learning, and Research

Investigating New Roles for Digital Technology in Teaching Computer Studies in Africa Through a Virtual-Learning-Environment

Deborah Agbanimu*, National Open University of Nigeria, Nigeria

Peter Okebukola, Lagos State University-ACEITSE, Nigeria

Juma Shabani, Univeristy of Burundi, Burundi

Franklin Onowugbeda, Lagos State University-ACEITSE, Nigeria

Esther Peter, Lagos State University-ACEITSE, Nigeria

Adekunle Oladejo, Lagos State University-ACEITSE, Nigeria

Olasunkanmi Gbeleyi, Lagos State University-ACEITSE, Nigeria

Ibukunolu Ademola, Lagos State University-ACEITSE, Nigeria

Strand 12: Technology for Teaching, Learning, and Research

Exploring Promises and Pitfalls of Artificial Intelligence in Education: A Pilot Study

Divya Baranwal*, Southern Methodist University, USA

Strand 12: Technology for Teaching, Learning, and Research

Exploring Automated Evaluation of Teacher Attention to Student Ideas During Argumentation-Focused Science Discussions

Jamie Mikeska*, ETS, USA

Alessia Marigo, ETS, USA

Jessica Tierney, ETS, USA

Tricia Maxwell, ETS, USA

Duy Pham, ETS, USA

Beata Beigman Klebanov, ETS, USA

Strand 12: Technology for Teaching, Learning, and Research

Cultivating Hardware Engineering Interest in High School Students Using Hands-on Learning

Andrea Ramirez-Salgado*, University of Florida, USA

Pavlo Antonenko, University of Florida, USA

Strand 12: Technology for Teaching, Learning, and Research

Technology to Support the NGSS Practice of Mathematical and Computational Thinking in Early Elementary Classrooms

Kristina Tank*, Iowa State University, USA

Tamara Moore, Purdue University, USA

Anne Ottenbreit-Leftwich, Indiana University, USA

Barbara Fagundes, Purdue University, USA

Zarina Wafula, Iowa State University, USA

Sohheon Yang, Indiana University, USA

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

Exploring the Development of Students' Nature of Engineering Views and their Identification with Engineering

Jacob Pleasants*, University of Oklahoma, USA

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

Towards a Multidisciplinary Framework for Teaching Socio-scientific Issues

Scott Bonham*, Western Kentucky University, USA

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

Re-evaluating the Impact of School Size on Students' Physical Science Enrollment and Performance

Monika Siepsiak*, Stony Brook University, USA

Keith Sheppard, Stony Brook University, USA

Angela Kelly, Stony Brook University, USA

Strand 14: Environmental Education and Sustainability

Mothers as Ambassadors of Climate Change Behaviors Education: Multi-Case Study between Mexico and United States

Regina Ayala Chavez*, NC State University, USA

K.C. Busch, NC State University, USA

Strand 14: Environmental Education and Sustainability

Understanding Teachers' Knowledge and Confidence in Teaching Climate Change & Marine Science

Lauren Madden*, The College of New Jersey, USA

Louise Ammentorp, The College of New Jersey, USA

Nathan Magee, The College of New Jersey, USA

Graceanne Taylor, Save Barnegat Bay, USA

National Center for Science Education

Sponsored Session

Safeguarding Sound Science – Resolving Science Misconceptions in the Secondary Classroom

18-Mar-24, 5:30 PM-6:15 PM

Location: Governor's Square 10

Safeguarding Sound Science – Resolving Science Misconceptions in the Secondary Classroom

ORGANIZERS

Amanda Townley, National Center for
Science Education, USA
Lin Andrews, National Center for Science
Education, USA
Wendy Johnson, National Center for
Science Education, USA

**PhET Interactive Simulation, CU-
Boulder**
Sponsored Session
*Discover PhET-iO Simulations for
Research with Full API Control and
Backend Data*
18-Mar-24, 5:30 PM-6:15 PM
Location: Governor's Square 11

*Discover PhET-iO Simulations for
Research with Full API Control and
Backend Data*

ORGANIZERS
Kathy Perkins, University of Colorado
Boulder, USA

PANELISTS
Kathy Perkins, University of Colorado,
Boulder, USA
Amy Rouinfar, University of Colorado,
Boulder, USA
Kathryn Woessner, University of Colorado,
Boulder, USA

**International Journal of Science
Education**
Social Event
IJSE Reception
18-Mar-24, 6:30 PM-7:30 PM
Location: Plaza Ballroom ABC/DEF

**Research in Artificial Intelligence-
Involved Science Education (RAISE)**
Sponsored Session
*RAISE Book Talk: Uses of Artificial
Intelligence for STEM Education*
18-Mar-24, 7:00 PM-9:00 PM
Location: Directors Row I

*RAISE Book Talk: Uses of Artificial
Intelligence for STEM Education*

ORGANIZERS
Xiaoming Zhai, University of Georgia, USA
Kent Crippen, University of Florida, USA

PANELISTS
Joe Krajcik, Michigan State University, USA

Equity And Ethics Committee
Social Event
Equity & Ethics Committee Dinner
18-Mar-24, 7:00 PM-9:00 PM
Location: Off Site

ORGANIZERS
Phillip Boda, University of Illinois, USA
Ilana De La Cruz, Texas A&M University,
College Station, TX, USA

19 MARCH 2024

Committee Meeting
Publications Advisory Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Governor's Square 10

Committee Meeting
Social Media, Website, Communications Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Governor's Square 11

Committee Meeting
Program Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Governor's Square 12

Committee Meeting
Elections Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Governor's Square 16

Committee Meeting
Awards Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Governor's Square 17

Committee Meeting
Research Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 1

Committee Meeting
Equity and Ethics Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 2

Committee Meeting
External Policy and Relations Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 3

Committee Meeting
International Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 4

Committee Meeting
Graduate Student Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 5

Committee Meeting
Membership Committee Meeting
19-Mar-24, 7:00 AM-8:00 AM
Location: Plaza Court 6

Roundtables Session 2

19-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Ballroom ABC/DEF

Strand 6: Science Learning in Informal Contexts Roundtable

STEMming the Slide: Enhancing Self-Efficacy via a Summer Academy

Caleb Smith*, Southeastern Oklahoma State University, USA

Katheryn Shannon*, Southeastern Oklahoma State University, USA

Michael Hardy*, Southeastern Oklahoma State University, USA

Strand 6: Science Learning in Informal Contexts

Work-in-progress Roundtable

"Escaping the Room, Entering the Nano-World"- Learning about Nano through a Chemical Escape Room

Shelley Rap*, Weizmann Institute of Science, Israel

Malka Yayon, Weizmann Institute of Science, Israel

Ron Blonder, Weizmann Institute of Science, Israel

Strand 6: Science Learning in Informal Contexts Roundtable

Kitchen Chemistry Boosts STEM Identity and Increases STEM Career Interests.

Chen Chen*, University of Hong Kong, Hong Kong

Jiaxin Chen*, University of Hong Kong, Hong Kong

Liang Ju, University of Hong Kong, Hong Kong

Gerhard Sonnert, Harvard-Smithsonian Center for Astrophysics, USA

Philip Sadler, Harvard-Smithsonian Center for Astrophysics, USA

Strand 6: Science Learning in Informal Contexts

Work-in-progress Roundtable

Storied Experiences of Informal Science Learning in U.S. College Students and Impacts on Science Identity

Paul Le*, University of Colorado Denver, USA

Sarah Hug, Colorado Evaluation and Research Consulting, USA

Strand 6: Science Learning in Informal Contexts

Work-in-progress Roundtable

Using Community Ethnography and Networks of Support to Foster Consequential Learning through Community-Centered Energy Engineering

Carlos Meza-Torres*, Arizona State University, USA

Michelle Jordan, Arizona State University, USA

Steve Zuiker, Arizona State University, USA

Strand 6: Science Learning in Informal Contexts

Work-in-progress Roundtable

Drawing from Narrative Techniques to Explore Impact Identity and Scientist Public Engagement: A Pilot Study

Brenda Guerrero*, Florida International University, USA

Strand 7: Pre-service Science Teacher Education Roundtable

BIPOC Teacher Candidates'

Translanguaging Selves: Their Assets and Identities as Future Elementary Science Teachers

Patricia Venegas-Weber*, University of Washington, USA

Jessica Thompson*, University of Washington, USA

Strand 7: Pre-service Science Teacher Education Roundtable

Field Experience Reconceptualized for Elementary Science and Mathematics Methods Courses

Sheryl McGlamery*, University of Nebraska at Omaha, USA

Saundra Shillingstad*, University of Nebraska at Omaha, USA

Strand 7: Pre-service Science Teacher Education Roundtable

Using the Draw-A-Scientist Test to Understand Pre-Service Elementary Teachers' Perceptions of Scientists

Sissy Wong*, University of Houston, USA

Maria Walsh, University of Houston, USA

Samuel Katende, University of Houston, USA

Strand 7: Pre-service Science Teacher Education Roundtable

Elementary Preservice Teachers' Competence in Planning and Implementing Empathic Design in Cross-Cultural STEM Education

Soo Won Shim*, Illinois State University, USA

Selcen Gauzy, Purdue University, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Supporting preservice science teachers to teach ambitiously: A collaborative self-study

Barbara Billington*, University of Minnesota - Twin Cities, USA

Eva Nelson*, University of Minnesota - Twin Cities, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Exploring How Elementary Preservice Teachers Develop Reform-Minded Science Teacher Identities Across a Science Methods Course

Jenna Gist*, Purdue University, USA

Brenda Capobianco, Purdue University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Developing a Social Network Tool to Support and Characterize STEM Teacher Leadership

John O'Meara*, Montclair State University, USA

Shanna Anderson, Montclair State University, USA

Timothy Aberle, Montclair State University, USA

Ursula Derios, Montclair State University, USA

Mika Munakata, Montclair State University, USA

Monica Taylor, Montclair State University, USA

Emily Klein, Montclair State University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Supporting Teachers' Understanding and Infusion of Culturally Responsive and Anti-Racist Teaching in Science

Shannon Davidson*, University of Alabama, USA

Roxanne Hughes, Florida State University, USA

Stacey Hardin, University of Washington, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Longitudinal Studies of In-Service Teacher Education: A Discussion of Methods

Chris Pavlovich*, Montana Technological University, USA

Rayelynn Brandl*, Montana Technological University, USA

Strand 10: Curriculum and Assessment

Work-in-progress Roundtable

How Does the Framing of Anchoring Phenomena Affect Student Perception of Interest and Relevance?

Zoe Buck Brace*, BSCS Science Learning, USA

Jamie Noll*, BSCS Science, USA

Diego Rojas-Perilla*, BSCS Science Learning, USA

Joe Kremer*, Denver Public Schools, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

New STEM Teachers' Experiences: Teacher Preparation, Culture, Identity, and Belonging

Danielle Sodani*, American University, USA

Shari Watkins*, American University, USA

Carolyn Parker*, American University, USA

Kiho Kim*, Washington College, USA

Sarah Belson*, American University, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Preservice Teachers' Facilitation of Argumentation: Exploring Their Attention to and Perceived Complexity of Students' Thinking

Meredith Park Rogers*, Indiana University, USA

Taiwo Ogundapo*, Indiana University, USA

Esther Namakula*, Indiana University, USA

Kady Lane*, Indiana University, USA

Dionne Cross Francis, University of North Carolina - Chapel Hill, USA

Pavneet Kaur Bharaj, CSU-Bakersfield, USA

Weverton Ataide Pinheiro, Texas Tech University, USA

Adam Maltese, Indiana University, USA

Jamie Mikeska, Educational Testing Service, USA

Calli Shekell, Thiel College, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Exploring the Use of Model Eliciting Activities to Promote Quantitative Reasoning Among Preservice Teachers

Cynthia Lima*, University of Texas at San Antonio, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Laying the Foundation for Translanguaging Pedagogy in Preservice Secondary Science and Math Teacher Preparation

Edward Lyon*, Sonoma State, USA

Caroline Spurgin*, Sonoma State, USA

Lyn Scott, Cal State East Bay, USA

Michele Korb*, Cal State East Bay, USA

Strand 7: Pre-service Science Teacher Education

Work-in-progress Roundtable

Examining the Dimensionality of NGSS

Learning Objectives Generated by

Preservice Elementary Teachers

Lin Xiang*, University of Kentucky, USA

Corinne Lardy*, California State University, Sacramento, USA

YoungJin Song*, California State

University, Long Beach, USA

Michele Korb*, California State University, East Bay, USA

Hui-Ju Huang*, California State University, Sacramento, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

"You Can't Take for Granted That Kids

Know That!": Centering Teacher Learning

Around Equity Supports

Jennifer Jackson*, The Pennsylvania State University, USA

Scott McDonald, The Pennsylvania State University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Unlocking Potential: Navigating Universal

Design for Learning in Elementary

Engineering for Diverse Learners

Bree Jimenez*, The University of Texas

Arlington of, USA

Ginevra Courtade, University of Louisville, USA

Mary Elliott, University of Louisville, USA

Jennifer Fosbinder, University of Louisville, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Engaging with Science Educators through

Flipped Observations to Support

Enactment of Social Justice Practices

Felisha Dake*, Oregon State University, USA

Cory Buxton, Oregon State University, USA

Melissa Livingston, Oregon State University, USA

Karla Hale, Oregon State University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Supporting Teachers in Developing and

Using Data Literacy Skills Through

Research Experience for Teachers

Program

Amanda Morrison*, Oregon State University, USA

Michael Giamellaro, Oregon State University, USA

Strand 8: In-service Science Teacher Education

Work-in-progress Roundtable

Effective Engineering Education for

Elementary Multilingual Learners: A

Conceptual Framework for

Transformative Professional Learning

Jerome Shaw*, University of California, Santa Cruz, USA

Strand 10: Curriculum and Assessment Roundtable

Stemtelling: Learning Science and

Building Epistemic Communities Through

Storytelling

Jenny Tilsen*, University of Minnesota, USA

Strand 10: Curriculum and Assessment Roundtable

The Impact of Ungrading on Secondary Physics Students' Self Determination

Christopher Sarkonak, Crocus Plains Regional Secondary School, Canada

Ellen Watson*, Brandon University, Canada

Strand 10: Curriculum and Assessment Roundtable

The State of Framework-aligned Assessment Tasks: Where are we?

Clarissa Deverel-Rico*, BSCS Science Learning, USA

Patricia Olson, BSCS Science Learning, USA

Cari Herrmann Abell, BSCS Science Learning, USA

Chris Wilson, BSCS Science Learning, USA

Strand 10: Curriculum and Assessment

Work-in-progress Roundtable

The Grand Challenges Project: Co-Developing an International Interdisciplinary SSI-Based Science Curriculum

Keren Dalyot*, Weizmann Institute of Science, Israel

Nannan Fan, University of North Carolina at Chapel Hill, USA

Heewoo Lee, University of North Carolina at Chapel Hill, USA

Rebecca Lesnepsy, University of North Carolina at Chapel Hill, USA

Shira Passentin, Weizmann Institute of Science, Israel

Natasha Segal, Weizmann Institute of Science, Israel

Zhen Xu, University of North Carolina at Chapel Hill, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

David Fortus, Weizmann Institute of Science, Israel

Strand 8: In-service Science Teacher Education Roundtable

Empowering Science Teachers' Pedagogical Transformation through Participation in an Online Asynchronous Graduate Program

Elizabeth Saville*, UBC Okanagan, Canada

David Anderson, UBC, Canada

Marina Milner-Bolotin, UBC, Canada

Publications Advisory Committee Sponsored Session

NARST/NSTA Annual Research Worth Reading Recognition

19-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 16

NARST/NSTA Annual Research Worth Reading Recognition

ORGANIZERS

Lindsay Lightner, Washington State University Tri-Cities, USA

Tina Vo, University of Nevada, Los Vegas, USA

Emily Dare, Louisiana State University, USA

G. Michael Bowen, Mount Saint Vincent University, Canada

Shiang-Yao Liu, National Taiwan Normal University, Taiwan

Deborah Hanuscin, Western Washington University, USA

**Strand 1: Science Learning:
Development of student
understanding
Related Paper Set
*Science Learning Progression
Research: Insights, Challenges, and
Future Directions***

19-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row E

Learning Progression in Genetics

Ravit Duncan*, Rutgers University, USA

Moraima Castro-Faix, Rutgers University,
USA

*Learning Progressions for Energy in
Physical Sciences*

Jeffrey Nordine*, University of Iowa, USA

David Fortus, Weizmann Institute of
Science, Israel

*Geology & Earth Systems Sciences
Learning Progressions*

Richard Duschl, Southern Methodist
University, USA

Scott McDonald*, Penn State University,
USA

*Developing Three-Dimensional Learning
Progressions of Energy, Interaction, and
Matter at Middle School: A Design-Based
Research*

Namsoo Shin*, Michigan State University
CREATE for STEM Institute, USA

PENG HE*, Michigan State University
CREATE for STEM Institute, USA

Joseph Krajcik, Michigan State University
CREATE for STEM Institute, USA

*Learning Progression in Environmental
Science*

Wendy Johnson*, National Center for
Science Education, USA

Emily Scott, Washington State Office of
the Superintendent of Public Instruction,
USA

Hannah Miller, Vermont State University,
USA

Charles Anderson, Michigan State
University, USA

**Strand 2: Science Learning: Contexts,
Characteristics and Interactions
SC-Organized Paper Set**

Identity and Diversity

19-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 11

*Science Identity Development Across
Multiple Spatial Configurations: A
Narrative Inquiry Project*

Alison Happel-Parkins*, University of
Memphis, USA

Katherine Ayers*, St. Jude Children's
Research Hospital, USA

Olayinka Mohorn-Mintah*, University of
Memphis, USA

*Minoritized High Schoolers' Perceptions of
Science and Scientists*

Jennifer Tripp*, University at Buffalo,
SUNY, USA

Noemi Waight, University of Buffalo -
SUNY, USA

Xiufeng Liu, University at Buffalo, SUNY,
USA

*Not the Only Novice in the Room:
Partnership and Belongingness in a
Research Immersion Program*

Robyn Pennella*, St. Jude Children's
Research Hospital, USA

Katherine Ayers, St. Jude Children's
Research Hospital, USA

Olayinka Mohorn-Mintah, University of
Memphis, USA

Summer Jasper, St. Jude Children's Research Hospital, USA
Susan Nordstrom, University of Memphis, USA

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies
SC-Organized Paper Set
Teacher Learning
19-Mar-24, 8:15 AM-9:45 AM
Location: Plaza Court 1

Comparison of an AI Professional Development Program's Impact on Science and non-Science Teacher AI Literacy

Katherine Moore, MIT STEP Lab, USA
Phylis Wilson*, Richmond Public Schools, USA
Helen Zhang, Boston College, USA
Irene Lee, MIT STEP Lab, USA

A Longitudinal Study of Teacher Leadership Identity Development
Christine Lotter*, University of South Carolina, USA

Jan Yow, University of South Carolina, USA
Denae Kizys, University of South Carolina, USA
Latrice Jones, University of South Carolina, USA

Conceptualization and Development of an Instrument for Exploring the Metacognition of Junior High Science Teachers

Gamolnaree Laikram, The Institute for the Promotion of Teaching Science and Technology, Thailand
Gregory Thomas*, University of Alberta, Canada

Exploring Science Teachers Sensemaking of Generic Equity-focused Professional Development
Matt Stewart*, University of Washington, USA

Framing the Game: Teachers' Perspectives of Varied Epistemological Framing
Christine Hirst Bernhardt*, University of Maryland, USA
Janelle Bailey*, Temple University, USA

Strand 5: College Science Teaching and Learning (Grades 13-20)
SC-Organized Paper Set
Metacognition and Conceptual Understanding in Biology
19-Mar-24, 8:15 AM-9:45 AM
Location: Governor's Square 17

Using the Inventory of Biotic Climate Literacy: Identifying Target Conceptions for Undergraduate Biology Courses

Emily Holt*, University of Northern Colorado, USA
Sara Gliese, University of Maryland, USA
Gili Marbach-Ad, University of Maryland, USA
Kaci Thompson, University of Maryland, USA
Karen Carleton, University of Maryland, USA

Exploring Before Instruction to Improve Conceptual Understanding in Biology
Raina Isaacs*, University of Louisville, USA
Natalie Christian, University of Louisville, USA
Rachel Hopp, University of Louisville, USA
Jeffery Masters, University of Louisville, USA
Linda Fuselier, University of Louisville, USA
Lianda Velic, University of Louisville, USA

Jeffrey Hieb, University of Louisville, USA
Raymond Chastain, University of Louisville, USA
Marci DeCaro, University of Louisville, USA

Individual Variation in Undergraduate Student Metacognitive Monitoring and Error Detection During Biology Model Evaluation

Joe Dauer*, University of Nebraska, USA
Mei Grace Behrendt, University of Nebraska, USA
McKenna Elliott, University of Nebraska, USA
Bethany Gettings, Michigan State University, USA
Carrie Clark, University of Nebraska, USA
Tammy Long, Michigan State University, USA

Undergraduate Students' Utilization of Central Dogma Content Knowledge in Argumentation after Problem-based Learning

Katherine Sharp*, Missouri University of Science and Technology, USA
Jeffrey Chalfant, University of Kentucky, USA
Rebecca Krall, University of Kentucky, USA

Strand 6: Science Learning in Informal Contexts Symposium
Science in the Outdoors: Engaging Teachers and Students in Citizen/Community and Place-based Science
19-Mar-24, 8:15 AM-9:45 AM
Location: Directors Row H

Science in the Outdoors: Engaging Teachers and Students in

Citizen/community and Place-Based Science.

Roberta Hunter*, Michigan State University, USA
Gail Richmond, Michigan State University, USA
Rachel Stronach, University of Massachusetts Dartmouth, USA
Hamza Malik, University of Massachusetts Dartmouth, USA
Stephen Witzig, University of Massachusetts Dartmouth, USA
Zion Michal, Bar-Ilan University, Israel
Batzon Nimrod, Bar-Ilan University, Israel
Jadda Miller, University of California Davis, USA
Emma Schectman, University of California, Davis, USA
Heidi Ballard, University of California, Davis, USA

Strand 7: Pre-service Science Teacher Education
Related Paper Set
Conceptualizing and Supporting the Complexities of Science Teacher Noticing
19-Mar-24, 8:15 AM-9:45 AM
Location: Governor's Square 10

How Preservice Elementary Teachers Notice Opportunities for Equitable Sensemaking in Science

Amanda Benedict-Chambers*, Missouri State University, USA
Carrie-Anne Sherwood*, Southern Connecticut State University, USA

Pre-Service Science Teachers' Conceptualization of Responsive Teaching
Nessrine Machaka*, University of Illinois at Urbana-Champaign, USA
Christina (Stina) Krist*, University of Illinois at Urbana-Champaign, USA

Approaches to Equity as a Lens to Understand PST's Noticing and Responding

Heather Johnson*, Vanderbilt University, USA

Miray Tekkumru-Kisa*, RAND Corporation, USA

Tara Barnhart*, Chapman University, USA

Exploring the Noticing Practices of Learning Assistants that Support Formative Assessment in STEM College Courses

Patricia Moreira*, University of Arizona, USA

Young Ae Kim, University of Arizona, USA

Paul Blowers, University of Arizona, USA

Lisa Elfring, University of Arizona, USA

Vicente Talanquer, University of Arizona, USA

How Instructional Coaching Supports Noticing for In/equity in the Science Classroom

Janet Carlson*, Stanford University, USA

Teacher Noticing in Appalachia: Context-Specific Knowledge of Place and Community in 5th Grade Teachers' Noticing

Melissa Luna*, West Virginia University, USA

Examining Teacher Noticing and Responding for Cultivating Science-as-Practice

Jennifer Richards*, Northwestern University, USA

Miray Tekkumru-Kisa*, RAND Corporation, USA

How Teachers Leading Professional Development for Peers Support

Professional Noticing in Formative Assessment Activities

Hannah Sevian, University of Massachusetts Boston, USA

Rebecca Lewis*, Hingham High School, USA

Strand 8: In-service Science Teacher Education

Symposium

Curriculum-Based Professional Development to Support Multilingual Learners: Conceptual Framework, Instruments, and Impacts

19-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 12

Curriculum-Based Professional Development to Support Multilingual Learners: Conceptual Framework, Instruments, and Impacts

Eric Banilower*, Horizon Research, Inc., USA

Scott Grapin, University of Miami, USA

Alison Haas, New York University, USA

Okhee Lee, New York University, USA

Alycia Sterenberg Mahon, Western Michigan University, USA

Courtney Plumley, Horizon Research, Inc., USA

Abigail Schwenger, New York University, USA

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Assessment Development and Validation

19-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row J

*Comprehensive Scientific Creativity
Assessment: A New Approach for
Measuring Scientific Creativity in
Secondary School Students*

Shiyu Xu*, UCL Institute of Education,
United Kingdom

Michael Reiss, UCL Institute of Education,
United Kingdom

Wilton Lodge, UCL Institute of Education,
United Kingdom

*Development and Validation of Science
Self-Efficacy Survey Scales for Short-Term
Intervention*

Mikkel Bergqvist*, LIFE Foundation,
Denmark

*Comparing the Draw A Scientists-Test
with the Closed Views of Scientists, their
Activities, and Locations-Instrument*

Bianca Reinisch*, University of Potsdam,
Germany

Moritz Krell, Leibniz Institute for Science
and Mathematics Education, Germany

Charlotte Schramme, Freie Universität
Berlin, Germany

Petra Skiebe-Corrette, Freie Universität
Berlin, Germany

*Applying Rasch Model to Validate the
Instrument of Student Attitudes Toward
Stem (S-Stem)*

Yueying Shi*, Xingyao Campus Yunnan
University Secondary School, China

Xiaoming Zhai, University of Georgia, USA

Shuchen Guo*, Nanjing Normal University,
China

Enshan Liu, Beijing Normal University,
China

Strand 11: Cultural, Social, and Gender Issues

Symposium

***Building Culturally Sustaining
Projects and Partnerships to Support
Science for the 'Rest of Us'***

19-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 4

*Building Culturally Sustaining Projects
and Partnerships to Support Science for
the 'Rest of Us'*

Gisele Ragusa, University of Southern
California, USA

Colby Tofel-Grehl, Utah State University,
USA

Nicole Colston, Oklahoma State University,
USA

Constance Flanagan, University of
Wisconsin, USA

Ken Rafanan, TERC, USA

Helen Zhang, Boston College, Lynch
School of Education and Human
Development, USA

Angela Kelly, Stony Brook University, USA

Beatriz Perret*, Education Development
Center, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

***Critical Perspectives on Engineering
Identities: Questioning Ideologies
and Epistemologies***

19-Mar-24, 8:15 AM-9:45 AM

Location: Governor's Square 14

Economic Motivations for the Pursuit of STEM Careers: Implications for Inclusion and Justice

Christopher Irwin*, Florida International University, USA

Zahra Hazari*, Florida International University, USA

Remy Dou, Florida International University, USA

Philip Sadler, Harvard University, USA

Gerhard Sonnert, Harvard University, USA

A Systematic Literature Review of Survey Research on Engineering Identity

Amdad Ahmed Awsaf*, Florida International University, USA

Heidi Cian, MMSA, USA

Remy Dou, Florida International University, USA

An Intersectional, Longitudinal Analysis of Latiné Girls' Critical Consciousness

Summer Blanco*, University of Georgia, USA

Jessica Ortega, University of Georgia, USA

Tatiane Russo-Tait, University of Georgia, USA

Strand 11: Cultural, Social, and Gender Issues

Symposium

Working on Equity in Science

Education Across Places and Spaces

19-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 3

Working on Equity in Science Education Across Places and Spaces

Henriette Holmegaard*, University of Copenhagen, Denmark

Lucy Avraamidou, University of Groningen, Netherlands

Cristiano Moura*, Simon Fraser University, Canada

Felicia Mensah*, Columbia University, USA

Louise Archer*, University College London, United Kingdom

Natalie King*, Georgia State University, USA

Lene Madsen, University of Copenhagen, Denmark

Christina Siry*, University of Luxembourg, Luxembourg

Betzabe Torres Olave, University of Leeds, United Kingdom

Zahra Hazari, Florida International University, USA

Laura Peña-Telfer*, Georgia State University, USA

Mi'Kayla Newell*, Georgia State University, USA

Strand 12: Technology for Teaching, Learning, and Research

SC-Organized Paper Set

Technology for Science Learning 2

19-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 5

The Effect of Working Memory Capacity on Multimedia Learning

Do Hyong Koh*, University of Florida, USA

Muhammad Rahman, University of Florida, USA

Christine Wusylko, University of Florida, USA

Priyadharshini Prasad, University of Florida, USA

Xiaoman Wang, University of Florida, USA

Kara Dawson, University of Florida, USA

Marc Pomplun, University of Massachusetts Boston, USA

Jonathan Martin, University of Florida, USA

Albert Ritzhaupt, University of Florida, USA

Pasha Antonenko, University of Florida, USA

*Examining Networked Participation
Patterns within an Online Community
Science Project*

Richard Bex*, Illinois State University, USA

*3D Plants: Integrating Science,
Technology, and Design in STEAM+Ag
Education Using Emergent Technologies*

Sandra Arango-Caro*, Donald Danforth
Plant Science Center, USA

Kaitlyn Ying, Donald Danforth Plant
Science Center, USA

Michelle Arellano Haberberger, Saint
Louis Public Schools, USA

Tiffany Langewisch, Donald Danforth
Plant Science Center, USA

Nathaniel Ly, Donald Danforth Plant
Science Center, USA

Kristine Callis-Duehl, Donald Danforth
Plant Science Center, USA

*Using Scanning Electron Microscopy for
Exploring Dental Erosion in Middle-school*

Bat-Shahar Dorfman*, Weizmann
Institute of Science, Israel

Anat Yarden, Weizmann Institute of
Science, Israel

*Is Virtual Reality an Effective Instructional
Tool for Learning Anatomy and
Physiology?*

Carmen Carrion*, Agnes Scott College,
USA

Rocio Campo-Paz, Agnes Scott College,
USA

Nathan Hutcheson, Agnes Scott College,
USA

**Strand 13: History, Philosophy,
Sociology, and Nature of Science
SC-Organized Paper Set
Socioscientific Issues and
Implications**

19-Mar-24, 8:15 AM-9:45 AM

Location: Plaza Court 2

*Promoting College Students' Resistance to
Misinformation Through SSI Instruction*

Sarah Poor*, Texas A&M University, USA

Benjamin Herman*, Texas A&M University,
USA

Tamara Powers, Texas A&M University,
USA

*Beliefs in Conspiracy Theories and in the
Scientific Facts About COVID-19*

Anastasia Melagonitou, National and
Kapodistrian University of Athens, Greece

Apostolia Galani, National and
Kapodistrian University of Athens, Greece

Constantine Skordoulis, National and
Kapodistrian University of Athens, Greece

Martha Georgiou, National and
Kapodistrian University of Athens, Greece

Nausica Kapsala, National and
Kapodistrian University of Athens, Greece

Evangelia Mavrikaki*, National and
Kapodistrian University of Athens, Greece

*The Contextualization of Socioscientific
Issues in an Age of Accountability*

Karrie Wikman*, University of South
Florida, USA

*What are the Views of Scientists' and
News' on Nature of Science in COVID-19*

Xiao Huang*, College of Education,
Zhejiang Normal University, China

Cheng Ding, College of Education,
Zhejiang Normal University, China

Zhuang Zheng, Zhejiang Normal
University, China

Xin Bai, College of Education, Zhejiang Normal University, China

Jing Wang, College of education, Zhejiang Normal University, China

Ce Wu, China Association of Higher Education, China

Mapping Local Knowledge of Landscape, Nature, Climate, and History to Humanize Climate Data

Heather Killen*, University of Maryland, USA

Strand 14: Environmental Education and Sustainability

Related Paper Set

Educating in the Climate Crisis: Contextualizing Climate Change Understanding by Humanizing Pedagogy

19-Mar-24, 8:15 AM-9:45 AM

Location: Directors Row I

The Landscape of Elementary Climate Change Curriculum in Nations Across the Globe

Shweta Lahiri*, University of Georgia, USA
Emily Adah Miller*, University of Georgia, USA

Hong Tran, University of Georgia, USA

Ajay Sharma, University of Georgia, USA

Julie Luft, University of Georgia, USA

Joseph DeLuca, University of Georgia, USA

Elizabeth French, University of Georgia, USA

Climate Change as an Entry Point for Justice-Centered Ambitious Science Teaching

Hannah Cooke*, University of Connecticut, USA

Enacting Multispecies Care Through Engineering Design

Veronica Cassone McGowan*, University of Washington Bothell, USA

Research in Artificial Intelligence-Involvement Science Education (RAISE) Sponsored Session

Research in Artificial Intelligence-involved Science Education Poster Session

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 10

Research in Artificial Intelligence-involved Science Education Poster Session

ORGANIZERS

Xiaoming Zhai, University of Georgia, USA

Kent Crippen, University of Florida, USA

PANELISTS

Gyeong-Geon Lee Lee, University of Georgia, USA

Marcus Kubsch, Freie Universität Berlin, Germany

Christina Krist, University of Illinois at Urbana-Champaign, USA

Jamie Mikeska, ETS, USA

Geeta Verma, University of Colorado Denver, USA

Ashis Biswas, University of Colorado Denver, USA

Jennie Shin, University of Florida, USA

**Awards Committee
Sponsored Session
A Celebration of NARST Award
Recipients: Distinguished
Contributions to Research Award
[DCRA]**

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 15

*A Celebration of NARST Award Recipients:
Distinguished Contributions to Research
Award [DCRA]*

ORGANIZERS

Amelia Gotwals, Michigan State University,
USA

PANELISTS

Xiufeng Liu, University at Buffalo, USA

**Indigenous Science Knowledge (ISK-
RIG)**

**Sponsored Session
Embedding Indigenous Science
Knowledge and Ways of Knowing to
Promote Biocultural Diversity and
Sustainability**

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 16

*Embedding Indigenous Science
Knowledge and Ways of Knowing to
Promote Biocultural Diversity and
Sustainability*

ORGANIZERS

Julie Robinson, University of North Dakota,
USA

Sharon Nelson-Barber, WestEd, San
Francisco, CA, USA

PANELISTS

Bhaskar Upadhyay, University of
Minnesota, USA

Dana Zeidler, University of South Florida,
USA

Michelle Kooman, Gustavus Adolphus
College, USA

Julie Robinson, University of North Dakota,
USA

David Owens, University of Montana, USA.

Jared Tenbrink, University of Michigan –
Ann Arbor, USA

Pauline Chinn, University of Hawaii'i at
Mānoa, USA

Stacy Potes, University of Hawaii'i at
Mānoa, USA

David Zandvliet, Simon Fraser University,
Canada

Joshua Hunter, University of North
Dakota, USA

**Strand 1: Science Learning:
Development of student
understanding
SC-Organized Paper Set
Advancing Science Learning Through
Innovative Instructional Approaches
19-Mar-24, 10:00 AM-11:30 AM
Location: Directors Row E**

*Advancing Equitable Science Education:
Meta-synthesis on Addressing Needs of
Refugee Children in the Science
Classroom*

Shukufe Rahman*, Indiana University, USA

Arya Karumanthra*, Indiana University,
USA

Gayle Buck, Indiana University, USA

*Enhancing Repeating Grade 12 Students
Conception of Life Science Concepts using
Dialogical Argumentation*

Frikkie George*, Cape Peninsula University
of Technology, South Africa

Noluthando Hlazo, Cape Peninsula
University of Technology, South Africa
Alvin Riffel, University of the Western
Cape, South Africa

*A Systematic Literature Review of
Scientific Uncertainty at the Pedagogical
Level*

Carlos Meza-Torres*, Arizona State
University, USA

Ying-Chih Chen, Arizona State University,
USA

Jongchan Park, Arizona State University,
USA

*Exploratory and Confirmatory Factor
Analyses of an Uncertainty Management
for Productive Struggle Scale*

Jongchan Park*, Arizona State University,
USA

Emily Starrett*, Arizona State University,
USA

Carlos Meza-Torres*, Arizona State
University, USA

Ying-Chih Chen*, Arizona State University,
USA

Michelle Jordan*, Arizona State University,
USA

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

*Disrupting Epistemic and Ontological
boundaries of doing science and
producing science knowledge in K-12
classrooms*

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 11

*Disrupting Epistemic and Ontological
Boundaries of Doing Science and
Producing Science Knowledge in K-12
Classrooms*

Sugat Dabholkar*, Rutgers University, USA
Rishi Krishnamoorthy, Penn State
University, USA

Ashlyn Pierson, The Ohio State University,
USA

Anastasia Sanchez, University of
Washington, USA

Kathleen Arada, University of Washington,
USA

Deborah Dutta, Institute of Rural
Management Anand, India

Carrie Tzou, University of Washington
Bothell, USA

Jordan Sherry-Wagner, University of
Washington Bothell, USA

Veronica McGowan, University of
Washington Bothell, USA

Alejandra Frausto Aceves, Northwestern
University, USA

Ravit Duncan, Rutgers University, USA

Edna Tan, University of North Carolina –
Greensboro, USA

Philip Bell, University of Washington, USA

Megan Bang, Northwestern University,
USA

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

Characteristics and Strategies

SC-Organized Paper Set

*Disciplinary Literacies and Science
and Engineering Practices*

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 4

*Teachers' Enactment of Disciplinary
Literacy in Elementary Science Instruction*

Melissa Mendenhall*, Utah State Board of
Education, USA

Colby Tofel-Grehl, Utah State University,
USA

Kimberly Lott, Utah State University, USA

Elementary Teacher Background and Confidence in Science Content, Crosscutting Concepts, and Science and Engineering Practices

Laura Longo*, SUNY Stony Brook, USA

Angela Kelly, SUNY Stony Brook, USA

Examining Elementary Preservice Teachers' Initial Abilities to Engage in Asking Investigation Questions about Three-Dimensional Scenarios

Anna Maria Arias, Kennesaw State University, USA

Soon Lee*, Kennesaw State University, USA

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies
SC-Organized Paper Set
Developing Student Interest and Science Identities

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 1

Social and Emotional Skills and High School Junior Students' STEM Major Selection and GPA Scores

Adam Sahin*, Harmony Public Schools, USA

Hersh Waxman, Texas A&M University, USA

Daijazi Tang, University of Houston, USA

Middle School Students' Science Career Interests Improve with School Garden and STEAM Projects Elective Course

Michelle Parslow*, Utah State University, USA

Katherine Vela*, Utah State University, USA

Rita Hagevik, University of North Carolina-Pembroke, USA

Kathy Trundle, Utah State University, USA

Laura Wheeler, Brigham Young University, USA

Bearing Witness During Community Science Data Talks: Small-Scale Stretches Towards Justice Oriented Teaching

Imogen Herrick*, University of Kansas, USA

Michael Lawson, Kansas State University, USA

Cultivating science identity: An Automated Table-top Greenhouse Project with Middle School Students

Sheikh Ahmad Shah*, Boston College, USA

Daniel Raphael, Boston College, USA

Jaai Phatak, Boston College, USA

Avneet Hira, Boston College, USA

Helen Zhang, Boston College, USA

Mike Barnett, Boston College, USA

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

SC-Organized Paper Set

Addressing Bias and Equity in STEM

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 17

Analyzing, Critiquing, and Reimagining Diversity, Equity, and Inclusion Statements

Max Sherard*, Southern Methodist University, USA

Tatiane Russo-Tait*, University of Georgia, USA

Teaching More Than Facts: A Systematic Approach for Detecting Bias in Scientific Communications

Felicity Crawford, Boston University, USA

Mae Rose Gott, Boston University, USA

Adam Labadorf*, Boston University, USA

Melisa Osborne, Boston University, USA

Thomas McKenna*, Boston University, USA

Theresa Rüger, Newcastle University, United Kingdom

Barkha Shah, Boston University, USA

Examining Equitable, Student-Centered STEM Undergraduate Instruction Across Three U.S. Institutions

Dustin Van Orman*, Western Washington University, USA

Dan Hanley*, Western Washington University, USA

Josie Melton*, Western Washington University, USA

Abbey Gray*, Western Washington University, USA

Makayla Wilson*, Western Washington University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Critical Thinking to Support Teaching and Learning

19-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row H

A Complex Systems Analysis of a Preservice Elementary Teacher's Physical Computing Design

Cozde McLaughlin*, Penn State University, USA

Amy Voss Farris, Penn State University, USA

Designing to Foster Play in Preservice Elementary Teachers' Science Learning

Amy Farris*, Penn State University, USA

Anna Kim, Penn State University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Subject Specific Professional Development for Science Teachers

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 12

Exploring a Professional Development Program Focused on Environmental Health Sciences for Middle School Teachers

Andreia Dexheimer*, Southern Illinois University Edwardsville, USA

Jennifer Zuercher, Southern Illinois University Edwardsville, USA

Carol Colaninno, Emory University, USA

Charlie Blake, Southern Illinois University Edwardsville, USA

Ben Greenfield, University of Southern Maine, USA

Candice Johnson, Southern Illinois University Edwardsville, USA

Georgia Bracey, Southern Illinois University Edwardsville, USA

Sharon slocke@siue.edu, Southern Illinois University Edwardsville, USA

Camp Conservation: A Teacher Professional Development Program to Promote Conservation Action

Karen Hays*, Denver Zoological Foundation, USA

Emily Peterson, Denver Zoological Foundation, USA

Luis Vasquez, Denver Zoological Foundation, USA

Angela Moss-Barber, Denver Zoological Foundation, USA

Nichole Nageotte*, Denver Zoological Foundation, USA

Shelby McDonald, Denver Zoological Foundation, USA

Rachel Dickler, Denver Zoological Foundation, USA

Making Sense of Complex Genetics Together: A Science Teacher's Organizational Sensemaking During Co-Design.

Sara Porter*, University of North Carolina at Greensboro, USA

Hilleary Osheroff, Exploratorium, USA

White Board Speed-Dating in Physics Teacher Professional Development

Maggie Mahmood*, University of Illinois at Urbana-Champaign, USA

Devyn Shafer, University of Illinois at Urbana-Champaign, USA

Hamideh Talafian*, University of Illinois at Urbana-Champaign, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Teaching and Learning Focused on Emerging Technologies

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 6

Professional Development for Improving Precollege Teachers' Attitudes Towards Teaching Quantum Information Science and Technology

Michele Darienzo*, Stony Brook University, USA

Angela Kelly, Stony Brook University, USA

Tzu-Chieh Wei, Stony Brook University, USA

Dominik Schneble, Stony Brook University, USA

Essential Elements of Technology Mediated Lesson Study (TMLS) Cycles: A Study with Rural Science Teachers

Clara Smith*, Brigham Young University, USA

Heather Leary, Brigham Young University, USA

Michelle Hudson, Brigham Young University, USA

Max Longhurst, Utah State University, USA

Rebecca Sansom, Brigham Young University, USA

Supporting Teacher Learning for K-12 Quantum Teaching & Learning

Nancy Holincheck*, George Mason University, USA

Tiffany Butler*, George Mason University, USA

Michele Colandene, George Mason University, USA

Jessica Rosenberg, George Mason University, USA

Ben Dreyfus, George Mason University, USA

Mia Russell, George Mason University, USA

Arion Mitchell, George Mason University, USA

Teachers' Engaging in Systems Thinking through Game Design: A Teacher Professional Development Program

Michael Cassidy, TERC, USA

Gillian Puttick*, TERC, USA

Debra Bernstein, TERC, USA

Santiago Gasca, TERC, USA

Strand 10: Curriculum and Assessment

Related Paper Set

Deconstructing the Three Dimensions of Science Learning in Assessment

19-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row J

Applying the Construct Mapping Approach to Three Dimensional Assessment

Mark Wilson*, UC, Berkeley, USA
Linda Morell, UC, Berkeley, USA

Assessing Student Progress for the Crosscutting Concept of Patterns

Kristin Gunckel*, University of Arizona, USA
Malissa Hubbard, University of Arizona, USA
Sean Tan, University of California, Berkeley, USA

Assessing Students' Proficiency in Argumentation Across Three Scientific Domains: Physical, Life and Earth Science

Anna MacPherson*, American Museum of Natural History, USA
Mingfeng Xue, University of California, Berkeley, USA

How Teachers Use Results From Three Dimensional Tasks to Inform Their Practice

Linda Morell*, University of California, USA
Sara Dozier*, California State University, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Recognition, Representation, and Responsibility: Social Justice in STEM Education

19-Mar-24, 10:00 AM-11:30 AM

Location: Governor's Square 14

A Social Justice Lens to Investigate the Institutional Nature of Recognition in Science

Matheus dos Santos Barbosa da Silva*, University of São Paulo, Brazil
Ana Kasseboehmer, University of São Paulo, Brazil

Complicating Identity and Representation in the Elementary STEM Classroom

Sheila Castro*, University of Florida, USA
Amy Christensen, University of Florida, USA
May Steward*, University of Florida, USA
Julie Brown*, University of Florida, USA
Ebony Terrell Shockley, University of Maryland, USA
Chonika Coleman King, University of Florida, USA

Understanding to Unlearn: Implications of Unconscious Bias in STEM Teaching and Learning

Uchenna Emenaha Miles*, University of Texas at San Antonio, USA
Ian Thacker, University of Texas at San Antonio, USA
Samantha Leihnsing, University of Texas at San Antonio, USA

Views About Social Justice in Science Education Among Academic Staff Responsible for Initial Teacher Education
Michael Reiss*, UCL, United Kingdom
Wilton Lodge, UCL, United Kingdom
Marian Mulcahy, UCL, United Kingdom

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Transnational Lenses: Refusing Deficit Portrayals and Recognizing Diasporic Identities

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 3

Challenges and Opportunities to Navigate Identities in STEM: A Case for a Black Immigrant TA

Sule Aksoy*, CUNY Graduate Center, USA

(Re)conceptualizing Culturally Responsive STEM in US Schools: Including Voices of Black Immigrant Students

Chonika Coleman-King, University of Florida, USA

Takeshia Pierre*, University of Florida, USA

Kenesma John, University of Florida, USA

Mercedes Machado, University of Florida, USA

Taryrn Brown, University of Florida, USA

Hyunyi Jung, University of Florida, USA

Koree Badio, University of Florida, USA

The Role of Culture and Socialization on South Asian Women's Pursuit of STEM Education

Kinza Shaukat*, University of Western Ontario, Canada

Anton Puvirajah, University of Western Ontario, Canada

Strand 12: Technology for Teaching, Learning, and Research

Related Paper Set

Leveraging Embodied Cognition Using Virtual Reality in Middle School Science Education

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 5

Co-Designing a Science Lesson with VR in Middle School Science

Eduardo Estrada-Rosado*, Wake County Public School System, USA

Tyler Harper-Gampp, North Carolina State University, USA

Cesar Delgado, North Carolina State University, USA

Ruth Mathenge, North Carolina State University, USA

Matthew Peterson, North Carolina State University, USA

Karen Chen, North Carolina State University, USA

Linfeng Wu, North Carolina State University, USA

Impact of VR Science Lesson on Students' Knowledge of Scale

Cesar Delgado*, North Carolina State University, USA

Tyler Harper-Gampp, North Carolina State University, USA

Ruth Mathenge, North Carolina State University, USA

Matthew Peterson, North Carolina State University, USA

Karen Chen, North Carolina State University, USA

Student Impressions about a VR Science Lesson

Tyler Harper-Gampp*, North Carolina State University, USA

Cesar Delgado, North Carolina State University, USA

Matthew Peterson, North Carolina State University, USA

Karen Chen, North Carolina State University, USA

Ruth Mathenge, North Carolina State University, USA

Rebecca Planchart, North Carolina State University, USA

Robert Kulasingam, North Carolina State University, USA

Impact of a VR Science Lesson on Reform-Oriented Nature of Science Instruction

Ruth Mathenge*, North Carolina State University, USA

Robert Kulasingam, North Carolina State University, USA

Cesar Delgado, North Carolina State University, USA

Matthew Peterson, North Carolina State University, USA

Karen Chen, North Carolina State University, USA

Strand 13: History, Philosophy, Sociology, and Nature of Science
SC-Organized Paper Set

Information Engagement

19-Mar-24, 10:00 AM-11:30 AM

Location: Plaza Court 2

The Inevitably Social Nature of Public Engagement With Science: Epistemic Networks and Science Education

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

Noah Weeth Feinstein*, University of Wisconsin-Madison, USA

"Placebo works wonders." – Chinese and German Biology Students' Beliefs about Alternative Medicine and Evidence-based Medicine

Elvira Schmidt*, Justus-Liebig-University, Germany

Jing Jin, Stockholm University, Sweden

Shu-Nu Chang-Rundgren, Stockholm University, Sweden

Kerstin Kremer, Justus-Liebig-University, Germany

"We're Putting All Our Trust Into What He's Saying": Students' Evaluations of Science (Dis)Information

Daniel Pimentel*, University of Alabama, USA

Educating Future STEM Professionals through Misinformation/Disinformation Responsive Instruction

Benjamin Herman*, Texas A&M University, USA

Sarah Poor, Texas A&M University, USA

Aaron Kidd, Texas A&M University, USA

Daniel De Jesús, Texas A&M University, USA

Davis Varghese, Texas A&M University, USA

Michael Clough, Texas A&M University, USA

Asha Rao, Texas A&M University, USA

Strand 14: Environmental Education and Sustainability

SC-Organized Paper Set

Science as Civic Learning in K-12 System

19-Mar-24, 10:00 AM-11:30 AM

Location: Directors Row I

Youth Civic Engagement for the Environment and Sustainability

Ailee Odom, University of Florida, USA

Megan Ennes*, University of Florida, USA

Martha Monroe, University of Florida, USA

Exploring the Intersection of Civic and Science Outcomes: The Heat Island Task

Dante Cisterna*, ETS, USA

Karen Quintero, ETS, USA

Environmental Education in the Classroom: Selected Early-Career Teachers' Experiences Navigating Pre-service and In-service Activity Systems

Sarah Nuss*, William & Mary, USA

Lunch Break - See the City!

19-Mar-24, 11:30 AM-2:30 PM

Location: Off Site

Awards Committee

Sponsored Session

A Celebration of Early Career Research Award [ECRA], Outstanding Dissertation Research Award [ODRA], and NARST Fellows

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 15

A Celebration of Early Career Research Award [ECRA], Outstanding Dissertation Research Award [ODRA], and NARST Fellows

ORGANIZERS

Amelia Gotwals, Michigan State University, USA

PANELISTS

Lama Jaber, Florida State University, USA

Julia Plummer, Penn State University, USA

Douglas Larkin, Montclair State University, USA

Strand 1: Science Learning: Development of student understanding

SC-Organized Paper Set

Complex Systems and Socio Scientific Issues

19-Mar-24, 2:30 PM-4:00 PM

Location: Directors Row E

Exploring Quantitative Reasoning Through Computational Modeling of a Socio-Scientific Issue

Laura Zangori*, University of Missouri, USA

Zhen Xu*, University of North Carolina, USA

Troy Sadler*, University of North Carolina, USA

Swarna Mahapatra*, University of Missouri, USA

Identifying Building Blocks and Misconceptions: Exploring Undergraduates' Perceptions of Decentralization and Stochasticity in Complex Systems

Lin Xiang*, University of Kentucky, USA

Hunter Chandler*, Bluegrass Community & Technical College, USA

Exploring System Dynamics of Complex Societal Issues Through Socio-Scientific Models

Li Ke*, University of Nevada, Reno, USA

Eric Kirk, University of North Carolina at Chapel Hill, USA

Rebecca Lesnefsky, University of North Carolina at Chapel Hill, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

Exploring Students' Certainty of Assumptions About Socioscientific Issues

Jenny Dauer*, University of Nebraska-Lincoln, USA

Asghar Gill*, University of Nebraska-Lincoln, USA

Caitlin Kirby, Michigan State University, USA

Amanda Sorensen, Michigan State University, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions

SC-Organized Paper Set

Discourse and Argumentation

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 11

Students' Interest in Science: Influence of Students' Brain Type

Julia Welberg*, University of Münster, Germany

Daniel Laumann, University of Münster,
Germany

Susanne Heinicke, University of Münster,
Germany

*Exploring Speech and Listening
Characteristics of Elementary Teachers in
Generative Science Classrooms*

Ercin Sahin, University of Iowa, USA

Zeynep Montesoglu*, University of Iowa,
USA

Jee Suh, University of Alabama, USA

Brian Hand, University of Iowa, USA

Gavin Fulmer, University of Iowa, USA

*Grade 8 Students' Argumentation about
Scientific vs Socio-Scientific Issues*

Ihsan Ghazal*, Texas Christian University,
USA

Saouma Boujaoude, American University
of Beirut, Lebanon

Hayat Hokayem, Texas Christian
University, USA

*Evidence of Global Thinking in Students'
Socioscientific Issues Discourse*

Mary Short*, The George Washington
University, USA

*Evolving Argumentation Goals And
Shifting Discourse Moves: Tracing The
Work Of One Middle School Student*

Harini Krishnan*, University of Utah, USA

Lama Jaber, Florida State University, USA

Sherry Southerland, Florida State
University, USA

**Strand 4: Science Teaching — Middle
and High School (Grades 5-12):
Characteristics and Strategies
SC-Organized Paper Set**

Inclusive Teaching Practices

19-Mar-24, 2:30 PM-4:00 PM

Location: Directors Row I

Strategies to Support Multilingual

Learners Engaging in Science Practices

Collins Moga*, University of Massachusetts
Dartmouth, USA

Stephen Witzig, University of
Massachusetts Dartmouth, USA

Using Culturally and Linguistically

Responsive Teaching to Promote

*Students' Engagement in Science and
Engineering Practices*

Hada Herring*, University of Florida, USA

Amber Deig, University of Florida, USA

Julie Brown*, University of Florida, USA

Mark Pacheco, University of Florida, USA

*Game On:Facilitating Students' Interest in
Gaming as a Vehicle for Science Learning*

Justice Ejike*, Georgia State University,
USA

Natalie King, Georgia State University, USA

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

SC-Organized Paper Set

***Innovations in Teaching and Analysis
Strategies***

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 17

Using Natural Language Processing to Analyze Students' Problem-Solving Strategy Essays

Winter Allen*, Purdue University, USA
Jeremy Munsell, Purdue University, USA
Carina Rebello, Toronto Metropolitan University, Canada
Sanjay Rebello, Purdue University, USA

Navigating the New Frontier: Testing an Approach for Enhancing AI Awareness Among Non-STEM Undergraduates

Rebecca Zulli*, Cynosure Consulting LLC, USA
Adrienne Smith, Cynosure Consulting LLC, USA
Sambit Bhattacharya, Fayetteville State University, USA
Xiaochen Hu, Fayetteville State University, USA
Zahra Shekarkhar, Fayetteville State University, USA

Johnstone's Triangle as a Lens for Teaching With Case Studies in Undergraduate Classrooms.

Ally Hunter*, University of Massachusetts, USA
Melissa Zwick*, Stockton University, USA

Analyzing How Supplemental Instruction Impacts Student Motivation in an Introductory Organic Chemistry Course for Non-Majors

Michael Guyot*, University of Florida, USA
Samantha Hsu*, University of Central Florida, USA
Javlon Nizomov, University of Florida, USA
Pavlo Antonenko*, University of Florida, USA
Stefanie Habenicht, University of Florida, USA

Using fictionalized student dialogues to investigate students' exploration of alternative perspectives

Thanh Le*, Western Washington University, USA
Carolina Alvarado, California State University, Chico, USA
Andrew Boudreau, Western Washington University, USA
Jayson Nissen, Nissen Education Research and Design, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Supporting and Exploring What it Means to Teach in Equitable Ways

19-Mar-24, 2:30 PM-4:00 PM

Location: Plaza Court 4

Expanding Pre-Service Teachers' Anti-Deficit Noticing Abilities Using an Iterative Classroom Design

Alison Mercier*, University of Wyoming, USA
David Steele*, Alder Graduate School of Education, USA
Tierney Hinman, Auburn University, USA

Supporting Equitable Noticing in Elementary Science Methods Courses

Ashlyn Pierson*, The Ohio State University, USA
Andrea Henrie*, Vanderbilt University, USA
Mutiara Syifa*, The Ohio State University, USA
Teo Keifert*, University of North Texas, USA
Sophia Jeong*, The Ohio State University, USA
Heather Johnson*, Vanderbilt University, USA
Bethany Daniel, Vanderbilt University, USA
Sarah Lee*, Vanderbilt University, USA

Indonesia Teacher Candidates' Noticing and Navigating Equitable Sense-making in Teaching Physics Classrooms

Mutiara Syifa*, The Ohio State University, USA

Lin Ding*, The Ohio State University, USA

Exploring Preservice Teachers' Perspectives on Equity in Science Education in an Equity-focused Science Methods Course

Wanjoo Ahn*, Michigan State University, USA

Christina Schwarz, Michigan State University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Systematic Reviews in Science Teacher Education

19-Mar-24, 2:30 PM-4:00 PM

Location: Plaza Court 5

A Systematic Literature Review of Science Methods Instructors' Pedagogical Practices

Syahrul Amin*, Texas A&M University, USA

Joanne Olson*, Texas A&M University, USA

Systems Thinking in Science Teacher Education: A Systematic Review

Samia Khan*, University of British Columbia, Canada

Moritz Krell*, IPN – Leibniz Institute for Science and Mathematics Education, Germany

Promoting a Healthy Stress Response: A Systematic Review of Using Mindfulness with Pre-Service Teachers

Anne Levendusky*, University of Florida, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Growing and Supporting District and Teacher Leadership

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 12

Initial Growth of Inclusive Knowledge and Leadership Practices by Science Education Teacher-Leaders

Elizabeth Lewis*, University of Nebraska-Lincoln, USA

Elizabeth Hasseler, University of Nebraska-Lincoln, USA

Rachel Benzoni, University of Nebraska-Lincoln, USA

Gina Matkin, University of Nebraska-Lincoln, USA

Exploring the Formative Experiences of District Science Coordinators

Khushbu Singh*, Clemson University, USA
Jennifer Bateman, Clemson University, USA

Meredith Schwendemann, Clemson University, USA

Brooke A. Whitworth, Clemson University, USA

Exploring District Science Coordinators' Learning

Brooke Whitworth*, Clemson University, USA

Jennifer Bateman, Clemson University, USA

Meredith Schwendemann, Clemson University, USA

Khushbu Singh, Clemson University, USA

Hatice Ozen, University of Georgia, USA

Ashley Hunter, Clemson University, USA

Julie Luft, University of Georgia, USA

Contributions of Race on a STEM Teacher Leader's Self-Efficacy, Agency, Values, and Teacher Leadership

Damaris Blondonville-Ford*, Morgan State University, USA

Diana Cheng, Towson University, USA

Derrick Grubb, Morgan State University, USA

Justin Leonard, Prince Georges' County Public Schools, USA

Xiaoyin Wang, Towson University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Investigating and Supporting STEM Teaching and Learning

19-Mar-24, 2:30 PM-4:00 PM

Location: Directors Row H

Evaluation of a National Training Program of STEM-based Competencies in Oman

Mohamed Shahat*, Sultan Qaboos University, Oman

Sulaiman Al Balushi, Sultan Qaboos University, Oman

Marwa Alhinai, Ministry of Education, Oman

Mahmoud Amer, Sultan Qaboos University, Oman

Nabil Alhabsi, Ministry of Education, Oman

Khoula Alhosni, Sultan Qaboos University, Oman

Amur Al-Yahmedi, Sultan Qaboos University, Oman

Mohammed Al-Amri, Sultan Qaboos University, Oman

Sameh Ahmed, Sultan Qaboos University, Oman

Ehab Omara, Sultan Qaboos University, Oman

Exploring Physics Teachers' Resource Networks in Technology-Enhanced Learning Environments

Jaika Hott*, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Stefan Sorge, IPN - Leibniz Institute for Science and Mathematics Education, Germany

Marcus Kubsch, FU Berlin, Germany

Knut Neumann, IPN - Leibniz Institute for Science and Mathematics Education, Germany

From Design to Practice: Secondary Science Teachers' Reflections on an Integrated STEM Observation Protocol

Emily Dare*, Louisiana State University, USA

Joshua Ellis*, Louisiana State University, USA

Chris Irwin, Florida International University, USA

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Assessments Informing Instructional Practices

19-Mar-24, 2:30 PM-4:00 PM

Location: Directors Row J

Developing Instructionally Relevant Assessments in Middle School Chemistry

Katherine Lazenby*, NWEA, USA

Gavin Fulmer, NWEA, USA

Yon Soo Suh, NWEA, USA

Rob Howard, NWEA, USA

Alexis Prijoles, NWEA, USA

Susan Kowalski, NWEA, USA

Rethinking the Design of 3D Elementary Assessments: Considering the Role of Language in Science Learning

Alison Billman, University of California, Berkeley, USA
Jill Wertheim*, WestEd, USA
Lauren Brodsky, University of California, Berkeley, USA
Christopher Harris, WestEd, USA

Measuring Students 3D Learning and Transfer Using NGSS-Designed Life Science Assessments

Consuelo Morales*, Michigan State University, USA
Jane Lee*, Michigan State University, USA
Emil Eidin*, University of Wyoming, USA
Peng He, Michigan State University, USA
Irene Bayer, Michigan State University, USA

Integrating Curriculum-Independent Science Assessment Tasks into Elementary Teachers' Instruction

Sania Zaidi, University of Illinois at Chicago, USA
Brian Gane, University of Kansas, USA
Debbie Leslie, University of Chicago, USA
Carla Strickland*, University of Chicago, USA
Jeanne DiDomenico*, University of Chicago, USA

Strand 11: Cultural, Social, and Gender Issues

Symposium

A Multidimensional-Multiplicative Approach to Examining Blackness in STEM

19-Mar-24, 2:30 PM-4:00 PM

Location: Plaza Court 3

A Multidimensional-Multiplicative Approach to Examining Blackness in STEM

Terrell Morton*, University of Illinois Chicago, USA
Paula Price, North Carolina A&T State University, USA
Ashley Woodson*, Albion College, USA
Tia Madkins*, University of Texas Austin, USA
Yasmiyn Irizarry, University of Texas Austin, USA
Nickolaus Ortiz, Georgia State University, USA
Shari Watkins, American University, USA
Andrea Tyler, Tennessee State University, USA
Brain McGowan, American University, USA
Jennifer Adams, University of Calgary, Canada

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Science Teachers' Perspectives and Practices: Noticing Inequities, Envisioning Social Justice, and Enacting Decolonial Pedagogies

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 14

Teachers' Noticing of Science During Facilitated Equity Debriefs

Linsey Brennan*, Michigan State University, USA

Teaching and Learning Science as Social Justice: Perspectives of Students and Teachers

Katie Wade-Jaimes*, University of Nevada, USA

Maizie Dyess*, University of Nevada, USA
Burak Sahin*, University of Nevada, USA

Colorado Science Education Research

Does "Teaching Science for Social Justice" Change Over Time for Science Teachers?

Jessica Mader*, Colorado State University, USA

Laura Sample McMeeking, Colorado State University, USA

Andrea Weinberg, Arizona State University, USA

Diane Wright, Colorado State University, USA

Madison Scheer, Dawson School, USA

Meena Balgopal, Colorado State University, USA

Culturally Relevant STEM Education in Nigeria: An Exploratory Study of STEM Teacher Ideas About Teaching

Grace Tukurah*, Michigan State University, USA

Strand 14: Environmental Education and Sustainability

Related Paper Set

Frameworks and Considerations for Justice-Oriented, Place-based Learning

19-Mar-24, 2:30 PM-4:00 PM

Location: Governor's Square 10

Social Justice as Paradigm and Pedagogy

Bryan Brown, Stanford University, USA

Kendra Sobomehin*, Stanford University, USA

Tamara Sobomehin, Stanford University, USA

A Systematic Literature Review of Climate Change Education Studies Using Place-Based Theoretical and Pedagogical Frameworks

Asli Sezen-Barrie*, NSF, USA

Sara Tolbert, University of Canterbury, New Zealand

Sociopolitically-Conscious Science Teaching in the Garden

Christopher Jadallah*, UCLA, USA

Centering Racial Equity and Values-Based Research in Preservice Science Teacher Education in Undergraduate STEM Courses

Carrie Tzou, University of Washington Bothell, USA

Veronica Cassone McGowan*, University of Washington Bothell, USA

Symone Gyles, University of Washington Bothell, USA

Bryan White, University of Washington Bothell, USA

Elizabeth Starks, University of Washington Bothell, USA

Megan Bang, Northwestern University, USA

The Connect-Investigate-Interrogate-Act Framework for Designing and Studying Critical Place-based Learning

Heidi Carlone*, Vanderbilt University, USA

Jingyi Chen*, Vanderbilt University, USA

Hannah Ziegler*, Vanderbilt University, USA

Liwei Zhang, Vanderbilt University, USA

Zachary Conley, Vanderbilt University, USA

Yelena Janumyan, Vanderbilt University, USA

Tessaly Jen, Vanderbilt University, USA

Blaine Smith, Vanderbilt University, USA

Quinn Tanner, Vanderbilt University, USA

Leveraging Place-based Instruction for Climate Justice Education

Amal Ibourk*, Florida State University, USA

Collaboration for Local Sustainability: Indigenous Community Guided

*Transformative Science in a High School
in Nepal*

Aguwa Aguwa, Thakurdwara, Nepal

Bhaskar Upadhyay*, University of
Minnesota, USA

Kamal Koirala, Tribhuvan University, Nepal

*Supporting Justice-Oriented and
Community-Based Environmental Action
through Near-Peer Mentorship,
Geospatial Technology, & Digital Media
Storytelling*

Laura Cisneros, University of Connecticut,
USA

Todd Campbell*, University of
Connecticut, USA

Nicole Freidenfelds, University of
Connecticut, USA

Anna Lindemann, University of
Connecticut, USA

Heather Elliot-Famularo, University of
Connecticut, USA

Cary Chadwick, University of Connecticut,
USA

David Dickson, University of Connecticut,
USA

Byung-Yeol Park, University of
Connecticut, USA

Poster Session B

19-Mar-24, 4:15 PM-5:00 PM

Location: Plaza Foyer

**Strand 1: Science Learning:
Development of student
understanding**

*The Science Teachers' Perspective on the
Disciplinary Core Idea Map of Genetic
Variation*

Helen Semilarski*, University of Tartu,
Estonia

Helin Semilarski, University of Tartu,
Estonia

**Strand 1: Science Learning:
Development of student
understanding**

*Student Self-Efficacy: Exploring Anxiety,
Career Awareness, and Transversal Skills
in Science Education*

Janari Teessar*, University of Tartu, Estonia

Miia Rannikmäe, University of Tartu,
Estonia

Regina Soobard, University of Tartu,
Estonia

Jack Holbrook, University of Tartu, Estonia

**Strand 1: Science Learning:
Development of student
understanding**

*Do Students Learn Better When "Thinking
Periods" Are Interspersed Within Online
Science Lectures?*

Ella Ofek-Geva*, University of Connecticut,
USA

Sarah Gilmore, University of Connecticut,
USA

Ido Davidesco, University of Connecticut,
USA

Kyra Conville, University of Connecticut,
USA

Mary Kate Coburn, University of
Connecticut, USA

Sa'ar Karp Gershon, -, Denmark

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

*Engaging Students in Visualization for an
Inclusive Learning Environment*

Qingna Jin*, Cape Breton University,
Canada

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

*Preservice Primary Teachers' Perceptions
of STEM-Based Teaching in Natural
Sciences and Technology Classrooms*

Maria Tsakeni*, University of the Free
State, South Africa

Tafirenyika Mafugu, University of the Free
State, South Africa

Loyiso Jita, University of the Free State,
South Africa

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

*Fostering Sixth-grade Students' Science
Divergent and Convergent Thinking with
Augmented Reality*

Ya-Ting Chuang, Taipei Municipal Taiping
Elementary School, Taiwan

Yu-Ling Lu*, National Taipei University of
Education, Taiwan

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

*Instructional Strategies that Support
Multidimensional, Meaningful, and
Equitable Model-Based Teaching: A
Systematic Literature Review*

Grace Carroll*, North Carolina State
University, USA

Soonhye Park, North Carolina State University, USA

Matt Reynolds, North Carolina State University, USA

Amanda Hall, North Carolina State University, USA

Laura Chalfant, North Carolina State University, USA

Scott Ragan, North Carolina State University, USA

Jason Painter, North Carolina State University, USA

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

Collective PCK of Teachers Using American Sign Language to Teach Science With Deaf Students

Scott Cohen*, Georgia State University, USA

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

A New Path to Artificial Intelligence Proficiency: The Impact of CTCA

Racheal Fredrick*, Lagos State University, Nigeria

Esther Peter, Lagos State University, Nigeria

Peter Okebukola, Lagos State University, Nigeria

Juma Shabani, Université du Burundi, Burundi

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

Impact of Qualitative and Quantitative Characteristics of Students' Solutions when Problem-Solving with Productive Failure

Julia Hiniborch*, Leibniz University Hannover, Germany

Gunnar Friege, Leibniz University Hannover, Germany

Jakob Hoffmann, Leibniz University Hannover, Germany

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

Secondary Science Teachers' pPCK of the Science and Engineering Practices and Their Implementation

Harleen Singh*, California State University Stanislaus, USA

Yuxi Huang, University of Georgia, USA

Hong Tran, University of Georgia, USA

Julie Luft, University of Georgia, USA

Brooke Whitworth, Clemson University, USA

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

Pedagogical Content Knowledge of Scientific Online Reasoning: An Exploratory Case Study

Daniel Pimentel*, University of Alabama, USA

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

Exploring Secondary Science Educators' Knowledge and Experiences with Place-Based Education

Jake Johnson*, University of Nevada, Las Vegas, USA

Merryn Cole*, University of Nevada, Las Vegas, USA

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

Toward a Theoretical Framework for Data Fluency Teaching and Learning in Middle School STEM

Nicole Wong*, WestEd, USA
Rasha Elsayed, WestEd, USA
Leticia Perez*, WestEd, USA
Kirsten Daehler*, WestEd, USA
Pai-rou Chen, WestEd, USA

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

Wicked Problems and Wicked Solutions: Graduate Students' Experiences in A Convergent Research Environment

M. Gail Jones*, NCSU, USA
Julianna Nieuwsma, NCSU, USA
Kathleen Bordewieck, NCSU, USA
Gina Childers, NCSU, USA
Steve McDonald, NCSU, USA
Anna Marshall, University of Illinois, USA
Christine Hendren, App State University, USA
Brooke Mayer, Marquette, USA
John Classen, NCSU, USA
Maude Cuchiara, NCSU, USA

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

Effect of Nature Journaling on Engagement of Non-traditional Adult Learners in a Science Methods Course
Meenakshi Sharma*, Mercer University, USA

Strand 6: Science Learning in Informal Contexts

Individuals with Autism, Virtual Reality, and Learning Environments: Inclusivity or a Medical Model of Intervention?
Darby Drageset*, University of Florida, USA
Kent Crippen, University of Florida, USA

Strand 6: Science Learning in Informal Contexts

Museum Facilitator Understanding of Exhibit Potential for Open-Ended and Interactive Facilitation Encounters
Alexandria Muller*, University of California, Santa Barbara, USA
Ron Skinner, MOXI, The Wolf Museum of Exploration + Innovation, USA
Danielle Harlow, University of California, Santa Barbara, USA

Strand 6: Science Learning in Informal Contexts

Fostering a Sense of Belonging in a Research Immersion Program
Summer Jasper*, St. Jude Children's Research Hospital, USA
Robyn Pannella, St. Jude Children's Research Hospital, USA
Katherine Ayers, St. Jude Children's Research Hospital, USA

Strand 6: Science Learning in Informal Contexts

Cultivating Community and Identity with Latino STEM Undergraduates: Facilitating Science Learning in Family Gardens
Samuel Severance*, Northern Arizona University, USA
Alex Zazueta, University of California, Santa Cruz, USA
Isabella Rubalcava, University of California, Santa Cruz, USA
Samantha Salguera, University of California, Santa Cruz, USA
Alexie Leauthaud, University of California, Santa Cruz, USA

Strand 7: Pre-service Science Teacher Education

Representations, Decompositions, and Approximations: Improving PSETs Lesson

Development through Pedagogies for Teaching Practice

David Owens*, University of Montana, USA
Kimberly Kirstein, Georgia Southern University, USA

Strand 7: Pre-service Science Teacher Education

Exploration of the Use of Teacher Time-Outs to Develop Reflection-In-Action in Preservice Science Teacher Education

Laura Chalfant*, North Carolina State University, USA

Matt Reynolds, North Carolina State University, USA

Soonhye Park, North Carolina State University, USA

Strand 7: Pre-service Science Teacher Education

Eliciting Preservice Teachers' Content Knowledge for Teaching the Small Particle Model Using Practice-Based Measures

Deborah Hanuscin*, Western Washington University, USA

Emily Borda, Western Washington University, USA

Josie Melton*, Western Washington University, USA

Jamie Mikeska*, ETS, USA

Strand 8: In-service Science Teacher Education

Heat and the City: An Experiential Learning Approach to Climate Education

Eirini Chatzara, National and Kapodistrian University of Athens, Greece

Apostolia Galani*, National and Kapodistrian University of Athens, Greece

George Arhonditsis, University of Toronto Scarborough, Canada

Strand 8: In-service Science Teacher Education

Science-Specific Teaching Challenges Among Early Career Science Teachers

Lisa Borgerding*, Kent State University, USA

Shannon Navy, Kent State University, USA

Robert Idsardi, Eastern Washington University, USA

Shane Thomas, Washington State University, USA

Strand 8: In-service Science Teacher Education

Exploring the Resilience of Early Career and Experienced Teachers Facing an Emerging Crisis

Ella Yonai*, University of Georgia, USA

Julie Luft, University of Georgia, USA

Shelley Rap, Weizmann Institute Of Science, Israel

Blonder Ron, Weizmann Institute Of Science, Israel

Strand 8: In-service Science Teacher Education

Designing Elementary PD to Promote Science and Engineering Practices

Ryan Cain*, Weber State University, USA

Sara Gailey, Weber State University, USA

Strand 10: Curriculum and Assessment

Detecting FOCIS Survey with the Partial Credit Model and Rasch Model

Xin Xia*, University of Virginia, USA

Strand 10: Curriculum and Assessment

Revalidating a Measurement Instrument of Spatial Thinking Ability for Middle School and High School Students

Kannaki Thayaseelan*, University at Buffalo, USA

Yanfang Zhai, Capital Normal University,
China

Xiufeng Liu, University at Buffalo, USA

Strand 10: Curriculum and Assessment

Evaluating the Impact of NASA's STEM Programs on Student Interest, Identity, Self-Efficacy and Skills

Carla Johnson*, NC State University, USA

Janet Walton*, NC State University, USA

Toni May*, Drexel University, USA

Sera Harold*, NC State University, USA

Strand 10: Curriculum and Assessment

Linking Scientific and Engineering Content for the Development of Interdisciplinary STEM Projects

Janne-Marie Bothor*, University of Kassel, Germany

David-Samuel Di Fuccia, University of Kassel, Germany

Strand 11: Cultural, Social, and Gender Issues

Exploring U.S. Graduate Education through the Lens of Self-determination Theory

Karen Collier*, North Carolina State University, USA

Margaret Blanchard, North Carolina State University, USA

Strand 11: Cultural, Social, and Gender Issues

K-12 Science and Mathematics Teachers' Experiences Supporting Students' Critical Consciousness: A Descriptive Systematic Review

Sheila Castro*, University of Florida, USA

Julie Brown*, University of Florida, USA

Kent Crippen, University of Florida, USA

Strand 11: Cultural, Social, and Gender Issues

The STEM Pipeline Metaphor: Ineffective, Dehumanizing, and Marginalizing

Christian Glandorf*, New Mexico State University, USA

Claudia Trevino, New Mexico State University, USA

H. Prentice Baptiste, New Mexico State University, USA

Paulette Vincent-Ruz, New Mexico State University, USA

Strand 11: Cultural, Social, and Gender Issues

A Look at the Spectrum of Physics Teacher Identity Among Physics Instructors

Maya Patel*, Michigan State University, USA

Maria Horak, Michigan State University, USA

Clausell Mathis, Michigan State University, USA

Delwrick Nanthou, University of Washington-Bothell, USA

Strand 11: Cultural, Social, and Gender Issues

Examining The Experiences of Students from Underrepresented Populations in STEM Through a Decolonized Pathway Model

Jessica McClain*, Indiana University, USA

Gayle Buck, Indiana University, USA

Strand 11: Cultural, Social, and Gender Issues

All of Us Working Together: Examining Bidirectional Critical Relationality in a Community-Based Informal STEM Program

Ti'Era Worsley*, The University of North Carolina at Greensboro, USA

Strand 12: Technology for Teaching, Learning, and Research

Science Education and Emerging STEM Careers: The Case of Underwater ROV Operators

Minji Yun, University of Florida, USA

Kent Crippen*, University of Florida, USA

Strand 12: Technology for Teaching, Learning, and Research

Evaluation of Machine Learning Generated Feedback for Concept Maps

Tom Bleckmann*, Leibniz University

Hannover, Germany

Gunnar Friege, Leibniz University

Hannover, Germany

Strand 12: Technology for Teaching, Learning, and Research

Core Concepts of Artificial Intelligence in Education Using Robots (AIEDuRo): A Delphi Study

Divya Baranwal*, Southern Methodist University, USA

Ming Liu, National Dong Hwa University, Taiwan

Richard Duschl, Southern Methodist University, USA

Strand 12: Technology for Teaching, Learning, and Research

Using ArcGIS Online in an Environmental High School Science Classroom

Jonah Firestone*, Washington State University, USA

Danielle Malone, Washington State University, USA

Sarah Newcomer, Washington State University, USA

Judith Morrison, Washington State University, USA

Lindsay Lightner, Washington State University, USA

Strand 12: Technology for Teaching, Learning, and Research

Developing Digital Education Readiness in Tertiary Education: The STEM Digitalis project

Argyris Nipyrakis*, University of Groningen, Netherlands

Lucy Avraamidou, University of Groningen, Netherlands

Gunnar Friege, Leibniz University Hannover, Germany

Eilish McLoughlin, Dublin City University, Ireland

Priit Reiska, Tallinn University, Estonia

Dimitris Stavrou, University of Crete, Greece

Strand 12: Technology for Teaching, Learning, and Research

Problem Solving in Physics – Process Data from Eyetracking-Research

Gunnar Friege*, Leibniz University Hannover, Germany

Alexander Machleid, Leibniz University Hannover, Germany

Sonja Kohlmeier, Leibniz University Hannover, Germany

Tom Bleckmann, Leibniz University Hannover, Germany

André Meyer, Leibniz University Hannover, Germany

Dirk Brockmann-Behnsen, Leibniz University Hannover, Germany

Strand 12: Technology for Teaching, Learning, and Research

Lesson Plan to Use ChatGPT in Science Teaching: Lessons from Pre-Service Teachers' Perspectives

Gyeong-Geon Lee*, University of Georgia, USA

Xiaoming Zhai, University of Georgia, USA

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

*On Problematizing the Epistemic and
Axiological Nexus of Post-Normal Science
Education*

Hendra Agustian*, University of
Copenhagen, Denmark

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

*Comparing Chemists' Views of the Nature
of Science (NOS) With Their Levels of
Research Expertise*

Tulana Ariyaratne*, Systems Development
& Improvement Center, University of
Cincinnati, USA

Valarie Akerson, Indiana University, USA
Cathrine Reck, Indiana University, USA

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

*A framework to Conceptualize
Misinformation Literacy in Science Tasks*

Dante Cisterna*, ETS, USA
Cheryl Lavigne, ETS, USA

**Strand 14: Environmental Education
and Sustainability**

*"Wait, We Get to Build That?" Outcomes of
a Co-Created, Classroom Citizen Science
Project*

Laura Carsten Conner*, University of
Alaska, Fairbanks, USA

Nathan Kettle, University of Alaska,
Fairbanks, USA

William Simpson, University of Alaska,
Fairbanks, USA

Krista Heeringa, University of Alaska,
Fairbanks, USA

**Strand 14: Environmental Education
and Sustainability**

*Learning About Climate Change –
Comparison of Three Instructional
Approaches*

Sophia Siegmann*, Institute for Didactics
of Mathematics and Physics, Physics
Education Group, Germany

Gunnar Friege, Institute for Didactics of
Mathematics and Physics, Physics
Education Group, Germany

SeeMeTeach

Sponsored Session

***Teacher Observation Reimagined –
Using the SeeMeTeach Observation
App***

19-Mar-24, 4:15 PM-5:00 PM

Location: Governor's Square 10

*Teacher Observation Reimagined – Using
the SeeMeTeach Observation App*

ORGANIZER

Craig Berg, SeeMeTeach, USA

**Community Training and Assistance
Center (CTAC)**

Sponsored Session

***Integrated PreK-12 STEM as a
District-Wide Equity Move***

19-Mar-24, 4:15 PM-5:00 PM

Location: Governor's Square 11

*Integrated PreK-12 STEM as a District-
Wide Equity Move*

ORGANIZER

Scott Reynolds, Community Training and
Assistance Center (CTAC), USA

JRST

Social Event

JRST Editors' Dinner

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 16

Research Committee

Sponsored Session

***Sandra K. Abell Institute for Doctoral
Students Poster Symposium***

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 10

*Sandra K. Abell Institute for Doctoral
Students Poster Symposium*

ORGANIZERS

Julianne Wenner, Clemson University,
USA

Amelia Gotwals, Michigan State University,
USA

Christina Schwarz, Michigan State
University, USA

Brooke Whitworth, Clemson University,
USA

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

SC-Organized Paper Set

***Engineering, Physics, and Control-of-
Variables***

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 6

*A Method to Their Madness;
Characterizing Early Elementary
Children's Artifact Change During
Engineering Design*

Christine McGrail*, University of North
Dakota, USA

*Examining Middle School Students'
Epistemic Practices of Engineering During
Small Group Work*

Muhammad Purwanto*, University of
Minnesota Twin Cities, USA

Gillian Roehrig*, University of Minnesota
Twin Cities, USA

Jeann Wieselmann, Southern Methodist
University, USA

Ramya Sivaraj, University of Minnesota
Twin Cities, USA

*Interpreting Graded Problem Solutions:
The Inconsistent Messages That Students
Receive*

J. Caleb Speirs*, University of North
Florida, USA

Mark Swartz, University of North Florida,
USA

Sarah Nguyen, University of North Florida,
USA

W. Brian Lane, University of North Florida,
USA

*Learning the Control-of-Variables
Strategy through Self-Generated and
Vicarious Errors*

Linda Haemmerle*, University of Vienna,
Austria

Shelbi Kuhlmann, University of Memphis,
USA

Theresa Krause-Wichmann, Saarland
University, Germany

Andrea Moeller, University of Vienna,
Austria

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

Related Paper Set

Citizen Science in Elementary Settings: Fostering Engaging, Authentic, and Meaningful Science Learning

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 2

MothEd - Authentic Science for Elementary and Middle School Students

Peter White*, Michigan State University, USA

Brian Keas, Michigan State University, USA

David Stroupe, The University of Utah, USA

Supporting Elementary Teachers' Science Instruction through School-Community Partnerships to Design and Teach Locally-Relevant Citizen Science

Lara Gengareilly*, University of New Hampshire, USA

Sameer Honwad, University at Buffalo, USA

Megan Glenn, University of New Hampshire, USA

Erik Froburg, University of New Hampshire, USA

Malin Clyde, University of New Hampshire, USA

Haley Andreozzi, University of New Hampshire, USA

Engaging Elementary School Students in Community and Citizen Science to Support Socio-Ecological Systems Resilience

Shulong Yan*, University of California, Davis, USA

Alexandra Race, University of California, Davis, USA

Heidi Ballard, University of California, Davis, USA

Citizen Science in Elementary Classrooms: A Tale of Two Teachers

Patrick Smith*, Horizon Research, Inc., USA

Sarah Carrier, North Carolina State University, USA

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

Related Paper Set

Shifting Perspectives: Embracing Systemic Lenses in Discipline-Based Education Research

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 11

Drawing Connections Between Macro-Activity Systems and Micro-Interactions: Variation in Learning Assistant Facilitation Practices

Ira Caspari-Gnann*, Tufts University, USA

Nicolette Maggiore, Tufts University, USA

Jessica Karch, Tufts University, USA

Problematizing Effective Learning: What Does It Mean for a Learning Moment to Be Considered Effective?

Jessica Karch*, Tufts University, USA

Ira Caspari-Gnann, Tufts University, USA

When Boundaries become Barriers: Investigating Admission Standards for Chemistry Graduate Programs

Jocelyn Nardo*, The Ohio State University, USA

Beyond Large Enrollments: Cultivating Latine Student Success in Introductory Chemistry through Servingness-Centered Evidence-Based Pedagogies

Paulette Vincent-Ruz*, New Mexico State University, USA

MaryAnn Long, New Mexico State University, USA

Christian Glandorf, New Mexico State University, USA

Taiwo Adesunloye, New Mexico State University, USA

Understanding First-Generation Students' Experiences: An Asset-Based Approach

Klaudja Caushi*, Boston University, USA

Binyomin Abrams, Boston University, USA

Emergence of Embedded Activity Systems in the Chemistry Laboratory

Clarissa Keen*, Boston College, USA

Hannah Sevia, University of Massachusetts Boston, USA

Strand 6: Science Learning in Informal Contexts

SC-Organized Paper Set

Effects on informal Science Learning on STEM Career Interests

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 12

Virtual and Augmented Reality Enhanced Science Learning and Incorporating Socioscientific Issues in Informal Learning Environment

Sharfun Islam Nancy*, University of South Florida, USA

Dana Zeidler, University of South Florida, USA

Improving High School Students' Attitudes Towards Quantum Information Science and Technology in a Summer Program

Angela Kelly*, Stony Brook University, USA

Michele Darienzo, Stony Brook University, USA

Tzu-Chieh Wei, Stony Brook University, USA

Dominik Schneble, Stony Brook University, USA

The SEMinal Impact of Out-of-School Science: A Study of Affective Models in Authentic Learning

Ella Yonai*, Weizmann institute of science, Israel

Ron Blonder, Weizmann institute of science, Israel

Profiling International Students in a Science Competition – Insights Regarding Science Education and Promising STEM-Careers

Charlotte Falkenberg*, Leibniz Institute for Science and Mathematics Education, Germany

Ute Harms, Leibniz Institute for Science and Mathematics Education, Germany

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Approaches to Enhance STEM Teaching

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 4

Enhancing STEM Teaching to Support English Learners

Catherine Lussier*, University of California, Riverside, USA

Melissa Klaib, University of California, Riverside, USA

Jack Eichler, University of California, Riverside, USA

Leslie Bushong, University of California, Riverside, USA

Identity Development of Preservice STEM Teachers After Teaching Practicum

Emine Sahin-Topalcengiz*, Mus Alparslan University, Turkey

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Justice-oriented and Humanizing Practices and Critical Stance Science Teaching Perspectives

19-Mar-24, 5:15 PM-6:45 PM

Location: Directors Row E

Examining Pre-service Teacher's Humanization of Science through a Research Experience for Teachers

Matthew Adams*, Michigan State University, USA

David Stroupe*, University of Utah, USA

Investigating Secondary Science Preservice Teachers' Onto-epistemologies as Pathways to Justice-Oriented Science Teaching

Kate Miller*, Michigan State University, USA

"Students Have the Right to Learn Science": Antiracist Science Teacher Preparation for Elementary Preservice Teachers

Jessica Chen*, Teachers College, Columbia University, USA

Exploring Possibilities for Teaching Science From a Critical Stance Perspective

Elaine Howes*, American Museum of Natural History, USA

Jamie Wallace*, American Museum of Natural History, USA

From Matter to Mattering: Reconstructing Science Methods Courses Towards Emancipatory Pedagogies and Abolitionist Teaching

Vanessa Louis*, University of Michigan, USA

Natalie King*, Georgia State University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Attending to Equity and Sociocultural Issues in Science and STEM

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 17

Capturing the Nature of SSI Teaching by using the Five-Dimensions Model of Practice

Dury Bayram*, Eindhoven University of Technology, Netherlands

Yael Shwartz*, Weizmann Institute of Science, Israel

Communities of Practice in Support of Urban Elementary Teachers' Thinking about Critical Pedagogy of Place

Gail Richmond*, Michigan State University, USA

Roberta Hunter, Michigan State University, USA

Tali Tal, Technion Israel Institute of Technology, Israel

Grace Tukurah, Michigan State University, USA

South African Teachers' Experiences in Positioning Science Education for Equal Access to All Students

Paul Iwuanyanwu*, Northwest University, South Africa

Meshach Ogunniyi, University of the Western Cape, South Africa

"We are better together": An Equity-Focused, Collaboration-Forward Engineering Professional Development Experience for Middle School Teachers
Cina Svarovsky*, University of Notre Dame, USA
Catherine Wagner*, University of Notre Dame, USA
Shannon McManus, Museum of Science, USA

Strand 8: In-service Science Teacher Education

Related Paper Set

Designing Teacher Learning for Promoting 3D Instruction and Assessment

19-Mar-24, 5:15 PM-6:45 PM

Location: Governor's Square 15

Leveraging a School-Based Professional Learning Community to Support Teachers Customization of a Reform-Oriented OER Curriculum.

Austin Moore*, Boston College, USA
Katherine McNeill, Boston College, USA
Maria Morena Vera, Boston College, USA

Curriculum-Based Professional Learning and Teacher Attention to the Epistemic Aspects of Classroom Talk and Collaboration

Chris Griesemer*, University of California Davis, USA
Cynthia Passmore*, University of California Davis, USA
Jessica Alzen, University of Colorado Boulder, USA
Jason Buell, Northwestern University, USA
Kelsey Edwards, Northwestern University, USA
William Penuel, University of Colorado Boulder, USA
Brian Reiser, Northwestern University, USA

Preparing Rural Teachers to Design Framework-Aligned Assessment Tasks: Variations in Who Learns and Why
William Penuel*, University of Colorado Boulder, USA
Abraham Lo*, BSCS Science Learning, USA

Fostering Teachers' Ambitious Teaching Practices for Supporting the Implementation of Performance Assessments in Science
Miray Tekkumru-Kisa*, RAND Corporation, USA
Jill Wertheim*, WestEd, USA

Core Practices of Storyline Instruction for Reforming Novice Teacher Education
Sage Andersen*, The University of Texas at Austin, USA
María González-Howard, The University of Texas at Austin, USA

Strand 10: Curriculum and Assessment

Related Paper Set

Innovative and Equitable Curriculum, Instruction, and Assessment Resources Aligned with the Next Generation Science Standards

19-Mar-24, 5:15 PM-6:45 PM

Location: Directors Row J

Overview of Project Goals, Design Frameworks, & Products
James Pellegrino, University of Illinois Chicago, USA
Ellen Forte*, edCount, USA

Illustration of the Curriculum Map and Resources for a Grade Level Unit
Erin Buchanan, edCount, LLC, USA
Charlene Turner*, edCount, LLC, USA

Example of the Stage 3 Learning Plan for a Grade Level Unit

Jared Ten Brink*, University of Michigan-Ann Arbor, USA

Mary Nyaema, University of Illinois-Chicago, USA

Donald Wink, University of Illinois-Chicago, USA

Sania Zaidi, University of Illinois-Chicago, USA

Examples of End of Unit (EOU)

Assessments with Discussion of a Pilot Study Results

Howard Everson*, City University of New York, USA

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Perspectives of Curriculum

Adaptation and Core Ideas

19-Mar-24, 5:15 PM-6:45 PM

Location: Directors Row H

Collaboration for Curriculum

Implementation in Lesotho: Insights From a Distributed Instructional Leadership Perspective

Nthooa Lisene*, University of the Free State, South Africa

Loyiso Jita, University of the Free State, South Africa

Exploring Core Ideas: A Systematic

Literature Review of Core Ideas in Science Education

Helen Semilarski*, University of Tartu, Estonia

Helin Semilarski, University of Tartu, Estonia

Exploring the Level of Content Knowledge Emphasis Among Botany Curriculums of Public Universities in Bangladesh

Sheikh Tahmina Awal*, Institute of Education and Research, University of Dhaka, Bangladesh

A Teacher's Journey Through Co-designing and Adapting Curricular Materials

Katarzyna Pomian Bogdanov*, Northwestern University, USA

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Empowering Students in

Engineering: Ethical and

Transformative Learning Approaches for a Socially Conscious Future

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 3

Cultivating Community Connections between Undergraduates and

Elementary Students through the Co-Design of Engineering Games

G. R. Marvez*, Tufts University, USA

Greses Pérez, Tufts University, USA

Fostering Critical Consciousness: Faculty Impact on Teaching Social Responsibility in Engineering Education

Sindia Rivera-Jiménez*, University of Florida, USA

Engineering Students' Epistemologies in Design Problem Solving: Exploring the Gap Between Professed and Enacted Epistemologies

Trevion Henderson*, Tufts University, USA

Joshua Cohen*, Tufts University, USA

Renegotiating Roles & Responsibilities in an Undergraduate Engineering Design Course

Monica Cardella*, Florida International University, USA

Alexandra Strong, Florida International University, USA

Stephen Secules, Florida International University, USA

Trina Fletcher, Florida International University, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

STEM Identity Trajectories:

Intersectional Interplays of Capital, Aspirations, and Resistance

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 1

Young Women's STEM Trajectories, Age 10-22: Intersectional interplays of Identity, Capital, Field and 'Luck'

Louise Archer*, University College London, United Kingdom

Supporting First-Generation Refugee Families' STEM Aspirations and College Navigation

Eugene Judson*, Arizona State University, USA

Mohammed Ibrahim, Arizona State University, USA

STEM Identity Progression/Evolution in Black Students: From Undergraduate HBCUs to Graduate PWIs

Karen Marshall*, Oakwood University, USA

Carmen Bucknor*, Oakwood University, USA

Sylvia Butterfield*, National Science Foundation, USA

Christyn Byrd*, University of Alabama in Birmingham, USA

Asian and Asian American Women in STEM: Stories of Challenge and Resistance

Jasmyne Yeldell*, University of North Carolina, USA

Dionne Cross Francis, University of North Carolina, USA

Pavneet Kaur Bharaj, California State University, USA

Anina Mahmud*, University of North Carolina, USA

Raven Walters, University of North Carolina, USA

Kerrie Wilkins-Yel, University of Massachusetts, USA

Strand 12: Technology for Teaching, Learning, and Research

SC-Organized Paper Set

Technology for Science Learning 3

19-Mar-24, 5:15 PM-6:45 PM

Location: Plaza Court 5

Comparing Two Iterations of a Place-Based Socioscientific Issues Course Embedded with Different Extended Reality Applications

Mark Newton*, East Carolina University, USA

Len Annetta*, East Carolina University, USA

Framing the Hybrid: A Multi-Dimension Perspective

Ehud Aviran*, Weizmann Institute of Science, Israel

Ron Blonder, Weizmann Institute of Science, Israel

Analysis and Evaluation of Socioscientific Issues Collaborative Argumentation from Interpersonal Neural Synchronization Perspective

Yangchunxiao Wang*, Beijing Normal University, China

Yong Xie, Beijing Normal University, China

Xingda Li, Beijing Normal University, China

Shuhao Yang, Beijing Normal University, China

Dana Zeidler, University of South Florida, USA

Chunming Lu, Beijing Normal University, USA

Yonghe Zheng, Beijing Normal University, China

From Chalkboard to Keyboard: Effect of Paced-Flexible-Model on Achievement in Evolution via a Virtual-Learning-Environment

Franklin Onowugbeda*, Lagos State University-ACEITSE, Nigeria

Peter Okebukola, Lagos State University-ACEITSE, Nigeria

Juma Shabani, University of Burundi, Burundi

Deborah Agbanimu, National Open University of Nigeria, Nigeria

Strand 14: Environmental Education and Sustainability

SC-Organized Paper Set

Sustainability Literacy

19-Mar-24, 5:15 PM-6:45 PM

Location: Directors Row I

Environmental Attitude's Role in Student-Centered Learning About the Forest Ecosystem and Sustainability

Tessa-Marie Baierl*, University of Bayreuth, Germany

Franz Bogner, University of Bayreuth, Germany

Comparison of Rural and Urban Secondary School Teachers' Perceptions About Sustainable Development and Sustainability Competences

Anne Laius*, University of Tartu, Estonia

Rolf Saarna, University of Tartu, Estonia

A Coastal Ecology Summer Course: Engaging Future Photographers, Policy Makers, Engineers, & Community Workers

Hamza Malik*, University of Massachusetts, USA

Rachel Stronach*, University of Massachusetts, USA

Stephen Witzig*, University of Massachusetts, USA

Context Matters When Assessing Science Civic Engagement in Science Literacy Students

Jennifer Teshera-Levy*, University of Nebraska-Lincoln, USA

Irfanul Alam, University of Colorado, USA

Lisa Corwin, University of Colorado, USA

Jenny Dauer, University of Nebraska-Lincoln, USA

Graduate Student Committee

Sponsored Session

Graduate Student Forum

19-Mar-24, 6:45 PM-7:45 PM

Location: Plaza Ballroom ABC/DEF

ORGANIZERS

Jennifer Bateman, Clemson University, Augusta, Ga, USA

Amy Padlof, FIU, USA

Beyza Okan, Bogazici University, Turkey

Justin Andersson, University of Nebraska, USA

Johan Tabora, University of Illinois Chicago, USA

Kristal Turner, University of Calgary, Canada

Zhongyan Zhang, University of Leeds,
United Kingdom
Lauren Wagner, Florida State University,
USA

Social Event

STEM Trivia Night!

19-Mar-24, 6:45 PM-7:45 PM

Location: Governor's Square 15

ORGANIZERS

Margaret Blanchard, NC State University,
USA
Matt Reynolds, NC State University, USA

Indigenous Science Knowledge (ISK- RIG)

Sponsored Session

***Fireside Chat: Networking,
Socializing and Getting to Know and
Learn From and With ISK-RIG
Enthusiasts***

19-Mar-24, 6:45 PM-7:45 PM

Location: Governor's Square 14

*Fireside Chat: Networking, Socializing and
Getting to Know and Learn From and
With ISK-RIG Enthusiasts*

Continental and Diasporic Africa in Science Education (CADASE)

Social Event

***CADASE Social: Reconnecting Across
the Diaspora***

19-Mar-24, 6:45 PM-7:45 PM

Location: Governor's Square 12

*CADASE Social: Reconnecting Across the
Diaspora*

ORGANIZERS

Rona Robinson-Hill, Ball State University,
USA.
Shari Watkins, American University, USA

Fellows Program

Social Event

***NARST Fellows Inaugural Gathering
(Invited Social Event)***

20-Mar-24, 7:00 AM-8:00 AM

Location: Directors Row I

*NARST Fellows Inaugural Gathering
(Invited Social Event)*

20 MARCH 2024

Committee Meeting

Strand 1 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 10

Committee Meeting

Strand 2 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 11

Committee Meeting

Strand 3 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 12

Committee Meeting

Strand 4 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 14

Committee Meeting

Strand 5 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 16

Committee Meeting

Strand 6 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Governor's Square 17

Committee Meeting

Strand 7 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 8

Committee Meeting

Strand 8 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 2

Committee Meeting

Strand 10 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 3

Committee Meeting

Strand 11 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 4

Committee Meeting

Strand 12 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 5

Committee Meeting

Strand 13 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 6

Committee Meeting

Strand 14 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Plaza Court 7

Committee Meeting

Strand 15 Meeting

20-Mar-24, 7:00 AM-8:00 AM

Location: Directors Row E

Plenary Session

Membership and Business Meeting

20-Mar-24, 8:15 AM-9:15 AM

Location: Plaza Ballroom ABC/DEF

**Graduate Student Committee
Sponsored Session**

***Graduate Student Research
Symposium***

20-Mar-24, 9:15 AM-10:45 AM

Location: Governor's Square 10

Graduate Student Research Symposium

ORGANIZERS

Savannah Graham, University of Houston,
USA

Justin Andersson, University of Nebraska-
Omaha, USA

Johan Tabora, University of Illinois at
Chicago, USA

Mutiara Syifa, The Ohio State University,
USA

Alyssa Freeman, Middle Tennessee State
University, USA

Andrea Reeder, Middle Tennessee State
University, USA

Austin Jenkins, Purdue University, USA

Sierra Morandi, Florida State University,
USA

Cathy Cullicott, Arizona State University,
USA

Allison Metcalf, Florida State University,
USA

**Strand 1: Science Learning:
Development of student
understanding**

Related Paper Set

***The Value of Cognitive Linguistics for
the Design of Fruitful Learning***

Environments in Biology Education

20-Mar-24, 9:15 AM-10:45 AM

Location: Plaza Court 2

*Quo Vadis – Learning Progressions in the
Context of the Conceptual Metaphor
Theory*

Denis Messig*, Department of Science
Education, Germany

Jorge Gross, Department of Science
Education, Germany

*Understanding Student Conceptions
About Cell Membranes*

Leonie Johann, Nord University, Norway

Jorge Groß*, Leibniz Universität Hannover,
Germany

Fredrik Rusk, Åbo Akademi University,
Finland

*The Benefit of Moral Metaphors for
Fostering Decision-Making Competence
in the Field of Animal Ethics*

Nadine Tramowsky*, University of
Education Freiburg, Germany

*Peer Interaction - Tracking Conceptual
Transformation in Collaborative Learning
Environments*

Malte Michelsen*, Leibniz Universität
Hannover, Germany

Jorge Groß, Leibniz Universität Hannover,
Germany

**Strand 2: Science Learning: Contexts,
Characteristics and Interactions
SC-Organized Paper Set
*Undergraduate Pedagogy and
Practices***

20-Mar-24, 9:15 AM-10:45 AM

Location: Plaza Court 5

*What is a Geoscientist? Uncovering
Conceptual Profiles in Undergraduate
Student Drawings*

William Romine*, Wright State University,
USA

Deepika Menon, University of Nebraska, USA
Peggy McNeal, Towson University, USA

Undergraduate Virtual Mentorship in Support of K-12 Science Inquiry Practices
Alex St. Louis*, Augusta University, USA

Can I Kick It: The Evolution of University Students' Pedagogical Practices in a Sneaker Lab
Kareem Edouard*, Drexel University, USA
Sinead Meehan, Drexel University, USA

Strand 3: Science Teaching — Primary School (Grades preK-6):
Characteristics and Strategies
SC-Organized Paper Set
Science Teacher Learning
20-Mar-24, 9:15 AM-10:45 AM
Location: Plaza Court 3

Scaffolding Elementary Students' Scientific Evaluations of Model-Evidence Relationships About Fossils
Timothy Klavon*, Black Hills State University, USA
Sydney Haugland, Black Hills State University, USA
Nancy Gans, University of Maryland, USA
Melissa Schwiesow, Black Hills State University, USA

A Case of Preservice Elementary Teachers Making Meaning Through Modeling Practices
Ayça Fackler*, The University of Missouri, USA

Examining Influences on Elementary Teachers' Transfer of Learning from a Science Professional Development Program

Andrea Phillips*, Indiana University, USA
Meredith Park Rogers, Indiana University, USA

Fostering Pedagogical Judgment in Novice Elementary Science Teachers
Christopher Mangogna*, University of Washington, USA

Strand 6: Science Learning in Informal Contexts
SC-Organized Paper Set
Learning science with families
20-Mar-24, 9:15 AM-10:45 AM
Location: Governor's Square 11

The Interplay between Interest Development, Conceptual Change, Affect, and Agency in Everyday Family Science Interactions
Irit Vivante*, Ben Gurion University of the Negev, Israel
Dana Vedder-Weiss*, Ben Gurion University of the Negev, Israel

Capturing Family Engagement during an At-Home STEM Intervention
Kristie Gutierrez*, Old Dominion University, USA
Margaret Blanchard*, NC State University, USA
Kylie Swanson*, University of Colorado Colorado Springs, USA

Science Identity Work and Persistence from an Intensive Family Workshop Series
Debbie Siegel*, Institute for Learning Innovation, USA
Scott Byrd*, Medomak Consulting Group, USA
Elysa Corin, Institute for Learning Innovation, USA

Paseos and Outdoor School: Developing Latina/o/x Families' Interest and expertise in the outdoors.

Diana Crespo-Camacho*, Oregon State University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Reflective Practice to Support Teaching and Learning

20-Mar-24, 9:15 AM-10:45 AM

Location: Plaza Court 4

Reflective Practice-Driven Pre-Service Teachers Develop Science and Engineering Lesson

Tharueseann Prasoplarb*, Kasetsart University, Thailand

Chatree Faikhamta, Kasetsart University, Thailand

Elementary Teacher Candidates' Reflection on Their Roles as Educators After Engaging in a Digital Simulation.

Zoubeida Dagher*, University of Delaware, USA

Christy Metzger, University of Delaware, USA

Strand 8: In-service Science Teacher Education

Symposium

A Symposium Applying Conjecture Mapping to Learn From Design Tensions in Curriculum-Based Professional Learning

20-Mar-24, 9:15 AM-10:45 AM

Location: Governor's Square 14

A Symposium Applying Conjecture Mapping to Learn From Design Tensions in Curriculum-Based Professional Learning

Cynthia Passmore*, University of California, Davis, USA

Stina Krist*, University of Illinois, USA

Jason Buell*, Northwestern University, USA

Chris Griesemer*, University of California, Davis, USA

Barbara Hug*, University of Illinois, USA

Katherine McNeill*,
katherine.mcneill@bc.edu, USA

Sean Smith, Horizon Research, USA

Brian Reiser*, Northwestern University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Enacting Social Justice Focused Science and STEM Learning

20-Mar-24, 9:15 AM-10:45 AM

Location: Governor's Square 12

Transforming STEM Education: Co-creating Educator Critical Identities through Social Justice and Culturally Sustaining Pedagogies

Karla Hale*, Western Oregon University, USA

Cory Buxton, Oregon State University, USA

Felisha Dake, Oregon State University, USA

Melissa Livingston, Oregon State University, USA

Core to What? Novice STEM Teachers' Perceptions of Antiracist and Socially Just Core Teaching Practices

Rachael Gordon*, University of Michigan, USA

Describing Teachers' Everyday Efforts to Enact Social Justice Teaching in Their Science Classrooms

Jarod Kawasaki*, California State University, Dominguez Hills, USA
Sandy Chang, University of California, Los Angeles, USA

"Making the Invisible, Visible!": Visualizing Science and Social Justice through Modeling

Marisa Ritchie*, California Polytechnic State University, USA
Spencer Paine*, California Polytechnic State University, USA
Christina Fuller*, California Polytechnic State University, USA
Jasmine Nation*, California Polytechnic State University, USA
Kurt Holland*, California Polytechnic State University, USA

Strand 10: Curriculum and Assessment Symposium
Measuring Computational Thinking in Non-Programming Contexts: Progress and Challenges
20-Mar-24, 9:15 AM-10:45 AM
Location: Plaza Court 6

Measuring Computational Thinking in Non-Programming Contexts: Progress and Challenges

Eben Witherspoon*, American Institutes for Research, USA
Jonathan Margolin, American Institutes for Research, USA
Dorothy Bennett*, New York Hall of Science, USA
Ibrahim Dahlstrom-Hakki*, TERC, USA
Jessica Bailey*, EDC, USA
Jackie DeLisi, EDC, USA
Emily Relkin, EDC, USA

Leiny Garcia*, WestEd, USA
Yvonne Kao, WestEd, USA
Arif Rachmatullah, SRI, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set
Supporting Agency, Access, and Community Building: From Middle School to Graduate School
20-Mar-24, 9:15 AM-10:45 AM
Location: Governor's Square 17

STEM ACCESS: Conceptualizing a University-School Partnership Model to Engineer Justice in STEM Education
Meredith Kier*, William & Mary, USA
Lindy Johnson, William & Mary, USA

Student Agency in Science Education: Navigating Structures for Inclusivity and Empowerment

Danielle Malone*, Washington State University, USA
Judith Morrison, Washington State University, USA

Conceptualizing a Slow-Science Approach to Fieldwork

Rie Malm*, University of Copenhagen, Denmark
Sriparna Saha, University of Colorado Boulder, USA
Lisa Corwin, University of Colorado Boulder, USA
Ben Kennedy, University of Canterbury, New Zealand

Role of Field Experiences and Student Identities in Community Building in EBIO Graduate Students

Sriparna Saha*, University of Colorado, USA

Lisa Corwin, University of Colorado, USA
Nancy Emery, University of Colorado, USA
Scott Taylor, University of Colorado, USA
Julian Resasco, University of Colorado, USA
Sandhya Krishnan, University of Colorado, USA
Valerie Mckenzie, University of Colorado, USA

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

Natural Language Processing in Science Teaching and Learning

20-Mar-24, 9:15 AM-10:45 AM

Location: Governor's Square 16

Natural Language Processing in Science Teaching and Learning

Mei-Hung Chiu*, National Taiwan Normal University, Taiwan

Mao-Ren Zeng*, National Taiwan Normal University, Taiwan

Ching-Sui Hung*, National Taiwan Normal University, Taiwan

Hsin-Kai Wu, National Taiwan Normal University, Taiwan

Ren-Cheng Zhang*, National Taiwan Normal University, Taiwan

I-Chien Chen*, Michigan State University, USA

Strand 14: Environmental Education and Sustainability

SC-Organized Paper Set

Socioscientific Reasoning and Perspective Taking

20-Mar-24, 9:15 AM-10:45 AM

Location: Plaza Court 8

Enhancing Undergraduate Students' Socioscientific Reasoning and Addressing Misconceptions through Internationalized Climate Change Instruction

Conghui Liu*, Indiana University Bloomington, USA

Shukufe Rahman*, Indiana University Bloomington, USA

Gayle Buck, Indiana University Bloomington, USA

Promoting Functional Scientific Literacy Through Community Service: Implications for Curriculum Development in Secondary Environmental Education

Emily Little*, Georgia State University, USA

Renee Schwartz, Georgia State University, USA

Erasure of Socioecological Violence in Science Education

Ajay Sharma*, University of Georgia, USA

SungEun Min, Kutztown University of Pennsylvania, USA

How to Cultivate Critical Awareness of Climate Change Using Socioscientific Perspectives

Eric Nolan*, California State University, East Bay, USA

Strand 15: Policy, Reform, and Program Evaluation

SC-Organized Paper Set

Advancing Students' Scientific Literacy and Equitable and Socially Transformative Science Pedagogy

20-Mar-24, 9:15 AM-10:45 AM

Location: Directors Row I

"Post-truth" and Science Education:

Towards an Updated Vision of Scientific Literacy

Katrin Vaino*, University of Tartu, Estonia

Anastasiya Astapova, University of Tartu, Estonia

Konstantinos Korfiatis, University of Cyprus, Cyprus

Oleg Popov, Umeå University, Sweden

Hans Orru, Umeå University, Sweden

Ana Valdmann, University of Tartu, Estonia

Socially-Transformative Engineering Pedagogy

Senay Purzer*, Purdue University, USA

"Filling the Gaps": Leaders Building Capacity for Equitable K-12 Computer Science Education in States

Stefanie Marshall*, Michigan State University, USA

Ain Grooms*, University of Wisconsin-Madison, USA

Joshua Childs*, University of Texas- Austin, USA

SJ Hemmerich*, University of Wisconsin-Madison, USA

Grace Tukurah*, Michigan State University, USA

Roundtables Session 3

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Ballroom ABC/DEF

Strand 11: Cultural, Social, and Gender Issues

Roundtable

The STEM Continuum: Understanding Female Perceptions

Carol Waters*, University of Houston-Clear Lake, USA

Mary Curtis, University of Houston-Clear Lake, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Examining the Identity Transformation of African American Students in STEM Counterspaces

Lezly Taylor*, Virginia Tech, USA

Brenda Brand, Virginia Tech, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

The Impact of the NARST Sandra K. Abell Institute for Doctoral Students: A Counterstory

Seema Rivera*, Clarkson University, USA

Meredith Kier, William and Mary, USA

Julianne Wenner, Clemson, USA

Shelly Rodriguez, University of Texas at Austin, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Science is For Us Too: Elevating Black and Latina Girls' Voices Through Community and Care

Laura Peña-Telfer*, Georgia State University, USA

Natalie King, Georgia State University, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Exploring STEM Teacher Educators' Perspectives on Culturally Responsive Practices

Uchenna Emenaha*, The University of Texas at San Antonio, USA

Jessica Gehrtz, The University of Texas at San Antonio, USA

Strand 10: Curriculum and Assessment

Work-in-progress Roundtable

A Design-Based Research Approach to Fostering Middle Schoolers' Socio-scientific Argumentation Skills

Samuel Bullard*, University of Minnesota, USA

Keisha Varma, University of Minnesota, USA

Strand 10: Curriculum and Assessment

Work-in-progress Roundtable

Global and Local Dynamics Navigating Grand Challenges

Heewoo Lee*, University of North Carolina at Chapel Hill, USA

Troy Sadler, University of North Carolina at Chapel Hill, USA

David Fortus, Weizmann Institute of Science, Israel

Rebecca Lesnefsky, University of North Carolina at Chapel Hill, USA

Keren Dalyot, Weizmann Institute of Science, Israel

Nannan Fan, University of North Carolina at Chapel Hill, USA

Zhen Xu, University of North Carolina at Chapel Hill, USA

Shira Passentin, Weizmann Institute of Science, Israel

Natasha Segal, Weizmann Institute of Science, Israel

Strand 11: Cultural, Social, and Gender Issues Roundtable

Physics Research Experiences for Undergraduate Fellows: A Three-Year Study

Jennifer Wilhelm*, University of Kentucky, USA

Andrea Ratcliff, University of Kentucky, USA

Cameron Richards, University of Kentucky, USA

Heather McCall, University of Kentucky, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Centering Economic Equity in STEM: Challenges on the Road to Expanding Access to STEM Degrees

Leandra Cate, University of Washington, USA

Lia Wetzstein*, University of Washington, USA

Katie Kovacich, University of Washington, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Formation of Disciplinary Science Identities in Upper Secondary School

Jonas Niemann*, University of Copenhagen, Denmark

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

(re)Shaping Science Curricula: A Multicultural Approach

Sarah Ragoub*, University of Manitoba, Canada

Strand 11: Cultural, Social, and Gender Issues Roundtable

A Longitudinal Study of Engineering Major Attrition: Gender Disparities

Niyazi Erdogan, Texas A&M University, USA

Olukayode Apata, Texas A&M University, USA

Karen Rambo-Hernandez, Texas A&M University, USA

Allison Esparza*, Texas A&M University, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Using Active Learning Strategies to Close Equity Gaps for Biology Students of Historically Underrepresented Backgrounds

Stephanie Marin-Rothman*, Indiana University, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Navigating Emotions in Women Undergraduate Students' Developing Science Identities

Hillary Mason*, University of Nebraska-Lincoln, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Adapting the Family Resilience Framework to Understand Strengths of Latinx Families in Early STEM Learning

Smirla Ramos Montañez*, TERC, USA

Scott Pattison, TERC, USA

María Quijano, Metropolitan Family Service, USA

Shauna Tominey, Oregon State University, USA

Viviana López Burgos, TERC, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Mentors Matter: Queer Undergraduate Students' Perceptions of Research

Aramati Casper*, Colorado State University, USA

Kelly Lane, University of Minnesota - Twin Cities, USA

Sarah Eddy, University of Minnesota - Twin Cities, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Boys Perceptions of Women Scientist: Shifting the Lens on Gender Disparity in STEM

Sara Sweetman*, University of Rhode Island, USA

Strand 11: Cultural, Social, and Gender Issues

Work-in-progress Roundtable

Successful Scientists with (dis)Abilities: Identities and Views on the Nature of Science

Jonathan Hall*, California State University, San Bernardino, USA

Mila Rosa Carden*, University of North Texas, USA

Strand 11: Cultural, Social, and Gender Issues

Roundtable

Science Teachers' Perspectives on Multicultural Dynamics in Science Classrooms

Selvet Ece Genek*, The Ohio State University, USA

Lin Ding, The Ohio State University, USA

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

Virtual Learning Experiences: A Pilot Study of Technology Integration and Creative Production

Doris Chin*, Stanford Graduate School of Education, USA

Rachel Wolf*, Stanford Graduate School of Education, USA

Strand 12: Technology for Teaching, Learning, and Research

Roundtable

Investigating the Effectiveness of Using Technology for Remediation of High School Students' Misconceptions

Narendra Deshmukh*, Homi Bhabha Centre for Science Education, TIFR,, India

Strand 12: Technology for Teaching, Learning, and Research

Roundtable

Harnessing Digital Curation for Personalized Science Learning in Science Secondary School

Gal Stern*, Technion, Israel Institute of Technology, Israel

Dina Tsybulsky, Technion, Israel Institute of Technology, Israel

Strand 12: Technology for Teaching, Learning, and Research

Work-in-progress Roundtable

Investigating College Science Teachers' Digital Practices: A Global Study

Le Quan Ly*, University of Technology, Sydney, Australia

Tracey-Ann Palmer, University of Technology, Sydney, Australia

Kirsty Young, University of Technology, Sydney, Australia

Matthew Kearney, University of Technology, Sydney, Australia

Strand 12: Technology for Teaching, Learning, and Research

Work-in-progress Roundtable

Connecting the Dots: How Students Communicate Through Virtual Field Trips

Aman Desai*, Stanford University, USA

Rachel Wolf, Stanford University, USA

Kristen Blair, Stanford University, USA
Doris Chin, Stanford University, USA

Strand 14: Environmental Education and Sustainability

Roundtable

A Scoping Review of the Intersection of Environmental and Science Identity

Roberta Hunter*, Michigan State University, USA

Susan Caplow, University of Montevallo, USA

Strand 14: Environmental Education and Sustainability

Work-in-progress Roundtable

Developing a Background Survey to Measure Teachers' Knowledge and Practices Around Environmental Justice

Katy Nilsen*, WestEd, USA

Ashley Iveland, WestEd, USA

Melissa Rego, WestEd, USA

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

Characteristics and Strategies

Work-in-progress Roundtable

Teachers' Attention to Student Interest in Selecting Anchoring Phenomena in an Environmental Justice Project

Susan Zwiep*, BSCS Science Learning, USA

Katherine Nilsen*, WestEd, USA

Jill Grace, WestEd, USA

Zoe Buck Bracey, BSCS Science Learning, USA

Ashley Ivelan, WestEd, USA

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

Characteristics and Strategies

Roundtable

Student Expression of Transformative Learning Following Science Instruction

Using a Current Case of Environmental Injustice

Shondricka Burrell*, Morgan State University, USA

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

Conceptions of Uncertainty: A Delphi Study With Science Education Researchers and Scientists.

Simon Blauza*, University of Münster, Centre for Biology Education, Germany
Kerstin Kremer, Justus Liebig University, Institute for Biology Education, Germany
Benedikt Heuckmann, University of Münster, Centre for Biology Education, Germany

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

The Integration of the Nature, Philosophy, and History of Science in Canadian Science Education Degrees

Ellen Watson*, Brandon University, Canada
Sarah Ragoub*, University of Manitoba, Canada

APISER RIG

Sponsored Session

Asian and Pacific Islanders in Science Education Research Poster Session

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 10

Asian and Pacific Islanders in Science Education Poster Session

ORGANIZERS

Xinying Yin, California State University-San Bernardino, USA

Jennifer Tripp, University at Buffalo, USA.

Hosun Kang, University of California-Irvine, USA

PANELISTS

Pauline Chinn, University of Hawai'i at Mānoa

Andy Trinh, University of California, San Diego, USA

Meena Balgopal, Colorado State University, USA

Emily Slater, Utah State University, USA

Joe Deluca, University of Georgia

Jaesung Park, University at Albany-SUNY, USA

Tony Chontong, California State University, Fresno, USA

Strand 1: Science Learning: Development of student understanding

SC-Organized Paper Set

Unraveling Students' Scientific Understanding Across Disciplines

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Court 2

Exploring Relationships between Elementary Students' Mechanistic Reasoning and Argumentation about their Engineering Design Solutions

Mustafa Topcu*, Yildiz Technical University, Turkey

Kristen Wendell, Tufts University, USA

Students' Ideas About Heat Transfer Tell Us a Lot: Are We Heeding?

Rajashri Priyadarshini*, Indian Institute of Technology Bombay, India

Chandan Dasgupta, Indian Institute of Technology Bombay, India

Sahana Murthy, Indian Institute of Technology Bombay, India

Greek Secondary School Students' Teleology and Essentialism Conceptions About Genes

Florian Stern*, University Teacher Training Institute (IUFE), University of Geneva, Switzerland

Panagiotis Stasinakis, Ministry of Education, Greece

Antonios Krimitzas, Ministry of Education, Greece

George Verroios, Ministry of Education, Greece

Katerina Gioti, Ministry of Education, Greece

Andreas Mueller, University Teacher Training Institute (IUFE), University of Geneva, Switzerland

Kostas Kampourakis, Faculty of Science, Section of Biology, University of Geneva, Switzerland

Exploring Epistemic Heterogeneity in a Critical Place-based Science Curriculum

Hannah Ziegler*, Vanderbilt University, USA

Heidi Carlone*, Vanderbilt University, USA

Zachary Conley, Vanderbilt University, USA

Yelena Janumyan Doe, Vanderbilt University, USA

Strand 2: Science Learning: Contexts, Characteristics and Interactions
SC-Organized Paper Set
STEM Expectations, Opportunities, Skills

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Court 5

Science Career Expectations and Science-Related Motivation: A Latent Profile Analysis Using PISA 2015 Data

Yanfang zhai*, Capital Normal University, China

Xiufeng Liu, University at Buffalo, State University of New York, USA

Nice to Run into 'Roo: Examining Middle School Students' Conceptual Understanding of Change over Time

Rochelle Cassells*, University of Utah, USA

Harini Krishnan*, University of Utah, USA

Louisa Stark, University of Utah, USA

Identifying STEM Opportunities for K-12 Students within a District

Elizabeth Crotty*, University of Wisconsin - Eau Claire, USA

Emily Landwehre, University of Wisconsin - Eau Claire, USA

Whitney Onyancha, University of Wisconsin - Eau Claire, USA

Elizabeth Stretch, University of Minnesota, USA

Non-Science Performances in Small Group Positioning

Marta Stoeckel*, University of Minnesota, USA

Anjar Putro Utomo*, University of Minnesota, USA

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies
SC-Organized Paper Set
Socioscientific Foci for Scientific Literacy

20-Mar-24, 11:00 AM-12:30 PM

Location: Directors Row I

Towards Transformative Science Education for Responsible Citizenship: Investigating Science Teachers' Integration of Informed Decision Making

Erik Barendsen*, Radboud University, Netherlands

Ineke Henze, Radboud University,
Netherlands

Dury Bayram, Eindhoven University of
Technology, Netherlands

*Collective Pedagogical Content
Knowledge to Develop Teaching About
Sustainability Issues*

Annika Forsler*, Halmstad University,
Sweden

Pernilla Nilsson, Halmstad University,
Sweden

Susanne Walan, Karlstad University,
Sweden

*Cultivating Informed Citizens Through
Socioscientific Issues: A Systematic Review*

Jing Lin*, Beijing Normal University, China

Colorado Science Education Research

*Scoping Review of Articles Measuring
Climate Change Acceptance*

Jessica Duke*, University of Northern
Colorado, USA

Emily Holt, University of Northern
Colorado, USA

Karlleigh Wattier, University of Northern
Colorado, USA

*Examining Students' General Chemistry
Performance Following a Voluntary
Supplemental Course*

Brayan Diaz*, North Carolina State
University, USA

Tyler Harper-Gampp, North Carolina State
University, USA

*Undergraduate STEM Students'
Expectations and Value Perceptions from
a Longitudinal STEM-focused Support
Program Experience*

John Tillotson*, Syracuse University, USA

Gaye Ceyhan, Bogazici University, Turkey

Gizem Ozyazici, Syracuse University, USA

Amanda Surman, Syracuse University,
USA

*Investigating Responsive Pedagogical
Approaches to Promote University
Students' Trust in Well-Established
Science*

Benjamin Janney*, Texas A&M University,
USA

Benjamin Herman, Texas A&M University,
USA

Tamara Powers, Texas A&M University,
USA

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

SC-Organized Paper Set

*Examining Approaches for
Supporting Student Performance*

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 12

*Implementing Brokering and Multi-
mentor Approaches to Support Retention
of Undergraduate STEM Majors from
Minoritized Groups*

Stacy Olitsky*, Saint Joseph's University,
USA

Strand 6: Science Learning in Informal Contexts

SC-Organized Paper Set

*Meaningful Science Learning
Experiences for High Schoolers and
Undergraduates in Informal Contexts*

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 11

*Contributing and Belonging: Mentorship
and Participation in a Research
Experience for Undergraduates*

Stephen Burgin*, The University of
Arkansas, USA

Zephaniah Greenwell, The University of Arkansas, USA

Environmental Education Internships Over Time: How Current and Former Interns Describe Their Experiences

Rachel Stronach*, University of Massachusetts Dartmouth, USA

Hamza Malik, University of Massachusetts Dartmouth, USA

Stephen Witzig, University of Massachusetts Dartmouth, USA

Urban Farming within a Transdisciplinary Research Practice Partnership

Marc Sager*, Southern Methodist University, USA

Anthony Petrosino*, Southern Methodist University, USA

Perceived Authenticity of Out-of-school Chemistry Learning Environments

Christian Strippel*, Ruhr-University Bochum, Germany

Lena Finger, Ruhr-University Bochum, Germany

Joachim Wirth, Ruhr-University Bochum, Germany

Katrin Sommer, Ruhr-University Bochum, Germany

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Exploring How Preservice Teachers Engage with Engineering Practices Across Different Contexts

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Court 4

Pre-service Teachers Depiction of the Nature of Engineering via the Family Resemblance Approach

Tamar Ginzburg*, Technion - Israel Institute of Technology, Israel

Miri Barak, Technion - Israel Institute of Technology, Israel

Sibel Erduran, The University of Oxford, United Kingdom

The Engineering Design Efficacy Journey of Novice Science Teachers

Laura Wheeler*, Brigham Young University, USA

Max Longhurst, Utah State University, USA

Preservice Science Teachers' Development in Understanding the Relevance of Scientific and Engineering Practices

Young Ae Kim*, Defense Language Institute, USA

Michele Korb*, CSU East Bay, USA

Scientific Thinking Beyond Science Contexts: Everyday Science as a Frame Beyond Labs and Classrooms

Bryan Nichols*, Florida Atlantic University, USA

Strand 7: Pre-service Science Teacher Education

SC-Organized Paper Set

Research Investigating Competency in Preparing Preservice Teachers and Teacher Educators

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 14

Can STEM and non-STEM Major Preservice Teachers Acquire Same Teaching Competence From STEM Method Course

Hsiao-Lin Tuan*, National Changhua University of Education, Taiwan

Chi-Chin Chin, National Taichung University of Education, Taiwan

Becoming a Globally Competent Educator: Self-Study of My Theoretical and Practical Understanding of Global Competency.

Arya Karumanthra*, Indiana University, USA

Gayle Buck, Indiana University, USA

Evaluating Questioning Competency in Elementary Pre-Service Teachers Using Likert-Scale Questions

Jianlan Wang*, Texas Tech University, USA

Shahin Kashef, University of Georgia, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Exploring Science Aspirations, Process Skills, and Capital Across Sociocultural Contexts

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 15

Differences in Science Expectancy-Value Beliefs and STEM Career Pathways by Rurality

Guan Saw*, Claremont Graduate University, USA

Reclaiming Missed Opportunity: Reflections on the Influence of Culture on Development of Science Process Skills

Peter Okebukola*, Lagos State University, Nigeria

Moses Emmanuel, Lagos State University, Nigeria

Atinuke Adekoya, Lagos State University, Nigeria

Joshua Akinpelu, Lagos State University, Nigeria

Ann Itodo, Lagos State University, Nigeria

Abdulazeez Balogun, Lagos State University, Nigeria

Modupe Omokongbe, Lagos State University, Nigeria

A Theoretical Framework To Understand The Effect of Cultural Context On Immigrant Students' Science Attitudes

Hawwa Gorkem Altunbas*, UCL - Institute of Education, United Kingdom

Strand 11: Cultural, Social, and Gender Issues

Symposium

Indigenizing STEM Within Teacher Education and Professional Development

20-Mar-24, 11:00 AM-12:30 PM

Location: Governor's Square 17

Indigenizing STEM within Teacher Education and Professional Development

Julie Robinson*, University of North Dakota, USA

Rebekah Hammack, Purdue University, USA

Paichi Shein, National Sun Yat-sen University, Taiwan

Agnes Ahanonye, University of The Witwatersrand, South Africa

Bhaskar Upadhyay, University of Minnesota, USA

Pauline Chinn, University of Hawaii at Manoa, USA

Lenora Crabtree, University of North Carolina Charlotte, USA

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

SC-Organized Paper Set

History of Science

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Court 3

Explicit NOS Instruction in Chemical Experiments using Reflective Scientific Inquiry and History of Science Approaches

Janne-Marie Bothor*, University of Kassel, Germany

David-Samuel Di Fuccia, University of Kassel, Germany

Unraveling the Fictionalized Ideal: The Evolution of “The” Scientific Method in the 19th Century

Farnaz Avarzamani*, Arizona State University, USA

Mila Rosa Carden, University of North Texas, USA

Peter Rillero, Arizona State University, USA

Samira Golshani, Islamic Azad University, Iran, Islamic Republic of

Impact of Historical Science Stories on Post-Secondary Students’ NOS Understanding and Attitudes Toward Science

Michael Clough*, Texas A&M University, USA

Benjamin Herman, Texas A&M University, USA

Alex Sobotka, Texas A&M University, USA

Alister Olson, Texas A&M University, USA

Interaction of History and STEM Learning Goals in Teacher-Developed Curriculum Materials

Wonyong Park*, University of Southampton, United Kingdom

Strand 14: Environmental Education and Sustainability

Related Paper Set

Science Teacher Education Towards Environmental Justice: Approaches, Strategies and Frameworks

20-Mar-24, 11:00 AM-12:30 PM

Location: Plaza Court 8

Centering ‘Āina-Based [land, earth] Education in Place-Based STEM Instruction

Tara O'Neill*, University of Hawaii at Manoa, USA

Double Stimulation: Repositioning Preservice Elementary Teachers as Agents of Social and Environmental Justice

Jenny Martin*, Australian Catholic University, Australia

Art and Science-based Cyanotype Experiences Help Promote Environmental Awareness and Stewardship in Pre-service Teacher Training

Maraliz Fischler-Barraza*, San Diego State University, USA

Children Leveraging Science Practices, Care and Expertise towards Hyperlocal and Global Climate Justice

Kathleen Schenkel*, San Diego State University, USA

Cassie brownell, Ontario Institute for Studies in Education, University of Toronto, Canada

Jon Wargo, University of Michigan, USA

Strand 3: Science Teaching — Primary School (Grades preK-6): Characteristics and Strategies SC-Organized Paper Set Supporting Diverse Science Instruction

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 2

Elementary School Teachers' Use of Educative Support Curricula: Citizen Science Projects in Science Instruction

Sarah Carrier*, North Carolina State University, USA

Patrick Smith, Horizon Research, Inc., USA

Jill McGowan, North Carolina State University, USA

Lindsey Sachs, Horizon Research, Inc., USA

Meredith Hayes, Horizon Research, Inc., USA

Sarah Safley, Horizon Research, Inc., USA

Chris Goforth, North Carolina Museum of Natural Sciences, USA

Danielle Scharen, Horizon Research, Inc., USA

Exploring the Complexity of Teacher Development for Adaptive Teaching in Science Education

Jee Kyung Suh*, University of Alabama, USA

Jale Dursun*, University of Alabama, USA

Ercin Sahin, University of Iowa, USA

Brian Hand, University of Iowa, USA

Gavin Fulmer, Northwest Evaluation Association, USA

Supporting Elementary Teachers' Use of Culturally Responsive Pedagogy with Scenario-Based Performance Tasks

Jamie Mikeska*, ETS, USA

Jessica Tierney, ETS, USA

Niki Kanagaki, ETS, USA

Pamela Lottero-Perdue, Towson University, USA

Alessia Marigo, ETS, USA

Tricia Maxwell, ETS, USA

Katie Miller, Lawrenceville Elementary, USA

Devon Kinsey, ETS, USA

The Role of Curriculum Materials in Supporting Science Talk in K-2 Classrooms

Amelia Gotwals*, Michigan State University, USA

Tanya Wright, Michigan State University, USA

Strand 4: Science Teaching — Middle and High School (Grades 5-12): Characteristics and Strategies SC-Organized Paper Set Teachers' Use of Curricular Resources 20-Mar-24, 1:45 PM-3:15 PM Location: Directors Row I

The Effect of Intervention Coursework on Science Achievement

Kristin Mansell*, Texas Tech University, USA

Practitioner-reported Needs for Enacting, Implementing, and Adopting OpenSciEd Curriculum Materials

Kevin McElhaney*, Digital Promise, USA

Rochelle Urban, Digital Promise, USA

Danae Kamdar, Digital Promise, USA

Early Career Science and Mathematics Teachers' Access to and Use of Resources

Robert Idsardi*, Eastern Washington University, USA

Shannon Navy, Kent State University, USA

Julie Luft, University of Georgia, USA

Lisa Borgerding, Kent State University, USA

Ella Yonai, University of Georgia, USA

Emily Hamada, Eastern Washington University, USA
Adepeju Prince, Kent State University, USA
Kelly Kulp, University of Georgia, USA
Elizabeth Ayano, University of Georgia, USA
Jose Pavez, Western Illinois University, USA

Strand 5: College Science Teaching and Learning (Grades 13-20)
SC-Organized Paper Set
Advancing Assessment Literacy and Pedagogical Practices
20-Mar-24, 1:45 PM-3:15 PM
Location: Governor's Square 12

Measuring Assessment Literacy of STEM Faculty in Higher Education: A Systematic Review

Mikayla Strasser*, University of Illinois Chicago, USA
Yue Yin, University of Illinois Chicago, USA

Prospective Elementary Teachers' Written and Pictorial Images Representing Observations and Inferences of a Puzzling Phenomenon

Jaclyn Murray*, Mercer University, USA

Effects of Learning Assistant Facilitation on Student In-the-Moment Learning
Nicolette Maggiore*, Tufts University, USA
Ira Caspari-Gnann, Tufts University, USA

Tertiary Engineering Faculty's Journey to Active Learning Pedagogies through Lesson Study

Cynthia Gibson, University of Texas at San Antonio, USA
Elizabeth McMillan*, University of Texas at San Antonio, USA
Juliet Langman, Kennesaw State University, USA

Jorge Solís, University of Texas at San Antonio, USA
Janeth Martinez-Cortes, University of Texas at San Antonio, USA

Strand 6: Science Learning in Informal Contexts
SC-Organized Paper Set
Developing STEM Identities and Feelings in Informal Learning Contexts
20-Mar-24, 1:45 PM-3:15 PM
Location: Governor's Square 11

Harnessing the Strengths of Young Black Girl's Feelings Towards Science from an OST Space

Heather Lavender*, University of Georgia, USA

Future Teachers in the Making: Identity Development through Afterschool STEM Programming

Jasmine Nation*, California Polytechnic State University, San Luis Obispo, USA

Alexandria Hansen, California State University, Fresno, USA

Kristin Bridgeford, California Polytechnic State University, San Luis Obispo, USA

Jess Jensen, California Polytechnic State University, San Luis Obispo, USA

Katie Sinclair*, California Polytechnic State University, San Luis Obispo, USA

Myunghwan Shin, California State University, Fresno, USA

Isabella Contreras, California Polytechnic State University, San Luis Obispo, USA

Claire Gillaspie*, California Polytechnic State University, San Luis Obispo, USA

Engaging in Scaffolded Outdoor Scientific Practices to Build Feelings of Being a Scientist

Kristy Daniel*, Texas State University, USA

Rachel Lincoln Seets, Texas State University, USA
Carolyn Jess, Texas State University, USA
Jill Zipperer, Texas State University, USA

Supporting Equitable Practice in Makerspaces: Learnings From Youth Programmes in the Global Makerspaces
Meghna Nag Chowdhuri*, University College London, United Kingdom
Louise Archer*, University College London, United Kingdom

Strand 7: Pre-service Science Teacher Education

Symposium

Teaching Science for Justice: A Case Study of Preparing and Supporting Teachers Across Three Years

20-Mar-24, 1:45 PM-3:15 PM

Location: Governor's Square 15

Teaching Science for Justice: A Case Study of Preparing and Supporting Teachers Across Three Years

Sinead Brien*, University of South Carolina Upstate, USA

Matthew Adams, Michigan State University, USA

Taylor Mackenzie, Everett High School, USA

Katelynn Jackson, Holt High School, USA

Nicole Hefty, Canal Winchester High School, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

Mentoring and Empowering Teacher Leaders

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 5

Mentor Teachers' Perceptions of Mentoring for Reform-Oriented Science Teaching Before and After Implementing Educative Mentoring

Amanda Hall*, North Carolina State University, USA

Grace Carroll, North Carolina State University, USA

Soonhye Park, North Carolina State University, USA

W. Matthew Reynolds, North Carolina State University, USA

N. Scott Ragan, North Carolina State University, USA

Jason Painter, North Carolina State University, USA

Implementation of a Pilot STEMM Planning Institute for K-12 Campus Leadership Teams

Matthew Blank*, Baylor College of Medicine, USA

Alana Newell, Baylor College of Medicine, USA

Nancy Moreno, Baylor College of Medicine, USA

Science Instructional Coaches: Characteristics, Contexts, and Community
Emma Refvem*, Durham Public Schools, USA

M. Jones*, North Carolina State University, USA

Amber Meeks, North Carolina State University, USA

Tanzimul Ferdous, North Carolina State University, USA

Strand 8: In-service Science Teacher Education

SC-Organized Paper Set

NGSS Practices and Pedagogy

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 4

Leveraging Instructional Routines to Facilitate NGSS Implementation in High School Science

Elizabeth Chatham*, New Visions for Public Schools, USA

Angela Kelly, StonyBrook University, USA

Exploring Teachers' Experiences with Implementing Open-ended Inquiry Labs in High School Physics Classes

Hamideh Talafian*, University of Illinois at Urbana-Champaign, USA

Maggie Mahmood, University of Illinois at Urbana-Champaign, USA

Tim Stelzer, University of Illinois at Urbana-Champaign, USA

Eric Kuo, University of Illinois at Urbana-Champaign, USA

Morten Lundsgaard, University of Illinois at Urbana-Champaign, USA

Devyn Shafer, University of Illinois at Urbana-Champaign, USA

Samuel Engblom, University of Illinois at Urbana-Champaign, USA

Cultural Historical Analysis of Teacher Reflections on Data Investigations of Extreme Weather in Rural Classrooms

Gili Marbach-Ad, University of Maryland, USA

Asli Sezen-Barrie*, National Science Foundation, USA

Josephine Louie, EDC, USA

Emily Fagan, EDC, USA

Brian Fitzgerald, Mount Washington, USA

Kevin Waterman, EDC, USA

Pam Buffington, EDC, USA

Engaging Student Learning With Models Through the Epistemology of Models

Anupong Praisri*, Kasetsart University (Bangkhen Campus), Thailand

Chatree Faikhamta, Kasetsart University (Bangkhen Campus), Thailand

Akarat Tanakand, Kasetsart University (Bangkhen Campus), Thailand

Samia Khan, The University of British Columbia, Canada

Strand 10: Curriculum and Assessment

SC-Organized Paper Set

Assessing and Enhancing Scientific and Engineering Practices

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 6

Chunking Code, Representation, and Science Content to Enhance Secondary Students' Participation in Computational Science Investigations

Christopher Lore*, The Concord Consortium, USA

Hee-Sun Lee, The Concord Consortium, USA

Amy Pallant, The Concord Consortium, USA

Jie Chao, The Concord Consortium, USA

Evaluating Singapore Middle School Students' Grasp of Scientific Practices

Yann Shiou Ong*, Nanyang Technological University, Singapore

Yew-Jin Lee, Nanyang Technological University, Singapore

Miechie Leowardy, Nanyang Technological University, Singapore

Impacts & Moderation of a Model-Based High School Biology Program on Student Outcomes

Christopher Wilson*, BSCS Science Learning, USA

Cynthia Passmore, University of California Davis, USA

Molly Stuhlsatz, BSCS Science Learning, USA

Cari Herrmann Abell, BSCS Science Learning, USA

Jeffrey Snowden, BSCS Science Learning, USA

Hessan Ghanimi, University of California Davis, USA

Patricia Olson, BSCS Science Learning, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set ***Confronting Biases and Affirming Identities Across Machine Learning, Generative AI, and Undergraduate STEM Research***

20-Mar-24, 1:45 PM-3:15 PM

Location: Governor's Square 17

Barriers of Machine Language in African Schools: Testing the Efficacy of Cultural Relevant Pedagogy

Abdulazeez Balogun*, Lagos State University, Nigeria

Olasunkanmi Gbeleyi, Lagos State University-ACEITSE, Nigeria

Onuorah Benjamin, Lagos State University-ACEITSE, Nigeria

Peter Okebukola, Lagos State University-ACEITSE, Nigeria

The Potential Effects of AI Implicit Bias on Motivational Dispositions

Robert Monahan*, North Carolina State University, USA

Amanda MacCormac, North Carolina State University, USA

James Minogue, North Carolina State University, USA

A Qualitative Examination of Social and Science Identities Prior to a Post-Baccalaureate Research Program

Tina Zecher*, Northern Arizona University, USA

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set

Expanding the Justice-Centered Ambitious Science Teaching Epistemic Community

20-Mar-24, 1:45 PM-3:15 PM

Location: Governor's Square 10

Justice-Centered STEM Education to Address Pressing Societal Challenges
Okhee Lee*, New York University, USA

Justice-focused Community Agency to Transform Classroom Teaching
Marina Alexio, University of Minnesota, USA

Bhaskar Upadhyay*, University of Minnesota, USA

Kamal Koirala, Tribhuvan University, Nepal

Co-Creating With-ness, Vitality, and Axiological Tools for Justice-Oriented Elementary Science Teaching

Andrea Henrie*, Vanderbilt University, USA

Heidi Carlone*, Vanderbilt University, USA

Heather Johnson*, Vanderbilt University, USA

Adam Bell, Vanderbilt University, USA

Tessaly Jen*, Vanderbilt University, USA

Sarah Lee*, Vanderbilt University, USA

Liwei Zhang, Vanderbilt University, USA

Hannah Ziegler, Vanderbilt University, USA

Weaving Opportunities for Justice-Centered Science Teaching into a Secondary Science Methods Class

DelVechio Rich*, Montclair State University, USA

Delia Furer*, Montclair State University, USA

Douglas Larkin*, Montclair State University, USA

Preparing Teachers for Rigorous and Equitable Science Instruction in Linguistically Diverse Classrooms

Alexis Rutt*, University of Mary Washington, USA

An Ethical Imperative: "Working Difference" In Science Teacher Education Through a Posthuman Lens

Sophia Jeong*, The Ohio State University, USA

Ashlyn Pierson*, The Ohio State University, USA

Teo Keifert*, University of North Texas, USA

Andrea Henrie*, Vanderbilt University, USA

Heather Johnson*, Vanderbilt University, USA

Bethany Daniel*, Vanderbilt University, USA

Sarah Lee, Vanderbilt University, USA

Justice-Centered Ambitious Teaching: Where Teachers Chose to Start

April Luehmann*, University of Rochester, USA

Yang Zhang, Northwestern University, USA

Hannah Cooke, University of Connecticut, USA

Todd Campbell, University of Connecticut, USA

Déana Scipio, Islandwood, USA

Priya Pugh, Islandwood, USA

Strand 11: Cultural, Social, and Gender Issues

SC-Organized Paper Set

Pedagogy Matters: Assessing Equitable Instructional Practices and Impacts

20-Mar-24, 1:45 PM-3:15 PM

Location: Governor's Square 16

Development and Validation of the BOLD Protocol: Measuring Biology Teachers' Culturally and Linguistically Responsive Instruction

Niki Koukoulidis*, University of Florida, USA

Jinnie Shin, University of Florida, USA

Julie Brown, University of Florida, USA

Mark Pacheco, University of Florida, USA

Potency of Culturo-Techno-Contextual Approach in Enhancing Achievement of Senior Secondary School Physics Students in Optics.

John Ogonenwe*, African Center of Excellence for Innovative and Transformative STEM Education, Nigeria
Tunde Rahman, Lagos State University, Nigeria

Peter Okebukola, African Center of Excellence for Innovative and Transformative STEM Education, Nigeria
Juma Shabani, universite du Burundi, Burundi

Ibukunolu Ademola, African Center of Excellence for Innovative and Transformative STEM Education, Nigeria

Increasing Active Learning Methods Improves Engineering Mathematics Course Outcomes, Especially for Underrepresented Students in STEM

Katherine Golway*, University of Louisville, USA

Campbell Bego, University of Louisville, USA
Shannon Derkson, University of Louisville, USA
Jeffrey Hieb, University of Louisville, USA
Marci DeCaro, University of Louisville, USA

Strand 12: Technology for Teaching, Learning, and Research
SC-Organized Paper Set
Technology in Science Teaching and Learning
20-Mar-24, 1:45 PM-3:15 PM
Location: Governor's Square 14

Differences in ICT TPACK Efficacy Among Science Teachers in Elementary and Middle Schools

Adjoa Mensah*, University of Nevada Las Vegas, USA

Mayra Marquez Mendez, University of Nevada Las Vegas, USA

Tina Vo, University of Nevada Las Vegas, USA

Scaffolding Students' Co-Construction and Peer-Critiquing of Carbon Cycling Models and Investigating the Effects

Hsin-Yi Chang*, National Taiwan Normal University, Taiwan

Leveraging Learning Experience Design to Foster Cognitive and Behavioral Impact with Embedded Video Questions

Joseph Wong*, University of California, Irvine, USA

Lindsey Richland*, University of California, Irvine, USA

Brad Hughes*, University of California, Irvine, USA

Strand 13: History, Philosophy, Sociology, and Nature of Science
SC-Organized Paper Set
NOS in Pre-Service Teacher Education

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 3

Improving Preservice Elementary Teachers' Conceptions of Nature of Science Through Participation in Citizen Science Projects

Mila Rosa Carden*, University of North Texas, USA

Karthigeyan Subramaniam*, University of North Texas, USA

Christopher Long*, University of North Texas, USA

Nazia Khan*, University of North Texas, USA

Exploring Three Secondary Preservice Teachers' Views of NOS, Beliefs about Teaching NOS, and NOS Teaching

Kelsey Beeghly*, University of Central Florida, USA

Su Gao, University of Central Florida, USA

Jerrid Kruse, Drake University, USA

Investigating Nature of Science Conceptions and Argumentation Components in a Science Methods Course

Rola Khishfe*, American University of Beirut, Lebanon

Exploring Elementary Preservice Teachers' Scientific Explanations: A Comparative Analysis using NOSE Framework and CER Model

Sahar Alameh*, University of Kentucky, USA

Blake Sampson, University of Kentucky, USA

**Strand 14: Environmental Education
and Sustainability**

SC-Organized Paper Set

***Building Teachers' Capacity on
Climate Literacy***

20-Mar-24, 1:45 PM-3:15 PM

Location: Plaza Court 8

*Developing Elementary Teachers' Self-
efficacy for Climate Change Teaching and
Climate Change Literacy Using Learning
Technologies*

Lauren Wagner*, Florida State University,
USA

Amal Ibourk*, Florida State University, USA

Khadija Zogheib*, Florida State University,
USA

*Watershed Moments: Investigating
Teacher Motivation and Benefits to Place-
Based Environmental Professional
Development Workshops*

Jessica Stephenson Reaves*, Kennesaw
State University, USA

Rasheda Likely, Kennesaw State
University, USA

Anna Maria Arias, Kennesaw State
University, USA

*Building Capacity to Teach and Learn
Earth & Environmental Data Science at
Smaller Minority Serving Institutions*

Nathan Quarderer*, CU

Boulder/CIRES/ESIIL/Earth Lab, USA

Emily Ward, CU Boulder/CIRES/ESIIL, USA

Katherine Halama, CU

Boulder/CIRES/ESIIL/Earth Lab, USA

Jennifer Balch, CU

Boulder/CIRES/ESIIL/Earth Lab, USA

Elsa Culler, CU Boulder/CIRES/ESIIL/Earth
Lab, USA

Chelsea Nagy, CU

Boulder/CIRES/ESIIL/Earth Lab, USA

James Sanovia, CU

Boulder/CIRES/ESIIL/AIHEC, USA

James Rattling Leaf, CU

Boulder/CIRES/ESIIL/NC CASC, USA

Anne Gold, CU Boulder/CIRES/ESIIL, USA

Plenary Session

Closing Session

20-Mar-24, 3:30 PM-4:30 PM

Location: Plaza Ballroom ABC/DEF

Committee Meeting

NARST Board of Directors Meeting

20-Mar-24, 5:00 PM-10:00 PM

Location: Directors Row E

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