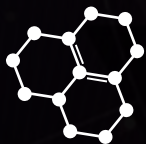


NARST 2017

GLOCALization and Sustainability of Science Education Research and Practice

NARST 90th Annual International Conference

Grand Hyatt San Antonio – San Antonio, TX, USA – April 22-25, 2017



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A worldwide organization for improving
science teaching and learning through research

NARST 2017

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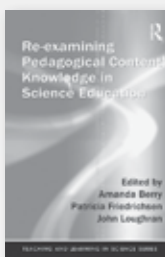
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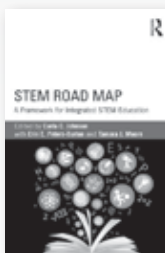
Handbook of Research on Science Education, Volume II

Edited by Norman Lederman, Sandra K. Abell



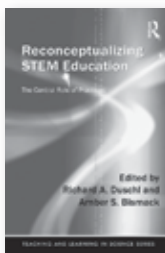
Re-Examining Pedagogical Content Knowledge in Science Education

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STEM Road Map: A Framework for Integrated STEM Education

Edited by Carla C. Johnson with Erin E. Peters-Burton, Tamara J. Moore



Reconceptualizing STEM Education: The Central Role of Practices

Edited by Richard A. Duschl, Amber S. Bismack

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NARST 2017

90th Annual International Conference

Grand Hyatt San Antonio | San Antonio, TX, USA
April 22-25, 2017

Glocalization and Sustainability of
Science Education Research and Practice

ACKNOWLEDGMENTS

The following members of the Program Committee helped in preparing and editing the 2017 NARST Annual International Conference Program Book.

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Barbara Crawford, President-Elect and Program
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Toni A. Sondergeld, NARST Scheduling Coordinator

Notes

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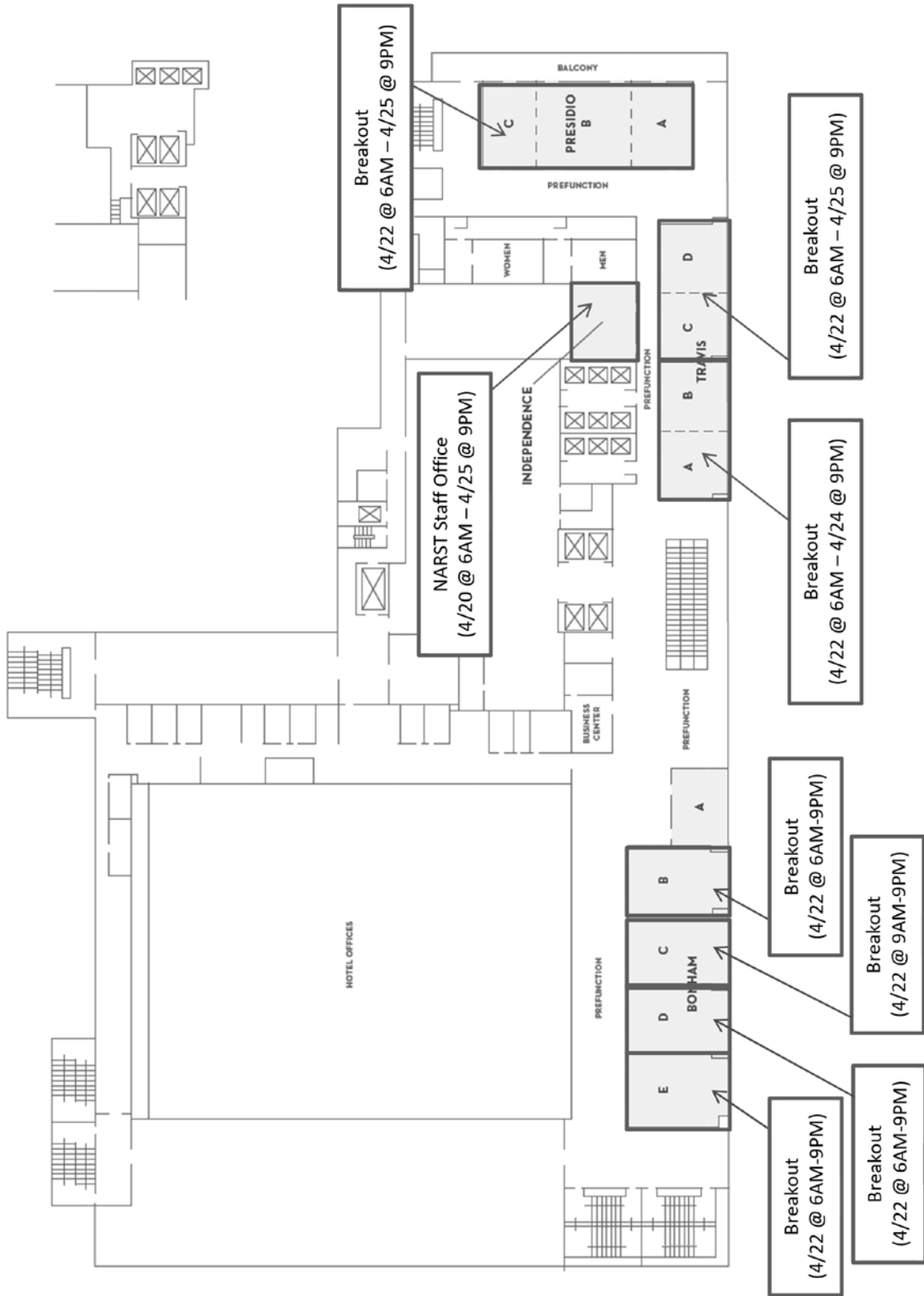
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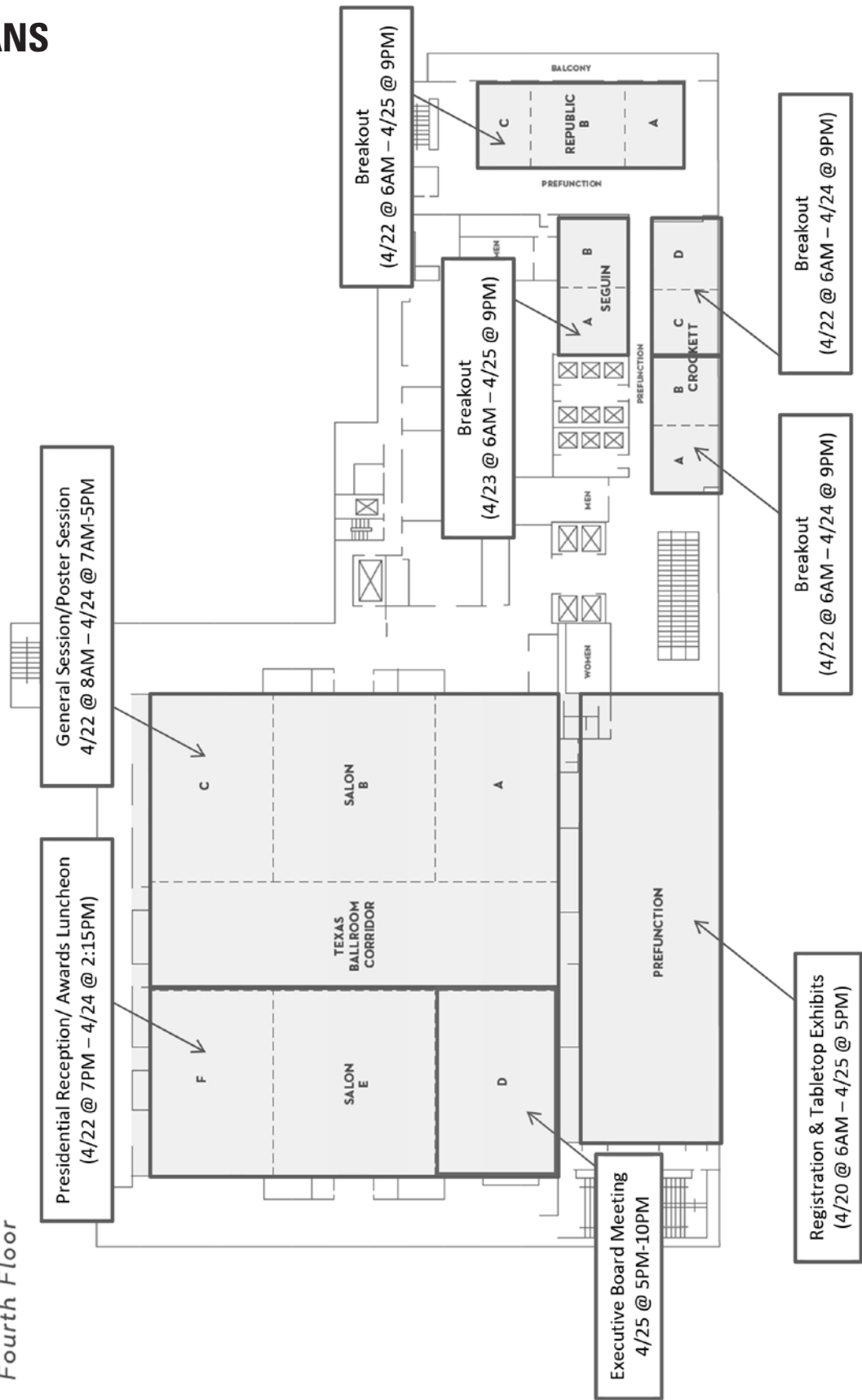


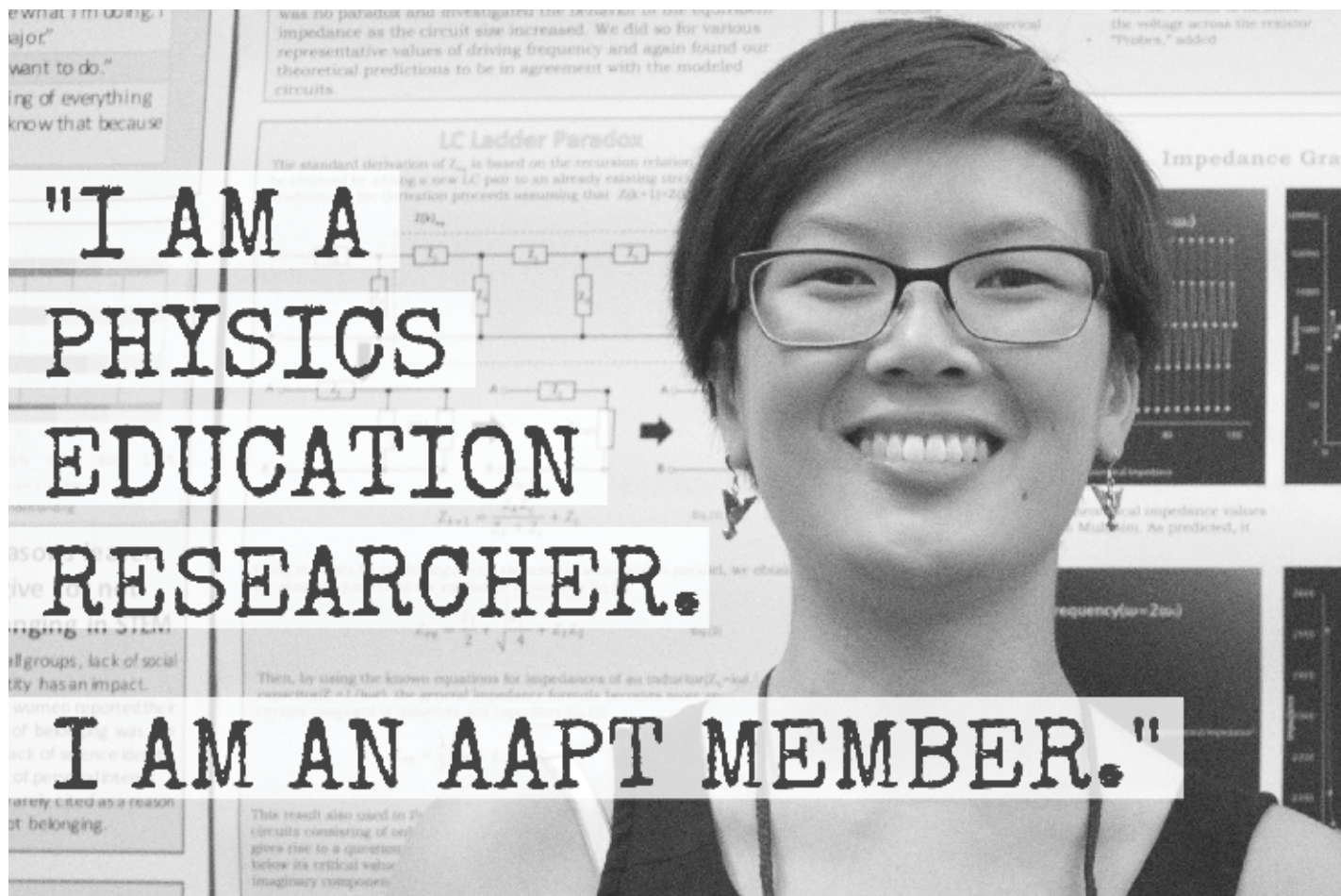
FLOOR PLAN *Third Floor*



FLOOR PLANS

FLOOR PLAN
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The Physics Education Research Topical Group (PERTG) is a group within the American Association of Physics Teachers (AAPT), formed for those with a special interest in research on the teaching and learning of physics. Along with the option to join PERTG, Membership in AAPT provides physics educators with:

- Access to current and archived issues of *The Physics Teacher* and the *American Journal of Physics*
- Discounts on registration for national conferences and workshops
- Webinars and lesson plans inspired by articles published in *The Physics Teacher*
- Leadership opportunities through AAPT's committees, programs, and governance
- Access to funding through grants and scholarships
- Recognition of professional success through awards
- Career support through the AAPT Career Center
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Visit AAPT's table at NARST for more information on AAPT Membership and PERTG, or visit aapt.org!



American Association of Physics Teachers
Enhancing the understanding and appreciation of physics through teaching

General Information

Information about NARST

The National Association for Research in Science Teaching was founded in 1928 for the purpose of promoting research in science education at all educational levels and disseminating the findings of this research in such ways as to improve science teaching and learning.

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

The ultimate goal of NARST is to help all learners achieve science literacy. NARST promotes this goal by: 1) encouraging and supporting the application of diverse research methods and theoretical perspectives from multiple disciplines to the investigation of teaching and learning in science; 2) communicating science education research findings to researchers, practitioners, and policy makers; and 3) cooperating with other educational and scientific societies to influence educational policies. To learn more about NARST you may visit the Association's website at <http://narst.org/> and read the Bylaws approved by the membership in October 2008 at http://www.narst.org/about/NARST_bylaws.pdf.

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.
- The NARST Annual International Conference Program and Abstracts are available on the conference page of the NARST website.
- Members have access to E-NARST News, which is published twice a year and available on the NARST website.
- Website and Listserv, allowing access to further information about the Association. You may access this site at the following URL: <http://www.narst.org>. There is further information about subscribing to the listserv on this site.

Explanation of Program Session Formats

Paper Sessions Organized by the Program Committee

In a paper session, the presider introduces the presenters and monitors the time used for each presentation. All papers will be allotted 15 minutes for presentation, followed by approximately 5 minutes of questions or discussion. The presider and audience will use any time remaining in the session for additional discussion, general review, and suggestions for further research. Each presenter is expected to have a manuscript for distribution to attendees. The manuscript may be available either via hard copy distribution at the session or via electronic access provided by the author.

Symposium

A symposium involves a panel of experts or stakeholders who examines a specific theme or issue. This format does not involve the presentation of individual papers. Therefore, individual papers and authors will not be listed under this format. Rather, the participants are listed as panel members. The proposer controls presentations, discussion, and questioning with the assistance of the presider or discussant (if designated). Discussion should promote the expression of similar or alternative viewpoints and theoretical positions. The proposer of the symposium is expected to disseminate a paper or a summary with references either via hard copy distribution at the session or via electronic access provided by the proposer.

Related Paper Set

This category accommodates, in a single session, three to five related research papers reporting several studies that originate from a common base of research. This format also allows for common elements of design or approach to be presented once rather than repetitively. The proposer and authors may determine the specifics of the session once it is accepted. For instance, those involved may opt for a formal presentation style or they may conduct their session in a more informal, discussion-oriented style. Each presenter is expected to have a manuscript for distribution to attendees. The manuscript may be available either via hard copy distribution at the session or via electronic access provided by the author.

Interactive Poster Sessions

This format offers presenters the opportunity to display their work graphically in a traditional poster session format. Displays should fit on the 48" (long) x 36" (high) tri-fold boards provided and should include a brief abstract in large typescript. Each presenter must set up the display prior to the start of the Poster Session and then remove it promptly at the end of the Poster Session. Each presenter is expected to have a manuscript for distribution to attendees. The manuscript may be available either via hard copy distribution at the session or via electronic access provided by the author.

Guidelines for Meeting Presenters

- Go to the designated room at least 10 minutes early.
- Greet the presider/discussant.
- NARST provides the LCD and screen in each presentation room. NARST does not provide computers. You must have your own notebook computer or you may put your file on a USB flash drive in advance, in case you will be using another presenter's computer for your presentation.
- Check your understanding of the LCD projector and any other audiovisual equipment prior to the session.
- Keep presentation within the designated time limit.
- Invite audience comments and questions.
- If there is no presider assigned for your session, then presenters should keep time for each other.

Guidelines for Presiders and Discussants

We have accommodated most sessions with a presider, whose role is detailed below. For sessions without presiders, we are counting on the presenters to set aside time for discussion so that the audience participants can contribute to a discussion of the papers.

The role of the Presider includes:

- Arrive early at designated room and arrange furniture as per desires of presenters.
- Check and focus LCD projector.
- Check pronunciations of the names of the presenter and their institutions.
- With presenters, make a time plan, retaining the order of presenters in the program.
- Start session promptly.
- Introduce presenters and serve as timekeeper. Alert presenters when they have 5, 3, and 1 minute remaining. It is important to end each presentation within the agreed allocated time to ensure fairness to all presenters and in order to end the session on time. One suggestion that may be followed is if someone begins to exceed their allotted time, then it is appropriate to stand up and politely announce to the audience that you invite further discussion directly with the author(s) at the conclusion of the entire session.
- Facilitate discussion, assuring equitable involvement of audience members. Close session on time.

The role of the Discussant includes:

- Read papers before the session and have remarks prepared ahead of time.
- Perform presider duties as detailed above, if there is only a discussant for the session.
- After the presentation, make brief and cogent remarks on each paper with suggestions for future research.

Strand Key

STRAND 1 – Science Learning: Understanding and Conceptual Change
STRAND 2 – Science Learning: Contexts, Characteristics, and Interactions
STRAND 3 – Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies
STRAND 4 – Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
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 – Reflective Practice
STRAND 10 – Curriculum, Evaluation, and Assessment
STRAND 11 – Cultural, Social, and Gender Issues
STRAND 12 – Educational Technology
STRAND 13 – History, Philosophy, and Sociology of Science
STRAND 14 – Environmental Education
STRAND 15 – Policy

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2018 NARST Annual International Conference

The Program Chair invites NARST members and others to participate in the 2018 NARST Annual International Conference and to contribute to the 2018 conference by submitting program proposals.

VENUE:

NARST 2018 Annual International Conference

The Westin Peachtree Plaza

Atlanta, GA, USA

March 10-13, 2018

THEME:

Re-centering on Scientific Literacy in an Era of Science Mistrust and Misunderstanding

The theme of the NARST 2018 annual meeting emerges from both historical and current events. Promoting **scientific literacy** has been at the center of educational reforms for more than a century. It is clear that much more work is needed. Scientific literacy is the knowledge and understanding of scientific concepts and principles, and an understanding of how scientists use logic and evidence; in other words, how scientists think. Scientific literacy is desperately needed in our modern world in which environmental, medical, and social crises appear on every horizon; in a world where important decisions are often not based on scientific evidence. We stand with our toes dipping into an ocean of newly discovered data about physics, genetics, gender, and many other areas. We have lots to learn about who we are and what we are and where we fit into the universe. We will inevitably have to restructure our understandings of just about everything to accommodate new information. Let's get ready to deal with that reality.

It is a particularly challenging time for educators in today's changing educational environments. In today's social context there are disturbing trends of anti-science rhetoric. Recently some public officials in the United States have supported the teaching of creationism. Anti-science rhetoric, discounting of scientific evidence, and undermining of concepts such as evolution and climate change are issues teachers at all levels need to address in the near future.

It appears as if scientific literacy, once a central theme, has drifted away from being an important goal of education in the United States. Some people now regard science as a threat to their religious or personal positions; others see science as an inconvenience, obstructing their progress to personal or financial goals. As long as science is not more generally understood to be a lens through which to view and understand our world, it will be easier to manipulate opinions, exclude data and logic from our social and political decision making processes, and discourage open discussion of issues and problems.

Further, scientific literacy needs to be a central theme in preparing new teachers in STEM disciplines in knowing how to best enhance the achievement of young African Americans, Latino/a, and other students from populations generally underrepresented in the sciences. It is no longer enough to "teach science" and hope some of the students "get it." We need to actively and deliberately reach out to diverse cultures and sociological groupings that have traditionally "not gotten it" and help them to appreciate what science is and how it can be useful to them personally.

Today, it is more important than ever for science education researchers in our NARST community to share and defend their research findings about how to best educate young people in the sciences, and how best to prepare educators in helping people to develop critical thinking skills, to use logic and evidence in decision making and in the construction of knowledge, and to appreciate nature of science. Today is an important time to refocus on a goal of achieving Scientific Literacy for All. If the NARST community can stay positive, committed, focused, and work together, we can make a difference.

We welcome your contributions to science education research at the 2018 NARST Annual Conference.

SUBMISSION DEADLINE:

The Program Chair or designate must receive your program proposals for the 2018 Annual International Conference by August 15, 2017. This deadline allows sufficient time for processing, reviewing, and evaluating the many submitted proposals in a fair manner. By early July 2017, the call for program proposals will appear on the NARST website.

CONFERENCE CHAIR:

Barbara Crawford, President-Elect

Future Meeting Dates for NARST, NSTA, and AERA

2017

AERA San Antonio, TX, April 27-May 1

2018

NSTA Atlanta, Georgia, March 15-18

NARST Atlanta, GA, March 10-13

AERA New York, NY, April 13 -17

2016-2017 Strand Coordinators

Strand 1: Science Learning, Understanding, and Conceptual Change

(18) Knut Neumann, (17) Ibrahim Delen

Strand 2: Science Learning: Contexts, Characteristics and Interactions

(18) Fang-Ying Yang, (17) Christopher G. Wright

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

(18) Laura Zangori, (17) Mandy Biggers

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

(18) Tom Bielik, (17) Regina L. Suriel

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

(18) Carina Rebello, (17) Rebekka Darner-Gougis

Strand 6: Science Learning in Informal Contexts

(18) Kelly Riedinger, (17) Joy A. Kubarek-Sandor

Strand 7: Pre-service Science Teacher Education

(18) Sara Raven, (17) David Stroupe

Strand 8: In-service Science Teacher Education

(18) Emily A Dare, (17) Lisa A. Borgerding

Strand 9: Reflective Practice

(18) Patricia Gail Patrick, (17) Gayle Buck

Strand 10: Curriculum, Evaluation, and Assessment

(18) Mauricio Pietrocola, (17) Amy Trauth-Nare

Strand 11: Cultural, Social, and Gender Issues

(18) Anna Lewis, (17) Neporcha Cone

Strand 12: Educational Technology

(18) Joshua Alexander Ellis, (17) Diana Jass Ketelhut

Strand 13: History, Philosophy and Sociology of Science

(18) Ben Herman, (17) Christine McDonald

Strand 14: Environmental Education

(18) Teresa Shume, (17) Cassie Quigley

Strand 15: Policy

(18) Kathryn Hayes, (17) Jacob Foster

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Marco-Bujosa, Lisa	Owens, David	Sciaky, Elizabeth	Vedder-Weiss, Dana
Marsan, Lynnsay	Owolabi, Tunde	Sen, Mutlu	Vesterinen, Veli-Matti
Martin, Anita	Ozdem-Yilmaz, Yasemin	Seo, Kyungwoon	Vezino, Beau
Martin, Ron	Ozturk, Gokhan	Shapiro, Marina	Vincent-Ruz, Paulette
Martin, Sonya	Ozturk, Nilay	Shepard, Kelly	Vo, Tina
Mawyer, Kirsten	Padilla-Martinez, Kira	Sheth, Manali	Waight, Noemi
McBeath, Jasmine Kyle	Palincsar, Annemarie	Shiverdecker, Terry	Waldrip, Bruce
McClain, Lucy	Park, Mihwa	Sikorski, Tiffanyrose	Wallon, Robert
McConnell, William	Park, Soonhye	Silva Mangiante, Elaine	Walter, Emily
McDermott, Mark	Parker, Carolyn	Simpson, Amber	Wang, Hui-Hui
McFadden, Justin	Patrick, Patricia	Singer, Jonathan	Wang, Jianlan
Mcgee, Steven	Pearson, Nelson	Skaza Acosta, Heather	Wang, Kuo-Hua
McGinnis, J.	Pegg, Jerine	Skeeles-Worley, Angela	Warfa, Abdi
McGowan, Veronica	Perin, Suzanne	Smith, Leigh	Weible, Jennifer
McGregor, Deb	Peters-Burton, Erin	Smith, Mike	Weiser, Gary
Menon, Preetha	Petty, Lori	Sonam, Tenzin	Wendell, Kristen
Michel, Hanno	Pietrocola, Mauricio	Song, Youngjin	Wendt, Jillian
Mikeska, Jamie	Pimentel, Diane	Sorge, Stefan	Wenger, Matthew
Miller, Alison	Plummer, Julia	Sozbilir, Mustafa	Wertheim, Jill
Miller, Bridget	Powell, Wardell	Stammen, Andria	White, Francesca
Minogue, James	Price, Aaron	Stapleton, Sarah	Whittington, Kirby
Minshew, Lana	Pringle, Malcolm	Staus, Nancy	Whitworth, Brooke
Momsen, Jennifer	Purzer, Senay	Stephens, Marilyn	Wieselmann, Jeanna
Moore, Michael	Quinlan, Catherine	Strimaitis, Anna	Williams, Grant
Morrison, Deb	Qureshi, Azhar	Strippel, Christian Georg	Witzig, Stephen
Moscarella, Rosa	Rachmatullah, Arif	Stuhlsatz, Molly	Wizner, Francine
Mulvey, Bridget	Radoff, Jennifer	Subramaniam, Karthigeyan	Wood, Krista

Wortel-London, Stephanie	Tanis Ozcelik, Arzu	Wright, Ann	Yin, Yue
Wray, Kraig	Telli, Sibel	Wright, Christopher	Yoon, Sae Yeol
Wright, Christopher	Thummaphan, Phonraphee	Wright, Elizabeth	Zaidi, Sania
Wulff, Peter	Todd, Amber	Wu, Jason	Zangori, Laura
Yamaguchi, Etsuji	Tolbert, Sara	Yang, Yang	Zastavker, Yevgeniya
Yarden, Anat	Topcu, Mustafa	Yarema, Sandra	Zhang, Chunlei
Yilmaz Senem, Beril	Towns, Leonard	Yarker, Morgan	Zimmerman, Randi
Yilmaz-Tuzun, Ozgul	Tran, Lynn	Yerrick, Randy	Zisk, Robert
Yin, Yue	Trujillo, Caleb	Yoho, Rachel	Zoellick, Bill
Yoon, Sae Yeol	Tucker-Raymond, Eli	Yoon, Sae Yeol	
You, Hye Sun	Tuncay-Yuksel, Busra	You, Hye Sun	
Yu, Shu Mey	Tunncliffe, Sue	Young, Tyron	
Yuksel, Tugba	Tupper, Benjamin	Zangori, Laura	
Zaidi, Sania	Tutwiler, Michael	Zastavker, Yevgeniya	
Zangori, Laura	Upadhyay, Bhaskar	Zhai, Xiaoming	
Zimmerman, Randi	Urueta, Tathali	Zisk, Robert	
Zwiep, Susan	Vallett, David	Zoellick, Bill	
Sen, Hanife	Van Duzor, Andrea	Zwiep, Susan	
Sengul, Ozden	Vanmali, Binaben	Wang, Jianlan	
Seo, Kyungwoon	Vaughn, Ashley	Webb, Angela	
Seung, Eulsun	Vergara, Claudia	Webb, Aubree	
Shah, Ashima	Verma, Geeta	Weitzel, Holger	
Shama, Ajay	Veron, Dana	Wendt, Jillian	
Shapiro, Marina	Vesterinen, Veli-Matti	Wengrowicz, Niva	
Sharma, Meenakshi	Vhurumuku, Elaosi	Wessnigk, Susanne	
Sheffield, Adriane	Vieira, Rodrigo	West, Andrew	
Shehab, Saadeddine	Waight, Noemi	Wheeler, Lindsay	
Shemwell, Jonathan	Waldrip, Bruce	White, Francesca	
Sherwood, Carrie-Anne	Walter, Emily	Whitworth, Brooke	
Sheth, Manali	Wan, Zhi Hong	Wiebke, Heidi	
Shimek, Christine	Wang, Jian	Wiggins, Benjamin	
Shin, Myunghwan	Wang, Jianlan	Wild, Andrew	
Shofner, Marcia	Wang, Jing-Ru	Wilhelm, Jennifer	
Siatras, Anastasios	Wardrip, Peter	Williams, Grant	
Siegel, Marcelle	Webb, Aubree	Wilmes, Sara	
Smith, Mike	Weeks, Faith	Wilson, Rachel	
Smith, Patrick	Weible, Jennifer	Wingert, Kerri	
Smolek, Tamara	Weiland, Ingrid	Wiseman, Dawn	
Sondergeld, Toni	Wendel, Paul	Witzig, Stephen	
Soobard, Regina	Wendell, Kristen	Wizner, Francine	
Spray, Jason	Wengrowicz, Niva	Wong, Sissy	
Staus, Nancy	Wenner, Julianne	Wood, Krista	
Stefanile, Adam	Wertheim, Jill	Woods-Townsend, Kathryn	
Strimaitis, Anna	Wessnigk, Susanne	Woolcott, Geoff	
Strippel, Christian Georg	Wetzstein, Lia	Wright, Ann	
Strohl, Carrie	Wheeler, Lindsay	Wyner, Yael	
Stromholt, Shelley	Whittington, Kirby	Xiao, Sihan	
Stroupe, David	Whitworth, Brooke	Yalaki, Yalcin	
Stuessy, Carol	Wild, Andrew	Yamaguchi, Etsuji	
Subramaniam, Karthigeyan	Wilkerson-Jerde, Michelle	Yan, Xiaomei	
Suh, Jee Kyung	Williams, Grant	Yarden, Anat	
Summers, Ryan	Witzig, Stephen	Yarema, Sandra	
Sun, Baoling	Wizner, Francine	Yarker, Morgan	
Sung, Shannon	Wolfe, Teresa	Yerdelen, Sündüs	
Swanson, Lauren	Wong, Sissy	Yestness, Nissa	
Szyjka, Sebastian	Wood, Krista	Yeung, Yau-yuen	
Tal, Tali	Wortel, Stephanie	Yilmaz-Tuzun, Ozgul	
Tan, Yuen Sze Michelle	Wray, Kraig	Yin, Xinying	

NARST Presidents

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

NARST Executive Directors

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

Paul H. Joslin 1975 – 1980
William G. Holliday 1980 – 1985
Glenn C. Markle 1985 – 1990
John R. Staver 1990 – 1995
Arthur L. White 1995 – 2000
David L. Haury 2000 – 2002
John W. Tillotson 2002 – 2007
William C. Kyle, Jr. 2007 – 2018

JRST Editors

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

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Agin, Michael	Fensham, Peter	Markle, Glenn	Ritz, William
Andersen, Hans	Ganiel, Uri	McCormack, Alan	Roberts, Douglas
Anderson, Ronald	Gunstone, Richard	McFadden, Charles	Rose, Ryda
Angell, Carl	Haney, Richard	Merzyn, Gottfried	Schmidt, Donald
Arzi, Hanna	Hassan, Abdelmoneim	Niaz, Mansoor	Sequeira, Manuel
Baker, Dale	Haurly, David	Nous, Albert	Sherwood, Robert
Barnes, Marianne	Helgeson, Stanley	Novak, Joseph	Simmons, Ellen
Barrow, Lloyd	Hewson, Peter	Okebukola, Peter	Simonis, Doris
Bartlett, Guilford	Hill, Todd	Olstad, Roger	Smith, Edward
Barufaldi, James	Holliday, William	Padilla, Michael	Stuessy, Carol
Berkheimer, Glenn	Jaffarian, Bill	Pak, Sung Jae	Swift, J.
Bethel, Lowell	Joslin, Paul	Pedemonte, Gian	Thier, Herbert
Christopher, John	Kahle, Jane	Piburn, Michael	Thier, Marlene
Dahncke, Helmut	Kennedy, David	Poel, Robert	Walding, Richard
De Jong, Onno	Krockover, Gerald	Poth, James	Waldrip, Bruce
Dehaan, Robert	Lemke, Jay	Prather, J.	Welch, Wayne
Doran, Rodney	Lindauer, Ivo	Quigley, Cassie	Williams, Robert
Enochs, Larry	Lunetta, Vincent	Rennie, Leonie	Yore, Larry
Feher, Elsa	Mallinson, Jacqueline	Riechard, Donald	Zoller, Uri

NARST Award Recipients

Distinguished Contributions to Science Education through Research Award

This award is presented at the Annual International Conference but is bestowed only when an outstanding candidate, or candidates, have 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	Year	Awardee	Year	Awardee
1986	Anton E. Lawson	2001	John K. Gilbert	2012	Charles W. (Andy) Anderson
1987	Paul DeHart Hurd	2002	Audrey B. Champagne		Larry Yore
1988	John W. Renner	2003	Barry J. Fraser	2013	Dale R. Baker
1989	Willard Jacobson	2004	Robert E. Yager	2014	Glen Aikenhead
1990	Joseph D. Novak		Paul Black		Richard Gunstone
1991	Robert L. Shrigley	2005	John C. Clement		Frances Lawrenz
1992	Pinchas Tamir	2006	David Treagust	2015	Richard A. Duschl
1993	Jack Easley, Jr.	2007	Kenneth Tobin		Meshach Mobolaji Oggunniyi
1994	Marcia C. Linn	2008	Dorothy Gabel	2016	Lynne D. Dierking
1995	Wayne W. Welch	2009	Peter W. Hewson		John N. Falk
1996	Carl F. Berger		Leonie Jean Rennie		Dana L. Zeidler
1997	Rosalind Driver		Wolff-Michael Roth	2017	Avi Hofstein
1998	James J. Gallagher	2010	Reinders Duit		
1999	Peter J. Fensham		Joseph Krajcik		
2000	Jane Butler Kahle	2011	Norman Lederman		

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	Major Professor
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 and 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 Zimmerman	Phillip Bell
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 and Anne-Lise Halvorsen
2015	Allison Godwin	Geoffrey Potvin
2016	Anna MacPherson	Jonathan Osborne
2017	Anita Schuchardt	Christian Schunn

Early Career Research Award

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

Year	Awardee	Year	Awardee	Year	Awardee
1993	Wolff-Michael Roth	2001	Julie A. Bianchini	2010	Thomas Tretter
1994	Deborah J. Tippins	2002	Alan G. Harrison	2011	Katherine L. McNeill
1995	Nancy B. Songer	2003	Fouad Abd-El-Khalick	2012	Victor Sampson
1996	Mary B. Nakhleh	2004	Grady J. Venville	2013	Alandeom W. Oliveira
1997	Peter C. Taylor	2005	Randy L. Bell	2014	Cory Forbes
1998	J. Randy McGinnis	2006	Heidi Carlone	2015	Benjamin C. Herman
1999	Craig W. Bowen	2007	Bryan A. Brown	2016	Richard L. Lamb
	Gregory J. Kelly	2008	Hsin-Kai Wu	2017	Ying-Chih Chen
2000	Angela Calabrese Barton	2009	Troy D. Sadler		David Stroupe

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

The NARST Outstanding Paper Award

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

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

Outstanding Master's Thesis Award

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

Year	Awardee	Major Professor
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 B. T. Gilbert	Randy K. Yerrick
2000	Rola Fouad Khishfe	Fouad Abd-El-Khalick
2002	Laura Elizabeth Slocum	Marcy Hamby Towns

Classroom Applications Award

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

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

NARST Leadership Team & Committees

2016-2017

Officers

President

President-elect

Immediate Past President

Executive Director

Mei-Hung Chiu (2018)

Barbara Crawford (2018)

Mary M. Atwater (2017)

William C. Kyle, Jr. (2018)

National Taiwan Normal University

The University of Georgia

The University of Georgia

University of Missouri – Saint Louis

Executive Board Members:

Lynn Dierking (2019)

Katherine McNeill (2019)

Maria Rivera Maulucci (2019)

Alicia C. Alonzo (2018)

Nam-Hwa Kang (2018)

Eileen Carlton Parsons (2018)

Gregory Kelly (2017)

Jomo W. Mutegi (2017)

Tali Tal (2017)

Oregon State University

Boston College

Barnard College, Columbia University

Michigan State University

Korea National University of Education (KNUE)

The University of North Carolina at Chapel Hill

Pennsylvania State University

Indiana University, IUPUI

Technion-Israel Institute of Technology

International Coordinator

Graduate Student Representative

NARST Liaison to NSTA

NSTA Representative

JRST Editors (term ends 2020)

Lucy Avraamidou (2019)

Selina L. Bartels (2017)

Deborah Hanuscin (2018)

John W. Tillotson (2017)

Fouad Abd-El-Khalick

Dana L. Zeidler

University of Groningen, Netherlands

Illinois Institute of Technology

University of Missouri

Syracuse University

The University of North Carolina at Chapel Hill

University of South Florida – Tampa Bay

Equity and Ethics Committee

Chair:

(18) Nam-Hwa Kang

Korea National University of Education

nama.kang@gmail.com

Members:

(19) Rekha Koul

(19) Lizette Ramos

(19) Senetta F. Bancroft

(19) Melody Russell

(18) Mercy Ogunsola-Bandele

(18) Deniz Saribas

(18) Sanghee Cho

(17) Francesca White

(17) Miri Barak

(17) Enrique Lopez

(17) Rhea Miles

Curtin University

University of Guadalajara

Grand Valley State University

Auburn University

Adamawa State University

Istanbul Aydin University

University of North Georgia

Indiana University

Technion-Israel Institute of Technology

University of Colorado-Boulder

East Carolina University

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External Policy and Relations Committee

Co-Chairs:

(17) Greg Kelly	Pennsylvania State University	gkelly@psu.edu
(19) Katherine McNeill	Boston College	kmcneill@bc.edu

Members:

(19) Andy Anderson	Michigan State University	andya@msu.edu
(19) Christina V. Schwarz	Michigan State University	cschwarz@msu.edu
(19) Patricia Simmons	North Carolina State University	patricia_simmons@ncsu.edu
(18) Andre Green	University of South Alabama	green@southalabama.edu
(18) Christopher Emdin	Teachers College, Columbia University	emdin@tc.edu
(18) Celeste Pea	National Science Foundation	cpea@nsf.gov
(17) Alix Cotumaccio	American Museum of Natural History	acotumaccio@amnh.org
(17) Todd Hutner	University of Texas-Austin	thutner@gmail.com
(17) Meredith Park Rogers	Indiana University	mparkrog@indiana.edu
(17) Kate Popejoy	Da Vinci Science Center	PopejoyPhD@gmail.com

International Committee

Chair – International Coordinator:

(19) Lucy Avraamidou	University of Groningen, Netherlands	l.avraamidou@rug.nl
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Members:

(19) Shirly Avargil	Bar-Ilan University	shirly.avargil@biu.ac.il
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-----------------------------	---	------------------------

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(18) Knut Neumann	IPN, Germany	neumann@ipn.uni-kiel.de
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Strand 2: Science Learning: Contexts, Characteristics and Interactions

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

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

(18) Tom Bielik	Michigan State University	tbielik@msu.edu
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Strand 5: College Science Teaching and Learning (Grades 13-20)

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Strand 7: Pre-service Science Teacher Education

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Strand 9: Reflective Practice

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Strand 10: Curriculum, Evaluation, and Assessment

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Strand 11: Cultural, Social, and Gender Issues

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Strand 12: Educational Technology

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Strand 13: History, Philosophy and Sociology of Science

(18) Ben Herman	University of Missouri	hermanb@missouri.edu
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Outstanding Doctoral Research Award Selection Committee

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(19) Shulamit Kapon
(19) Barbara Hug
(18) Jacqueline McDonnough
(18) Sissy Wong
(18) Hsin-Kai Wu
(18) Orit Ben Zvi Assaraf
(18) Daniel Capps
(17) Dan Carpenter
(17) Brendan Callahan
(17) Len Annetta
(17) Tracy Huziak-Clark

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University of Houston
National Taiwan Normal University
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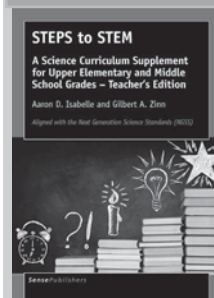
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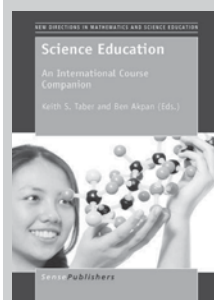


New Books



STEPS to STEM: A Science Curriculum Supplement for Upper Elementary and Middle School Grades - Teacher's Edition

Aaron D. Isabelle and Gilbert A. Zinn



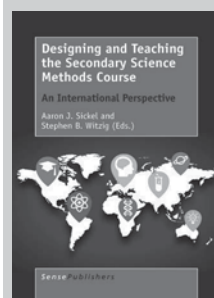
Science Education: An International Course Companion

Edited by Keith Taber and Ben Akpan



Drawing for Science Education: An International Perspective

Phyllis Katz



Designing and Teaching the Secondary Science Methods Course: An International Perspective

Edited by Aaron J. Sickel and Stephen B. Witzig

NARST Annual International Conference

Schedule at a Glance – 2017

Grand Hyatt San Antonio
San Antonio, TX, USA

Date/Time	Event	Room
Friday, April 21		
7:30 AM – 5:00 PM	NARST Executive Board Meeting #1	Hyatt Lone Star D
2:00 PM – 5:00 PM	Conference Registration	Hyatt Texas Foyer
Saturday, April 22		
7:00 AM – 5:00 PM	Conference Registration	Hyatt Texas Foyer
7:30 AM – 10:15 AM	NARST Executive Board Meeting #1 (continued)	Hyatt Lone Star D
<i>Please note:</i> You must register for the Pre-conference Workshops with your Advance Conference Registration. You may only register for one workshop.		
8:00 AM – 11:45 AM	Pre-Conference Workshop #1: Equity and Ethics Committee Free Maximum registration – 90 Title: Glocalization and Sustainability of Science Education Research and Practice Organizers: Enrique Lopez, Nam-Hwa Kang, Tasneem Anwar, Senetta Bancroft, Phillip Boda, Tamra-Kay Alisa Francis, Deniz Saribas, and Azam Saiqa	Hyatt Lone Star F
8:00 AM – 11:45 AM	Pre-Conference Workshop #2: Research Committee Free Maximum registration – 42 Title: Critical Youth Participatory Research in Science Education Presenters: Angela Calabrese Barton, Edna Tan, Jrene Rahm, Christina Nazar, Kathleen Schenkel, Daniel Birmingham, Tara O'Neill, Takumi Sato, and Day Greenberg	Hyatt Republic ABC
8:00 AM – 11:45 AM	Pre-Conference Workshop #3: Research Committee Free Maximum registration – 30 Title: Dialogical Argumentation as a Pedagogic and Mediating Tool for Harmonizing Students' Lifeworld with School Science Presenters: Meshach Ogunniyi, Femi Otulaja, Christopher Diwu, Keith-Roy Langenhoven, and Cynthia Fakudze	Hyatt Presidio ABC
8:00 AM – 11:45 AM	Pre-Conference Workshop #4: Research Committee Free Maximum registration – 40 Title: Developing a Competitive Educational Research Proposal for the US National Science Foundation (NSF) Division of Research on Learning Presenters: Michael Ford	Hyatt Travis AB
8:00 AM – 11:45 AM	Pre-Conference Workshop #5: Research Committee Free Maximum registration – 50 Title: Designing Adequately Powered Effectiveness Trials for Science Intervention Studies Presenters: Joe Taylor, Jessaca Spybrook, and Susan Kowalski	Hyatt Bowie ABC

Date/Time	Event	Room
8:00 AM – 11:45 AM	Pre-Conference Workshop #6: Publications Advisory Committee Free Maximum registration – 30 Title: Scholarly Writing for Early Career Researchers Presenters: Julie Luft, Angie Calabrese Barton, Bryan Brown, Zahara Hazari, Vanessa Kind, Danusa Munford, Marissa Rollnick, and Bhaskar Upadhyay	Hyatt Crockett AB
10:30 AM – 11:45 AM	Pre-Conference Workshop #7: A NARST Board Sponsored Workshop Free Maximum registration – 90 Title: Making NARST Transparent: Organization, Roles and Responsibilities Organizers: Tali Tal, Katherine McNeill, Barbara Crawford, Selina Bartels, and John Tillotson	Hyatt Lone Star E
11:45 AM – 12:50 PM	Attendees	Lunch on your own
11:45 AM – 12:50 PM	Committee Meetings (Box lunch provided for committee members)	Concurrent Session Rooms
1:00 PM – 2:30 PM	Plenary Session #1 Speaker: Andreas Schleicher, Director for Education and Skills, Special Advisor on Education Policy to the Secretary-General, Organization for Economic Co-operation and Development (OECD) Title: Strong Performers and Successful Reformers in Science Education: Lessons from the World	Hyatt Texas Ballroom A, B, and C
2:40 PM – 4:10 PM	Concurrent Session #1	Concurrent Session Rooms
4:20 PM – 5:50 PM	Concurrent Session #2	Concurrent Session Rooms
6:00 PM – 7:00 PM	Mentor-Mentee Nexus	Hyatt Presidio ABC
6:00 PM – 7:00 PM	Research Interest Groups (RIGs) Meetings Contemporary Methods for Science Education Research Continental and Diasporic Africa in Science Education (CADASE) Engineering Education Latino/a RIG (LARIG)	Hyatt Lone Star D Hyatt Lone Star E Hyatt Lone Star F Hyatt Bowie ABC
7:00 PM – 9:30 PM	Presidential / Welcome Reception (Appetizers served and cash bar)	Hyatt Texas Ballroom D, E, and F

Sunday, April 23

6:00 AM – 7:15 AM	Mind and Sole (Off-site)* <i>*This event is not sponsored nor endorsed by NARST</i>	Grand Hyatt Lobby
7:00 AM – 5:00 PM	Conference Registration	Hyatt Texas Foyer
8:30 AM – 10:00 AM	Concurrent Session #3	Concurrent Session Rooms
10:15 AM – 11:45 AM	Concurrent Session #4	Concurrent Session Rooms
12:00 PM – 1:00 PM	NARST Annual Membership Meeting (formerly NARST Business Meeting) (Box lunch provided for 1st 100 attendees who sign up)	Hyatt Bowie ABC
12:00 PM – 1:00 PM	Lunch	On your own
1:15 PM – 2:45 PM	Concurrent Session #5	Concurrent Session Rooms
2:45 PM – 3:15 PM	Break	
3:15 PM – 4:15 PM	Concurrent Session #6A: Poster Session	Hyatt Texas Ballroom A, B, and C
4:15 PM – 5:15 PM	Concurrent Session #6B: Poster Session	Hyatt Texas Ballroom A, B, and C
5:30 PM – 7:00 PM	Graduate Student Forum	Hyatt Travis CD
5:30 PM – 7:00 PM	Early Career Faculty Forum	Hyatt Presidio ABC

Date/Time	Event	Room
6:00 PM – 8:30 PM	JRST Editorial Team Meeting / Dinner Sponsored by Wiley-Blackwell (By invitation only)	HBG Convention Center 004
6:00 PM – 7:30 PM	Reception: <i>International Journal of Science and Mathematics Education</i> Sponsored by Springer (By invitation only)	Hyatt Bowie ABC

Monday, April 24

7:15 AM – 8:30 AM	Committee Meetings	
7:00 AM – 5:00 PM	Registration	Hyatt Texas Foyer
8:45 AM – 10:15 AM	Plenary Session #2: Theme: Challenges in Learning Science Concepts Presenter: Michelene (Micki) Chi, Dorothy Bray Endowed Professor of Science and Teaching, Division of Educational Leadership and Innovation, Mary Lou Fulton Teachers College, Arizona State University Title: Teaching Emergence: An Attempt at Differentiating Science Concepts of Processes Presenter: Stella Vosniadou, Strategic Professor, School of Education Flinders University, Australia Title: The Co-existence of Intuitive and Scientific Understandings: Implications for the Design of Curricula and Instruction	Hyatt Texas Ballroom A, B, and C
10:30 AM – 12:00 PM	Concurrent Session # 7	Concurrent Session Rooms
12:15 PM – 2:15 PM	Awards Luncheon	Hyatt Texas Ballroom D, E, and F
2:30 PM – 4:00 PM	Concurrent Session # 8	Concurrent Session Rooms
4:15 PM – 5:45 PM	Concurrent Session # 9	Concurrent Session Rooms
6:30 PM – 9:00 PM	Equity and Ethics Dinner (Maximum attendance: 80) Dinner, including tax and gratuity, is \$50. <i>Please note:</i> You must register for this event with your Advance Conference Registration. Tickets purchased for this event are not refundable. There will be no tickets sold onsite.	Off-site: Fogo de Chão San Antonio 849 E. Commerce St. #393

Tuesday, April 25

7:00 AM – 8:15 AM	Strand Meetings	Concurrent Session Rooms
7:00 AM – 12:00 PM	Conference Registration	Hyatt Texas Foyer
8:30 AM – 10:00 AM	Concurrent Session # 10	Concurrent Session Rooms
10:15 AM – 11:45 AM	Concurrent Session # 11	Concurrent Session Rooms
12:00 PM – 1:00 PM	Lunch	On your own
1:00 PM – 2:30 PM	Concurrent Session # 12	Concurrent Session Rooms
2:45 PM – 4:15 PM	Concurrent Session # 13	Concurrent Session Rooms
5:00 PM – 10:00 PM	NARST Executive Board Meeting #2	Hyatt Texas Ballroom D

PROGRAM

Friday, April 21, 2017

NARST Executive Board Meeting Session #1

7:30am – 5:00pm, Hyatt Lone Star D

Conference Registration

2:00pm – 5:00pm, Hyatt Texas Foyer

Saturday, April 22, 2017

Conference Registration

7:00am – 5:00pm, Hyatt Texas Foyer

NARST Executive Board Meeting

Session #1 (continued)

7:30am – 10:15am, Hyatt Lone Star D

Pre-Conference Workshops

8:00am – 11:45am

Pre-Conference Workshop #1: Equity and Ethics

Committee (Free – 90 participants max)

Glocalization and Sustainability of Science Education Research and Practice

8:00am – 11:45am, Hyatt Lone Star F

Organizers:

Enrique Lopez
Nam-Hwa Kang
Tasneem Anwar
Senetta Bancroft
Phillip Boda
Tamra-Kay Alisa Francis
Deniz Saribas
Azam Saiqa
Sheron Mark

Pre-Conference Workshop #2: Research Committee

(Free – 42 participants max)

Critical Youth Participatory Research in Science Education

8:00am – 11:45am, Hyatt Republican ABC

Presenters:

Angela Calabrese Barton
Edna Tan
Jrene Rahm
Christina Nazar
Kathleen Schenkel
Daniel Birmingham
Tara O'Neill
Takumi Sato
Day Greenberg

Pre-Conference Workshop #3: Research Committee

(Free – 30 participants max)

Dialogical Argumentation as a Pedagogic and Mediating Tool for Harmonizing Students' Lifeworld with School Science

8:00am – 11:45am, Hyatt Presidio ABC

Presenters:

Meshach Ogunniyi
Femi Otulaja
Christopher Diwu
Keith-Roy Langenhoven
Cynthia Fakudze

Pre-Conference Workshop #4: Research Committee

(Free – 40 participants max)

Developing a Competitive Educational Research Proposal for the US National Science Foundation (NSF) Division of Research on Learning

8:00am – 11:45am, Hyatt Travis AB

Presenters:

Michael Ford

Pre-Conference Workshop #5: Research Committee

(Free – 50 participants max)

Designing Adequately Powered Effectiveness Trials for Science Intervention Studies

8:00am – 11:45am, Hyatt Bowie ABC

Presenters:

Joe Taylor
Jessaca Spybrook
Susan Kowalski

Pre-Conference Workshop #6: Publications Advisory

Committee (Free – 30 participants max)

Scholarly Writing for Early Career Researchers

8:00am – 11:45am, Hyatt Crockett AB

Presenters:

Julie Luft
Bryan Brown
Zahra Hazari
Vanessa Kind
Danusa Munford
Marissa Rollnick
Bhaskar Upadhyay

Pre-Conference Workshop #7: A NARST Board Sponsored Workshop (Free – 90 participants max)
Making NARST Transparent: Organization, Roles and Responsibilities

10:30am – 11:45am, Hyatt Lone Star E

Organizers:

Tali Tal

Katherine McNeill

Barbara Crawford

Selina Bartels

John Tillotson

Lunch—On Your Own
11:45am – 12:50pm

Committee Meetings

(Box lunch provided for committee members)

11:45am – 12:50pm

Awards Committee Chairs & Co-Chairs Meeting

11:45am – 12:50pm, Hyatt Lone Star E

Equity and Ethics Committee Meeting

11:45am – 12:50pm, Hyatt Lone Star F

External Policy and Relations Committee Meeting

11:45am – 12:50pm, Hyatt Bonham B

Research Committee Meeting

11:45am – 12:50pm, Hyatt Bonham C

Membership and Election Committee Meeting

11:45am – 12:50pm, Hyatt Bonham D

International Committee Meeting

11:45am – 12:50pm, Hyatt Bonham E

Program Committee Meeting

11:45am – 12:50pm, Hyatt Bowie ABC

Publications Advisory Committee Meeting

11:45am – 12:50pm, Hyatt Crockett AB

Plenary Session #1

Strong Performers and Successful Reformers in Science Education: Lessons from the World

1:00pm – 2:30pm, Hyatt Texas Ballroom A, B, and C

Presider: Mei-Hung Chiu, National Taiwan Normal University

Presenter:

Andreas Schleicher

Director for Education and Skills, Special Advisor on Education Policy to the Secretary-General, Organization for Economic Co-operation and Development (OECD)

Concurrent Session #1
2:40pm – 4:10pm

Publications Advisory Committee Sponsored Symposium

How to Get Your Research Published in Science Education Journals

2:40pm – 4:10pm, Hyatt Lone Star D

Presider: Alicia C. Alonzo, Michigan State University

Representatives of Publishers:

Ian White, Routledge

Eric Piper, Wiley

Bernadette Ohmer, Springer

Journal Editors:

Fouad Abd-El-Khalick, Journal of Research in Science Teaching

Dana L. Zeidler, Journal of Research in Science Teaching

Sherry A. Southerland, Science Education

John Settlage, Science Education

Jan H. Van Driel, International Journal of Science Education

Ross Nehm, CBE Life Science Education

Catherine Milne, Cultural Studies in Science Education

Christina Siry, Cultural Studies in Science Education

Michael Mueller, Cultural Studies in Science Education

Alan Reid, Environmental Education Research

Sue Dale Tunnicliffe, Journal of Biological Education

Lisa Benson, Journal of Engineering Education

Jan van Aalst, Journal of the Learning Sciences

Susan Yoon, Journal of the Learning Sciences

Kent Crippen, Journal of Science Education and Technology

Norm G. Lederman, Journal of Science Teacher Education

Judith S. Lederman, Journal of Science Teacher Education

Gregory J. Kelly, Science and Education

Shrikrishna Singh, Routledge/Taylor & Francis

David Boyt, Routledge/Taylor & Francis

Strand 1: Science Learning, Understanding and Conceptual Change

Administrative ESERA Sponsored Session

Admin Symposium: How Effective is Education for Sustainable Development at School? Findings from Recent Studies across Europe

2:40pm – 4:10pm, Hyatt Lone Star E

Presenters:

Anna Uitto, University of Helsinki, Finland
 Jelle Boeve-de-Pauw, University of Antwerp, Belgium
 Niklas M. Gericke, Karlstad University, Sweden
 Daphne Goldman, Beit Berl Academic College, Israel
 Dorit Baum, University of Haifa, Israel
 Teresa Berglund, Karlstad University, Sweden
 Daniel Olsson, Karlstad University, Sweden
 Peter Van Petegem, University of Antwerp, Belgium
 Seppo Saloranta, University of Helsinki, Finland
 Bell Weiss, University of Haifa, Israel

Admin Symposium: Quality STEM Education for All: The Role of Science Education in Supporting Migrant and Refugee Children

2:40pm – 4:10pm, Hyatt Bowie ABC

Presenters:

Ibrahim Delen, Usak University
 Knut Neumann, Leibniz Institute for Science Education, Kiel
 Ingrid M. Sanchez-Tapia, UNICEF
 Joseph S. Krajcik, Michigan State University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Symposium: Epistemic Agency as a Members' Experience

2:40pm – 4:10pm, Hyatt Travis AB

Presider: Christina Krist, University of Maryland College Park

Discussant: Brian Reiser, Northwestern University

Presenters:

Christina Krist, University of Maryland College Park
 Danielle T. Keifert, Exploratorium
 Déana A. Scipio, TERC
 Anna M. Phillips, Tufts University
 Jessica Watkins, Tufts University
 David Hammer, Tufts University
 Brian J. Reiser, Northwestern University

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

Assessing Young Learner's Science Thinking

2:40pm – 4:10pm, Hyatt Bonham B

Presider: Sarah J. Carrier, North Carolina State University

Identifying the Ingredients of STEM in Unexpected Places: Early Childhood Cooking Activities

Todd Milford, University of Victoria
 Christine D. Tippet, University of Ottawa

Investigating Upper Elementary Students' Conceptual Knowledge of Magnetism through Writing

Osman Aksit, North Carolina State University
 Alonzo B. Alexander, North Carolina State University
 Eric N. Wiebe, North Carolina State University
 Bradford Mott, North Carolina State University
 James C. Lester, North Carolina State University

Learning a System of Practices of Science through Energy: A Fourth-grade Case Study

Roger G. Tobin, Tufts University
 Sara J. Lacy, TERC
 Sally Crissman, TERC
 Nick Haddad, TERC
 Nathaniel J.S. Brown, Boston College
 Gulsah Gurkan, Boston College
 Courtney Castle, Boston College

The Effect of Hands-on Activities on Elementary Science Learning: A Critical Literature Review

J. Steve Oliver, University of Georgia
 Lu Wang, University of Georgia

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

Special Topics in Science Teaching and Learning

2:40pm – 4:10pm, Hyatt Crockett AB

Presider: Alex T. Madsen, Purdue University

Assessing Teacher and Student Effects of the Research Goes to School Project

Alex T. Madsen, Purdue University
 Gabriela C. Weaver, University of Massachusetts Amherst

Fifth Grade Students' Model-based Argumentation and Informal Reasoning about Landslides

Bahadir Namdar, Recep Tayyip Erdogan University
Aysegul Demir, Recep Tayyip Erdogan University

Impact of the STEM Career Graph on the Perceived Inclusion of STEM Domains in Careers

Daniel L. Dickerson, East Carolina University
Kristine L. Callis-Duehl, East Carolina University
Joi P. Walker, East Carolina University
Steven F. Wolf, East Carolina University
William J. McConnell, Virginia Wesleyan College
Petros Katsioloudis, Old Dominion University
Stephen R. Burgin, University of Arkansas

Students' Longitudinal NOS Views 4-5 Years after an Explicit/Reflective Middle School Science Course

Jesse L. Wilcox, Drake University
Jerrid W. Kruse, Drake University
Randi E. Lines, Drake University
Ehren Whigham, Drake University

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

Symposium: Biology Education Research (BER) at NARST – Opportunities for All

2:40pm – 4:10pm, Hyatt Crockett CD

Presider: Abdi M. Warfa, University of Minnesota

Presenters:

Abdi M. Warfa, University of Minnesota
Sehoya Cotner, University of Minnesota
Sara E. Brownell, Arizona State University
Stephanie Gardner, Purdue University
Maurina L. Aranda, Purdue University
Cara Gormally, Gallaudet University
Seth K. Thompson, University of Minnesota
Cissy Ballen, Cornell University
Katelyn Cooper, Arizona State University
Lucas M. Jenó, University of Bergen

Strand 7: Pre-service Science Teacher Education Symposium: Developing Trajectories for Ambitious and Equitable Elementary Science Teaching: Exploring Novices' Knowledge, Beliefs, and Practices

2:40pm – 4:10pm, Hyatt Presidio ABC

Discussant: Mandy Biggers, Pennsylvania State University

Presenters:

Elizabeth A. Davis, University of Michigan
Annemarie Palincsar, University of Michigan
Amber S. Bismack, University of Michigan
Benjamin L. Tupper, University of Michigan
Jacqueline F. Handley, University of Michigan
Mandy Biggers, Pennsylvania State University

Strand 8: In-service Science Teacher Education Argumentation

2:40pm – 4:10pm, Hyatt Bonham D

Presider: Margaret R. Blanchard, North Carolina State University

Supporting Self-Regulated Learning Strategies to Improve Teacher Outcomes in a Scientific Argumentation Professional Development Experience

Erin E. Peters-Burton, George Mason University
Jordan Goffena, George Mason University
Mike Briscoe, George Mason University

Teacher Changes While Implementing Argument-based Inquiry and Their Impact on Student Critical Thinking Skills

Soonhye Park, North Carolina State University
Jee Kyung Suh, University of Iowa
Yejun Bae, The University of Iowa
Brian M. Hand, University of Iowa

The Impact of Implementing and Refining an Argumentation Instructional Model on Science Teachers' Beliefs

Patrick J. Enderle, Georgia State University
Ozden Sengul, Georgia State University
Yotah Koulagna, Georgia State University
Jonathon Grooms, George Washington University
Victor D. Sampson, University of Texas, Austin

Theory and Pedagogy of Argumentation in Science Education: Science Teachers' Instructional Practices

Yasemin Ozdem-Yilmaz, Gaziosmanpasa University
Jale Cakiroglu, Middle East Technical University
Hamide Ertepinar, Istanbul Aydin University

Strand 8: In-service Science Teacher Education
Symposium: Exploring Examples of Organizational Sensemaking as Educators Shift Teaching Practices to Align to NGSS

2:40pm – 4:10pm, Hyatt Republic ABC

Discussant: Carrie Allen, SRI International

Presenters:

Sara C. Heredia, The University of North Carolina, Greensboro

Tammy L. Cook-Endres, Exploratorium

Therese Arseneault, Gateway Middle School

Clarissa Deverel, Gale Ranch Middle School

Carrie D. Allen, SRI International

Strand 11: Cultural, Social, and Gender Issues
Symposium: A Spectrum of Youth Participation in Research Across Sites/Uses: Toward Critical Equity Frameworks

2:40pm – 4:10pm, Hyatt Travis CD

Presider: Heidi Ballard, University of California Davis

Presenters:

Angela Calabrese Barton, Michigan State University

Edna Tan, University of North Carolina, Greensboro

Takumi Sato, Virginia Polytechnic Institute and State University

Daniel Birmingham, Colorado State University

Tara B. O'Neill, University of Hawaii

Myunghwan Shin, California State University, Fresno

Kathleen A. Schenkel, Michigan State University

Day W. Greenberg, Michigan State University

Christina Restrepo Nazar, Michigan State University

Heidi Ballard, University of California, Davis

Strand 12: Educational Technology

New Frontiers for Learning

2:40pm – 4:10pm, Hyatt Bonham C

Presider: Muhsin Menekse, Purdue University

Project-Based MOOCs As Means For Enhancing Knowledge Construction And Motivation To Learn

Miri Barak, Technion-Israel Institute of Technology

Abeer Watted, Technion-Israel Institute of Technology

EMAC Framework: Disseminating Research Findings through Blogs, Podcasts, and Online Videos

Eun Ah Lee, University of Texas, Dallas

Matthew J. Brown, University of Texas, Dallas

Second-year Results from a Randomized Trial to Evaluate Globalized Online Science Units for Middle School

Fatima Terrazas Arellanes, University of Oregon

Emily Walden, University of Oregon

Lisa Strycker, University of Oregon

Alejandro J. Gallard, Georgia Southern University

Strand 13: History, Philosophy, and Sociology of Science
Diversity in Nature of Science, Scientific Inquiry and History and Philosophy of Science

2:40pm – 4:10pm, Hyatt Lone Star F

Presider: Allison Antink-Meyer, Illinois State University

Beyond the Myth of the “Scientific Method”: A Case Study of Pre-service Chemistry Teachers’ Understanding of the Diversity of Scientific Methods

Sibel Erduran, University of Oxford, UK

Ebru Kaya, Bogazici University

Complex Changes: Visualizing Teacher’s Accurate Understanding and Misconceptions Regarding Scientific Inquiry and Nature of Science

Yue Li, Miami University

Sarah B. Woodruff, Miami University

Understanding and Acceptance of the Theory of Evolution Among Tibetan Buddhist Monastics

Tenzin Sonam, University of Arizona

Who Are We? Mapping Difference among Academics’ of Science Teaching and Learning Values and Approaches

Michelle Wooten, University of Alabama

Concurrent Session #2

4:20pm – 5:50pm

Strand 1: Science Learning, Understanding and Conceptual Change

Modeling, Explaining and Reasoning about Matter

4:20pm – 5:50pm, Hyatt Bowie ABC

Presider: Mark A. McDermott, University of Iowa

A Study of Elementary Children’s Mental Models of Atomic Structure

Carole E. Haeusler, University of Southern Queensland

Jennifer Donovan, University of Southern Queensland

Exploring the Conceptual Affordances of Embodied Explanatory Control of a Gas Pressure Simulation

David E. Brown, University of Illinois, Urbana Champaign

Nitasha Mathayas, University of Illinois, Urbana Champaign

Robb Lindgren, University of Illinois, Urbana Champaign

Linking Middle School Students’ Chemistry Content Knowledge and Spatial Reasoning

Merryn Cole, University of Kentucky

Jennifer A. Wilhelm, University of Kentucky

Strand 1: Science Learning, Understanding and Conceptual Change

Model-based Teaching and Learning of Science

4:20pm – 5:50pm, Hyatt Lone Star E

Presider: May Lee, Michigan State University

Second Graders’ Emerging Particulate Models of Matter in the Context of Learning through Model-Based Inquiry

Ala Samarapungavan, Purdue University

Lynn A. Bryan, Purdue University

Jamison M. Wills, Purdue University

Impact of Model-based Science Instruction on 3rd Grade Students’ Scientific Explanations for Hydrologic Cycling

Cory T. Forbes, University of Nebraska, Lincoln

Devarati Bhattacharya, University of Nebraska, Lincoln

Ben Baumfalk, University of Nebraska, Lincoln

Tina Vo, University of Nebraska, Lincoln

Laura Zangori, University of Missouri

Christina V. Schwarz, Michigan State University

Greg Welch, University of Nebraska, Lincoln

The Influence of Model-based Science Teaching on Female Students’ Attitudes and Confidence Levels

Grant Williams, Saint Thomas University

John J. Clement, University of Massachusetts

Using Revised Modeling Ability Analytic Index to Compare Cross-countries Students’ Modeling Ability in TIMSS Items

Jing-Wen Lin, National Dong Hwa University

Ruan-Ching Yu, National Dong Hwa University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set: Promoting Engagement and Learning in Elementary Science Using Multiple Literacies in Project-based Learning

4:20pm – 5:50pm, Hyatt Travis AB

Using Multimedia Resources and Digital Tools to Engage Third Graders in the Work of Ornithologists

Annemarie S. Palincsar, University of Michigan
Meredith Baker, University of Michigan
Kirsten Edwards, University of Michigan
Miranda Fitzgerald, University of Michigan
Linda Lee Kucan, University of Pittsburgh
Elliot Soloway, University of Michigan

Using Discourse Tools to Foster Student Intentionality in Knowledge Building and Equitable Sense-Making

Emily Miller, University of Wisconsin, Madison

Purposeful Pedagogy: Teachers' Experience with Project Based Learning

Barbara Schneider, Michigan State University
Emily Miller
Joseph S. Krajcik, Michigan State University

Constructing the Practice of Scientific Modeling in Project-Based Elementary Science Classes

Deborah C. Peek-Brown, Michigan State University
Kellie Cunningham, Michigan State University

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

A Symposium on Teaching and Learning about Climate Change: A Framework for Educators

4:20pm – 5:50pm, Hyatt Crockett AB

Presenters:

Michael P. Clough, Iowa State University
Elizabeth Hufnagel, University of Maine
Dana L. Zeidler, University of South Florida
Amanda N. Peel, University of Missouri
Charles W. Anderson, Michigan State University
Daniel P. Shepardson, Purdue University
Wendy R. Johnson, Michigan State University
Kirstin C. Busch, Stanford University
J. R. McGinnis, University of Maryland
Glenn Branch, National Center for Science Education

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

Related Paper Set: The Impacts of the Learning Assistant (LA) Models on LA and Student Outcomes

4:20pm – 5:50pm, Hyatt Crockett CD

Analysis of Learning Assistants' Physics Identity Development through the Lens of Communities of Practice

Eleanor W. Close, Texas State University
Jessica Conn, Texas State University
Aaron Collins, Texas State University
Rebel Nicholson, Texas State University

Impact of the Learning Assistant Experience on Teachers' Classroom Practice

Kara Gray, University of Colorado, Boulder
Valerie K. Otero, University of Colorado, Boulder

In-class vs. Online Administration of Concept Inventories and Attitudinal Assessments

Manher Jariwala
Ben Van Dusen, California State University, Chico
Eleanor W. Close, Texas State University
Jada-Simone S. White

The Impact of Learning Assistants on Inequities in Physics Student Outcomes

Jayson Nissen, California State University, Chico
Ben Van Dusen, California State University, Chico

Strand 6: Science Learning in Informal Contexts

Symposium: Using Locally Relevant Authentic Inquiries to Engage Youth in Environmental Science Topics Out-of-School

4:20pm – 5:50pm, Hyatt Bonham E

Presider: Bernadette Sibuma, Education Development Center, Inc.

Discussant: Caroline Parker, Education Development Center, Inc.

Presenters:

Bernadette Sibuma, Education Development Center, Inc.
Caroline Parker, Education Development Center, Inc.
Lauren B. Birney, Pace University
Ardice Hartry, University of California, Berkeley
Anne Kern, University of Idaho
Kathy Bertram, Alaska Pacific University
Gerald Knezek, University of North Texas
Rhonda Christensen, Institute for the Integration of Technology into Teaching and Learning

Strand 7: Pre-service Science Teacher Education
Argumentation, Evidence, and Socioscientific Issues

4:20pm – 5:50pm, Hyatt Lone Star F

Presider: Ibrahim Delen, Usak University

Contribution of the Argumentation-Based Laboratory to Pre-Service Chemistry Teachers' Microscopic Explanations of Chemistry Concepts

Selcuk Kilinc, Middle East Technical University

Mustafa Tuysuz, Yuzuncu Yil University

Esra Sarici, Middle East Technical University

Ceren Soysal, Middle East Technical University

Esen Uzuntiryaki-Kondakci, Middle East Technical University

Learning to Teach Science through Socioscientific Issues in Pre-service Science Teacher Education

Devrim Guven, Bogazici University

John W. Tillotson, Syracuse University

Pre-service Teachers' Thinking About Evidence and Evaluations of Trustworthiness of the Claims in Socioscientific Issues

Gaye D Ceyhan, Syracuse University

Deniz Saribas, Istanbul Aydin University

Doug Lombardi, Temple University

Using a Dialogical Argumentation Instructional Model for Integrating Science and Indigenous Knowledge Worldviews

Keith R. Langenhoven, University of the Western Cape

Strand 7: Pre-service Science Teacher Education
Pre-service Teachers' Understanding of Science

4:20pm – 5:50pm, Hyatt Travis CD

Presider: Amy M. Lark, Michigan Technological University

Developing Tools to Support the Growth of Science Teachers' Pedagogical Content Knowledge: Analysis of Narrative

Saiqa Azam, Memorial University of Newfoundland

Pre-service Teachers' Understanding of Modeling-Based Assessment in Science Classrooms

Young Ae Kim, University of Georgia

J. Steve Oliver, University of Georgia

Supporting Secondary Science Pre-service Teachers in Developing Formative Assessment Pedagogical Knowledge and Skills

Benjamin Ho, Alpine Academy High School

Melissa A. Jurkiewicz, Mercer University

Strand 8: In-service Science Teacher Education
Related Paper Set: Supporting and Developing K-12 Science Teacher Practice, Knowledge, and Leadership Through Vertically Aligned PLCs

4:20pm – 5:50pm, Hyatt Republic ABC

A Comparative Study of the Implementation of a Multi-site Professional Development Program on Teacher Learning and Instructional Practices in Science

Kelly Riedinger, Oregon State University

Self-Efficacy for K-12 Teachers of Science

Amanda M. Gunning, Mercy College

Peter Hillman, Mercy College

Meghan E. Marrero, Mercy College

Quality of Feedback in Vertically Aligned PLCs

Mika Munakata, Montclair State University

Emily Klein, Montclair State University

Monica Taylor, Montclair State University

Kristen Trabona, Montclair State University

Zareen Rahman, Montclair State University

Effective Development and Support for Practicing Elementary Science Teachers

Peter Hillman, Mercy College

Strand 10: Curriculum, Evaluation, and Assessment
Symposium: Assessing Systems Thinking through Science and Engineering Practices

4:20pm – 5:50pm, Hyatt Bonham D

Discussant: Susan Yoon, University of Pennsylvania

Presenters:

Hee-Sun Lee, The Concord Consortium

Daniel N. Damelin, The Concord Consortium

Amy Pallant, The Concord Consortium

Jie Chao, The Concord Consortium

Charles Xie, Concord Consortium

Carolyn Staudt, Concord Consortium

Nanette Dietrich, Millersville University

Susan Yoon, University of Pennsylvania

Strand 10: Curriculum, Evaluation, and Assessment
Symposium: New Directions and Long-standing Issues in Assessment of Evolutionary Knowledge

4:20pm – 5:50pm, Hyatt Lone Star D

Discussant: Louis Nadelson, Boise State University

Presenters:

Cesar Delgado, North Carolina State University

Kathryn Green, North Carolina State University

Margaret M. Lucero, Santa Clara University

Dianne L. Anderson, Point Loma Nazarene University

Louis S. Nadelson, Boise State University

Strand 11: Cultural, Social, and Gender Issues
Symposium: Structured Poster Session on Culture, Context and Science Assessments: Obstacles or Opportunities for Glocalization?

4:20pm – 5:50pm, Hyatt Presidio ABC

Discussant: Steven Semken, Arizona State University

Presenters:

Sharon Nelson-Barber, WestEd

Pauline W. U. Chinn, University of Hawaii, Manoa

Kaui Sang, Hawaii Department of Education

Huihui Kanahale Mossman, University of Hawaii

Irasema Ortega, University of Alaska – Anchorage

Steven C. Semken, Arizona State University

Strand 14: Environmental Education
Climate Change, Religious Worldviews

4:20pm – 5:50pm, Hyatt Bonham C

Presider: Barry Golden, University of Tennessee

Development of a Contextualized Spatial Thinking Assessment for Enhanced Greenhouse Effect

Heather J. Skaza Acosta, Florida Gulf Coast University

Marykay Orgill, University of Nevada, Las Vegas

Kent J. Crippen, University of Florida

Is Climate Change being Taught in U.S. Schools? An Analysis of Science Frameworks

Barry Golden, University of Tennessee

Amelia Brown, University of Tennessee

Moving beyond a Knowledge Deficit Perspective & Towards a Theory of Climate Change Action for Youth

K.C. Busch, Stanford University

Relationships among Evangelical College Students' Worldviews and their Anthropogenic Climate Change Literacy

Joel Light, University of Northwestern, Saint Paul

Fred Finley, University of Northwestern, Saint Paul

Social-cultural Anchors for Sustainability within Israeli Youth Movements: Comparison among Secular, Religious and Ultra-orthodox Movements

Daphne Goldman, Beit Berl College

Sara Pe'er, Oranim

Bela Yavetz, Kibbutzim

Strand 15: Policy
Related Paper Set: Detailed Examination of Intervention Research in Science Education: Findings from Three Large-scale Meta-analyses

4:20pm – 5:50pm, Hyatt Bonham B

Discussant: Erin Furtak, University of Colorado

Logistics and Techniques for Conducting Large-scale Meta-analyses Subject/Problem

Qi Z Zhang, Western Michigan University

Qian Wang, Western Michigan University

Karen Askinas, BSCS

Joseph A. Taylor, BSCS

Susan M. Kowalski, BSCS

A Large-scale Statistical Meta-Analysis of Student Science Outcomes

Joseph A. Taylor, BSCS

Susan M. Kowalski, BSCS

Karen Askinas, BSCS

Qi Zhang, Western Michigan University

Qian Wang, Western Michigan University

A Large-Scale Meta-Analysis of Teacher Interventions in Science Education

Karen Askinas, BSCS

Susan M. Kowalski, BSCS

Joseph A. Taylor, BSCS

A Descriptive Meta-analysis of the Federally Funded Portfolio of Science Education: NSF, NIH, and IES

Susan M. Kowalski, BSCS

Joseph A. Taylor, BSCS

Karen Askinas, BSCS

Erin M. Furtak, University of Colorado

Evening/Social Events

Membership and Elections Committee Sponsored Session *Mentor-Mentee Nexus*

Informal discussion: Early career NARST members are matched with more seasoned members to help launch or expand professional networks.

6:00pm – 7:00pm, Hyatt Presidio ABC

Presiders: Malcolm Butler, University of Central Florida

Research Interest Groups (RIGs) Meetings

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. At the 2017 Business Meeting, the RIG members will engage in a series of exploratory planning discussions. The intended outcome of these discussions is to elaborate and clarify the RIG's mission, as well as identifying future speakers, future subcommittees, and interest in RIG leadership positions.

6:00pm – 7:00pm, Hyatt Lone Star D

Presider: Joseph Taylor, BSCS

Continental and Diasporic Africa in Science Education (CADASE)

CADASE RIG is driven by the mission to support research in science education that will have a positive impact on the lives of children of African ancestry. This is accomplished by (a) encouraging science educators to engage in research aimed at meeting the needs of people of African ancestry; and (b) providing intellectual, professional, and personal space for science educators engaged in such research. At the 2017 NARST-CADASE RIG business meeting, members will continue to discuss plans to work on its unfinished business from the past year including: a) arrange for junior faculty to partner with senior faculty with similar research interests to possibly participate in cross-regional research and compare outcomes; b) establish a formal mentorship program for senior professors to mentor junior faculty through email and/or face-to-face interactions and to provide assistance and recommendations with job placements; c) work to recruit science education scholars from Central and South America into CADASE membership d) work to recruit graduate science education scholars into CADASE membership; and e) intensify efforts to establish a stronger relationship with science education scholars throughout the African continent.

6:00pm – 7:00pm, Hyatt Lone Star E

Presiders:

Irene U. Osisioma, California State University, Dominguez Hills
Leon Walls, University of Vermont

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. At the 2017 Business Meeting, the RIG members will discuss the following items:

- a) Updates on membership (120+ members), listserv, and facebook community; b) Voting for next year's leadership team; c) Plans for collaborative paper sets, symposiums, and panels; and d) Support for networking.

6:00pm – 7:00pm, Hyatt Lone Star F

Presiders:

Cathy Lachapelle
Tamara Moore

Latino/a RIG (LARIG)

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

6:00pm – 7:00pm, Hyatt Bowie ABC

Presiders: Alejandro Gallard, Georgia Southern University

Presidential/Welcome Reception

Social Event: All NARST conference participants are welcome—free appetizers and cash bar.

7:00pm – 9:30pm, Hyatt Texas Ballroom D, E, and F

Sunday, April 23, 2017

Mind and Sole (Off-Site)

This event is not sponsored or endorsed by NARST.

6:00am – 7:15am, Grand Hyatt Lobby

Conference Registration

7:00am – 5:00pm, Hyatt Texas Foyer

Concurrent Session #3

8:30am – 10:00am

International Committee Sponsored Session

Admin Symposium: 13 Questions: Reframing Education's Conversation: Science

8:30am – 10:00am, Hyatt Republic ABC

Discussant: Lynn A. Bryan, Purdue University

Presenters:

Lucy Avraamidou, University of Groningen, Netherlands
 Ana Becerra, Comunidades Justas/Just Communities
 Carolina Castano Rodriguez, Australian Catholic University
 Rowhea Elmsky, Washington University
 Anita Hussenius, Uppsala University, Sweden
 Shakhnoza Kayumova, University of Massachusetts Dartmouth
 Femi Otulaja, University of the Witwatersrand
 Michael Reiss, University College of London
 Christina Siry, University of Luxembourg
 Lily Taylor, Murdoch University, Australia

Strand 1: Science Learning, Understanding and Conceptual Change

Related Paper Set: Bringing Together Research Traditions: What Can Learning Progressions and Teaching-Learning-Sequences Designers Learn from Each Other?

8:30am – 10:00am, HBG Convention Center 006D

Presiders:

Alicia C. Alonzo, Michigan State University
 Italo Testa, University Federico II, Napoli, Italy

Discussant:

Charles W. Anderson, Michigan State University

Developing Learning Progressions for Momentum and Mechanical Energy: Insights for Instruction

Alicia C. Alonzo, Michigan State University
 Alexander Robinson, Thornapple Kellogg High School, Middleville, MI

Designing a Three-Dimensional Curriculum for Climate Change Education Informed by Learning Progression Research

Hannah K. Miller, Johnson State College
 Wendy R. Johnson, Michigan State University
 Charles W. Anderson, Michigan State University

Iterative Refinement of Teaching Learning Sequences: The Cases of Optical Properties of Materials and Floating/Sinking

Italo Testa, University Federico II, Italy
 Petros Kariotoglou, University of Western Macedonia, Greece
 Dimitris Psillos, University of Thessaloniki, Greece

Improving Student Understanding of Quantum Mechanics Concepts Using a Quantum Interactive Learning Tutorial

Emily M. Marshman, University of Pittsburgh
 Chandralekha Singh, University of Pittsburgh

Evaluating and Redesigning Introductory Physics Teaching Learning Sequences

Kristina Zuza Elozegi, University of Basque Country, Spain
 Jaume Ametller, Universitat de Girona, Spain
 Jenaro Guisasola, University of Basque Country, Spain

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Related Paper Set: Deepening Students' Understanding of Modern Genetics: Four Approaches that Link Molecular Genetics with Mendelian Genetics

8:30am – 10:00am, HBG Convention Center 007A

Presider: Anat Yarden, Weizmann Institute of Science

Discussant: Grady Venville, University of Western Australia

Students' Molecular Genetics Explanations of Inheritance Patterns

Moriama Castro-Faix, Rutgers University
 Ravit Golan Duncan, Rutgers University

High School Students' Ability to Connect Three Conceptual Models in Genetics

Michal Haskel-Ittah, Weizmann Institute of Science
 Anat Yarden, Weizmann Institute of Science

Difficulties in Integrating the Genetic-Meiotic and Genetic-Molecular Models of Genetics

Amber Todd, Wright State University
 William L. Romine, Wright State University

Interactions between Modeling and Argumentation while Building the Model of Gene Expression

Noa Ageitos, Universidade de Santiago de Compostela
Blanca Puig Mauriz, Universidade of Santiago de Compostela
Grady J. Venville, University of Western Australia

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

Related Paper Set: Learning Disciplinary Knowledge through Engineering Design in the Elementary Grades

8:30am – 10:00am, Hyatt Crockett AB

An Efficacy Study of [Engineering Curriculum (EC)]: Quantitative Modeling of Outcomes

Cathy P. Lachapelle, Museum of Science
Christine M. Cunningham, Museum of Science, Boston
Yoonkyung Oh, Pennsylvania State University

Learning Science through Engineering Design

Gregory J. Kelly, Pennsylvania State University
Christine M. Cunningham, Museum of Science, Boston
Carmen M. Vanderhoof, Pennsylvania State University
Peter R. Licon, Pennsylvania State University

Managing Uncertainty within Elementary Engineering Groups

Carmen M. Vanderhoof, Pennsylvania State University

“Success” is Not the Only Goal: Improvement from Failure in Elementary Engineering Projects

Matthew Johnson, Pennsylvania State University
William S. Carlsen, Pennsylvania State University

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

Related Paper Set: Modeling in Undergraduate Biology: Unpacking Students’ Representations of Systems

8:30am – 10:00am, HBG Convention Center 007C

Presiders:

Jennifer L. Momsen, North Dakota State University
Tammy Long, Michigan State University

How do Undergraduate Students Perceive Models in a Model-based Introductory Biology Course?

Caleb Trujillo, Michigan State University
Steve Bennett, Michigan State University
Tammy Long, Michigan State University

Student Use of Deep Approaches to Modeling in an Introductory Biology Course

Steve Bennett, Michigan State University
Amelia Wenk Gotwals, Michigan State University
Tammy Long, Michigan State University

Analyzing Student Models from a Functional Perspective

Amanda Sebesta, Saint Louis University
Hannah Aherrera, Saint Louis University
Elena Bray Speth, Saint Louis University

How Well Do Student Models Align with their Written Explanations?

Elena Bray Speth, Saint Louis University
Adam Reinagel, Saint Louis University
Sara Wyse, Bethel University
Kari Blom, Bethel University

How Do Students Use Models of Biological Systems to Make Predictions?

Jennifer L. Momsen, North Dakota State University
Sara Wyse, Bethel University

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

Biology and Environmental Learning

8:30am – 10:00am, Hyatt Crockett CD

Presider: Emily M. Walter, California State University

Increasing Undergraduate Cell Biology Performance through Writing-to-Learn

Meena M. Balgopal, Colorado State University
Anne Marie Casper, Colorado State University
Alison M. Wallace, Minnesota State University Moorhead
Paul J. Laybourn, Colorado State University
Ellen Brisch, Minnesota State University, Moorhead

Simulated Computational Model Activity Improves Conceptual Understanding about Biological System

Heather E Bergan-Roller, University of Nebraska, Lincoln
Nicholas J Galt, Valley City State University
Tomá Helikar, University of Nebraska, Lincoln
Joseph Dauer, University of Nebraska, Lincoln

The Impact of an Environment-driven Socioscientific Issue Intervention on Undergraduate Students’ Environmental Consciousness

Hsin-Hui Wang, National Sun Yat-Sen University
Zuway-R Hong, National Sun Yat-Sen University
Huann-Shyang Lin, National Sun Yat-Sen University
Hsiang-Ting Chen, National Sun Yat-Sen University
Kuay-Keng Yang, National Sun Yat-Sen University

***The Science Research Resource Generator:
Undergraduate Sophomore Biology Students' Perceptions
of their Social Capital***

Katherine Doerr Morosky, The University of Texas, Austin
Erin L. Dolan, University of Georgia

***Strand 6: Science Learning in Informal Contexts
Science Learning in and about Nature – B***

8:30am – 10:00am, HBG Convention Center 007B

Presider: Jennifer Dewitt, UCL Institute of Education

***Defining and Developing Curricula in Informal Science
Education Contexts***

Martin H. Smith, University of California, Davis
Steven Worker, University of California
Lynn Schmitt-McQuitty, University of California
Cheryl L. Meehan, University of California
Andrea P. Ambrose, University of California
Kelly M. Brian, University of California
Emily A. Schoenfelder, University of California

***Elementary School Students' Experience in Science
Museum – What Do They Like or Dislike?***

Neta Shaby, Ben-Gurion University of the Negev, Israel
Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev, Israel
Tali Tal, Technion-Israel Institute of Technology

***Participation in Informal Science Learning Experiences:
The Rich Get Richer?***

Jennifer DeWitt, UCL Institute of Education
Louise Archer, UCL Institute of Education

***Perceived Levels of Self-Efficacy in Informal
Science Educators***

Megan Ennes, North Carolina State University
Gail Jones, North Carolina State University
Katherine Chesnutt, North Carolina State University
Hardin Engelhardt, Marbles Children's Museum

***Visitors and Alignment: Actor-network Theory and
the Ontology of Informal Science Institutions***

Patricia Patrick, Consultant

***Strand 7: Pre-service Science Teacher Education
Symposium: Affordances and Challenges of Framing Science
Teacher Preparation Programs around Core Practices***

8:30am – 10:00am, HBG Convention Center 006B

Presenters:

Ron Gray, Northern Arizona University
Melissa Braaten, University of Colorado, Boulder
Danielle K. Ross, Northern Arizona University
David Stroupe, Michigan State University
Elaine V. Howes, American Museum of Natural History
Daniel Wolff, American Museum of Natural History
John Settlage, University of Connecticut
Scott McDonald, Pennsylvania State University
Heather J. Johnson, Vanderbilt University
Kirsten K. Mawyer, University of Hawaii

***Strand 7: Pre-service Science Teacher Education
Pre-service Teachers' Learning of Inquiry-based Teaching***

8:30am – 10:00am, HBG Convention Center 007D

Presider: Cheryl T. Horton, University of North Carolina at
Chapel Hill

***Assessing the Development of Pre-service Biology
Teachers' Inquiry Competence: An Approach to Evaluate
Learning Opportunities***

Sabrina Mathesius, Freie Universität Berlin
Till Bruckermann, University of Cologne
Maria-Elisa Puhmann, Freie Universität Berlin
Kirsten Schlüter, University of Cologne
Annette Upmeier Zu Belzen, Humboldt-Universität Zu Berlin
Dirk Krueger, Freie Universitaet Berlin

***Challenges Pre-service Science Teachers Face when
Implementing a 5E Inquiry Model of Instruction***

Ramya Enugu, Texas Christian University
Hayat Hokayem, Texas Christian University

***Exploring the Impact of a Museum-based Teacher Preparation
Program on Emergent Science Teaching Practices***

Bernadette Doykos, University of Southern Maine
Catherine Fallona, University of Southern Maine
David L. Silvernail, University of Southern Maine

***Prospective Noyce Teacher Candidates' Pedagogical
Orientations towards Inquiry Science Teaching***

Rebekka Darner Gougis, Illinois State University
Frackson Mumba, University of Virginia
Kara E. Baldwin, Illinois State University
William J. F. Hunter, Illinois State University
Anthony W. Lorschbach, Illinois State University

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

8:30am – 10:00am, HBG Convention Center 008A

Presider: Alex T. Kararo, Purdue University

***Creating Successful Middle School Teacher –
Professional Engineer Partnerships To Support NGSS***

Diane Silva Pimentel, University of New Hampshire

***Improving Professional Development Experiences for
Teachers Trainees in a Problem-based/Project-based
Curriculum to Improve their Fidelity of Implementation***

Mary K. Nyaema, University of Iowa

***Investigating the Development of Elementary Teachers’
Philosophy and Nature of Technology & Engineering Views***

Hallie S. Edgerly, Drake University

Jaclyn M. Easter, Grand View University

Jerrid W. Kruse, Drake University

Jesse L. Wilcox, Drake University

***The Influence of an Authentic Engineering Design
Experience on Elementary Teachers’ Nature of
Engineering Views***

Hasan Deniz, University of Nevada Las Vegas

Ezgi Yesilyurt, University of Nevada Las Vegas

Erdogan Kaya, University of Nevada, Las Vegas

Mohamed Trabia, University of Nevada, Las Vegas

**Strand 10: Curriculum, Evaluation, and Assessment
Symposium: NGSS-Aligned Ecosystems Curriculum, PD
and Assessments: What’s Different This Time?**

8:30am – 10:00am, HBG Convention Center 006C

Presider: Suzanne M. Wilson, University of Connecticut

Discussant: Elizabeth Davis, University of Michigan

Presenters:

Anna C. MacPherson, American Museum of Natural History

Wendy M. Jackson, University of California, Berkeley

Dora E. Kastel, American Museum of Natural History

Bianca Montrosse-Moorhead, University of Connecticut

Barbara Nagle, University of California, Berkeley

Maia K. Willcox, University of California, Berkeley

Suzanne M. Wilson, University of Connecticut

Elizabeth A. Davis, University of Michigan

Strand 11: Cultural, Social, and Gender Issues

Increasing Engagement, Building Identity, and Narrowing Gaps

8:30am – 10:00am, HBG Convention Center 008B

Presider: Mary M. Atwater, University of Georgia

***Formulating a Personalized STEM Education and Career
Development Plan from a Lens of Identity Development***

Sheron Mark, University of Louisville

***Acts of Authentication for Teen Identity Authoring in Informal
learning: Examining a Research Practice Partnership***

Geeta Verma, University of Colorado, Denver

Todd Campbell, University of Connecticut

TJ McKenna, University of Connecticut

Analia Villagra, Connecticut Science Center

Hank Gruner, Connecticut Science Center

***Examining the Relationship between Age, Grade-Level,
and Preference for Science Activities in Elementary-aged
Students Grades 3-6***

Angela Skeeles-Worley, University of Virginia

Robert H. Tai, University of Virginia

Ji Hoon Ryoo, University of Virginia

John T. Almarode, James Madison University

Adam V. Maltese, Indiana University

***Micro-agential Steps: Measuring the Initiation of Agency
within Science Classes***

Zahra Hazari, Florida International University

Sanaz Farhangi, Florida International University

Geoff Potvin, Florida International University

***Science Identity as a Gateway for Engineering
Professional Aspirations***

UrLeaka W. Newsome, Metro Nashville Public Schools

Mary M. Atwater, University of Georgia

Strand 12: Educational Technology***Flipped and Blended Learning Environments***

8:30am – 10:00am, Hyatt Travis CD

Presider: Georgia Hodges, University of Georgia***A Content Analysis of Intervention Research on Flipped Classroom Studies in Engineering Courses***

Ceyhan Cigdemoglu, Atilim University

Harika Ozge Arslan, Yuzuncu Yil University

Online Ethics Education for Science and Engineering Graduates: Introducing the C3 Instructional Model

Gizell Green

Miri Barak

The Evidences from 10 Years Literature: A Content Analysis of Flipped Classroom Intervention Research Studies

Harika Ozge Arslan, Yuzuncu Yil University

Ceyhan Cigdemoglu, Atilim University

The Impact of a Blended Learning Environment on Students Understanding: The Case of Redox Reaction

Lu Wang, University of Georgia

Georgia Hodges, University of Georgia

Tom Robertson, Cogent Education

Strand 13: History, Philosophy, and Sociology of Science***Admin Symposium: International Collaborative******Investigation of Beginning Seventh Grade Students'******Understandings of Scientific Inquiry***

8:30am – 10:00am, Hyatt Presidio ABC

Discussants:

Judith Lederman, Illinois Institute of Technology

Norman Lederman, Illinois Institute of Technology

Presenters:

Mark Akubo, Florida State University

Benjamin J. Barlow, Griffith University

Selina Bartels, Illinois Institute of Technology

Estelle Blanquet, Université de Bordeaux & ESPE d'Aquitaine

Ron Blonder, Weizmann Institute of Science

Heba EL-Deghaidy, American University in Cairo, AUC

Ozgur Kivikcan Dogan, Marmara University

David Santibanez Gomez, Universidad Católica Silva Henríquez

Jakob Gyllenpalm, Stockholm University

Soraya Hamed Al-Lal, University of Seville

Cigdem Han-Tosunoglu, Marmara University

Xiao Huang, Zhejiang Normal University

Kerstin Kremer, Kiel University

Jari Lavonen, University of Helsinki

Cheng Liu, Beijing Normal University

Enshan Liu, Beijing Normal University

Shiang-Yao Liu, National Taiwan Normal University

Rachel Mamlok, Weizmann Institute of Science

Christine V. McDonald, Griffith University

Irene Neumann, Kiel University

Yaozhen Pan, Zhejiang International Studies University

Juan Jimenez Pavez, Illinois Institute of Technology

Renee Schwartz, Georgia State University

Strand 14: Environmental Education

Measuring Environmental Behaviors, Knowledge, and Attitudes

8:30am – 10:00am, HBG Convention Center 006A

President: Keith R. Langenhoven, University of the Western Cape

Toward Pollinator Conservation – Acquiring Environmental Relevant Knowledge about Bees

Kerstin Bissinger, University of Bayreuth

Christine J. Thorn, University of Bayreuth

Mona L. Schönfelder, University of Bayreuth

Franz X. Bogner, University of Bayreuth

How Individual Environmental Attitudes Predict Cognitive Knowledge in Nature Conservation

Kerstin Bissinger, University of Bayreuth

Christine J. Thorn, University of Bayreuth

Mona L. Schönfelder, University of Bayreuth

Franz X. Bogner, University of Bayreuth

Fostering Environmental Literacy by an IBSE-approach

Kerstin Bissinger, University of Bayreuth

Christine J. Thorn, University of Bayreuth

Mona L. Schönfelder, University of Bayreuth

Franz X. Bogner, University of Bayreuth

Measuring Key Components of the Competence Model for Environmental Education

Lisa D. Felix, University of Arizona

Bruce Johnson, University of Arizona

Sanlyn Buxner, University of Arizona

Constantinos C. Manoli, University of Arizona

Strand 15: Policy

Related Paper Set: Organizing for Multi-State Educational Improvement in Science Education

8:30am – 10:00am, Hyatt Seguin AB

Discussant: Richard Duschl, Pennsylvania State University

Redesigning Infrastructures for Tailored Instructional Improvement: A Networked Improvement Community for State Science Education

William R. Penuel, University of Colorado

Philip L. Bell, University of Washington

Sam Shaw, South Dakota Department of Education

Tiffany Neill, Oklahoma State Department of Education

Richard A. Duschl, Pennsylvania State University

Influence Maps: A Strategy for Improving Vertical Coherence in State Science Education

Robbin Riedy, University of Colorado Boulder

Katie Van Horne, University of Colorado, Boulder

William R. Penuel, University of Colorado

Philip L. Bell, University of Washington

Sam Shaw, South Dakota Department of Education

Tiffany Neill, Oklahoma State Department of Education

Teacher Vision of Science Education: One Measure of Vertical Coherence

Joanna Weidler-Lewis, University of Colorado, Boulder

Rebecca Kaplan, University of Colorado, Boulder

Katie Van Horne, University of Colorado, Boulder

William R. Penuel, University of Colorado

Collaborative Design Practices of a Research-Practice Partnership Supporting State-level Educational Improvement

Philip L. Bell, University of Washington

Shelley Stromholt, University of Washington

Concurrent Session #4

10:15am – 11:45am

Presidential Sponsored Session

Admin Symposium: Global and Local Social, Cultural, Language, and Political Aspects for Science Education

10:15am – 11:45am, Seguin AB

President: Mei-Hung Chiu, National Taiwan Normal University

Discussant: Larry Yore, USA

Presenters:

Larry Bencze, Canada

Lyn Carter, Australia

Sonya Martin, Korea

Christina Siry, Luxembourg

Hsiao-Lin Tuan, Taiwan

Jinwoong Song, Korea

Jiyeon Na, Korea

Publications Advisory Committee Sponsored Session

Admin Symposium: The JRST Doctoral Student Mentored Reviewer Initiative: Bolstering a Top-Tier Research Journal's Graduate Education Contributions

10:15am – 11:45am, Hyatt Republic ABC

Presenters:

Fouad Abd-El-Khalick, University of North Carolina

Dana L. Zeidler, University of South Florida

Strand 1: Science Learning, Understanding and Conceptual Change

Teaching and Learning of Energy as a Cross-Cutting Concept

10:15am – 11:45am, HBG Convention Center 006D

Presider: Italo Testa, University Federico II Napoli

Student Conceptualization of Wind Energy Issues and Their Decision-Making in Wind Energy Education

Ashley Peterson, University of Nebraska, Lincoln

Cory T. Forbes, University of Nebraska, Lincoln

Korean Secondary Students' Learning Progression of Energy Concepts across Physical and Biological Contexts: A Connection to the Curriculum

Nam-Hwa Kang, Korea National University of Education

A Cognitive Scaffold for Teaching Energy Transfer between Systems in Middle School

Marcus Kubsch, Leibniz Institute, Kiel

Jeffrey Nordine, Leibniz Institute, Kiel

Leveraging Students Prior Knowledge to Adapt Science Curricula to Local Context

Lana Minshew, University of North Carolina, Chapel Hill

Kelly Barber-Lester, University of North Carolina, Chapel Hill

Sharon Derry, University of North Carolina, Chapel Hill

Janice L. Anderson, University of North Carolina, Chapel Hill

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Student Interests and Motivations

10:15am – 11:45am, HBG Convention Center 007A

Gamification and the Enhancement of Motivation to Learn Biology in an Introductory Undergraduate Laboratory Course

David Owens, Middle Tennessee State University

Angela Barlow, Middle Tennessee State University

Cindi Smith-Walters, Middle Tennessee State University

Eric Oslund, Middle Tennessee State University

Dennis Mullen, Middle Tennessee State University

Modeling Changes to Students' Motivation for Science in Schools that Serve Low SES Communities

Israel Touitou, Weizmann Institute of Science

David L. Fortus, Weizmann Institute of Science

Motivational Beliefs in Science Learning and School Motivational Contexts: Evidence of Taiwanese TIMSS Eighth-grade Data

Chen-Lung Wang, National Central University

Pey-Yan Liou, National Central University

Network Centrality in Interactive Physics Classes Facilitates Changes in Physics Interest Via Students' Self-efficacy

Remy Dou, Florida International University

Eric Brewe, Florida International University

Geoff Potvin, Florida International University

Justyna P. Zwolak, Florida International University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Integrated Science Approaches

10:15am – 11:45am, Hyatt Crockett CD

Presider: Ceyhan Cigdemoglu, Atilim University

"Using Your Brain to Figure It Out": Transitioning to the Reform Science Classroom

Aliza Stein, Northwestern University

Brian J. Reiser, Northwestern University

Achievements in Science Reading Literacy: The Science Literacy and Literacy in Science Relationship

Billy McClune, Queen's University

Exploring the Significant Predictors of Student Creative Science Thinking Performance

Kuay-Keng Yang, National Sun Yat-Sen University

Ling Lee, National Sun Yat-Sen University

Zuway-R Hong, National Sun Yat-Sen University

Huann-Shyang Lin, National Sun Yat-Sen University

Integrated Science and Literacy K-12 Instruction: A Meta-analysis

Jennifer C. Parrish, Middle Tennessee State University

Summer Talbert, Middle Tennessee State University

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

Symposium: Results of the PCK Summit 2016: Five Approaches for Capturing PCK

10:15am – 11:45am, HBG Convention Center 007B

Discussant: Alicia C. Alonzo, Michigan State University

Presenters:

Erik Barendsen, Radboud University Nijmegen
Ineke Henze, Delft University of Technology
Pernilla Nilsson, Halmstad University
Dürdane Bayram-Jacobs, Delft University of Technology
Sven Liepertz, University of Potsdam
Andreas Borowski, University of Potsdam
Kirsten Daehler, WestEd
Joan I. Heller, Heller Research Associates
Nicole Wong, Heller Research Associates

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

Poster Symposium: Supporting Three-dimensional Science Teaching and Learning with a Comprehensive, Learning Progression-based System

10:15am – 11:45am, Hyatt Presidio ABC

Discussant: William Penuel, University of Colorado

The Relationship between Students' Explanations and their Interpretation of Inquiry Investigations

Emily Scott, Michigan State University
Charles W. Anderson, Michigan State University

An Initial Learning Progression Describing Students' Understanding of a Model of the Global Carbon Cycle

Joyce M. Parker, Michigan State University
Beth A. Covitt, University of Montana
May Lee, Michigan State University
Charles W. Anderson, Michigan State University

An Examination of Discourse in Carbon TIME Classrooms

Wendy Johnson, Michigan State University
Hannah Miller, Johnson State College
Charles W. Anderson, Michigan State University

Routines of Interaction around Carbon TIME Tools that Enhance Student Learning

MaryMargaret Welch, Seattle Public Schools
Jennifer Newell, Seattle Public Schools
Christa Haverly, Michigan State University
Marcos Gonzalez, Michigan State University

The Influence of Social Networks and Context on Teacher Agency

Stefanie Marshall, Michigan State University
William R. Penuel, University of Colorado
Qinyun Lin, Michigan State University

Teachers' Sensemaking About Innovative Curriculum Materials

Elizabeth Xeng de los Santos, Michigan State University
Charles W. Anderson, Michigan State University

Using Survey Data to Measure Teaching Practices and Network Effects in Carbon TIME

Qinyun Lin, Michigan State University
William R. Penuel, University of Colorado
Kenneth A. Frank, Michigan State University

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

Physics – Problem Solving and Instruction

10:15am – 11:45am, HBG Convention Center 007C

Presider: Muhsin Menekse, Purdue University

An Analysis of Discussion Quality in LA-Supported Group Physics Problem Solving

Alaina Pak, George Washington University
Tiffanyrose Sikorski, George Washington University

Effect of Visual Cues and Video Solutions on Eye-gaze Patterns

Tianlong Zu, Purdue University
Elise Agra, University of Chicago
John Hutson, Kansas State University
Lester Loschky, Kansas State University
N. Sanjay Rebello, Purdue University

Impact of Mathematical Complexity on Students' Conceptual Performance in Sequential and Simultaneous Synthesis Physics Problems

Bashirah Ibrahim, The Ohio State University
Lin Ding, The Ohio State University

What's Important: An Analysis of Student Comments on Physics Professors on RateMyProfessors.com

Mihwa Park, University at Buffalo, SUNY

Strand 7: Pre-service Science Teacher Education***Pre-service Teachers' PCK***

10:15am – 11:45am, HBG Convention Center 007D

Presider: Mark A. McDermott, University of Iowa***Model-Based Inquiry into Prospective Teachers' Topic-Specific Pedagogical Content Knowledge for Teaching Dissolving***

Karthigeyan Subramaniam, University of North Texas

Domain Specific Facets of Pre-Service Teachers' Academic Self-Concept

Markus Elsholz, University of Wuerzburg

Thomas Trefzger, University of Wuerzburg

Susanne Kuger, German Institute for International Educational Research

Investigating the Relationship of Pre-service Physics Teachers CK and PCK with Academic Self-concept

Stefan Sorge, Leibniz Institute for Science and Mathematics Education, Kiel

Knut Neumann, Leibniz Institute for Science and Mathematics Education, Kiel

Jens Möller, University of Kiel

The Development and Application of PCK by Pre-service Teachers in the Student Lab

Susan Fried, University Wuerzburg

Thomas Trefzger, University of Wuerzburg

Strand 8: In-service Science Teacher Education Inquiry

10:15am – 11:45am, HBG Convention Center 008A

Presider: Sarah R. Stapleton, University of Oregon***Changing Teacher Values about Science Instruction: Cumulative Influences of a Research Experience and Materials Development***

Senetta F. Bancroft, Southern Illinois University, Carbondale

Deborah G. Herrington, Grand Valley State University

Molly M. Edwards, Grand Valley State University

Stephanie Tanis, Grand Valley State University

Classroom Patterns that Characterize the Different Levels of Inquiry Instruction

Daniel M. Alston, The University of North Carolina, Charlotte

Jeff C. Marshall, Clemson University

Julie B. Smart

Examining In-service Teachers' Metamodeling Knowledge

Kirsten K. Mawyer, University of Hawaii

The Influence of Teacher's Perceptions of School Environment on Student Learning in Science

Rachel Shefner, Loyola University Chicago

Stacy Wenzel, Loyola University Chicago

Nayantara Abraham, Loyola University Chicago

Kelly Holmes, Loyola University Chicago

Strand 8: In-service Science Teacher Education NGSS

10:15am – 11:45am, Hyatt Crockett AB

Presider: Tonya D. Jeffery, Texas A&M University***Effect of Long-term Supportive Professional Development on NGSS Implementation***

Cindy L. Kern, Quinnipiac University

Amanda Bozack, Radford University

Rosemary Whelan, University of New Haven

NGSS and CCSS Integration in Secondary Classrooms: Implications from an Interdisciplinary Teacher Professional Development Program

Susan Gomez Zwiap, California State University, Long Beach

Secondary Teachers' Struggles to Develop Coherent NGSS Instruction

William A. Sandoval, University of California, Los Angeles

Nathan Cournoyer, University of California, Los Angeles

Na'im Eggleston, University of California, Los Angeles

Anahid Modrek, University of California, Los Angeles

Jarod Kawasaki, University of California, Los Angeles

Teachers' Ideas about Teaching the Science Practices in the Next Generation Science Standards

Jarod Kawasaki, University of California, Los Angeles

William A. Sandoval, University of California, Los Angeles

Lilia Rodriguez, University of California, Los Angeles

Strand 9: Reflective Practice***Reflective Practice – Paper Session B***

10:15am – 11:45am, HBG Convention Center 006A

Presider: Allan Feldman, University of South Florida***Argumentation and Modelling in a High School's Chemistry Class***

Kira Padilla-Martinez, Facultad de Química, UNAM

José M. Montañó-Hilario, Facultad de Química, UNAM

Building an Understanding: What Motivates Teachers to use a Science Outreach Project

Karen Spuck, Clarion University

Developing Protocols to Support Collaborative Teacher Reflection and Professional Learning for Science Argument Writing

Naa Ammah-Tagoe, SRI International
Kyra Caspary, SRI International
Tanya Baker, National Writing Project
Eric Greenwald, Lawrence Hall of Science
Linda Friedrich, National Writing Project

Participatory Action Research Examining Use of Annotated Videos by Pre-Service Teachers to Promote Reflective Practice

Gloria J. Hardrict-Ewing, University of Missouri, Saint Louis

***Strand 10: Curriculum, Evaluation, and Assessment
Related Paper Set: The Long and Winding Road to NGSS Implementation***

10:15am – 11:45am, HBG Convention Center 006C

Discussant: Joseph Krajcik, Michigan State University

Does a Focus on Modeling and Explanation of Molecular Interactions Impact Student Learning and Identity?

Steven McGee, Northwestern University
Randi McGee-Tekula, The Learning Partnership
Jennifer Duck, The Learning Partnership

Developing and Empirically Validating Hypothetical Learning Progression For Three Dimensional Learning of Electrical Interactions.

Leonora Kaldaras, Michigan State University
Joseph S. Krajcik, Michigan State University

Students' Development and Use of Models of Atomic Structure

Kristin Mayer, Michigan State University
Joseph S. Krajcik, Michigan State University

Supporting Teachers in Developing Inclusive Three-dimensional Learning Environments During Class Discussions

Angela D. Kolonich, Michigan State University
Gail Richmond, Michigan State University
Joseph S. Krajcik, Michigan State University

Strand 11: Cultural, Social, and Gender Issues

Related Paper Set: Exploring Artscience: Identity, Connection, and Agency with Science through Art

10:15am – 11:45am, HBG Convention Center 008B

Discussant: Edna Tan, University of North Carolina at Greensboro

Colors of Nature: Art/Science Agency in Intersecting Figured Worlds

Blakely Tsurusaki, University of Washington
Carrie T. Tzou, University of Washington, Bothell
Laura Conner, University of Alaska Fairbanks
Mareca Guthrie, University of Alaska Fairbanks
Stephen Pompea, National Optical Astronomy Observatory

Artsience: Fostering Active Relational Involvements with Microbial Life

Ann S. Rosebery, TERC
Beth Warren, TERC
Déana A. Scipio, TERC
Tammie Visintainer, TERC

Tech Tales: Connecting Robotics with Family Storytelling

Carrie T. Tzou, University of Washington, Bothell
Megan Bang, University of Washington
Philip L. Bell, University of Washington
Theresa Hortsman, University of Washington, Bothell
Shelley Stromholt, University of Washington
Gabriel A. De Los Angeles, University of Washington
Nancy Price, University of Washington

Complex Systems, Story and Art: Engaging Native Youth in Learning About Climate Change

Megan Bang, University of Washington
Priya Pugh, University of Washington
Megan McGinty, University of Washington

***Strand 12: Educational Technology
Understanding with Technology***

10:15am – 11:45am, Hyatt Travis CD

Presider: David B. Vallett, University of Nevada

Changes in Students Phylogenetic Tree-Reading: A Quasi-Experimental Design Study

Carrie J. Bucklin, Southern Utah University
Kristy L. Daniel, Texas State University

Determining the Effects of Computer Assisted Predict-Observe-Explain Technique in General Biology Courses

Yilmaz Kara, Karadeniz Technical University

Evaluating Role of Interactive Visualization Tool in Improving Students' Conceptual Understanding of Chemical Equilibrium

Bharath Kumar, University of Kentucky

Rebecca McNall Krall, University of Kentucky

Student Understanding about Exponential Growth and the Richter Scale following an Embodied Digital Simulation

Jason Morphew, University of Illinois

Nitasha Mathayas, University of Illinois, Urbana Champaign

Sahar K. Alameh, University of Illinois, Urbana Champaign

Robb Lindgren, University of Illinois, Urbana Champaign

Strand 12: Educational Technology

Designing for Learning

10:15am – 11:45am, HBG Convention Center 006B

Presider: Joshua A. Ellis, Michigan Technological University

SEM or STEM? Variations in Science Teachers' Technology Integration in a Co-designed STEM Unit

Angelina Constantine, University of Minnesota

Paula S. Rozowa, University of Minnesota

Alaina Szostkowski, University of Minnesota

Joshua A. Ellis, Michigan Technological University

Gillian Roehrig, University of Minnesota

Evidence-centered Design & Usability Analysis: An Iterative Design Approach to a Genetics Digital Learning Environment

Eric N. Wiebe, North Carolina State University

James H. Creager, North Carolina State University

Osman Aksit, North Carolina State University

Katherine Chesnutt, North Carolina State University

Bitu Akram, North Carolina State University

Bradford Mott, North Carolina State University

James C. Lester, North Carolina State University

Frieda Reichsman, The Concord Consortium

Chad Dorsey, The Concord Consortium

Geospatial Technology as Show-and-tell or Game-changer? Science Teachers' TPACK Development in a PD Course

Bridget K. Mulvey, Kent State University

Annual Membership Meeting

(formerly NARST Business Meeting)

Box lunch provided for 1st 100 attendees who sign up.

12:00pm – 1:00pm, Hyatt Bowie ABC

Lunch—On Your Own

12:00pm – 1:00pm

Concurrent Session #5

1:15pm – 2:45pm

Equity and Ethics Committee Sponsored Session

Admin Symposium: Poster Symposium – Jhumki Basu Scholar

Symposium: Equity and Excellence in Science Education

1:15pm – 2:45pm, Hyatt Presidio ABC

Presiders:

Nam-Hwa Kang, Korea National University of Education

Sanghee Choi, University of North Georgia

S. Lizette Ramos-de Robles, Universidad de Guadalajara

A Case of Design Based Online Teacher Professional Development to Introduce Integration of STEM

Tasneem Anwar, University of Minnesota

How Science Teacher Educators of Color Conceptualize and Operationalize their Pedagogy in Science Methods Courses

Sumreen Asim, University of North Texas

The Perspectives and Experiences of African American Students in an Informal Science Program

Dominique Bulls, University of North Carolina at Chapel Hill

Elephant in the Classroom: Social Positioning of Emergent Bilingual Students and Implications on Science Identity Development

Shakhnoza Kayumova, University of Massachusetts Dartmouth

In the Midst of a Disaster: A Critical Analysis of Relationships between Science Curriculum Development, Implementation, and Local Environmental Injustice Crises

Corey Knox, University of Arizona

The Impact of Place-based Case Studies on Student Learning and Affect in Introductory Biology

Lynnsay Marsan, University of Texas at El Paso

Gendered Performance Differences in Introductory STEM Courses are Consistent across Five Universities

Rebecca Matz, Michigan State University

STEM Story-Telling Online Resource for Inclusive Environments (STEM STORIES)

Ayana McCoy, University of Massachusetts Boston

Science Teacher Identity Development through a Black Feminist Lens: Stories of Resilience, Resistance, and Struggle for Recognition

Olayinka Mohorn, University of Illinois at Chicago

Examining the Influence of Physics Focused Professional Development on Advanced Placement Teachers – A Case Study

Justina Ogodo, University of Alabama

The Use of a Sociocultural Construct to Examine four Hispanic High School Students' Experiences in a Lunar Research Program

Catherine Quinlan, Howard University

Pre-Service Science Teachers in Culturally Diverse Classrooms

Suzanna Roman, Georgia State University

Middle School Teachers' Experiences with Engineering Design Projects: Supporting English Language Learners and At-Risk Students in STEM

Diane Silva Pimentel, University of New Hampshire

Designing Equitable Science Learning Environments for Elementary-aged Emerging Bilingual Students

Enrique Suarez, University of Colorado Boulder

Research Committee Sponsored Session Admin Symposium: Methodological, Ethical, and Identity Issues in Naming Ourselves and Others

1:15pm – 2:45pm, Hyatt Seguin AB

Presenters:

Maria S. Rivera Maulucci, Barnard College
 Felicia Moore Mensah, Columbia University
 Carolyn A. Parker, The John Hopkins University
 Renee S. Schwartz, Georgia State University
 Phillip A. Boda, Columbia University
 Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill
 Dana L. Zeidler, University of South Florida

Strand 1: Science Learning, Understanding and Conceptual Change

Understanding the Science of Earth and Space

1:15pm – 2:45pm, HBG Convention Center 006D

Presider: Muhsin Menekse, Purdue University

Development of a Learning Progression about Stars and their Properties

Silvia Galano, University of Camerino, Italy

Arturo Colantonio, Liceo Statale, Italy

Silvio Leccia, INAF, Capodimonte Astronomical Observatory of Naples, Italy

Emanuella Puddu, INAF, Capodimonte Astronomical Observatory of Naples, Italy

Italo Testa, University of Naples, Italy

Students Learning about Science Practices in Astronomy: The Role of Telescopes in Astronomical Investigations

Timothy G. Gleason, Pennsylvania State University

Julia Plummer, Pennsylvania State University

Chrysta Ghent, Pennsylvania State University

Christopher Palma, Pennsylvania State University

Identifying Early Productive Stepping Stone Conceptions of Three-dimensional Earth Science Understanding by High School Students

Anna Beck, Columbia University

Allison Bookbinder, Columbia University

Min Jung Lee, Columbia University

Ann E. Rivet, Columbia University

The Role of Perspective Taking in How Middle School Students Explain Lunar Phases

Abha M. Vaishampayan, Pennsylvania State University

Julia Plummer, Pennsylvania State University

Kyungjin Cho, Pennsylvania State University

Patricia Udomprasert, Harvard University

Erin Johnson, Harvard University

Susan Sunbary, Smithsonian Astrophysical Observatory

Henry Houghton, Harvard University

Erika Wright, Smithsonian Astrophysical Observatory

Helen Zhang, Boston College

Alyssa Goodman, Harvard University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Examining Teacher Roles

1:15pm – 2:45pm, HBG Convention Center 007A

Presider: Ryan Summers, University of North Dakota

Exploring Teachers' Framing of Citizen Science

Emily Harris, University of California, Davis

Heidi Ballard, University of California Davis

Testing the Impact of Situational Features on Measures of Biology Students' Genetics Understanding

Robyn Tornabene, Stony Brook University

Ross H. Nehm, Stony Brook University

Philipp Schmiemann, University of Duisburg, Essen

The Impact of Questioning Techniques on STEM Instruction

Heidi Cian, Clemson University

Lorraine A. Jacques, Clemson University

Cassie Quigley, Clemson University

Danielle Herro, Clemson University

Variation in How Teachers Support Student Critique in Argumentation Discussions

María González-Howard, Boston College

Katherine L. McNeill, Boston College

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

Examining Novice Teachers in Elementary Classrooms

1:15pm – 2:45pm, Hyatt Crockett CD

Presider: Anna Maria Arias, Illinois State University

Graduate Students' Knowledge and Beliefs of Teaching and Learning STEM by Integrating STEM through Agriculture, Food and Natural Resources (AFNR)

Hui-Hui Wang, Purdue University

Neil A. Knobloch, Purdue University

Utilizing an Instructional Log to Examine Novice Teachers' Science Instruction: Profiles of Practice

Elizabeth Greive, North Carolina State University

James Minogue, North Carolina State University

Sarah J. Carrier, North Carolina State University

Temple A. Walkowiak, North Carolina State University

Voices from the Field: Constraints Encountered by Early Career Elementary Science Teachers

Teri N. Johnson, Virginia Commonwealth University

Katherine P. Dabney, Virginia Commonwealth University

Effects of Female Role Models-driven Inquiry on Students' Images of Scientists and Scientific Career Awareness

Hsiang-Ting Chen, National Sun Yat-Sen University

Hsin-Hui Wang, National Sun Yat-Sen University

Ying-Yan Lu, National Sun Yat-Sen University

Huann-Shyang Lin, National Sun Yat-Sen University

Zuway-R Hong, National Sun Yat-Sen University

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

Student Beliefs and Identity

1:15pm – 2:45pm, HBG Convention Center 007C

Presider: Zahra Hazari, Florida International University

Black Females in STEM Undergraduate Research Programs: Strengths and Assets Associated with Their Identity

Terrell R. Morton, University of North Carolina, Chapel Hill

Eileen Carlton Parsons, University of North Carolina, Chapel Hill

Caesar R. Jackson, North Carolina Central University

Exploring Under-represented College Freshmen's Readiness for STEM Learning

Shiyu Liu, Ocean University of China

NOS Views and Epistemological Views of College Biology Students

Lisa A. Borgerding, Kent State University

Hasan Deniz, University of Nevada

The Effect of SAT Math scores on women's Self-Efficacy and its implications for Chemistry Learning

Paulette Vincent-Ruz, Learning Research and Development Center

Christian D. Schunn, University of Pittsburgh

Strand 6: Science Learning in Informal Contexts

Lessons Learned from Maker Spaces and Afterschool Clubs

1:15pm – 2:45pm, HBG Convention Center 007B

Presider: Aaron Price, Museum of Science and Industry, Chicago

Exploring Career Interests, Perceptions, and Content Knowledge of Rural, Underrepresented Middle School STEM Club Members

Margaret R. Blanchard, North Carolina State University

Kristie S. Gutierrez, North Carolina State University

Kylie J. Hoyle, North Carolina State University

Lauren A. Harper, Leesville High School

Jason L. Painter, North Carolina State University

N. Scott Ragan, North Carolina State University

Factors Related to Intended Climate Change Behaviors of Rural Middle School Students and Their Families

Kristie S. Gutierrez, North Carolina State University

Margaret R. Blanchard, North Carolina State University

Improving Computational Thinking Skills and Physics Engineering Learning by Using Makerspace Activities and Formative Assessments

Yue Yin, College of Education University of Illinois, Chicago

Roxana Hadad, Northeastern Illinois University

Xiaodan Tang, University of Illinois, Chicago

Qiao Lin, University of Illinois, Chicago

C. Meghan Hausman, Northeastern Illinois University

Visual Literacies and Expansive Educational Opportunities: Using Images to Learn in Makerspaces

Eli Tucker-Raymond, TERC

Brian Gravel, Tufts University

Aditi Wagh, Tufts University

Briana Jefferson, TERC

Ada Ren, TERC

Youth Engagement as Scientists and Engineers within a Making-related After-school Program

Amber Simpson, Indiana University

Adam V. Maltese, Indiana University

Alexandra M. Burris, Indiana University

Strand 7: Pre-service Science Teacher Education

Pre-service Teachers and the Next Generation Science Standards

1:15pm – 2:45pm, HBG Convention Center 006A

Presider: Stephen B. Witzig, University of Massachusetts Dartmouth

Elementary Pre-service Teachers' Lesson Reflections on Promoting Norms of Interaction for Students' Engineering Design

Elaine M. Silva Mangiante, Salve Regina University

Adam Moore, University of Rhode Island

Exploring Pre-service Teachers' Pedagogical Content Knowledge for NGSS practices through Curriculum Critique and Revision Task

Tejaswini S. Dalvi, University of Massachusetts

Elaine M. Silva Mangiante, Salve Regina University

Kristen B. Wendell, Tufts University

Making Sense of the NGSS: Pre-service Teachers' Practical Knowledge

Deborah L. Hanuscin, University of Missouri, Columbia

Laura Zangori, University of Missouri

Strand 7: Pre-service Science Teacher Education

Pre-service Teacher Learning in Lab and Physics Settings

1:15pm – 2:45pm, HBG Convention Center 007D

Presider: May Lee, Michigan State University

Assessing the Professional Vision of Pre-service Teachers in the Student-lab

Florian Treisch, University of Würzburg

Thomas Trefzger, University of Würzburg

Comparison of Pre-service Physics Teachers' Conceptual Understanding in Model-Based Scientific Inquiry and Scientific Inquiry Environments

Feral Ogan-Bekiroglu, Marmara University

Arzu Arslan-Buyruk, Sebahattin Zaim University

Listening and Responding to Student Thinking – The Importance of Epistemic Empathy

Lama Jaber, Florida State University

Sherry A. Southerland, Florida State University

Felisha Dake, Florida State University

Practical and Discursive Consciousness of Novice Science Teachers when Facing the Science Classes

Mauricio Pietrocola, University of São Paulo
 Kellys R. Saucedo, University of São Paulo
 Samuel M. Schnorr, University of São Paulo
 Juliana Maia, University of São Paulo
 Antonio Carlos Mometti, University of São Paulo

Strand 8: In-service Science Teacher Education

Symposium: Identity at the Crossroads Intersections of Teacher Identity and Contexts of Teaching, Learning and Living

1:15pm – 2:45pm, HBG Convention Center 006B

Presenters:

Jennifer Adams, Brooklyn College, CUNY
 Susan McCullough, Graduate Center, CUNY
 Atasi Das, CUNY
 La Toya Strong, CUNY
 Sabrina Hussain, Urban Advantage
 Cristina A. Trowbridge, American Museum of Natural History

Strand 8: In-service Science Teacher Education
PCK

1:15pm – 2:45pm, HBG Convention Center 008A

Presider: Justina A. Ogodo, The University of Alabama

Challenges of Teachers Developing and Implementing Practices-based Student Investigations

Kathleen Hill, Pennsylvania State University
 Matthew Johnson, Pennsylvania State University
 Amanda Smith, Pennsylvania State University
 Annmarie R. Ward, Pennsylvania State University

Developing Design Expertise through a Teacher-Scientist Partnership Professional Development Program

Julie Bokor, University of Florida
 Kent J. Crippen, University of Florida

Does it Matter to be Informed – Naive or not? An Example of Professional Development Program about NOS

Cigdem Han Tosunoglu, Marmara University
 Nihal Dogan, Abant Izzet Baysal University
 Gizem Ertugrul, Abant Izzet Baysal University
 Ferah OZER, Abant Izzet Baysal University
 Serhat Irez, Marmara University
 Gultekin Cakmakci, Hacettepe University
 Yalcin Yalaki, Hacettepe University

The Development of Teachers' Topic-Specific PCK in Stoichiometry through Participation in a Learning Study

Stephen A. Malcolm, University of the Witwatersrand
 Marissa S. Rollnick, Wits University
 Elizabeth Mavhunga, University of Witwatersrand

Strand 10: Curriculum, Evaluation, and Assessment

Related Paper Set: Supporting Secondary Students' Modeling Practice Using a Web-based Modeling Tool

1:15pm – 2:45pm, HBG Convention Center 006C

Presider: Joseph S. Krajcik, Michigan State University

Designing a Systems Modeling Tool That is Accessible to Secondary Students

Daniel N. Damelin, The Concord Consortium
 Joseph S. Krajcik, Michigan State University
 William Finzer, The Concord Consortium

A Collaborative Model for the Development of NGSS-aligned Units that Incorporates Student Model Building

Steven Roderick, The Concord Consortium

Explanations and Relationships in Students' Mental and External Models

Li Ke, Michigan State University
 A. Lynn Stephens, University of Massachusetts

Using Technologies to Support Middle School Students in Building Models of Stream Water Quality

Ann M. Novak, Greenhills School

Using a Modeling Tool and Project-based Learning Materials to Promote Students' Classroom Engagement

Tom Bielik, Michigan State University
 Sebastian T. Opitz, Michigan State University

Strand 11: Cultural, Social, and Gender Issues

Leveraging Diversity in STEM Teaching and Learning

1:15pm – 2:45pm, HBG Convention Center 008B

Presider: Natalie S. King, Georgia State University

Beliefs and Attitudes Toward STEM: Increasing Interest in STEM for Female Students of Color

Elizabeth Crotty, University of Minnesota
 Felicia Leammukda, University of Minnesota
 Jeanna Wieselmann, University of Minnesota
 Gillian Roehrig, University of Minnesota

Factors Influencing Student Interest in STEM Fields

Melinda A. Hamilton, University of Idaho

Susan Stauffer, University of Idaho

Teachers' Modifications of an Integrated STEM Lesson with Intent to Incorporate Cultural Relevance

Felicia Leammukda, University of Minnesota

Julie C. Brown, University of Minnesota

Emily A. Dare, Michigan Technological University

Paula S. Rozowa, University of Minnesota

Gillian Roehrig, University of Minnesota

Leveraging Students' Everyday Engineering Practices in the Science Classroom

Veronica McGowan, University of Washington

Philip L. Bell, University of Washington

Strand 12: Educational Technology

Virtual and Augmented Reality

1:15pm – 2:45pm, Hyatt Crockett AB

Presider: Len Annetta, East Carolina University

Cognitive Demand and Dynamics: Comparison of Virtual and Real Laboratories in Science Education via fNIRS

Richard Lamb, University at Buffalo, SUNY

Len Annetta, East Carolina University

Jonah B. Firestone, Washington State University Tri-Cities

Pavlo D. Antonenko, University of Florida

Maureen Schmitter-Edgecombe, Washington State University

Xiufeng Liu, University at Buffalo, SUNY

Ren Lie, University at Buffalo, SUNY

Designing Gestures to Control a Simulation for the Causes of Seasons

Nathan Kimball, Concord Consortium

Christina Silliman, University of Illinois, Urbana Champaign

Robb Lindgren, University of Illinois, Urbana, Champaign

Effect of Hands-on and Hands-off Collaborative Augmented Reality Activities on Chemistry Learning and Interest

Shih-Yeh Chen, National Taiwan Normal University

Shiang-Yao Liu, National Taiwan Normal University

Relating Cognitive Development to Perceptions of Virtual Presence in 3-D, Haptic-enabled, Virtual Reality Science Instruction

Rebecca Hite, Texas Tech University

M. Gail Jones, North Carolina State University

Gina Childers, University of North Georgia

Megan Ennes, NC State University

Katherine Chesnutt, North Carolina State University

Mariana Pereyra, North Carolina State University

Emily Cayton, North Carolina State University

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

1:15pm – 2:45pm, Hyatt Republic ABC

Presider: Zoubeida R. Dagher, University of Delaware

Consistency of Nature of Science Views

Rola Khishfe, American University of Beirut

Developing 7th Grade Students' Nature of Science Views with Explicit Reflective Approach

Kayahan Ince, Institute of Educational Sciences

Sinan Özgelen, Mersin University

Does NOS Understanding Foster Science Content Learning? Impact of an Epistemologically Informed Unit About Energy

Hanno Michel, Leibniz Institute for Science and Mathematics Education, Kiel

Irene Neumann, Leibniz Institute for Science and Mathematics Education, Kiel

What Does Philosophy Education Have to Say About Science Education?

Caio S. Nagayoshi, University of São Paulo

Hamilton Haddad Jr., University of São Paulo

Strand 14: Environmental Education***Symposium: Promoting Student-led Research-informed Sociopolitical Actions on Socioscientific Problems: "Inter/Transnational Perspectives"***

1:15pm – 2:45pm, Hyatt Travis CD

Presenters:

John L. Bencze, University of Toronto
 Mirjan Krstovic, Peel District School Board, Mississauga, ON
 Isabel G. Martins, Universidade Federal do Rio de Janeiro
 Lyn Carter, Australian Catholic University
 Jenny L. Martin, Australian Catholic University
 Chantal Pouliot, Université Laval
 Audrey Groleau, Université du Québec à Trois-Rivières and Université Laval
 Matthew Weinstein, University of Washington
 Ralph Levinson, University College London

Break**2:45pm – 3:15pm****Concurrent Session #6A****Poster Session****3:15pm – 4:15pm****Poster Session A****3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C****Strand 1: Science Learning, Understanding and Conceptual Change*****Poster Session A***

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A1. Using Models as Tools for Scientific Reasoning in Chemistry Education

Marvin Rost, Humboldt-Universität zu Berlin
 Rüdiger Tiemann, Humboldt-Universität Zu Berlin

A3. Analysis of Middle School Students' Representational Competencies on the Electric Current

Hye-Gyoung Yoon, Chuncheon National University of Education
 Kwanghee Jo, Chosun University
 Hunkoog Jho, Dankook University

A5. Comparing 3rd and 5th Grade Students' Model-Based Explanations about Water

Tina Vo, University of Nebraska, Lincoln
 Cory T. Forbes, University of Nebraska, Lincoln
 Laura Zangori, University of Missouri
 Christina V. Schwarz, Michigan State University

A7. Creating an Acid Base Learning Progression

Heather C. Thompson, Texas Christian University
 Erika Zimmermann, Texas Christian University

Strand 2: Science Learning: Contexts, Characteristics and Interactions***Poster Session A***

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A9. "This is Really Frying my Brain!" How Affect Supports Inquiry in an Online Learning Environment

Jennifer A. Radoff, Tufts University
 Lama Jaber, Florida State University
 Elizabeth Hufnagel, University of Maine
 Vesal Dini, Tufts University

A11. Exploring Different Achievers' Inquiry Competency and Inquiry Understanding under Inquiry-based Instruction

Yen-Ruey Kuo, National Changhua University of Education
 Hsiao-Lin Tuan, National Changhua University of Education
 Chi-Chin Chin, National Taichung University of Education

A13. Exploring the Gender Gap in STEM Career Participation

Matthew A. Mendicino, University of Georgia

A15. Instruction, Creativity and Facilitating Reasoning: An Exploratory Study

Bruce G. Waldrip, University of Tasmania
 Ari Widodo, Indonesian University of Education
 John D. Kenny, University of Tasmania

A17. Student Attitudes and Achievement in Middle School, Project-based Learning: What Do Students Do with Autonomy?

Katherine L. Supanich, Hope College
 Lara Iaderosa, Hope College
 Julie Isola, Hope College
 Carly Somnavilla, Hope College
 Stephen C. Scogin, Hope College

**Strand 3: Science Teaching – Primary School
(Grades preK-6): Characteristics and Strategies
Poster Session A**

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

**A19. Examining the Assessment Practices
of an Elementary Science Teacher**

Jeni R. Davis, University of South Florida

**Strand 4: Science Teaching – Middle and High School
(Grades 5-12): Characteristics and Strategies
Poster Session A**

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

**A21. "It's a Gassy World": Using Middle School Students'
Questions to Inform Climate Change Education**

Asli Sezen-Barrie, Towson University, Maryland

Jenna H. Trevillian, Bates Middle School, Annapolis, MD

Elizabeth Hufnagel, University of Pittsburgh

**A23. Designing an Instrument to Measure Science
Teachers' Appraisals and Emotional Responses when
Facilitating Inquiry-based Instruction**

Daniel M. Alston, The University of North Carolina, Charlotte

**A25. Exploring Fluctuating Interest in STEM Careers
amongst Middle School Girls**

Sheliza Ibrahim Khan, Western University

Isha Decoito, Western University

**A27. How Sentiments and Approaches Change from
AP to Regular and to Honors Science Courses**

Eugene Judson, Arizona State University

Lydia Ross, Arizona State University

**A29. Improvement of Students' Science Knowledge
and Socioscientific Reasoning through Socioscientific
Issue Teaching**

Hai T. Nguyen, University of Missouri, Columbia

Troy Sadler, University of Missouri

Andrew T. Kinslow, University of Missouri

**A31. Teaching Electrical Resistance to 6th Grade
Visually Impaired Students**

Betul Okcu, Ataturk University

Mustafa Sozbilir, Ataturk University, Turkey

Mustafa Bulbul, Kafkas University, Turkey

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

Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

**A33. Disappearing trends: Examples of Simpson's
Paradox in Introductory Science Courses**

Rebecca L. Matz, Michigan State University

Zachary D. Nusbaum, Michigan State University

James T. Laverty, Kansas State University

Melanie M. Cooper, Michigan State University

**A37. What Attitudes Matter for Homework and Exams
across First and Second Year Weeder Chemistry Courses?**

Anita Schuchardt, University of Minnesota

Joseph J. Grabowski, University of Pittsburgh

Christian D. Schunn, University of Pittsburgh

**A39. Exploring the Cognitive Processes and Scientific
Epistemic Views Involved in Comprehending Multiple
Representations in Physics Textbooks**

Guo-Li Chiou, National Taiwan University of Science and
Technology

Chin-Chung Tsai, National Taiwan University of Science and
Technology

**A41. Reasoning and Arguments: An Exploratory Study
of Community College Students' Theory Building and
Argumentation Skills**

Deborah Lan, The Ohio State University

Lin Ding, Ohio State University

**A43. Demonstration and Dialectical Arguments: Guiding
Undergraduate Student Writing about Cancer Biology**

Meena M. Balgopal, Colorado State University

Anne Marie Casper, Colorado State University

Paul J. Laybourn, Colorado State University

Ellen Brisch, Minnesota State University, Moorhead

**A45. The Impact of the Innovative Course on Developing
Spatial Thinking Abilities in College Students**

Youngjin Song, California State University, Long Beach

Lisa Martin-Hanses, California State University, Long Beach

Susan Gomez-Zwiep, California State University, Long Beach

Hye Sun You, Michigan State University

Strand 6: Science Learning in Informal Contexts Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A47. Gender and Age Cohort Differences in Motivations, Participation Choices in Free Choice STEM-Learning Activities

Elysa N. Corin, Exploratorium

M. Gail Jones, North Carolina State University

Thomas Andre, Iowa State University

Gina Childers, University of North Georgia

A49. How Does Learners' Sociocultural Participation in their Communities Shape Their Ideas about Climate Change?

J. R. McGinnis, University of Maryland

Emily Hestness, University of Maryland

Natalie Harr Ylizarde, University of Maryland

Emily A. Freeland, University of Maryland

Wayne Breslyn, Montgomery County Public Schools

A51. Middle School Girls' Science Achievement and Cognition, Effects of an After School Informal Science Program

Jennifer A. Gatz, Stony Brook University

Angela M. Kelly, Stony Brook University

Sheri L. Clark, Stony Brook University

A53. Reading Zoos: Using Discourse Analysis to Uncover Meaning in Zoo Signs

Benjamin L. Tupper, University of Michigan

Leah A. Bricker, University of Michigan

Strand 7: Pre-service Science Teacher Education Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A55. Approaching Pre-Service Science Education Preparation with a Playful Learning Pedagogy

Jennifer L. Weible, Central Michigan University

Kevin D Cunningham, Central Michigan University

A57. Developing a Three-dimensional View of Science Teaching: A Tool for Facilitating Pre-service Teacher Learning

Corinne H. Lardy, California State University, East Bay

Michelle L. Sinapuelas, California State University, East Bay

Rachelle DiStefano, California State University, East Bay

Christine Bae-Lee, Virginia Commonwealth University

Michele Korb, California State University, East Bay

Danika LeDuc, California State University, East Bay

A59. Designing Science Tasks for Productive Whole Class Discussions: Supporting Pre-service Teachers' in Task Selection and Design

Danielle K. Ross, Northern Arizona University

A61. Flexible Thinking: A Key Competency for Pre-service STEM Teachers

Miri Barak, Technion-Israel Institute of Technology

Ariella Levenberg, Technion-Israel Institute of Technology

Strand 8: In-service Science Teacher Education Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A63. Development of a Scale for Assessing Science Teachers' Professional Development Needs for Teaching Collaborative Problem Solving

Shu-Ching Wang, Shuang Shih Junior High School

Kuo-Hua Wang, National Changhua University of Education

A65. A Phenomenological Case Study of Pakistani Science Teachers' Experiences of Professional Development

Azhar M. Qureshi, Georgia State University, Atlanta

Kadir Demir, Georgia State University

A67. Advancing Vector Knowledge and Confidence in K-12 Teachers

Greg Bartus, Stevens Institute of Technology

A69. Bias against Elementary Teachers in a Local Professional Development Implementation

Samuel Severance, University of Colorado, Boulder

A71. Design, Implementation and Evaluation of a Graduate Course on Argumentation

Yasemin Ozdem-Yilmaz, Gaziosmanpasa University

Jale Cakiroglu, Middle East Technical University

Hamide Ertepinar, Istanbul Aydin University

A73. Effect of Professional Development Course on Palestinian Primary In-service Science Teachers' Attitude toward Teaching Sciences

Iyad M. Dkeidek, Al-Quds University

Ziad Qabajia, Al-Quds University

Mohsen Adas, Al-Quds University

A75. Elementary In-service Teacher Uptake of Reform-based Science Teaching Practices of a University STEM Professional Development Program

Madhura Kulkarni, Northern Kentucky University
 Patricia S. Bills, Northern Kentucky University
 Joseph Nolan, Northern Kentucky University
 Morgan Carter, Northern Kentucky University

A77. Evidenced-based Teacher Ownership of the Education through Science Philosophy and approach to Science Teaching at the Secondary Level

Ana Valdmann, University of Tartu
 Miia Rannikmae, University of Tartu
 Jack B. Holbrook, University of Tartu

A79. Examining the Relationship between Professional Development and Classroom Practice in Elementary Science Professional Development

Judith Warren Little, University of California, Berkeley
 Selena Burns, Heller Research Associates
 Elena Duran Lopez, University of California, Berkeley
 Joan I. Heller, Heller Research Associates
 J. Owen Limbach, Heller Research Associates
 Anna Weltman, University of California, Berkeley
 Nicole Wong, Heller Research Associates

A81. Exploring Changes in Science Teachers' Conceptions and Connections of STEM Concepts and Earthquake Engineering

Baki Cavlazoglu, Karadeniz Technical University
 Carol L. Stuessy, Texas A&M University

A83. Exploring the Identity Development of a Beginning In-service Elementary Science Teacher

Lisa Marco-Bujosa, Boston College
 Abigail Jurist Levy, Education Development Center

A85. Factors Affecting Special Education Teachers' Burnout and Perceptions of Mindfulness – Practices to Build Social/Emotional Competence

Carol Cao, Texas Tech University

A87. FOCCUSS and NEVADA-S: The Results Two Years of Statewide NGSS Professional Development

David B. Vallett, University of Nevada, Las Vegas
 Hasan Deniz, University of Nevada
 Kristoffer Carroll, Southern Nevada Regional Professional Development Program
 Bret Sibley, Southern Nevada Regional Professional Development Program
 Eileen M. Gilligan, Clark County School District

Strand 9: Reflective Practice

Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

Strand 10: Curriculum, Evaluation, and Assessment

Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A91. A Molecular Genetics Learning Progression Web: Using Model Search to Target Hub Ideas

Josefina Correa, University of Puerto Rico, Rio Piedras
 Amber Todd, Wright State University
 William L. Romine, Wright State University

A93. Assessment of Next Generation of Science Learning

Andrew J. Womack, University of Missouri
 Eric P. Wulff, University of Missouri
 Troy Sadler, University of Missouri
 William L. Romine, Wright State University

A95. Comparing the Alignment between Two Observational Measures of Science Teachers' Instructional Practice

Jamie N. Mikeska, ETS
 Joshua M. Rosenberg, Michigan State University

A97. Engineering and Science: Striving to Understand their Interrelated Roles in the Curriculum

Eunjeong Kim, University of Georgia
 J. Steve Oliver, University of Georgia

A99. Making Science Texts Accessible to Middle Grade Students with Learning Differences

Regina Suriel, Valdosta State University
 Crystal Randolph, Valdosta State University

A101. Measure of Affect in Science and Technology (MAST): Development and Validation of a New Instrument

Eric P. Wulff, University of Missouri
 William L. Romine, Wright State University
 Troy Sadler, University of Missouri

A103. Measuring Students' Climate Change Knowledge: Instrument Development and Validation

Andrea Drewes, University of Delaware
Wayne Breslyn, Montgomery County Public Schools
J. R. McGinnis, University of Maryland
Chrystalla Mouza, University of Delaware
Emily Hestness, University of Maryland, College Park
Joseph Henderson, University of Delaware

A105. Sci-Lift Participants' Initial Ideas about Educative Curricular Materials

Julie A. Birt, University of Missouri
Sarah A. Arnold, University of Missouri
Mojtaba Khajeloo, University of Missouri
Marcelle Siegel, University of Missouri, Columbia

A107. From Fragments to Wholes: Investigating the NOS in the Science Curriculum in Taiwan

Yi-Fen Yeh, National Taiwan Normal University
Sibel Erduran, University of Oxford, UK
Ying-Shao Hsu, National Taiwan Normal University

**Strand 11: Cultural, Social, and Gender Issues
Poster Session A**

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A109. African American Students' Perceptions of Science Education: What They Really Think

Tara M. Nkrumah, University of South Florida
Selene Y. Willis, University of South Florida

A111. Decolonizing Science Education Research: Dismantling Academic Power Structures in Solidarity with the Subaltern

Jean R. Aguilar-Valdez, Portland State University

A113. Developing Pre-service Teachers' Knowledge for teaching Science to English Language Learners through Merging Learning Cycle and SIOP Models.

Vanashri J. Nargund-Joshi, New Jersey City University

A115. The Role of Failure in the Development of STEM Professionals

Adam V. Maltese, Indiana University
Amber Simpson, Indiana University

Strand 12: Educational Technology

Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A117. Digital Badges and Informal Science Learning: Badges for College Credit

Theresa Horstman, University of Washington Bothell
Gavin Tierney, University of Washington
Carrie T. Tzou, University of Washington Bothell

A119. Entrepreneurial Thinking: Cross Cutting Concepts for Science Teachers

Len Annetta, East Carolina University
Marina Shapiro, George Mason University
Richard Lamb, University at Buffalo, SUNY

A121. Inquiry-Based Ecosystem Science Learning in Virtual Environments – Comparing Virtual and Physical Concept Mapping

Shari Jackson Metcalf, Harvard University
Amy M. Kamarainen, Harvard University
Jeffrey King, Harvard University
Tina Grotzer, Harvard University
Chris Dede, Harvard University

A123. Learning Chemistry Concepts through Serious Game Play

Marina Shapiro, George Mason University
Len Annetta, East Carolina University

A125. Teaching the Systems Aspects of Epistemologically Authentic Experimentation in Ecosystems through Immersive Virtual Worlds

Tina Grotzer, Harvard University
Shari Jackson Metcalf, Harvard University
Michael S. Tutwiler, Harvard
Amy M. Kamarainen, Harvard
Meredith Thompson, MIT
Chris Dede, Harvard University

A127. The Characteristics of Inquiry-type Science Teachers using the Scratch Program for Movements of the Planets

Seoung-Hey Paik, Korea National University of Education
Youngjun Lee, Korea National University of Education
Eun Sun Choi, Korea National University of Education
Jeong Won Choi, Korea National University of Education
Noh Heejin, Korea National University of Education

Strand 13: History, Philosophy, and Sociology of Science Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A129. Developing Third Graders' Conceptions of Nature of Science and Scientific Identities through a Gravity Unit

Valarie L. Akerson, Indiana University

Naime Elcan, Indiana University

Banu Avsar Erumit, Indiana University

A131. Using Educative Curriculum materials to Support Integration of Engineering Design in Science and Technology Classrooms

Jonathan Singer, University of Maryland, Baltimore

Tory Williams, University of Maryland, Baltimore

Julie Ross, University of Maryland, Baltimore

Christopher Rakes, University of Maryland, Baltimore

Jacqueline Krikorian, University of Maryland, Baltimore

Strand 14: Environmental Education Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A133. Children's Sense of Place in New Town through Migration Policy in Korea

Seoung-Hey Paik, Korea National University of Education

Eunjeong Ju, Mirue Elementary School

Choi Hee, Chungcheongbuk

Jang Sujeong, Korea National University of Education

A135. Dirt, Bugs, and Worms: Attitudes and Self-efficacy of Educators Regarding Dirty and Scary Science

Nichole L. Nageotte, Indiana University

Gayle A. Buck, Indiana University

A137. Discourse on Water in Society: An Analysis of Introductory Geography Textbooks

Francesca A. White, Indiana University

A139. Exploring History for Place-based Learning of Sustainability

Miyoun Lim, Ewha Womans University

A141. Indonesian Pre-service Biology Teachers' Perceptions towards Environment and Field Trips as an Environmental Education Tool

Minsu Ha, Kangwon National University, South Korea

Arif Rachmatullah, Kangwon National University, South Korea

Fenny Roshayanti, University of PGRI Semarang, Indonesia

A143. Interpreting Middle School Students' Climate Change Learning through a Figured Worlds Perspective

Emily Hestness, University of Maryland, College Park

J. R. McGinnis, University of Maryland

Strand 15: Policy

Poster Session A

3:15pm – 4:15pm, Hyatt Texas Ballroom A, B, and C

A145. An Analysis of Research on the Impact of Block Scheduling on Science Teaching and Learning

Dorothy Holley, Clayton High School

Soonhye Park, North Carolina State University

Concurrent Session #6B

Poster Session

4:15pm – 5:15pm

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

Strand 1: Science Learning, Understanding and Conceptual Change

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B2. Deepening High School Students' Knowledge about Earth Science Topics Through Scientific Evaluation and Plausibility Reappraisal

Janelle M. Bailey, Temple University

Doug Lombardi, Temple University

Elliot S. Bickel, Temple University

Shondricka Burrell, Temple University

B4. Development and Validation of a Learning Progression for Systems Thinking in Ecosystems

Hui Jin, Educational Testing Service

Hyo Jeong Shin, Educational Testing Service

Hayat Hokayem, Texas Christian University

Farah Qureshi, Educational Testing Service

Thomas Jenkins, Educational Testing Service

B6. Role of Imaginary Play in the Zone of Proximal Development and Science Learning

Michael Kamen, Southwestern University
Mary E. Rouhiainen, Southwestern University

B8. Role of Mathematical Complexity on Students' Problem Solving Approaches to Synthesis Physics Problems

Bashirah Ibrahim, The Ohio State University
Lin Ding, The Ohio State University

B10. Student Learning of Graphing Skills in Conjunction with Instructional Feedback

Nirit Glazer, SVN
Yariv Glazer, SVN

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B12. The Choice to Remain in STEM: A Characterization of Transfer Students' Experiences

Terrell R. Morton, University of North Carolina, Chapel Hill
Lisa A. Corwin, University of Colorado, Boulder
Cynthia Demetriou, University of North Carolina, Chapel Hill
A. T. Panter, University of North Carolina, Chapel Hill

B14. The Rural Effect: How Students' STEM Perceptions are Influenced by Attending a Rural High School

Ben Pitchford, Colquitt County High School
Regina Suriel, Valdosta State University

B16. Theoretical Proposition: INPLACE Mobile Games Promote Collaborative Learning Through Cooperation, Social Flow, and Effective Communication

Denise M. Bressler, The State University of New Jersey

B18. Transfer of Intellectual Resources between Science and Mathematics: Development and Validation of a Theoretical model

Kyungwoon Seo, Minnesota State University, Mankato
Kyong Mi Choi, University of Iowa
Brian M. Hand, University of Iowa

B20. Wading into the River: Girls Exploring Future Possible Selves in a Geoscience/Biology/Technology Summer Program

Suzanne Perin, University of Alaska, Fairbanks
Laura Conner, University of Alaska, Fairbanks
Laura Oxtoby, University of Alaska, Fairbanks

Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies
Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B22. Testing Our Assumptions about Teaching Philosophy and Nature of Technology to Elementary Students

Kayla K. Brauer, Drake University
Jerrid W. Kruse, Drake University
Renald Daemicke, Drake University
Mitchell Klocke, Drake University
Megan Wagner, Drake University
Jesse L. Wilcox, Drake University
Colin Seebach, Bergman Academy
Jaclyn Easter, Drake University

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B24. Local Factors Hindering Transitions towards NGSS and STEM Practices for Middle School Science Teachers

Issam H. Abi-El-Mona, Rowan University

B26. Pilot Instrument for Measuring Physics Teachers Knowledge of Formative Assessment of Force and Motion

Marilyn M. Stephens, University of Alabama
Dennis Sunal, University of Alabama
Cynthia Szymanski Sunal, University of Alabama
Jim A. Minstrell, FACET Innovations
James W. Harrell, University of Alabama

B28. Restate, Answer, Cite, and Explain Paragraphs as Written Argumentation in Eighth Grade Physical Science

David L. Pauli, University of Georgia

B30. Science with a Smile: Humor as Antidote to Depressed Achievement in and Poor Attitude to Perceived Difficult Science Concepts in Nigerian Schools

Peter A. Okebukola, Lagos State University

B32. Using Choice to Uncover the Role of Gender Stereotypes in High School Physics Assignments

Samuel Wheeler, North Carolina State University
Margaret R. Blanchard, North Carolina State University

B34. Using Resource Teams to Integrate Computational Thinking into NGSS Aligned Investigations for K-12 Classrooms

Danika N Korpacz, University of Rhode Island
Jay A. Fogleman, University of Rhode Island

B36. Effects of Culturally Responsive Teaching on Nature-of-Science Thinking in an Anatomy and Physiology Classroom

Heidi Cian, Clemson University

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

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B38. Exploring College Students' Written Arguments Generated During an Environmental Science Course

Lauren H. Swanson, Whittier College
Ruben Solorza, Whittier College
Cinzia Fissore, Whittier College

B40. Monitoring Students' Atom Model Change via Model-based Inquiry

Tugba Yuksel, Purdue University
Lynn A. Bryan, Purdue University

B42. Where's the Reflection? A Critical Literature Review of University Science Service-learning Experiences

Gretchen P. King, University of Georgia

B44. Scientific Reasoning Among Undergraduate STEM Majors

Katherine Molloyhan, The Ohio State University
Lin Ding, The Ohio State University

B46. The Process by which Faculty Members Adopt Innovative Teaching Practices

Gili Marbach-Ad, University of Maryland
Carly Rietschel, University of Maryland

B48. How Feelings about Student-centered Strategies Affect Actual Implementation

Eugene Judson, Arizona State University
Lydia Ross, Arizona State University
Stephen J., Arizona State University
James A. Middleton, Arizona State University

B50. Undergraduate Students' Use and Understanding of Scientific and Popular Media Articles

Diane Lally, University of Nebraska, Lincoln
Jaime L. Sabel, University of Memphis
Cory T. Forbes, University of Nebraska, Lincoln

B52. Science Divorced from Its Philosophy: Turkish Undergraduate Physics Students' Views of Science

Deniz Gurcay, Hacettepe University
Mehmet Aydeniz, University of Tennessee

Strand 6: Science Learning in Informal Contexts Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B54. Reframing Massive Open Online Courses as Free-choice Learning Environments

Sanlyn R. Buxner, University of Arizona
Matthew C. Wenger, University of Arizona
Chris D. Impey, University of Arizona
Martin Formanek, University of Arizona

B56. Shifts in Students' Views towards Engineering in an Out-of-School-Time Program

Richard Gears, Stony Brook University
Angela M. Kelly, Stony Brook University
Monica Bugallo, Stony Brook University

B58. The Impact of Organizing Middle and High School STEM Clubs on Undergraduate STEM Majors

Bryan Shao-Chang Wee, University of Colorado, Denver
Michael Ferrara, University of Colorado, Denver
Michael Jacobson, University of Colorado, Denver
Hillary Mason, University of Colorado, Denver
Ronald Rorrer, University of Colorado, Denver
Robert M. Talbot, University of Colorado, Denver

B60. Youths Learning to Communicate with the Public about Science

Leah A. Bricker, University of Michigan
Benjamin L. Tupper, University of Michigan

Strand 7: Pre-service Science Teacher Education Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B62. Are We Opening the Science Pipeline? Putting a Magnifying Lens on Early Science Teacher Education

Jennifer Gallo-Fox, University of Delaware
Lauren Stegeman, University of Delaware
Andrea Drewes, University of Delaware

B64. Learning to Teach Science to English Language Learners: A Study of Pre-service Teachers

Walter Aminger, UCSB

Stacey L. Carpenter, University of California, Santa Barbara
 Sarah Hough, University of California, Santa Barbara
 Ashley Iveland, University of California, Santa Barbara
 Valerie Meier, University of California, Santa Barbara
 Sungmin Moon, University of California, Santa Barbara
 Julie A. Bianchini, University of California, Santa Barbara

B66. Pre-service Science Teachers' Trustworthiness Evaluations of Texts on a Pseudo-scientific and a Socioscientific Topic

Mehpare Saka
 Deniz Sarba

B68. Recognizing Student Understanding from Assessment: Chemistry Pre-service Teacher's Competencies

James M. Nyachwaya, North Dakota State University

B70. Prospective Science Teachers' Knowledge of Science Practices Situated in the Classroom

Barbara A. Crawford, University of Georgia
 Robert Idsardi, University of Georgia
 Camela Kiernan, Rochester Institute of Technology

B72. Understanding the Practices of Science and Engineering: Perceptions of Teachers Across the Learning-to-Teach Continuum

Alexandria K. Hansen, University of California, Santa Barbara
 Sungmin Moon, University of California, Santa Barbara
 Ashley Iveland, University of California, Santa Barbara
 Stacey L. Carpenter, University of California, Santa Barbara
 Danielle Boyd Harlow, University of California, Santa Barbara
 Julie A. Bianchini, University of California, Santa Barbara

**Strand 8: In-service Science Teacher Education
 Poster Session B**

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B74. Fostering Teachers' Autonomous Motivation and Development: A Self-determination Theory Perspective

Keith Power
 Karen Goodnough, Memorial University

B76. Growth in Elementary School Teachers' Views of Science and Engineering Practices

Augusto Z. Macalalag, Arcadia University
 Katie Miller, Arcadia University

B78. Impact of a Professional Project in Terms of LPoSMC on Novice Physics Teachers: Results of a Randomized Controlled Trial

Xiaoming Zhai, Beijing Normal University
 Yuying Guo, Beijing Normal University
 Min Li, University of Washington

B80. Implementing STEM Education at a District Level

Tamara Holmlund Nelson, Washington State University, Vancouver
 Kristin S. Huggins, Washington State University

B82. Learning About Teaching Practices: The Importance of Providing Support Structures in Science Professional Development

Dante Cisterna, University of Missouri
 Ibrahim Delen, Usak University

B84. Maker Educators: Encouraging Active, Creative, and Self-Directed Students through Making in School Settings

Amber Simpson, Indiana University
 Chad Ratliff, Assistant Director of Instruction, Albemarle County
 Adam V. Maltese, Indiana University

B86. Mapping a Teacher's Enactment of Engineering Design-based Instruction and Impact on Student Learning

Jeffrey D. Radloff, Purdue University
 Brenda M. Capobianco, Purdue University
 Jacqueline DeLisi, Education Development Center
 Chell Nyquist, Purdue University
 Nancy Tyrie, Purdue University

B88. Retaining New Teachers in High Need Districts: What They Say has Helped

Tyler Wooley-Brown, Boston University/Brookline High
 Peter S. Garik, Boston University
 Russell Faux, Davis Square Research Associates
 Dan Dill, Boston University
 Andrew Duffy, Boston University
 Bennett Goldberg, Boston University
 Mark Greenman, Boston University

B90. Teacher Agency as a Mediator for Professional Identity in Secondary Science Teachers

Gail Richmond, Michigan State University
 Kraig A Wray, Michigan State University

Strand 9: Reflective Practice

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B92. The Impact of STEM Professionals as Teachers: An Action Research Project

Brandon Rodriguez, NASA Jet Propulsion Lab

Strand 10: Curriculum, Evaluation, and Assessment

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B94. The Learning Loss Effect in Genetics: What Ideas Do Students Retain or Lose After Instruction?

Amber Todd, Wright State University
William L. Romine, Wright State University
Michele Miller, Wright State University

B96. An Innovative Formative Assessment Cycle: Formative Assessment from a Sociocultural Perspective

Nilay Muslu, University of Missouri, Columbia

B98. Assessing and Understanding Student Engagement in Design-based Science in Small Group Work: Two Methodological Perspectives

Miancheng Guo, University of Massachusetts Amherst
Elizabeth McEneaney, University of Massachusetts Amherst
Martina Nieswandt, University of Massachusetts Amherst

B100. Students' Abilities to Critique Scientific Evidence when Reading and Writing Arguments

Amanda Knight-Bardsley, Egan Maritime Institute
Katherine L. McNeill, Boston College

B102. Science Education For All: Addressing Issues of Equity and Social Justice Through SSI

Tara M. Nkrumah, University of South Florida
Selene Y. Willis, University of South Florida

B104. A Progression and Bundling Model for Developing Integrated, Socially-relevant STEM Curriculum Aligned with the NGSS

Brenda G. Bergman, Michigan Tech University
Stephanie Tubman, Michigan Tech University
Emily Gochis, Michigan Technological University
Jacqueline E. Huntoon, Michigan Technological University

B106. An Assessment Instrument for Systems Thinking in Science and Engineering Education

Rea Lavi, Technion-Israel Institute of Technology
Yehudit Judy Dori, Technion-Israel Institute of Technology
Niva Wengrowicz, Technion-Israel Institute of Technology
Dov Dori, Technion-Israel Institute of Technology

B108. An Examination of Three Approaches to Engineering Integration

Selcen Guzey, Purdue University
Elizabeth A. Ring, University of Minnesota
Maurina L. Aranda, Purdue University
Tamara J. Moore, Purdue University

B110. Assessing Vision II Literacy with Socioscientific Issues: A Quantitative Assessment of Socioscientific Reasoning

William L. Romine, Wright State University
Troy Sadler, University of Missouri
Andrew T. Kinslow, University of Missouri

B112. Exploring Teacher Design Teams Endeavors while Creating an Elementary-focused STEM-Integrated Curriculum

Gillian Roehrig, University of Minnesota
Justin McFadden, University of Louisville

Strand 11: Cultural, Social, and Gender Issues

Poster Session B

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B114. Maker Identity: Profiles and Perspectives of Latina Young Women in a Maker Project

Jasmine Kyle McBeath, University of California, Santa Barbara
Javier Pulgar, University of California, Santa Barbara
Richard P. Duran, University of California, Santa Barbara

B116. The Experiences of Gay Men in STEM Majors and Workplaces: A Critical Review

David P. Steele, University of Georgia

B118. Cross-cultural Comparison between the Function of Social Support through Task Value in Students' Science Learning

Chen-Lung Wang, National Central University
Pey-Yan Liou, National Central University

Strand 12: Educational Technology**Poster Session B**

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B120. Using Unmanned Aerial Systems to Bring STEM Field Experiences to the Classroom

Pavlo D. Antonenko, University of Florida

Ivan Mutis, Illinois Institute of Technology

B122. The Teachers' Evaluation of a PhET Simulation: A Designer's Perspective vs. a Learner's Perspective

Xiaoyang G. Gong, University of Maryland

B124. To Use AR (Augmented Reality) or not to use AR in Formative Assessment? A Comparison

Kaushal Kumar Bhagat, Beijing Normal University

Wei-Kai Liou, National Taiwan Normal University

Chun-Yen Chang, National Taiwan Normal University

B126. Using Field and Online Technologies to Learn Watershed Modeling

Nanette Dietrich, Millersville University

Carolyn Staudt, Concord Consortium

Steven Kerlin, Northern Kentucky University

B128. Using Electronic Textiles to Train Teachers to Build Models While Teaching Core Content

Kristin Seattle, Utah State University

Colby Tofel-Grehl, Utah State University

Vicki Allan, Utah State University

Strand 13: History, Philosophy, and Sociology of Science**Poster Session B**

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B130. Science Teachers' Conceptions about Technology and Engineering in the Scientific Endeavor

Allison Antink-Meyer, Illinois State University

Daniel Z. Meyer, Illinois College

B132. The Influence of an Authentic Engineering Design Experience on Elementary Teachers' Engineering Teaching Efficacy Beliefs

Hasan Deniz, University of Nevada, Las Vegas

Ezgi Yesilyurt, University of Nevada, Las Vegas

Erdogan Kaya, University of Nevada, Las Vegas

B134. The Retention of STEM Teachers in High Need Schools: Could Gender Socialization Have a Role?

Stacy Olitsky, Saint Joseph's University

Strand 14: Environmental Education**Poster Session B**

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B136. Intersection between Global and Self-reported Community-based Environmental Concerns

Leslie Neitzer, Southern Illinois University

Vivien M. Chabalengula, University of Virginia

Frackson Mumba, University of Virginia

B138. Middle and Secondary Science Teachers' Knowledge and Beliefs about Climate Change

Rana Khalidi, University of Houston

B140. Moving Students towards Climate Consensus (slightly) through Argumentation

Barry Golden, University of Tennessee

B142. Socioscientific Reasoning in a High School Field Ecology SSI Course

Andrew T. Kinslow, University of Missouri

Troy D. Sadler, University of Missouri

Hai T. Nguyen, University of Missouri, Columbia

B144. Teaching Environmental Education: Conceptual Analysis

Paulina Grino, University of Arizona

B146. How Consistent are the Goals of Environmental Science Education Across Research and Policy Documents?

Margaretann G. Connell, Illinois Institute of Technology

Norman G. Lederman, Illinois Institute of Technology

Judith S. Lederman, Illinois Institute of Technology

Strand 15: Policy**Poster Session B**

4:15pm – 5:15pm, Hyatt Texas Ballroom A, B, and C

B148. Policy Messaging and Local Contexts: Early Implementation Efforts of the Next Generation Science Standards

Tina Cheuk, Stanford University

B150. Science Teacher and Administrator Perspectives of Teacher Evaluation Systems

Jessica A. Mintz, Stony Brook University

Angela M. Kelly, Stony Brook University

Evening/Social Events

Membership and Elections Committee Sponsored Session *Graduate Student Forum*

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

5:30pm – 7:00pm, Hyatt Travis AB

Presiders:

Selina L. Bartels, Concordia University Chicago
Francesca White, Indiana University

Membership and Elections Committee Sponsored Session (55 participants max)

Early Career and Junior Faculty Early Career Discussion

This session is particularly designed for the early career, junior faculty who need support during the first years of their academic career. The focus will be on round tables with experienced faculty who can guide junior faculty through important issues pertaining to the tenure process and other issues. Discussion topics include, but are not limited to: teaching, research, service, balance in the workplace, international work, etc. We invite all junior faculty interested in this topic to join us.

5:30pm – 7:00pm, Hyatt Presidio ABC

Presiders:

Brooke Whitworth, Northern Arizona University

JRST Editorial Team Meeting/Dinner

By invitation only – Sponsored by Wiley-Blackwell

6:00pm – 8:30pm, HBG Convention Center 004

Reception: *International Journal of Science and Mathematics Education*

By invitation only – Sponsored by Springer

6:00pm – 7:30pm, Hyatt Bowie ABC

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Monday, April 24, 2017

Conference Registration

7:00am – 5:00pm, Hyatt Texas Foyer

Committee Meetings

7:15am – 8:30am

Outstanding Doctoral Research Award Committee Meeting

7:15am – 8:30pm, Hyatt Crockett CD

Early Career Research Award Committee Meeting

7:15am – 8:30pm, Hyatt Presidio ABC

Distinguished Contributions through Research Award Committee Meeting

7:15am – 8:30pm, Hyatt Republic ABC

Equity and Ethics Committee Meeting

7:15am – 8:30pm, Hyatt Travis CD

External Policy and Relations Committee Meeting

7:15am – 8:30pm, HBG Convention Center 006A

Research Committee Meeting

7:15am – 8:30pm, HBG Convention Center 006B

Membership and Election Committee Meeting

7:15am – 8:30pm, HBG Convention Center 006C

International Committee Meeting

7:15am – 8:30pm, HBG Convention Center 006D

Program Committee Meeting

7:15am – 8:30pm, Hyatt Seguin AB

Publications Advisory Committee Meeting

7:15am – 8:30pm, HBG Convention Center 007A

Plenary Session #2

Theme: Challenges in Learning Science Concepts

8:45am – 10:15am, Hyatt Texas Ballroom A, B, and C

Presider: Mei-Hung Chiu, National Taiwan Normal University

Presenter:

Michelene (Micki) Chi, Dorothy Bray Endowed Professor of Science and Teaching, Division of Educational Leadership and Innovation, Mary Lou Fulton Teachers College, Arizona State University

Title: Teaching Emergence: An Attempt at Differentiating Science Concepts of Processes

Presenter:

Stella Vosniadou, Strategic Professor, School of Education, Flinders University, Australia

Title: The Co-existence of Intuitive and Scientific Understandings: Implications for the Design of Curricula and Instruction

Concurrent Session #7

10:30am – 12:00pm

Administrative Sponsored Session

Admin Symposium: NSTA's Annual Research Worth Reading Recognition

10:30am – 12:00pm, Hyatt Presidio ABC

Presenters:

Deborah L. Hanuscin, University of Missouri, Columbia
Julie C. Brown, University of Minnesota

Equity and Ethics Committee Sponsored Session

Admin Symposium: Addressing the Challenges of Science Teaching and Learning in a Glocal Context: Informing Practices in Equity and Ethics

10:30am – 12:00pm, Hyatt Republic ABC

Presider: Miri Barak, Israel Institute of Technology

Presenters:

Yehudit Judy Dori, Israel Institute of Technology, Israel
Marcelle Siegel, University of Missouri, USA
Peter A. Okebukola, Lagos State University, Nigeria
Sonya Martin, Seoul National University, Republic of Korea
Alejandro Gallard, Georgia Southern University, USA

Strand 1: Science Learning, Understanding and Conceptual Change

Innovative Approaches to Science Teaching and Learning

10:30am – 12:00pm, HBG Convention Center 006D

Presider: Steven Mcgee, Northwestern University

Attraction Versus Repulsion, or Attraction and Repulsion?

Learning about Chemical Bonding with the ELI-Chem Simulation

Asnat Zohar, University of Haifa

Sharona T. Levy, University of Haifa

Integrating the Arts into Science Teaching and Learning

Katie Green, North Carolina State University

Kathy Cabe Trundle, North Carolina State University

Maria Shaheen, Primrose Schools

Learning Progression Research: Toward Coherence in Teaching and Learning of Science

Hui Jin, Educational Testing Service

Jamie N. Mikeska, Educational Testing Service

Hayat Hokayem, Texas Christian University

Elia Mavronikolas, Educational Testing Service

Makerspace in STEM for Girls: A Physical Space to Develop 21st Century Skills

Rekha B. Koul, Curtin University of Technology

Rachel S. Sheffield, Curtin University of Technology

Susan Blackley, Curtin University of Technology

Nicolleta Maynard, Curtin University of Technology

Strand 2: Science Learning: Contexts, Characteristics and Interactions

System and Learner Factors

10:30am – 12:00pm, HBG Convention Center 007A

Presider: Nancy Romance, Florida Atlantic University

Constitution of Nature in Nature of Science Teaching Practices

Darren G. Hoeg, University of Toronto

Expecting Success? College Students' Beliefs about Majoring in Engineering

Shiyu Liu, Ocean University of China

Pre-doctoral Factors Influencing BMS-PhD Entry and Retention: A Qualitative Study

Devasmita Chakraverty, Washington State University

Donna B. Jeffe, Washington University

Robert H. Tai, University of Virginia

STEM Coach as Facilitator of Connectivity in and beyond a School District

Michael Giamellaro, Oregon State University, Cascades

Debbie Siegel, Oregon State University, Cascades

Alyssa Lopez, Oregon State University, Cascades

Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies Practices and Beliefs from Experienced Teachers Inside the Elementary Classroom

10:30am – 12:00pm, HBG Convention Center 006A

Presider: Tammy D. Lee, East Carolina University

A 3 Year Longitudinal Multi-case Study Exploring Three Elementary Teachers' Model-based Science Instruction about Water

Tina Vo, University of Nebraska, Lincoln

Cory T. Forbes, University of Nebraska, Lincoln

Laura Zangori, University of Missouri

Christina V. Schwarz, Michigan State University

Dialogic Teaching To Establish Consensus: Social Negotiation, Epistemic Engagement, and Conceptual Development

Ying-Chih Chen, Arizona State University

Dimensions of Attitudes towards Science (DAS): A Translation and Validation for the U.S. Context

Jillian L. Wendt, University of the District of Columbia

Elementary Teacher Characteristics: Predictors of Science Subject Matter Knowledge?

Leigh K. Smith, Brigham Young University

Ryan Nixon, Brigham Young University

Richard R. Sudweeks, Brigham Young University

Epistemic Orientation toward Teaching Science as a Conceptual Framework for Teacher Development

Jee Kyung Suh, University of Iowa

Soonhye Park, North Carolina State University

Brian M. Hand, University of Iowa

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
Related Paper Set: Conceptualizing, Assessing, and Validating Content Knowledge for Teaching Energy in Physics
 10:30am – 12:00pm, HBG Convention Center 007B
Discussant: Joseph Krajcik, Michigan State University

The Conceptual Framework and Research Design for Studying CKT in Physics (CKT-E)

Ruth A. Anderson, FACET Innovations, LLC
 Jim A. Minstrell, FACET Innovations, LLC
 Drew H. Gitomer, Rutgers University
 Courtney A. Bell, Educational Testing Service

Design, Development, and Findings of a CKT-E Assessment

Jim A. Minstrell, FACET Innovations
 Geoffrey Phelps, Educational Testing Service
 Drew Gitomer, Rutgers University

Validating CKT-E through the Enactment of Instruction – Classroom Observations

Courtney A. Bell, Educational Testing Service
 Robert Zisk, Rutgers University
 Drew Gitomer, Rutgers University

Validating CKT-E through the Enactment of Instruction – Classroom Artifacts

Robert Zisk, Rutgers University
 Drew Gitomer, Rutgers University
 Courtney A. Bell, Educational Testing Service

Conceptualizing, Assessing, and Validating Content Knowledge for Teaching Energy in Physics

Joseph S. Krajcik, Michigan State University

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

Motivation and Learning

10:30am – 12:00pm, HBG Convention Center 007C
Presider: Matthew A. Mendicino, University of Georgia

Factors that Influence Community College Students' Interest in Science Coursework

Hope M. Sasway, Suffolk County Community College
 Angela M. Kelly, Stony Brook University

Measuring Situational Interest in Earth Sciences

John P. Madura, Education Development Center
 Josephine Louie, Education Development Center

Motivating Students In Course-Based Undergraduate Research Experiences (CUREs): Comparing College Science Courses Using Self-determination Theory

Stephen C. Scogin, Hope College
 Marissa Marks, Hope College

Student-centered Learning Environments' Impact on Student Motivation and Learning in Introductory Biology

Kimberly Pigford, North Carolina State University
 Miriam Ferzli, North Carolina State University

Strand 6: Science Learning in Informal Contexts
Symposium: Natural History Museums as Communicators for the Nature of Science: Research Approaches on Visitors' and Scientists' Perceptions

10:30am – 12:00pm, HBG Convention Center 006B

Presider: Kerstin Kremer, Kiel University Germany

Discussant: Alexandra Moormann, Museum für Naturkunde

Presenters:

Kerstin Kremer, Kiel University Germany
 Alexandra Moormann, Museum für Naturkunde, Berlin
 Charlène Bélanger, Université du Québec à Montréal
 Anik Meunier, Université du Québec à Montréal
 Patrick Charland, Université du Québec à Montréal
 Maritza Macdonald, American Museum of Natural History
 Lourdes López, University of Granada Spain
 María-Dolores Olvera-Lobo, University of Granada Spain
 Marjorie Rhodes, New York University
 Daniel Zeiger, American Museum of Natural History

Strand 6: Science Learning in Informal Contexts
Topics in Science Communication: Controversial Issues and Use of Social Media

10:30am – 12:00pm, Hyatt Travis AB

Presider: Stephanie B. Wortel-London, Stony Brook University

Aren't You Afraid of Getting Sick?: Using Social Networking to Explore Food Waste and Sustainability

Kathleen A. Fadigan, Pennsylvania State University

Ask Dr. Twitter: Characterizing Social Media Claims about Controversial Science Issues

Anita S. Tseng, Stanford University

***Conceptualizing Social Paleontology:
An Exploration of Mental Models***

Lisa M. Lundgren, University of Florida
Kent J. Crippen, University of Florida
Eleanor E. Gardner, Florida Museum of Natural History
Victor J. Perez, Florida Museum of Natural History
Ronny Maik Leder, Leipzig Natural History Museum

***Museum Staff Expectations for Critical Science
Exhibitions: Lessons from Brazil***

Ana Maria Navas Iannini, University of Toronto
Erminia G. Pedretti, University of Toronto

**Strand 7: Pre-service Science Teacher Education
*Pre-service Teachers and Efficacy***

10:30am – 12:00pm, HBG Convention Center 007D

Presider: Todd Milford, University of Victoria

***Examining Relationship of Pre-service Teachers'
Self-efficacy Beliefs and Drawings of their Science
Teaching, and their Classroom Practice***

Sanghee Choi, University of North Georgia

***Self-efficacy of Secondary Science and Mathematics
Student Teachers***

Janelle M. Bailey, Temple University
Noelle A. Luccioni, Temple University

**Strand 7: Pre-service Science Teacher Education
*Related Paper Set: Learning to Teach Elementary Science:
Using Practice-based Teacher Education to Support
Teacher Learning and Practice***

10:30am – 12:00pm, Hyatt Crockett CD

***Content Knowledge for Teaching Science: How Pre-
service Elementary Teachers Use their Knowledge
of Science Content and Practices***

Amber S. Bismack, University of Michigan
Elizabeth A. Davis, University of Michigan
Annemarie S. Palincsar, University of Michigan

***Supporting Beginning Teacher Planning of
Investigation-based Science Discussions***

Sylvie M. Kademian, University of Michigan
Elizabeth A. Davis, University of Michigan

***Scaffolding Beginning Teaching Practices: An Analysis
of the Roles Played by Tools Provided to Pre-service
Elementary Teachers***

Sarah J. Fick, Wake Forest University
Anna Maria Arias, Illinois State University

***Attending to Student Thinking in Rehearsals: Exploring
the Connections Between Teacher Educator Feedback
and Novice Teacher Noticing***

Amanda Benedict-Chambers, Missouri State University

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

10:30am – 12:00pm, HBG Convention Center 008A

Presider: Stephen B. Witzig, University of Massachusetts
Dartmouth

***Decision-making Patterns of Science Teachers:
A Case of Genetics Dilemmas***

Umran Betul Cebesoy, Usak University
Ceren Oztekin, Middle East Technical University

***Enhancing K-12 Teachers' Cultural Awareness
Through Reflections of Socioscientific Issues in a
STEM Education Course***

Augusto Z. Macalalag, Arcadia University
Joseph A. Johnson, Mercyhurst University

***Nature of Science and Teachers' Attitudes toward
Democratic Teaching and Decision Making***

Heba El-deghaidy, American University in Cairo

***The Influence of SSI Pedagogical Development Course on
Science Teachers' PCK and Argumentation***

Emil Eidin, Weizmann Institute of Science
Yael Shwartz, Weizmann Institute of Science

**Strand 10: Curriculum, Evaluation, and Assessment
*Related Paper Set: STEM Coursework, Post-secondary
Training and Employment Outcomes: Backwards Mapping
of the Ideal Curricula***

10:30am – 12:00pm, HBG Convention Center 006C

Presider: Stacey Britton, University of Mississippi

***Exploring Secondary Education STEM Curricula
using State Longitudinal Data System***

Ryan M. Walker, Mississippi State University
Renee M. Clary, Mississippi State University
Gabriel A. Posadas, Mississippi State University
Katie Huston, Mississippi State University
Christina Hillesheim, Hiwassee College
Stacey Britton, University of Mississippi
Aressa Coley, Mississippi State University

The Relationship Between High School STEM Exposure and STEM College Outcomes

Renee M. Clary, Mississippi State University
 Ryan M. Walker, Mississippi State University
 Gabriel A. Posadas, Mississippi State University
 Katie Huston, Mississippi State
 Stacey Britton, University of Mississippi

STEM Post-Secondary Training Pathways

Gabriel A. Posadas, Mississippi State University
 Ryan M. Walker, Mississippi State University
 Renee M. Clary, Mississippi State University
 Katie Huston, Mississippi State University
 Stacey Britton, University of Mississippi

Post-Secondary STEM Graduates Entering into the Workforce

Katie Huston, Mississippi State University
 Ryan M. Walker, Mississippi State University
 Renee M. Clary, Mississippi State University
 Gabriel A. Posadas, Mississippi State University
 Stacey Britton, University of Mississippi
 Shana Lee, Mississippi State University

Strand 12: Educational Technology

Symposium: Lessons from a Decade of Video Game Research for Students with Disabilities in Science Education

10:30am – 12:00pm, Hyatt Travis CD

Presider: Len Annetta, East Carolina University

Presenters:

Sheri Berkeley, George Mason University
 James D. Basham, University of Kansas
 Matthew T. Marino, University of Central Florida
 Eleazar Vasquez, University of Central Florida
 Aubrey Whitehead, George Mason University
 Amanda Luh, George Mason University
 Benjamin Gallegos, University of Central Florida
 Maya Israel, University of Illinois, Urbana Champaign
 Len Annetta, East Carolina University

Strand 13: History, Philosophy, and Sociology of Science

Differing Perspectives on Nature of Science and Science Education

10:30am – 12:00pm, Hyatt Seguin AB

Presider: Ryan Summers, University of North Dakota

A Three Part Framework for Locating Aspects of NOS in the Enterprise of Science

Daniel Z. Meyer, Illinois College
 Allison Antink-Meyer, Illinois State University

Autonomy, Power and Science Education

Wayne Melville, Lakehead University
 Donald Kerr, Lakehead University
 Todd Campbell, University of Connecticut
 Geeta Verma, University of Colorado, Denver

Nature of Science Treatment in U.S. Science Standards: A Historical Account with Contemporary Implications

Ryan Summers, University of North Dakota
 Sahar K. Alameh, University of Illinois, Urbana Champaign
 Jeanne Brunner, University of Massachusetts Amherst
 John Maddux, Collegiate School of Medicine and Bioscience
 Robert C. Wallon, University of Illinois, Urbana Champaign
 Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill

Theories, Laws and Models as Scientific Knowledge Forms and Their Inclusion in Science Teacher Education

Ebru Kaya, Bogazici University
 Sibel Erduran, University of Oxford, UK

Strand 15: Policy

Admin Symposium: Conceptualizing Organizational Processes in Science Education Reform: A Set of Theoretical Tools

10:30am – 12:00pm, Hyatt Crockett AB

Conceptualizing Organizational Processes in Science Education Reform: A Set of Theoretical Tools

Kathryn N. Hayes, California State University
 Sara Heredia, The University of North Carolina, Greensboro
 Carrie D. Allen, SRI International
 John Settlage, University Connecticut
 William R. Penuel, University of Colorado

Awards Luncheon

**12:15pm – 2:15pm, Hyatt Texas
Ballroom D, E, and F**

Concurrent Session #8

2:30pm – 4:00pm

Presidential Sponsored Session

Admin Symposium: Cross-Countries Collaborations for a Globalized Science Education

2:30pm – 4:00pm, HBG Convention Center 008B

Presiders:

Mei-Hung Chiu, National Taiwan Normal University

Sibel Erduran, University of Oxford, UK

Discussant: Avi Hofstein, Weizmann Institute of Science, Israel

Presenters:

Joe Krajcik, Michigan State University

Jari Lavonen, University of Helsinki

Mei-Hung Chiu, National Taiwan Normal University

Rachel Mamlok-Naaman, Weizmann Institute of Science, Israel

Mustafa Sözbilir, Atatürk University, Turkey

Sibel Erduran, University of Oxford, UK

George DeBoer, AAAS

Strand 1: Science Learning, Understanding and Conceptual Change

Fostering and Assessing Students' Understanding of Climate Change

2:30pm – 4:00pm, HBG Convention Center 006D

Presider: Michael Giamellaro, Oregon State University

Middle Schoolers Developed Systems Thinking while Designing Computer Games about Climate Change

Gillian Puttick, TERC

Michael Cassidy, TERC

Eli Tucker-Raymond, TERC

Students' Model-Based Explanations about Carbon Cycling and Climate Change through Socioscientific Issues Based Learning

Laura Zangori, University of Missouri

Amanda N. Peel, University of Missouri

Andrew T. Kinslow, University of Missouri

Patricia J. Friedrichsen, University of Missouri, Columbia

Troy Sadler, University of Missouri

Assessing Student Learning about Global Climate Change through Science and Engineering Practices

Erin Burkett, Michigan Technological University

Brenda G. Bergman, Michigan Tech University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Assessing Factors Supporting Learning

2:30pm – 4:00pm, HBG Convention Center 007A

Presider: Pei-Ling Hsu, University of Texas

Combination of Worked-out-examples and Feedback for Promoting the Understanding of the Energy Concept

Matylda Dudzinska, Leibniz Universität Hannover IDMP AG

Physikdidaktik

Gunnar Friege, Institute for Mathematics and Physics Education

Development and Validation of an Instrument for Assessing Students' Attitudes Towards Graphing

Laura K. Ochs, University of Virginia

Frackson Mumba, University of Virginia

The Effect of Post-lesson Assessment and Evaluation on Permanent Learning and Cognitive Load

Nesli Kala Aydin

The Relationship Between Dialogic Teacher Feedback and Student Outcomes on Standardized Science Assessment

Mason Kuhn, University of Northern Iowa

Mark A. McDermott, University of Iowa

Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies *Related Paper Set: Improving Early Childhood Science: A Comprehensive Approach*

2:30pm – 4:00pm, Hyatt Seguin AB

Presider: Charlene M. Czerniak, University of Toledo

Elementary Science Teachers' Experiences with Synchronous Online, Asynchronous Online and Face-to-Face Coaching

Amanda M. Gilbert, University of Toledo

The Effects of Coaching Using a Reflective Framework on Early Childhood Science Teachers' Depth of Reflection and Change in Practice

Debra L. Bloomquist, University of Toledo

Long Term Changes in K-1 Teacher Practice While Enacting NGSS-Aligned Science Inquiry

Nicole A. Tuttle, University of Toledo

A Detailed Analysis of Family Utilization of Science Activity Packs

Lacey Strickler, University of Toledo

The Impact of Science Professional Development on Student Achievement

Charlene M. Czerniak, University of Toledo

Nicole A. Tuttle, University of Toledo

**Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
*Science Teachers' Knowledge***

2:30pm – 4:00pm, HBG Convention Center 007B

Presider: Italo Testa, University Federico II Napoli

A Solomon Islands Study of School-Based Science Assessment and Teacher Pedagogical Content Knowledge

Lionel C. Kakai, Curtin University

Tony W. Rickards, Curtin University

Exploring Subject Matter Knowledge among Science Teachers: The Potential of Concept Sketches

Julie A. Luft, University of Georgia

Ryan Nixon, Brigham Young University

Master Teachers' Topic-Specific Pedagogical Content Knowledge (TSPCK) of Electrochemistry

Stephanie M. O'Brien, Stony Brook University

Angela M. Kelly, Stony Brook University

Pedagogical Content Knowledge and Cognitive Activation as Influencing Factors for Students' Learning in Biology

Christian Förtsch, LMU Munich

Sonja Werner, LMU Munich

Lena Von Kotzebue, LMU Munich

Birgit Jana Neuhaus, LMU Munich

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

Pre-Service Teacher Learning in the Content Disciplines

2:30pm – 4:00pm, HBG Convention Center 007C

Presider: Binaben H. Vanmali, Arizona State University

An Examination of Pre-service Elementary Teachers' Learning about Chemistry Epistemic Practices

Minjung Ryu, Purdue University

Meng-Yang Wu, Purdue University

Jocelyn Elizabeth Nardo, Purdue University

Pre-Service Teachers' Reasoning Resources on Argumentative Conceptual Physics Problems

Carina M. Rebello, Purdue University

Biological Evolution Acceptance Among Pre-service Primary Teachers

Mustafa B. Aktan, Hacettepe University

Investigating Cognitive Processes in Inquiry Lab Tasks at the Undergraduate Level

Ines Sonnenschein, Humboldt-Universität zu Berlin

Jenna Koenen, Humboldt-Universität zu Berlin

Rüdiger Tiemann, Humboldt – Universität Zu Berlin

**Strand 6: Science Learning in Informal Contexts
*Related Paper Set: Pathways to STEM Identity: Investigations with Underserved Youth in Informal Settings***

2:30pm – 4:00pm, HBG Convention Center 006B

Presider: John H. Falk, Oregon State University

Developing a Descriptive Framework of Situated Identity Negotiation for Adolescents Participating in an Informal Engineering Education Program

Scott A. Pattison, Oregon Museum of Science and Industry

Ivel Gontan, Oregon Museum of Science and Industry

Smirla Ramos-Montanez, Oregon Museum of Science and Industry

Industry

"We've Learned that Anyone can be a Scientist": How Museum Program Design Supports Youth's Stem Linked Identities

Carrie D. Allen, SRI International

Vera Michalchik, Stanford University

William R. Penuel, University of Colorado

Traces: Emerging Short-Term Outcomes of Informal/Free-choice STEM Experiences among Girls of Color and Their Potential Long-term Influence on Identity Building

Lynn D. Dierking, Oregon State University

Heidi B. Carlone, University of North Carolina at Greensboro

Strand 7: Pre-service Science Teacher Education***Pre-service Teachers and Science Practices***

2:30pm – 4:00pm, HBG Convention Center 007D

Presenter: Julianne A. Wenner, Boise State University***Pre-service Science Teachers' Modelling-strategies***

Moritz Krell, Freie Universität Berlin

Susann Hergert, Freie Universität Berlin

Dirk Krueger, Freie Universität Berlin

Pre-service Teachers' Use of Curriculum Materials to Engage Students in Data Analysis

Anna Maria Arias, Illinois State University

Luminita Hartel, Illinois State University

Prospective Teachers' Knowledge for Constructing Concept Maps: An Analysis of the Quality of Concept Maps

Pamela Harrell, University of North Texas

Karthigeyan Subramaniam, University of North Texas

EunYoung Lee, University of North Texas

What Should I Have My Students Do? The Nature of Tasks Selected by Pre-service Teachers

Kirby Whittington, Florida State University

Miray Tekkumru Kisa, Florida State University

Sherry A. Southerland, Florida State University

Christine Andrews-Larson, Florida State University

Strand 8: In-service Science Teacher Education***Professional Development Needs & Delivery***

2:30pm – 4:00pm, HBG Convention Center 008A

Presenter: Augusto Z. Macalalag, Arcadia University***Examining the Instantiation of Teacher Leader Knowledge During the Enactment of Professional Development***

Laura A. Shafer, University of California Davis

Cynthia Passmore, University of California, Davis

Power of Data Facilitation Academy: Designing Facilitator Professional Development

Brooke A. Whitworth, Northern Arizona University

Nena Bloom, Northern Arizona University

Megan Walker, Northern Arizona University

Lori Rubino-Hare, Northern Arizona University

The Impact of Technology-Enhanced Professional Development in Science on Students' Learning

Hyunju Lee, Utah State University

Max L. Longhurst, Utah State University

Todd Campbell, University of Connecticut

Strand 8: In-service Science Teacher Education***Symposium: Innovations in Equity-Centered Teacher Learning***

2:30pm – 4:00pm, Hyatt Presidio ABC

Presenters:

Julie C. Brown, University of Minnesota

Pauline W. U. Chinn, University of Hawaii, Manoa

Meredith W. Kier, College of William and Mary

Veronica McGowan, University of Washington

Felicia Moore Mensah, Columbia University

Philip L. Bell, University of Washington

Alexis Patterson, University of California, Davis

Katie Van Horne, University of Colorado, Boulder

Maria S. Rivera Maulucci, Barnard College

Thomas McKenna, Connecticut Science Center

Strand 9: Reflective Practice***Reflective Practice – Paper Session A***

2:30pm – 4:00pm, HBG Convention Center 006A

Presenter: Banu Avsar Erumit, Indiana University***Developing an Identity as a Scientist: A Comparative Study Illustrating How a Dramatic Inquiry can Support Children to Successfully Engage in being Scientific***

Deb J. McGregor, Oxford Brookes University

Learning from Three Young Women's Stories: Recommendations for Teaching Science to Individuals with Disabilities

Lauren Madden, The College of New Jersey

Melissa Friedman, The College of New Jersey

Danielle Koehler, The College of New Jersey

Shanaya Panday, The College of New Jersey

The Influence of Parents on Undergraduate and Graduate Students' Entering the STEM Disciplines and Careers

Cheryl J. Craig, Texas A&M University

Paige K. Evans, University of Houston

Donna Stokes, University of Houston

Rakesh Verma, University of Houston

Using Reflective Soft-Systems Methodology to Describe Next Generation Assessment Research Practices

Christopher D. Murakami, University of Missouri, Columbia

Dante Cisterna, University of Missouri

Marcelle Siegel, University of Missouri, Columbia

Shannon Burcks, University of Missouri

Nilay Muslu, University of Missouri, Columbia

Suleyman Cite, University of Missouri, Columbia

Strand 10: Curriculum, Evaluation, and Assessment
Related Paper Set: The Processes of Curriculum Development for Three Middle School Projects at Different Stages of Development

2:30pm – 4:00pm, HBG Convention Center 006C

Development of the Five Tools and Processes for Translating the NGSS into Instruction and Classroom Assessment

Dora E. Kastel, American Museum of Natural History

Jody Bintz, BSCS

Three-Dimensional Teaching and Learning: Rebuilding and Researching an Online Middle School Curriculum to Support the NGSS

Brooke Bourdelat-Parks, BSCS

Betty Stennett, BSCS

Zoe E. Buck Bracey, BSCS

Audrey Mohan, Biological Sciences Curriculum Study

Jody Bintz, BSCS

Susan M. Kowalski, BSCS

Designing an NGSS-aligned Middle School Ecosystems Unit using the Five Tools and Processes

Maia K. Willcox, University of California, Berkeley

Barbara Nagle, University of California, Berkeley

Wendy M. Jackson, University of California, Berkeley

Dora E. Kastel, American Museum of Natural History

Redesigning Curriculum for Three-dimensional Teaching and Learning

Wendy M. Jackson, University of California, Berkeley

John Howarth, University of California at Berkeley

Maia K. Willcox, University of California, Berkeley

Strand 10: Curriculum, Evaluation, and Assessment
Contexts and Characteristics in Curriculum and Assessment

2:30pm – 4:00pm, Hyatt Republic ABC

President: Matthew J. Benus, Indiana University Northwest

An Examination of How Teachers' Beliefs about Scientific Argumentation are Impacted by Multimedia Educative Curriculum Materials (MECMs)

Katherine L. McNeill, Boston College

Maria Gonzalez-Howard, Boston College

Lisa Marco-Bujosa, Boston College

Suzanna Loper, University of California

Laura O'Dwyer, Boston College

Secondary Science Teachers' Values, Practices, and Proficiency for Classroom Assessment

Gavin W. Fulmer, University of Iowa

Christopher C. Deneen, NIE Singapore

Gavin T. L. Brown, University of Auckland

Wei Shin Leong, NIE Singapore

Kelvin H. K. Tan, NIE Singapore

Hui Yong Tay, NIE Singapore

Examining the Relationship between Context Characteristics and Student Performance on Context-based Items

Min Li, University of Washington

Maria Araceli Ruiz-Primo, University of Colorado, Denver

Dongsheng Dong, University of Washington

Jim A. Minstrell, FACET Innovations

Xiaoming Zhai, Physics department, BNU

Teacher Learning from an Educative Reform-oriented Science Curriculum: An Exploration of Teacher Curriculum Use

Lisa Marco-Bujosa, Boston College

Katherine L. McNeill, Boston College

Maria Gonzalez-Howard, Boston College

Suzanna Loper, University of California

The Role of Optional Discussion Activities in Supporting Motivation in a STEM Massive Open Online Course

William L. Wildberger, University of Florida

Pavlo D. Antonenko, University of Florida

Chris Mortenson, University of Florida

Strand 12: Educational Technology
Teachers' Perceptions of Technology

2:30pm – 4:00pm, HBG Convention Center 006A

President: Bridget T. Miller, University of South Carolina

Exploring Fossils with 3D Technologies:

A Study of Teachers' Perspectives of Integrated STEM

Pavlo D. Antonenko, University of Florida

Claudia Grant, University of Florida

Sean Moran, University of Florida

Bradford Davey, Technology for Learning Consortium, Inc.

Bruce MacFadden, University of Florida

Adam Wade, Santa Cruz County Office of Education

Assessing Chemistry Teachers' Change Process while Implementing Technology: The Concerns-based Adoption Model

Orit Herscovitz, Technion-Israel Institute of Technology
 Gabriella Shwartz, Technion-Israel Institute of Technology
 Shirley Avargil, Bar Ilan University
 Yehudit Judy Dori, Technion-Israel Institute of Technology

Middle School Science Teachers' Technology Decision for Inclusive Science Classrooms

Alexis A. Rutt, University of Virginia
 Frackson Mumba, University of Virginia
 Vivien M. Chabalengula, University of Virginia
 Laura K. Ochs, University of Virginia

Teacher Perceptions of Educational Technology in Schools across Rural Nepal

Emilie Coppinger, University of New Hampshire
 Sameer Honwad, University of New Hampshire

Strand 14: Environmental Education Students' Ecological Conceptions

2:30pm – 4:00pm, Hyatt Travis AB

Presider: Lucinda N. Sohn, Texas A&M University

Conceptual Change in Natural Resource Management Students' Ecological Literacy

Anne Marie A. Casper, Colorado State University
 Meena M. Balgopal, Colorado State University

Investigating Student and Teacher Perceptions of the Intersection between Daily Life & Ecology

Yael Wyner, City College of New York
 Erica Blatt, College of Staten Island

How Problem Features Interact with the Ways that Seventh Graders Frame Agency in Ecological Problems

Megan P. Cuzzolino, Harvard University
 Michael S. Tutwiler, Harvard
 Eric W Torres, Harvard Graduate School of Education
 Tina Grotzer, Harvard University

Design and Evaluation of an Advanced Undergraduate Course on Sustainable Energy for Science Majors

Elon Langbeheim, Weizmann Institute of Science

Concurrent Session #9

4:15pm – 5:45pm

Strand 1: Science Learning, Understanding and Conceptual Change

Understanding Students Conceptions about Science

4:15pm – 5:45pm, HBG Convention Center 006D

Presider: Michael Kamen, Southwestern University

Challenging Notions of Stable Cognitive Biases in Undergraduate Biology Students

Julia S. Gouvea, Tufts University
 Matthew R. Simon, Tufts University

Design of Remedial Module to Overcome School Students' Misconceptions in Biological Sciences

Narendra D. Deshmukh, Homi Bhabha Centre for Science Education

Longitudinal Learning Dynamics and the Conceptual Restructuring of Evolutionary Understanding

Xiaoying Wang, Stony Brook University
 Jesse Colton, Stony Brook University
 Gena C. Sbeglia, Stony Brook University
 Stephen J. Finch, Stony Brook University
 Ross H. Nehm, Stony Brook University

What Makes a Misconception Robust to Change

J. Bryan Henderson, Arizona State University
 Elon Langbeheim, Weizmann Institute of Science
 Michelene T. H. Chi, Arizona State University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Argumentation Interventions

4:15pm – 5:45pm, HBG Convention Center 007A

Presider: Annemarie Palincsar, University of Michigan

Enhancing Scientific Argumentation through Infographic Authoring

Joseph L. Polman, University of Colorado, Boulder
 Joanna Weidler-Lewis, University of Colorado, Boulder

How Does Argumentation from Experimental Data and Observations Influence Learning in School Science Labs?

Burkhard Priemer, Humboldt University of Berlin
Tobias Ludwig, Humboldt University of Berlin
Doris Lewalter, Technical University of Munich

Technology-enabled Real-time Scaffolding for Improving Secondary School Students' Written Scientific Argumentation about Complex Systems

Hee-Sun Lee, The Concord Consortium
Amy Pallant, The Concord Consortium
Ou Lydia Liu, Educational Testing Service

The Impact of the Design and Use of Multiple Models on Scientific Curricular Argument

William J. McConnell, Virginia Wesleyan College
Daniel L. Dickerson, East Carolina University
Stephen R. Burgin, University of Arkansas
Petros Katsioloudis, Old Dominion University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

K-12 Engineering Research

4:15pm – 5:45pm, Hyatt Presidio ABC

Presider: Catherine Quinlan, Howard University

How Should an Engineer Talk? Exploring the Language Demands of Engineering in an Elementary Classroom

Justin McFadden, University of Louisville

Is Engineering just an Application of Science and Mathematics? Investigating the Relation between Engineering, Science and Mathematics Competencies Empirically

Carolin Frank, University of Leipzig

Multimedia Notebook Cards in Support of Engineering Design Practices and Disciplinary Discourse in Elementary School

Kristen B. Wendell, Tufts University
Chelsea Andrews, Tufts University

Undergraduate Early Childhood Educators and Engineers Interdisciplinary Toy Design Collaboration: A Perception and Interaction Study

Amy Trauth, University of Delaware
Jennifer Gallo-Fox, University of Delaware
Lynn Worden, University of Delaware
Jenni Buckley, University of Delaware

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
Socioscientific Issues in Science Education

4:15pm – 5:45pm, HBG Convention Center 007B

Presider: Malcolm S. Pringle, Boston Public Schools

Development of a Socioscientific Issue Curriculum Unit for Middle School Students: Genetically Modified Foods
Mustafa S. Topcu, Yildiz Technical University

Evolution of a Model for Socioscientific Issue Teaching and Learning

Troy Sadler, University of Missouri
Patricia J. Friedrichsen, University of Missouri, Columbia
Jaimie Foulk, University of Missouri

Impact of Socioscientific Issues on Middle School Students' Character and Values for Global Citizens

Wardell A. Powell, University of Massachusetts Amherst
Dana L. Zeidler, University of South Florida

Exploring the Relationship among Middle Grade Teachers' Conceptions of STEM and Equity

Matthew Kloser, University of Notre Dame
Jessica Gottlieb, Texas Tech University
Matthew Wilsey, University of Notre Dame
Gina N. Svarovsky, University of Notre Dame
Patrick Kirkland, University of Notre Dame
Jessica Puricelli, University of Notre Dame

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

Learning Assistant Programs and Teaching Assistant Professional Development

4:15pm – 5:45pm, HBG Convention Center 007C

Presider: Claudia P. Aguirre-Mendez, Emporia State University

"Tell Me Why": Eliciting and Responding to Student Ideas in an Undergraduate Biology Laboratory Course

Anna M. Strimaitis, Florida State University
Sherry A. Southerland, Florida State University

Learning Assistant Practices through the Lens of Students: Micro-interactions and Impacts on Students' Metacognition in STEM College Classrooms

Hagit Kornreich-Leshem, Florida International University
Rocio Benabentos, Florida International University
Zahra Hazari, Florida International University
Geoff Potvin, Florida International University
Idaykis Rodriguez, Florida International University
Laird Kramer, Florida International University

The Relationship between Enacting Ambitious Instruction and Developing Sophisticated Conceptual Frameworks of Biological Knowledge

Anna M. Strimaitis, Florida State University
Sherry A. Southerland, Florida State University
Brittany Kraft, Florida State University
Carolyn Schultz, Florida State University

Undergraduate Facilitators for Active Learning in Organic Chemistry: The Outcomes of the Experience

Hannah E. Jardine, University of Maryland
Lee A. Friedman, University of Maryland

Strand 6: Science Learning in Informal Contexts
Science Learning in and about Nature – A

4:15pm – 5:45pm, HBG Convention Center 006B

Presider: Patricia Patrick, Consultant

A Targeted Literature Review of Field Trips in Outdoor Settings

James F. Ammons, University of Georgia
Barbara A. Crawford, University of Georgia

Bioinspiration at the Zoo: Synergy between Science Education and Environmental Education in an Informal Context

Michal Topaz, Technion-Israel Institute of Technology
Tali Tal, Technion-Israel Institute of Technology

Informal Science Learning in Formal Contexts: Children Help to Save Endangered Falcon

Dafna Gan, Seminar Hakibuzim, Northeastern University
Adiv Gal, Kibbutzim College

Strand 6: Science Learning in Informal Contexts
STEM Pathways and Pipelines with Informal Learning Settings

4:15pm – 5:45pm, Hyatt Travis AB

Presider: Jennifer L. Weible, Central Michigan University

Staying in Science: An Examination of Pathways of Youth Who Participate in Immersive Science Research Activities

Preeti Gupta, American Museum of Natural History
Karen Hammerness, American Museum of Natural History
Timothy Podkul, SRI International, Inc.

STEM Career Choices and Science Leisure-learning Interests

Gina Childers, University of North Georgia
Gail Jones, North Carolina State University
Katherine Chesnutt, North Carolina State University
Elysa N. Corin, Harvard-Smithsonian Center for Astrophysics
Thomas Andre, Iowa State University

The Effect of Repeated Attendance in STEM Outreach Programs and Other Factors on Pipeline Persistence

Alonzo B. Alexander, North Carolina State University
Osman Aksit, North Carolina State University
Eric N. Wiebe, North Carolina State University

The Effects of Integrated STEM Experiences on Student Confidence in STEM

Jeanna R. Wieselmann, University of Minnesota

Using Research to Practice Partnerships to Develop Ecosystem-wide, Customized Interventions to Sustain Youth STEM Interest

Nancy Staus, Oregon State University
Lynn D. Dierking, Oregon State University
John H. Falk, Oregon State University
Jennifer N. Wyld, Oregon State University

Strand 7: Pre-service Science Teacher Education
Preparing Teachers for Underserved Youth

4:15pm – 5:45pm, HBG Convention Center 007D

Presider: Alison R. Miller, Teachers College, Columbia University

Coherence and Connections: The Educational Value of Content Storylines in Learning to Develop Science Curricula

Catherine E. Milne, New York University
Robert Wallace, New York University
Fabienne Doucet, New York University

Impact of Engagement of Candidates with Urban Youth on Views about Learners and Teaching Practices

Gail Richmond, Michigan State University

Sociopolitical Understandings and the Structure-Agency Dialectic in Science Teacher Preparation

Daniel Morales-Doyle, University of Illinois, Chicago
Maria Varelas, University of Illinois, Chicago
David Segura, University of Illinois, Chicago
Carole P. Mitchener, University of Illinois, Chicago
Marcela Bernal-Munera, University of Illinois, Chicago

Using a Science as Inquiry Model to Prepare STEM Teachers in High Need Areas

Paige K. Evans, University of Houston

Cheryl Craig, Texas A&M University

Donna W. Stokes, University of Houston

**Strand 7: Pre-service Science Teacher Education
*Video Analysis and Pre-service Teacher Learning***

4:15pm – 5:45pm, Hyatt Republic ABC

Presider: Ron Gray, Northern Arizona University

“I’m So Proud of My Progress!”: Targeted Video Reflections to Support Reform-Oriented Science Teaching

Julianne A. Wenner, Boise State University

Julie M. Kittleson, University of Georgia

Examining the Impact of Lesson-analysis Based Teacher Education across Methods Courses, Student Teaching, and Induction

Christopher Wilson, BSCS

Molly Stuhlsatz, BSCS

Connie Hvidsten, BSCS

Betty Stennett, BSCS

Notice and Note: Exploring Pre-service Teachers’ Science Instruction through Video Analysis

Heather J. Johnson, Vanderbilt University

Teresa K. Dunleavy, Vanderbilt University

Melanie Hundley, Vanderbilt University

Tracking Student Teachers’ Changing Ability to Notice in a Video-based Biology Methods Course

Kennedy Kam Ho Chan, The University of Hong Kong

Jessica Shuk Ching Leung, The University of Hong Kong

Tracy Cuiling He, The University of Hong Kong

Dirac Sze Him Lam, The University of Hong Kong

Richard Chi Keung Ng, The University of Hong Kong

**Strand 8: In-service Science Teacher Education
*Teachers’ Communities of Practice & Collaboration***

4:15pm – 5:45pm, HBG Convention Center 008A

Presider: David F. Jackson, University of Georgia

Crossing Boundaries: The Role of Assessment as a Boundary Object in Professional Development

Marcelle A. Siegel, University of Missouri, Columbia

Suleyman Cite, University of Missouri, Columbia

Christopher D. Murakami, University of Missouri, Columbia

Nilay Muslu, University of Missouri, Columbia

Shannon Burcks, University of Missouri

Kemal Izci, Yuzuncu Yil University

Science Teachers’ Collective Sensemaking: A Conceptual and Analytic Framework to Understand Implementation of Reform Practices

Sara Heredia, The University of North Carolina, Greensboro

Teacher Professional Development and Communities of Practice. Insights from Eight Case Studies

Francesco Cuomo, Martin-Luther-Universität Halle-Wittenberg, Germany

Emilio Balzano, Università degli Studi di Napoli Federico II, Italy

Ciro Minichini, Istituto Nazionale di Documentazione, Italy

Serpico Marco, Università degli Studi di Napoli Federico II, Italy

Teacher of an Integrated STEM Language

Mary M. Capraro, Texas A&M University

Robert M. Capraro, Texas A&M University

Ali Bicer, Texas A&M University

Niyazi Erdogan, Balikesir University

Ayşe T. Oner, Texas A&M University

**Strand 10: Curriculum, Evaluation, and Assessment
*Related Paper Set: Supporting Three-Dimensional Science Learning and Instruction***

4:15pm – 5:45pm, HBG Convention Center 006C

Presider: David L. Fortus, Weizmann Institute of Science

Discussant: Norman Lederman, Illinois Institute of Technology

The Centrality of Phenomena in Three-Dimensional Learning and Instruction

Joseph S. Krajcik, Michigan State University

Tom Bielik, Michigan State University

Jeffrey Nordine, IPN, Kiel

Knut Neumann, Leibniz Institute for Science Education, Kiel

David L. Fortus, Weizmann Institute of Science

Norman G. Lederman, Illinois Institute of Technology

Instructional Coherence as a Support for Three-Dimensional Science Teaching

Jeffrey Nordine, IPN, Kiel
 Sebastian T. Opitz, Michigan State University
 Knut Neumann, Leibniz Institute for Science Education, Kiel
 David L. Fortus, Weizmann Institute of Science
 Joseph S. Krajcik, Michigan State University
 Norman G. Lederman, Illinois Institute of Technology

Assessing Three-Dimensional Learning

Knut Neumann, Leibniz Institute for Science Education, Kiel
 Marcus Kubsch, Leibniz Institute for Science and Mathematics Education, Kiel
 David L. Fortus, Weizmann Institute of Science
 Joseph S. Krajcik, Michigan State University
 Jeffrey Nordine, Leibniz Institute for Science and Mathematics Education, Kiel
 Norman G. Lederman, Illinois Institute of Technology

Supporting Student Engagement in Three-dimensional Learning and Instruction

David L. Fortus, Weizmann Institute of Science
 Israel Tuitou, Weizmann Institute of Science
 Joseph S. Krajcik, Michigan State University
 Jeffrey Nordine, Leibniz Institute for Science Education, Kiel
 Knut Neumann, Leibniz Institute for Science Education, Kiel
 Norman G. Lederman, Illinois Institute of Technology

Strand 11: Cultural, Social, and Gender Issues

Cultivating Science Teacher's Sociopolitical Consciousness

4:15pm – 5:45pm, HBG Convention Center 008B

Presenter: Tanja Tajmel, Humboldt-University Berlin

"That Study was Racist": A Critical Cross-Case Analysis of Sociopolitical Consciousness Raising in Secondary Science

Manali J. Sheth, Iowa State University

Comparing Secondary Science Teachers' Culturally Relevant Unit Plans Before and After an Equity-Focused Induction Course

Paula S. Rozowa, University of Minnesota
 Julie C. Brown, University of Minnesota
 Felicia Leammukda, University of Minnesota

Exploring Changes in Science Teachers' Attitudes Toward Culturally Diverse Students During an Induction Course

Preethi Titu, University of Minnesota
 Elizabeth A. Ring, University of Minnesota
 Julie C. Brown, University of Minnesota
 Gillian H. Roehrig, University of Minnesota

Influences of Science Students' Epistemic Reflections on their Sociopolitical Actions

John Lawrence Bencze, University of Toronto
 Mirjan Krstovic

Strand 14: Environmental Education

Symposium: From Globalization to Glocalization: Developing Ecological Sociopolitical Consciousness in Science Education

4:15pm – 5:45pm, Hyatt Travis CD

Presenters:

Sophia (Sun Kyung) Jeong, University of Georgia
 Kimberly Haverkos, Thomas More College
 Deborah J. Tippins, University of Georgia
 Bhaskar Upadhyay, University of Minnesota
 Shakhnoza Kayumova, University of Massachusetts Dartmouth
 Carolina C. Rodriguez, Australian Catholic University
 Hyoungbum Kim, Chungbuk National University, Korea
 Stacey Britton, University of Mississippi
 Ryan M. Walker, Mississippi State University
 Elizabeth Pate, University of Texas, San Antonio

Evening/Social Events

Equity and Ethics Committee Sponsored Outing *Equity Dinner (Maximum Attendance: 80)*

6:30pm – 9:00pm, Off-Site

Fogo de Chão San Antonio

849 E. Commerce St. #393

Dinner, including tax and gratuity, is \$50.

Please note: You must register for this event with your Advance Conference Registration. Tickets purchased for this event are not refundable. There will be no tickets sold onsite.

Tuesday, April 25, 2017

Conference Registration

7:00am – 12:00pm, Hyatt Texas Foyer

Strand Meetings

7:00am – 8:15am

Join Strand Coordinators to help shape future strand focus for presentations and administrative sessions. Questions and feedback are welcome.

Strand 1: Science Learning, Understanding and Conceptual Change

Meeting—7:00am – 8:15am, Hyatt Presidio ABC

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Meeting—7:00am – 8:15am, Hyatt Republic ABC

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

Meeting—7:00am – 8:15am, Hyatt Travis CD

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

Meeting—7:00am – 8:15am, Hyatt Seguin AB

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

Meeting—7:00am – 8:15am, HBG Convention Center 006A

Strand 6: Science Learning in Informal Contexts

Meeting—7:00am – 8:15am, HBG Convention Center 006B

Strand 7: Pre-service Science Teacher Education

Meeting—7:00am – 8:15am, HBG Convention Center 006C

Strand 8: In-service Science Teacher Education

Meeting—7:00am – 8:15am, HBG Convention Center 006D

Strand 9: Reflective Practice

Meeting—7:00am – 8:15am, HBG Convention Center 007A

Strand 10: Curriculum, Evaluation, and Assessment

Meeting—7:00am – 8:15am, HBG Convention Center 007B

Strand 11: Cultural, Social, and Gender Issues

Meeting—7:00am – 8:15am, HBG Convention Center 007C

Strand 12: Educational Technology

Meeting—7:00am – 8:15am, HBG Convention Center 007D

Strand 13: History, Philosophy, and Sociology of Science

Meeting—7:00am – 8:15am, HBG Convention Center 008A

Strand 14: Environmental Education

Meeting—7:00am – 8:15am, HBG Convention Center 008B

Strand 15: Policy

Meeting—7:00am – 8:15am, HBG Convention Center 007A

Concurrent Session #10

8:30am – 10:00am

Research Committee Sponsored Session

Admin Symposium: Positioning Indigenous Knowledge Systems in the Glocalization and Sustainability of Science Education Research and Practice

8:30am – 10:00am, HBG Convention Center 006A

Presenters:

Femi S. Otulaja, University of the Witwatersrand
 Meshach Mobolaji Ogunniyi, University of the Western Cape
 Irene U. Osisioma, California State University, Dominguez Hills

Strand 1: Science Learning, Understanding and Conceptual Change

Unraveling Genetics and Genetic Variation

8:30am – 10:00am, HBG Convention Center 006D

Presider: Sebastian T. Opitz, Michigan State University

Identifying the Relationships between Constructs in a Genetics LP

Moraima Castro, Rutgers University

Ravit Golan Duncan, Rutgers University

A Human(e) Genetics Education: Teaching about Human Genetic Variation Can Reduce Racial Bias amongst Adolescents

Brian M. Donovan, BSCS

Rob Semmens, Stanford

Phil Keck, The Live Oak School

Elizabeth Brimhall, Palo Alto Unified School District

K.C. Busch, Stanford Graduate School of Education

Using Corn to Foster Elementary Students' Understanding of Plant Life Cycle, Inheritance and Genetic Variation

Devarati Bhattacharya, University of Nebraska, Lincoln

Erin Ingram, University of Nebraska, Lincoln

Cory T. Forbes, University of Nebraska, Lincoln

Tyler Wolken, University of Nebraska, Lincoln

Maranda Kegley, University of Nebraska, Lincoln

Characterization of Argumentation Moves in a Genetics Modeling Assessment

Veronica L. Cavera, Rutgers University

Ravit Golan Duncan, Rutgers University

Rozaliya Seryapov, Rutgers University

Kira J. Belkin, Rutgers University

Clark A. Chinn, Rutgers University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Understanding Argumentation

8:30am – 10:00am, HBG Convention Center 007A

Presider: Abdi M. Warfa, University of Minnesota

A Statistical Investigation of the Role of Students' Content Knowledge in Argumentation Performance

Jianlan Wang, Texas Tech University

Zahra Hazari, Florida International University

Geoff Potvin, Florida International University

Development Pre-service Chemistry Teachers' Argumentation Skills in Implementing Science Writing Heuristic at Chemistry Laboratory Subject/Problem

Ceren Soysal, Middle East Technical University

Esra Sarici, Middle East Technical University

Mustafa Tuysuz, Yuzuncu Yil University

Selcuk Kilinc, Middle East Technical University

Esen Uzuntiryaki-Kondakci, Middle East Technical University

From Unproductive to Productive: Understanding Productive Argumentation from the Perspective of the Epistemological Resource Network

Jeonghwa Lee, Seoul National University

Heui-Baik Kim, Seoul National University

Learning to Argue in Elementary School over Time: Constructing Ways of Building Answers Using Evidence

Luiz Gustavo F. Franco, Universidade Federal de Minas Gerais

Danusa Munford, Universidade Federal de Minas Gerais

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies Instructional Approaches and Student Outcomes

8:30am – 10:00am, HBG Convention Center 007B

Presider: Grant E. Gardner, Middle Tennessee State University

High School Biology Instructors' Implementation of Peer Instruction: A Study of Vertical Transfer

Grant E. Gardner, Middle Tennessee State University

Jennifer C. Parrish, Middle Tennessee State University

Leigh McNeil, Middle Tennessee State University

Tom Cheatham, Middle Tennessee State University

Teachers' Perceptions of Integrating Computer Simulations into Science Instruction

Xiaoyang G. Gong, University of Maryland

Using Expert Perspectives to Inform the Design of Instruction about Ecosystem Science Practices

Amy M. Kamarainen, Harvard

Tina Grotzer, Harvard University

Shari Jackson Metcalf, Harvard University

Chris Dede, Harvard University

Making Science Practice Visible in the Classroom: Characterizing Teachers' Classroom Practice Related to the NGSS

Allyson M. Rogan-Klyve, Central Washington University

An Instructional Material for Teaching 'Life Cycle of Frog' to Visually Impaired Students

Seyda Gul, Ataturk University
Fatih Yazici, Ataturk University
Mustafa Sozbilir, Ataturk University

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

Chemistry Learning

8:30am – 10:00am, HBG Convention Center 007C

Presider: Stephen L. Thompson, University of South Carolina

Analyzing Predictors of Freshmen Content Knowledge Acquisition and Study Success in Chemistry

Daniel Averbeck, University of Duisburg, Essen
Elke Sumfleth, University of Duisburg, Essen
Eckart Hasselbrink, University of Duisburg, Essen

Exploring General Chemistry Students' Explanations for Differences in Ionization Energy

Ted M. Clark, The Ohio State University

Learning and Valuing in Two Context-based General Chemistry Courses

Courtney Ngai, University of Massachusetts, Boston
Hannah Sevan, University of Massachusetts Boston
Deirdre Hugi-Cleary, Gymnase Francais de Bienne
Florence Wanjiku, University of Massachusetts Boston
Jesse M Baldoria, University of Massachusetts Boston

Qualitative Assessment of Service Learning in Chemistry II

Megan O. Mahoney, Emporia State University
Claudia P. Aguirre-Mendez, Emporia State University
Diane L. Nutbrown, Emporia State University

Strand 6: Science Learning in Informal Contexts

Strand Sponsored Session: Dissecting Design Principles that Mediate Impact on Youth Participating in Long-term OST Programs

8:30am – 10:00am, HBG Convention Center 006B

Presider: Jennifer Adams, Brooklyn College, CUNY

Discussant: Preeti Gupta, American Museum of Natural History

Science and Youth Development in a Museum-based Out-of-school Time Program

Faith R. Kares, Museum of Science and Industry
Aaron Price, Museum of Science and Industry, Chicago

Longitudinal STEM Identity Trajectories

Roxanne M. Hughes, Florida State University

Youth Development through Employment, Enrichment, and Community

Priya Mohabir, New York Hall of Science
Katherine Culp, Education Development Center, Inc.

An ISE Program's Impact on STEM Major and STEM Career Outcomes

Bobby Habig, University of Notre Dame
Preeti Gupta, American Museum of Natural History
Jennifer Adams, Brooklyn College, CUNY

Strand 6: Science Learning in Informal Contexts

Topics in Science Communication: Stakeholders and Strategies

8:30am – 10:00am, Hyatt Crockett AB

Presider: Eli Tucker-Raymond, TERC

Automatic Jargon Identifier for Scientists Engaging with the Public and for Science Communication Educators

Tzipora Rakedzon, Technion-Israel Institute of Technology
Ayelet Baram-Tsabari, Technion-Israel Institute of Technology
Noam Chapnik, Holon Institute of Technology
Roy Yosef, Holon Institute of Technology
Elad Segev, Holon Institute of Technology

Comparing Engagement Formats to Motivate Local Community Public Climate Change Action

Kathryn Stofer, University of Florida
Lisa M. Lundgren, University of Florida
Makenna Lange, University of Florida
Vaughan S. James, University of Florida

Learning Science from Youths: Adult Responses when Youths Share Science

Amie Patchen, Boston College

Stakeholders' Views on Science Communication, Focusing on Channel Types

Zehavit Kohen, Technion-Israel Institute of Technology
Yehudit Judy Dori, Technion-Israel Institute of Technology

Telling my Story from my Perspective: African American Girls' Informal and Formal STEM Learning Experiences

Natalie S. King, Georgia State University

Strand 7: Pre-service Science Teacher Education
Socioscientific Issues and Pre-service Teacher Learning

8:30am – 10:00am, HBG Convention Center 007D

President: Sanghee Choi, University of North Georgia

Examining Teacher Development Toward Effective Inquiry Instruction

Jill Birren, Marquette University

Leigh Van den Kieboom, Marquette University

Pre-service Teachers' Attitudes Toward Biotechnology Applications

Jonathan Chitiyo, Southern Illinois University, Carbondale

Vivien M. Chabalengula, University of Virginia

Frackson Mumba, University of Virginia

Strand 8: In-service Science Teacher Education
Teaching in High-needs Schools

8:30am – 10:00am, HBG Convention Center 008A

President: Malcolm S. Pringle, Boston Public Schools

Commitment to STEM Teaching in High Need Schools: The Role of Scholarship Incentives

Stacy Olitsky, Saint Joseph's University

Evaluating the Impact of a Robert Noyce Scholarship Program on Science Teachers

Meltem Alemdar, Georgia Institute of Technology

Christopher Cappelli, Georgia Institute of Technology

Exploring Teacher Perceptions of the Enhancing Understanding of Concepts and Practices of Science (EUCAPS) Project

Andy Cavagnetto, Washington State University

Judith Morrison, Washington State University

Kathryn Baldwin, Washington State University

Olusola Adesope, Washington State University

Nicole Ferry, Washington State University

Investigating Supports for In-Service Science Teachers' Knowledge Development in High Needs Schools

Stephen B. Witzig, University of Massachusetts Dartmouth

Strand 8: In-service Science Teacher Education
Science Discourse

8:30am – 10:00am, Hyatt Crockett CD

President: Emily Reigh, Stanford University

Conversations around Practice: Mediating Opportunities to Learn About Teaching Science

Amy R. Ricketts, Pennsylvania State University

Practice-Based Professional Development on Science Discourse: Shifting Teacher Beliefs on Value and Barriers to Talk

Florencia Gomez Zaccarelli, Stanford University

Anita Tseng, Stanford University

Kirstin C. Busch, Stanford University

Jonathan Francis Osborne, Stanford

Hilda Borko, Stanford University

Teacher Facilitation of Elementary Science Discourse after a Professional Development Initiative: A Comparative Case Study

Emily Reigh, Stanford University

Florencia Gomez Zaccarelli, Stanford University

Hilda Borko, Stanford University

Jonathan Francis Osborne, Stanford University

Strand 8: In-service Science Teacher Education
Chemistry & Physics Teaching

8:30am – 10:00am, Hyatt Republic ABC

President: Peter S. Garik, Boston University

All Alone – A Study of Isolation of Chemistry Teachers in New York State

Linda Padwa, Stony Brook University

Keith Sheppard, Stony Brook University

Impact of Professional Development on High School Physics Teaching and Student Learning

Dennis Sunal, University of Alabama

Cynthia Szymanski Sunal, University of Alabama

Marsha E. Simon, University of Alabama

Tara Ray, University of Alabama

Justina A. Ogodo, The University of Alabama, Tuscaloosa

Marilyn M. Stephens, University of Alabama

James W. Harrell, University of Alabama

Mohan Aggarwal, Alabama A&M University

Barbara Cady, Alabama A&M University

Investigation of the Teacher's Perspective on Quantum Physics with the Delphi-method

Kim-Alessandro Weber, Leibniz Universitaet Hannover

Gunnar Friege, Leibniz Universitaet, Hannover

Rüdiger Scholz, Leibniz Universitaet, Hannover

The Impact of a Professional Development Intervention on Knowledge for Teaching Chemical Bonding

Marissa S. Rollnick, Wits University

Vanessa Kind, Durham University

How Mentoring Applications Affect the Learning Environment: Reflections from Chemistry Teachers as Mentees (Virtual Presentation)

Aysegul Saglam Arslan
Canan Cengiz

Strand 11: Cultural, Social, and Gender Issues
Exploring Factors that Influence Access and Quality in STEM Education

8:30am – 10:00am, HBG Convention Center 008B

Presider: Zoe E. Buck Bracey, BSCS

Enhancing Pre-service Science Teachers' Understanding on Entrepreneurship and Economics of Science

Sila Kaya, University of Limerick
Sibel Erduran, University of Oxford, UK
Naomi Birdthistle, Swinburne University of Technology

Examining Culturally and Linguistically Diverse Students' Learning Experiences When Co-constructing Scientific Models in a Middle School Science Classroom in Korea: Implications for Policy and Practice

Wanjoo Ahn, Seoul National University
Hee-Kyung Park, Seoul National University
Sonya N. Martin, Seoul National University
Ho-Jung Kim, Seoul National University
Hye-Eun Chu, Macquarie University

Glocalization: Exploring Local and Global Influences on Science Education Research in Canada

Jerine Pegg, University of Alberta
Dawn Wiseman, McGill University
Michael Montgomery, University of Alberta
Angela Hostetler, University of Alberta
Sam Cheng, University of Alberta

Long-term Impacts of Financial and Educational Support for Under-represented Minorities and First Generation STEM Undergraduates

Elizabeth Sciaky, University of California, Santa Barbara
Anne E. Leak, Rochester Institute of Technology

Strand 11: Cultural, Social, and Gender Issues
Valuing Students' Cultural Experiences and Linguistic Practices

8:30am – 10:00am, Hyatt Presidio ABC

Presider: Katherine Wade, Georgia State University

Critical Discourse Analysis of an Out-of-School Science Program for African American Girls

Katherine Wade, Georgia State University
Renee S. Schwartz, Georgia State University

Science Education in Multilingual Classrooms: The Case of a Middle Eastern Country

Sara Salloum, University of Balamand
Saouma B. Boujaoude, American University of Beirut

Sociocultural and Critical Perspectives on Language and Discursive Homogenization in Bilingual Science Classrooms

Caitlin G. Fine, University of Colorado, Boulder

The Formative Uses of Multimodal Representations in Linguistically Diverse Science Classrooms: Potential and Challenges

Preetha K. Menon, University of California, Santa Cruz

Strand 12: Educational Technology
Related Paper Set: Studying Science and Engineering Learning using Design and Simulation Technologies

8:30am – 10:00am, Hyatt Sequin AB

Presider: Jie Chao, Concord Consortium

Discussants:

Jennifer Chiu, University of Virginia

Using Visualizations to Support Understanding and Application of Thermodynamics Concepts in Middle School Engineering Design Projects

Amanda Gonczi, University of Virginia
Jennifer L. Chiu, University of Virginia

Scaffolding Teachers for Maximizing Student Learning of Engineering Design Practices in Formal Classrooms

Chandan Dasgupta, Purdue University
Alejandra Magana, Purdue University

Comparing Two Approaches to Engineering Design in the 7th Grade Science Classroom

Molly Goldstein, Purdue University
Senay Purzer, Purdue University
Robin Adams, Purdue University

Empowering Students to Be Change Makers with Innovative Design Tools

Jie Chao, The Concord Consortium
Charles Xie, Concord Consortium
Corey Schimpf, Concord Consortium
Joyce Massicotte, Concord Consortium
Saeid Nourian, Concord Consortium

**Strand 14: Environmental Education
*Socioscientific Issues, Sense of Place***

8:30am – 10:00am, Hyatt Travis CD

Presider: Xavier Fazio, Brock University

A Case Study of a Science and a Social Studies Teachers' Experiences of Co-teaching SSI-based Environmental Ethics Class

Engin Karahan, Eskisehir Osmangazi University
Gillian Roehrig, University of Minnesota

Developing Empathy through Place-based Environmental Socioscientific Issues

Benjamin C. Herman, University of Missouri-Columbia
Dana L. Zeidler, University of South Florida
Mark H. Newton, University of South Florida

Sense of Conservation: When Is a Black Rat Snake (Elaphe obsoleta) Really Just a Snake?

Jennifer Idema, NOAA
Patricia Patrick, Consultant

Using Students' Sense of Place as a way to Teach Environmental Issues from Local-global

S.Lizette Ramos, University of Guadalajara
Karina De Alba, Instituto Superior de Investigación y Docencia para el Magisterio

**Concurrent Session #11
10:15am – 11:45am**

**External Policy and Relations Committee,
Publications Advisory Committee, and Strand 15:
Policy Co-Sponsored Session**

Admin Symposium: Make a Difference: Practical Tools and Strategies for Reaching Policy Audiences

10:15am – 11:45am, Hyatt Travis CD

Presider: Katherine L. McNeill, Boston College

Presenters:

Philip L. Bell, University of Washington
Sinead Chalmers, Rennie Center
Kenneth W. Heydrick, Texas
Peter McLaren, Next Gen Education
Jodi Peterson, National Science Teachers Association

Strand 1: Science Learning, Understanding and Conceptual Change

Students Argumentation about Science and Scientific Evidence

10:15am – 11:45am, HBG Convention Center 006D

Presider: Matthew J. Benus, Indiana University Northwest

Examining the Concept of Evidence in Science Education

Jamison M. Wills, Purdue University

Disagreement Discourse Processes and Strategies in the Middle School Science Inquiry Classroom

Randi M. Zimmerman, Rutgers Graduate School of Education
Clark A. Chinn, Rutgers University
Ravit Golan Duncan, Rutgers University

Choosing Among Competing Models: Students' Evidence-based Arguments

Hebbah El-Moslimany, Rutgers University
Na'ama Y. Av-Shalom, Rutgers University
Ravit Golan Duncan, Rutgers University
Clark A. Chinn, Rutgers University

Argumentative Levels of Students' Written Statements on the Validity of an Electron Cloud Model

Sulaiman M. Al-Balushi, Sultan Qaboos University

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

10:15am – 11:45am, HBG Convention Center 007A

President: Alejandro J. Gallard, Georgia Southern University

Exploring the Teaching and Learning of Health Outcomes: Intersections of Race, Place, and Socioeconomic Status
 Tammie Visintainer, TERC

Gendered Interest: High School Genetics Curricula Activate Topical Interest in Biology amongst Girls

Daniel C. Edelson, BSCS

Brian M. Donovan, BSCS

Molly Stuhlsatz, BSCS

Urban Elementary Students' Conceptions of Engineering after Receiving an Integrated STEM Curriculum

David E. McKinney, The Johns Hopkins University

Catherine Kruchten, The Johns Hopkins University

Nicholas W. Lehn, The Johns Hopkins University

Carolyn A. Parker, The John Hopkins University

Sandra Strittmatter, The Johns Hopkins University

Using Contextual Mitigating Factors Analysis to Interrogate STEM Intervention Efforts

Alejandro J. Gallard, Georgia Southern University

Wesley Pitts, CUNY

S. Lizette Ramos-de Robles, Universidad de Guadalajara

Katie Brkich, Georgia Southern University

Belinda Flores Bustos, University of Texas, San Antonio

Lorena Claeys, University of Texas, San Antonio

Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies
Related Paper Set: Teachers' PCK for Structure and Properties of Matter: Methodological and Practical Considerations

10:15am – 11:45am, HBG Convention Center 006A

Discussant: Patricia Friedrichsen, University of Missouri

Eliciting Elementary Teachers' PCK for the Small Particle Model

Patrick S. Smith, Horizon Research, Inc.

Patricia J. Friedrichsen, University of Missouri, Columbia

Characterizing Elementary Teachers' Initial PCK for Teaching Structure and Properties of Matter

Deborah L. Hanuscin, University of Missouri, Columbia

Dante Cisterna, University of Missouri

Kelsey Lipsitz, University of Missouri

Capturing the Development of PCK of Pre-service Teachers of Chemistry on Particle Models

Jan H. Van Driel, Leiden University

Teachers' PCK in the Context of Teaching a Unit on Atomic Structure of Matter

Martina Struebe, University of Duisburg, Essen

Oliver Tepner, University of Regensburg, Germany

Elke Sumfleth, University of Duisburg, Essen

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
Increasing Learning Opportunities in Curriculum, Assessments and Instruction

10:15am – 11:45am, HBG Convention Center 007B

President: Marissa S. Rollnick, Wits University

Critical Analysis of the Advanced Placement Environmental Science Exam and Its Implications for Practice

Kelly F. Flanagan, Columbia University

Identifying the Cognitive and Metacognitive Strategies Used by 9th Grade Students Answering the Multiple-Choice Science Questions

Emine H. Diken, Kafkas University

Nejla Yuruk, Gazi University

Intended Design Versus Teacher Enactment of a DBR Project-based Middle School Biology Curriculum

Janice L. Anderson, University of North Carolina, Chapel Hill

Lana Minshew, University of North Carolina, Chapel Hill

Kelly Barber-Lester, University of North Carolina, Chapel Hill

Sharon Derry, University of North Carolina, Chapel Hill

Science Tasks, Teachers' Thinking about Task Demands and Students' Opportunities to Learn

Miray Tekkumru-Kisa, Florida State University

Hannah Hiester, Florida State University

Zahid Kisa, Florida State University

Examination of the Relationship between Students' Metacognition and Their Problem Solving Skills in Physics

Zeynep Dulger, Marmara University

Feral Ogan-Bekiroglu, Marmara University

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
Emotional and Motivational Aspects of Science Teaching and Learning

10:15am – 11:45am, Hyatt Presidio ABC

Presider: Juan Jimenez, Illinois Institute of Technology

Connections between Emotions and Teacher Practice: Implementing an Unconventional Pedagogy on Climate Change

Sarah El Halwany, University of Toronto, OISE

Minja Milanovic

Mirjan Krstovic

Majd Zouda, University of Toronto

John Lawrence Bencze, University of Toronto

How Individual Resources Relate to Small Group Functioning in Biology Engineering Design Tasks

Elizabeth McEaney, University of Massachusetts Amherst

Miancheng Guo, University of Massachusetts Amherst

Martina Nieswandt, University of Massachusetts Amherst

Investigating Factors Underlying Secondary Teachers' Motivation to Use Problem-based Learning

Huei Chen Lao, National Institute of Environmental Health Sciences

Margaret R. Blanchard, North Carolina State University

Teaching Topics in Ecology Through Incongruity

Francine Wizner, Albany University

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

Engineering and STEM Cognition

10:15am – 11:45am, HBG Convention Center 007C

Presider: Carina M. Rebello, Purdue University

Developing an Analytical Framework to Characterize Student Reasoning of Interdisciplinary Phenomena

Emily Scott, Michigan State University

Vashti Sawtelle, Michigan State University

Charles W. Anderson, Michigan State University

Mashood K. Kandiyil, Michigan State University

Rebecca L. Matz, Michigan State University

Sonia M. Underwood, Florida International University

Exploring the Reflection and Feedback Cycle to Enhance Engineering Students' Learning

Muhsin Menekse, Purdue University

Xiangmin Fan, University of Pittsburgh

Wencan Luo, University of Pittsburgh

Jingtao Wang, University of Pittsburgh

Diane Litman, University of Pittsburgh

First-Year Engineering Students' Implicit Theories of Creativity in Design

Jaclyn K. Murray, Georgia Institute of Technology

Barbara A. Crawford, University of Georgia

Strand 6: Science Learning in Informal Contexts
Symposium: Science Communication Education for STEM Professionals: Teaching Scientists to Communicate with Non-Expert Audiences

10:15am – 11:45am, Hyatt Crockett CD

Presider: Martin Storksdieck, Oregon State University

Presenters:

Ayelet Baram-Tsabari, Technion-Israel Institute of Technology

Bruce V. Lewenstein, Cornell University

Anthony Dudo, The University of Texas, Austin

Tiffany Lohwater, Center for Public Engagement with Science & Technology, AAAS

Martin Storksdieck, Oregon State University

Strand 7: Pre-service Science Teacher Education
Nature of Science and Pre-service Teachers

10:15am – 11:45am, HBG Convention Center 007D

Presider: Rebekka Darner Gougis, Illinois State University

Contextualization of Nature of Science Within the Socioscientific Issues Framework

Dilek Karisan, Adnan Menderes University

Dana L. Zeidler, University of South Florida

Investigating the Development of Pre-service Teachers' Philosophy and Nature of Technology & Engineering Views

Jerrid W. Kruse, Drake University

Hallie S. Edgerly, Drake University

Jaclyn M. Easter, Grand View University

Pre-service Science Teachers' Perceptions of Scientific Knowledge

Selin Akgun, Bogazici University

Ebru Kaya, Bogazici University

Sibel Erduran, University of Oxford, UK

Busra Aksoz, Bogazici University

Pre-service Teachers' Preference to Apply NOS Aspects and Evidence-based Thinking in their Teaching

Deniz Saribas, Istanbul Aydin University
Gaye Ceyhan, Bogazici University
Doug Lombardi, Temple University

**Strand 8: In-service Science Teacher Education
*Coaching & Co-Teaching***

10:15am – 11:45am, Hyatt Republic ABC

Presider: Andy Cavagnetto, Washington State University

Catching the Moments – Co-Teaching to Stimulate Science in the Preschool Context

Pernilla Nilsson, Halmstad University
Colette Murphy, Trinity College, Dublin

Distance-base Instructional Coaching for Elementary Teachers' Integrated STEM Teaching

SoonChun Lee, Wichita State University

The Impact of Video-based Coaching: Sadie's Story

Janet Carlson, Stanford University
Sadie Skiles, Oakland Technical High School

Coaching Partnerships for Implementation of STEM Integrated Curriculum (Virtual Presentation)

Tasneem Anwar, University of Minnesota
Gillian H. Roehrig, University of Minnesota

**Strand 10: Curriculum, Evaluation, and Assessment
*Issues in Physical Science Curriculum and Assessment***

10:15am – 11:45am, HBG Convention Center 006C

Presider: Joseph S. Krajcik, Michigan State University

A Multilevel Analysis of Changes in Physics Students' Conceptual Understanding using Technology-based Assessment

Yuan-Ling Liaw, FACET Innovations
Jim A. Minstrell, FACET Innovations
Dongsheng Dong, University of Washington

Creativity in a Project-Based Physics and Chemistry Intervention

Christopher Klager, Michigan State University
Barbara Schneider, Michigan State University
Joseph S. Krajcik, Michigan State University
Jari M.J. Lavonen, University of Helsinki
Katariina Salmela-Aro, University of Helsinki

Developing an NGSS-Aligned, LP-based Assessment of Students' Understanding of Matter

Aaron D. Rogat, Columbia University
Lei Liu, Educational Testing Service

Validating an Assessment for Tracking Students' Growth in Understanding of Energy from Elementary School to High School

Joseph M. Hardcastle, AAAS, Project 2061
Cari F. Herrmann Abell, AAAS, Project 2061
George E. De Boer, AAAS, Project 2061

**Strand 11: Cultural, Social, and Gender Issues
*STEM Learning Beyond the Classroom***

10:15am – 11:45am, HBG Convention Center 008B

Presider: Leah A. Bricker, University of Michigan

Decoding STEM: The Impact of STEM Outreach Programs on English Language Learners

Stephanie Florence, York University
Isha Decoito, Western University

Effects of Outdoor Experiences with Cultural Flavor on Students Achievement in Physics

Tunde Owolabi, Lagos State University, Lagos, Nigeria
Peter A. Okebukola, Lagos State University, Ojo
Hakeem O Akintoye, Lagos State University, Lagos
Olugbenga G. Akindoju, Lagos State University
Abraham Ologundudu, Lagos State University
Olubunmi B Onafowokan, Saint Augustine College of Education, Akoka

The Influence of Peer-Led Team Learning on the Recruitment and Retention of Underrepresented Minority Students in STEM Majors

Jeremy D. Sloane, Syracuse University
Julia J. Snyder, Syracuse University
Ryan D. Dunk, Syracuse University
Christina I. Winterton, Syracuse University
Jason R. Wiles, Syracuse University

Sociomaterial Assemblages in Online Asynchronous Learning Environments

Shannon Burcks, University of Missouri
 Marcelle Siegel, University of Missouri, Columbia
 Christopher D. Murakami, University of Missouri, Columbia
 Rose M. Marra, University of Missouri, Columbia

Strand 12: Educational Technology***Student Attitudes and Impacts***

10:15am – 11:45am, Hyatt Crockett AB

Presider: Jennifer L. Weible, Central Michigan University

The Cultural Science of Teaching Science Through Digital Tools

Kareem Edouard, Stanford
 Bryan A. Brown, Stanford University

Investigating what Factors May Affect Students' Attitudes toward Clicker Usage in Science Classrooms: An Exploratory Study

Yu-Ta Chien, National Taiwan Normal University
 Chun-Hui Jen, National Taiwan Normal University
 Sonya N. Martin, Seoul National University
 Hye-Eun Chu, Macquarie University
 Chun-Yen Chang, National Taiwan Normal University

Students' Motivational Expressions and Teacher's Motivational Support in an Online Forum during Open Inquiry

Idit Adler, Bar-Ilan University, Israel
 Michal Zion, Bar-Ilan University, Israel
 Liron Schwartz, Bar-Ilan University, Israel
 Nir Madjar, Bar-Ilan University, Israel

Supporting Preschool Science: The Use of Digital Tools to Promote Children's Engagement in Science Practices

Marion Goldstein, EDC
 Danae Kamdar, SRI International
 Regan Vidiksis, EDC
 Ximena Dominguez, SRI International

Strand 13: History, Philosophy, and Sociology of Science
Elementary Students' and Teachers' Views of Nature of Science, Scientific Inquiry and Socioscientific Issues

10:15am – 11:45am, Hyatt Seguin AB

Presider: Valarie L. Akerson, Indiana University

A Cross Sectional Study of Elementary Students' Understanding of Nature of Science and Scientific Inquiry

Selina Bartels, Illinois Institute of Technology
 Judith S. Lederman, Illinois Institute of Technology

Improving Nature of Science Instruction in Elementary Classes with Educative Curriculum Materials and Trade Books

Jeanne L. Brunner, University of Massachusetts Amherst
 Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill

Nature of Science and Elementary Teachers: Do Changes in Conceptions and Teaching Persist Eight Years following a Prolonged Professional Development Program?

Theresa A. Cullen, University of Oklahoma
 Valarie L. Akerson, Indiana University

No Child Too Young: An Exploratory Teacher Research Study of Socioscientific Issues Implementation at the Elementary Level

Sami Kahn, Ohio University

Strand 15: Policy***Policy and the Role of Teachers: Teacher Preparation and Teacher Leadership***

10:15am – 11:45am, HBG Convention Center 006B

Presider: Todd Campbell, University of Connecticut

The Relationship of Teacher Certification Preparation and Student Science Achievement: Analysis with NAEP 2011 Data

Feng Jiang, University of Arkansas
 Denise Ariola, University of Arkansas

Raising Test Scores Versus Teaching Thinking: Teachers' Views On How Simultaneous Policies Affect Practice

Anat Zohar, Hebrew University of Jerusalem
 Vered alboher Agmon, Hebrew University of Jerusalem

Developing Math/Science Teacher Leadership: A Consensus Approach to Evaluating Program Quality

Jody Bintz, BSCS
 Jodie Galosy, Knowles Science Teaching Foundation
 Barbara Miller, Education Development Center, Inc.
 Lindsey Mohan, University of Notre Dame/University of Texas Austin
 Audrey Mohan, Biological Sciences Curriculum Study

Science Teacher Leadership Practice: A Theory for Guiding Increased Attention to Teacher Leadership in Policy

Todd Campbell, University of Connecticut
 Julianne A. Wenner, Boise State University
 Latanya Brandon, University Connecticut

Lunch—On Your Own**12:00pm – 1:00pm****Concurrent Session #12****1:00pm – 2:30pm****Administrative Sponsored Session*****Admin Symposium: Maximizing Insight from Mixed Methods Research: A Range of Perspectives***

1:00pm – 2:30pm, Hyatt Seguin AB

Presenters:

Joseph A. Taylor, BSCS

Zahra Hazari, Florida International University

Valerie K. Otero, University of Colorado, Boulder

William R. Penuel, University of Colorado

Strand 1: Science Learning, Understanding and Conceptual Change***Explaining, Reasoning and Problem Solving in Science***

1:00pm – 2:30pm, HBG Convention Center 006D

Presider: Binaben H. Vanmali, Arizona State University***Extracting and Visualizing the Structure of Verbal Explanations***

Steffen Wagner, Humboldt-Universität zu Berlin

Burkhard Priemer, Humboldt-Universität zu Berlin

How Observation of Contrasts can Build Knowledge that Influences Reasoning

Maura B. Foley, University of Maine

Jonathan Shemwell, University of Maine

Effective Use of Contrasts in Learning Strategic Knowledge for Problem Solving

Thanh K. Le, University of Maine

Jonathan T. Shemwell, University of Maine

MacKenzie R. Stetzer, University of Maine

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

1:00pm – 2:30pm, HBG Convention Center 007A

Presider: Andri Christodoulou, University of Southampton***“Why Do We See Stars Only at Night?”: Exploring Children’s Everyday Thinking in Science***

Ashley N. Murphy, West Virginia University

Melissa J. Luna, West Virginia University

An Online Mentoring Model Based on the First Hand Information from Student-scientist Dialogues

Gokhan Ozturk, Middle East Technical University

Carol L. Stuessy, Texas A&M University

Bugrahan Yalvac, Texas A&M University

Communicating about Socioscientific Issues: UK Students’ Mapping of the Badger – Cattle Controversy

Andri Christodoulou, University of Southampton

Paul Davies, UCL Institute of Education

Marcus Grace, University of Southampton

Ralph Levinson, UCL Institute of Education

Joanne Nicholl, UCL Institute of Education

Willeke Rietdijk, University of Southampton

Students’ Recognition of the Educational Demands in Relation to a Socioscientific Issue Task

Mats G. Lindahl, Linnaeus University

Anne-Mari M. Folkesson, Linnaeus University

Dana L. Zeidler, University of South Florida

Strand 2: Science Learning: Contexts, Characteristics and Interactions***Influencing Student Interests***

1:00pm – 2:30pm, Hyatt Crockett AB

Presider: Jennifer L. Weible, Central Michigan University***Context, Content and Problem Orientation – Three Variables Influencing Students’ Situational Interest and Understanding in Chemistry***

Sebastian Habig, University of Duisburg, Essen

Helena Van Vorst, University of Duisburg, Essen

Elke Sumfleth, University of Duisburg, Essen

Does Interest Have an Expiration Date? Stability of Students’ Questions as Resource for Context-based Learning

Hani Swirski

Ayelet Baram-Tsabari, Technion-Israel Institute of Technology

Anat Yarden, Weizmann Institute of Science

Influencing the Self-efficacy and Identity of Students in a Pre-engineering Robotics Program

Brenda R. Brand, Virginia Tech

Takumi Sato, Virginia Tech

Whitney R. Wright, Virginia Tech

Anza Mitchell, Virginia Tech

***NGSS Aligned Problem-based Instruction:
Helping all Students Understand Ecology***

Amanda L. Gonczy, Michigan Technological University
Brenda G. Bergman, Michigan Tech University
Stephanie Tubman, Michigan Tech University
Jacqueline E. Huntoon, Michigan Technological University

**Strand 4: Science Teaching – Middle and High School
(Grades 5-12): Characteristics and Strategies
*Language and Literacy Issues in Science Teaching and Learning***

1:00pm – 2:30pm, HBG Convention Center 007B

President: Irene U. Osisioma, California State University

***Developing Higher-order Thinking Skills through
Web-based Texts in the Context of Green Chemistry***

Eldad Marom, Weizmann Institute of Science
Yehudit Judy Dori, Technion-Israel Institute of Technology
Yael Shwartz, Weizmann Institute of Science

***Efficacy of Multiple Vocabulary Strategies in High School
Anatomy for Bilingual Learners***

Angela Chapman, University of Texas Rio Grande Valley
Revathi Srinivas, The English and Foreign Languages University
Paul Sale, University of Texas, Rio Grande Valley

Supporting Literacy as Scientific Practice

Mon-Lin Ko, Learning Sciences Research Institute University of
Illinois, Chicago
Susan R Goldman, Learning Sciences Research Institute
University of Illinois, Chicago
Cynthia Greenleaf, Strategic Literacy Initiative WestEd
Willard Brown, Strategic Literacy Initiative WestEd

***Understanding Beyond the Words: How Language and Ideology
Impact Teacher's Understanding of Students' Knowledge***

Bryan A. Brown, Stanford University
Catherine Lemmi, Stanford University
Andrew Wild, Stanford University
Lynne Zummo, Stanford University
Quinten Sedlacek

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

Interdisciplinary Learning and Cognition

1:00pm – 2:30pm, HBG Convention Center 007C

President: Rebekka Darnier Gougis, Illinois State University

***Academic Success in STEM: Thanks to Visual Model
Comprehension?***

Thomas Dickmann, University Duisburg, Essen
Stefan Rumann, University Duisburg, Essen
Maria Opfermann, University Duisburg, Essen

***How does Subject Specific Prior Knowledge Predict
Study Success in Biology and Physics?***

Torsten Binder, University of Duisburg, Essen
Heike Theyßen, University of Duisburg, Essen
Angela Sandmann, University of Duisburg, Essen
Philipp Schmiemann, University of Duisburg, Essen

***Introductory Biology Students' Use of Rubrics to Engage
in Metacognition and Enhance Understanding***

Jaime L. Sabel, University of Memphis
Joseph Dauer, University of Nebraska, Lincoln
Cory T. Forbes, University of Nebraska, Lincoln

***The Influence of Spatial Aptitude on Undergraduate
Students' Tree-thinking Abilities***

Yi Kong, University of Texas, El Paso
Jeffrey Olimpo, University of Texas, El Paso

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

***Faculty/Instructor Professional Development and
Assessment of Instruction***

1:00pm – 2:30pm, Hyatt Presidio ABC

President: Mary M. Atwater, University of Georgia

***Affordances and Limitations of Collaborative Professional
Learning in Higher Education Biology Teaching***

Anuschka Neuwald, University of Wisconsin, Madison

***Congruence of Faculty Perceptions of Learning and
Instruction Prior to Engagement in Professional
Development Programs***

Robert Idsardi, University of Georgia
Jenna Wingfield, University of Georgia
Blake Whitt, University of Georgia
Paola Barriga, University of Georgia
Paula Lemons, University of Georgia
Marguerite Brickman, University of Georgia
Julie A. Luft, University of Georgia

***Similarities and Differences Between STEM Disciplines
Regarding Values of Skills and Exposure to Teaching Practices***

Gili Marbach-Ad, University of Maryland
Carly Rietschel, University of Maryland
Katerina Thompson, University of Maryland

Supporting Undergraduate STEM Educators' Instruction: Examining the Participation of Faculty/Instructors in Professional Development Programs

Jenna L. Wingfield, University of Georgia
Robert Idsardi, University of Georgia
Blake Whitt, University of Georgia
Paola Barriga, University of Georgia
Paula Lemons, University of Georgia
Marguerite Brickman, University of Georgia
Julie A. Luft, University of Georgia

**Strand 6: Science Learning in Informal Contexts
*Identity Development through Informal Learning***

1:00pm – 2:30pm, HBG Convention Center 006B

President: Megan Ennes, North Carolina State University

Examining the Influence of Participation in Citizen Science Projects on Participants' Identity with Respect to Science: A Study of 70 People across 6 Projects in the U.S.

Heidi L. Ballard, University of California, Davis
Lina Yamashita, University of California, Davis
Tina Phillips, Cornell Lab of Ornithology

I Like STEM, but am I a STEM-person?"Effects of Informal Learning and Mentors on STEM Identity

Stephanie B. Wortel-London, Stony Brook University
Angela M. Kelly, Stony Brook University

Identity Development through Practice: Supporting STEM Ecosystems with Internship Experiences in Informal Science Institutions

James F. Kiesel, California State University, Long Beach

Understanding How Participation in Middle/High School STEM Clubs Shapes Undergraduate Students' STEM Identities

Hillary Mason, University of Colorado, Denver
Robert M. Talbot, University of Colorado, Denver
Michael Ferrara, University of Colorado, Denver
Bryan Shao-Chang Wee, University of Colorado, Denver
Michael Jacobsen, University of Colorado, Denver
Ronald Rorrer, University of Colorado, Denver

**Strand 7: Pre-service Science Teacher Education
*Identity and Elementary Pre-service Teachers***

1:00pm – 2:30pm, Hyatt Crockett CD

President: Jeni R. Davis, University of South Florida

Exploring the Gap Between Pre-service Elementary Teachers' Actual and Designated Identities as Teachers of Science

Martha Canipe, Northern Arizona University

Pre-service Teacher Attitudes Toward Science and Science Teaching Based on Autobiographies

Amity F. Gann, Temple University
Janelle M. Bailey, Temple University
Brian T. Cooper, Temple University

Science Teacher Identity as a Lived Experience: A Case Study of Beginning Elementary Teachers

Lucy Avraamidou, University of Groningen, Netherlands

**Strand 8: In-service Science Teacher Education
*Teacher Attitudes, Beliefs, & Empowerment***

1:00pm – 2:30pm, HBG Convention Center 008A

President: Ibrahim H. Yeter, Texas Tech University

The Relationship Between Reform-based Beliefs and Practices for Beginning Science Teachers in an Induction Program

Joshua A. Ellis, Michigan Technological University
Elizabeth A. Ring, University of Minnesota
Julie C. Brown, University of Minnesota
Gillian H. Roehrig, University of Minnesota

Exploring Routes into Student Engagement: An Aspect of the Pedagogical Reasoning of Expert Teachers

Stephen Keast, Monash University
Ian J. Mitchell, Monash University
Debra Panizzon, Monash University
J. John Loughran, Monash University
Judie Mitchell, Monash University
Lucy Rutherford, Monash University
Melissa Tham, Monash University

Developing a Model of Subject Teaching Competence Based on Interviews with Secondary Science Teachers

Silin Wei, College of Material, Hangzhou Normal University
Qiaoli Wang, Hangzhou Normal University
Yuane Jia, University of Virginia
Pengfei Zhang, Hangzhou Normal University

An Experimental Study of an Urban Museum-based Teacher Professional Development Program's Impact on Student Achievement

Aaron Price, Museum of Science and Industry, Chicago
Ashley Chiu, Museum of Science and Industry, Chicago

Strand 10: Curriculum, Evaluation, and Assessment *Issues in Biology Curriculum and Assessment*

1:00pm – 2:30pm, HBG Convention Center 006C

Presider: Annemarie Palincsar, University of Michigan

Acceptance and Understanding of Evolutionary Theory in Chilean Middle School Students: A New Instrument

Juan Jimenez, Illinois Institute of Technology

Judith S. Lederman, Illinois Institute of Technology

Norman G. Lederman, Illinois Institute of Technology

Hernan Cofre, Pontificia Universidad Católica de Valparaíso

Claudia Vergara, Alberto Hurtado University

Expert Panel Content Validation of the Secondary-Biology Concept Inventory (S-BCI)

Andria Stammen, The Ohio State University

Deborah Lan, The Ohio State University

Anita Schuchardt, University of Pittsburgh

Lin Ding, Ohio State University

Kathy Lea Malone, Ohio State University

William Boone, Miami University

Zakee Sabree, The Ohio State University

Development of a Concept Inventory to Measure High School Biology Students Concept Knowledge

Kathy Lea Malone, Ohio State University

Andria Stammen

Lin Ding, Ohio State University

Anita Schuchardt, University of Pittsburgh

William Boone, Miami University

Zakee Sabree, The Ohio State University

Investigating Scientific Practices, Crosscutting Concepts, and Core Ideas in Undergraduate Biology Syllabi

Claire M. Morrison, Michigan State University

Sarah E. Jardeleza, Michigan State University and Salisbury University

Rebecca L. Matz, Michigan State University

Toward Interdisciplinary Science Learning: Development of an Assessment for Interdisciplinary Understanding of 'Carbon Cycling'

Hye Sun You, Michigan State University

Jill A. Marshall, University of Texas, Austin

Cesar Delgado, North Carolina State University

Strand 11: Cultural, Social, and Gender Issues

Examining Conditions that Facilitate the Success of All Learners

1:00pm – 2:30pm, Hyatt Republic ABC

Presider: Keith R. Langenhoven, University of the Western Cape

Measuring Science Success through One's Advocacy and Mentorship: Examining the Experiences of Black Male PhDs

Shari Watkins, University of Delaware

The Effect of Gender Composition on Small Groups in High School Science

Julie R. Robinson, University of Massachusetts Amherst

Martina Nieswandt, University of Massachusetts Amherst

Elizabeth McEneaney, University of Massachusetts Amherst

Conceptualizing Computing for Urban Latino Youth: A Reciprocal Model for Teaching Computational Competencies

Rouhollah Aghasaleh, Georgia State University

Patrick J. Enderle, Georgia State University

Anton Puvirajah, Georgia State University

Judith Monsaas, University System of Georgia

Suzanna Roman, Georgia State University

Renesha Hendrix, Georgia State University

Ying Zhu, Georgia State University

Conceptualizing Culturally Responsive Climate Literacy in Indigenous Communities

Alaina Szostkowski, University of Minnesota, Twin Cities

Devarati Bhattacharya, University of Nebraska, Lincoln, NE

Gillian Roehrig, University of Minnesota

Bridging Theory and Practice: Utilizing Hip-Hop Pedagogical Framework in an Urban Science Classroom (Virtual Presentation)

Edmund S. Adjapong, Columbia University

Strand 11: Cultural, Social, and Gender Issues

Symposium: Being Human in STEM Contexts: Reading Wynter for Rethinking/Reimagining Equity and Equal Educational Opportunity

1:00pm – 2:30pm, Hyatt Travis CD

Presider: Jomo W. Mutegei, Indiana University

Being Human in STEM Contexts: Reading Wynter for Rethinking/Reimagining Equity and Equal Educational Opportunity

Jennifer Adams, Brooklyn College, CUNY

Matthew Weinstein, University of Washington

Gillian Bayne, Lehman College

LaToya Strong, CUNY

Jean R. Aguilar-Valdez, Portland State University

Jomo W. Mutegi, Indiana University

Strand 14: Environmental Education

Preparing Pre-service and In-service Teachers

1:00pm – 2:30pm, HBG Convention Center 006A

Presider: Allan Feldman, University of South Florida

Comparing Motives and Environmental Literacy between Incoming Teaching-oriented and Non-teaching-oriented Students in Interdisciplinary Environmental Programs

Iris Alkaher, Kibbutzim College of Education

Daphne Goldman, Beit Berl Academic College

Content Knowledge Versus Pedagogical Skills: What Should We Emphasize in Pre-service Sustainability Courses?

Adiv Gal, Kibbutzim College

Dafna Gan, Northeastern University

In the Context of Education for Sustainable Development: Environmental Literacy Level of In-service Classroom Teachers

Aysegul Derman, Gaziantep University

Esme Hacieminoglu, Necmettin Erbakan University

Pre-service Elementary Teacher Participation and Learning during Clean-up Australia: A Volunteer Environmental Community Event

Wilhelmina Van Rooy, Australian Catholic University

Concurrent Session #13

2:45pm – 4:15pm

Strand 1: Science Learning, Understanding and Conceptual Change

Symposium: Constructing a Framework for Understanding Model-Based Teaching and Learning Processes

2:45pm – 4:15pm, Hyatt Seguin AB

Presider: Jonathan Shemwell, University of Maine

Discussant: Jim Minstrell, FACET Innovations

Presenters:

John J. Clement, University of Massachusetts

Grant Williams, Saint Thomas University

Maria Cecilia Nunez-Oviedo, University of Concepcion

A. Lynn Stephens, University of Massachusetts

Jim A. Minstrell, FACET Innovations

Jonathan Shemwell, University of Maine

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Disciplinary Practices in STEM

2:45pm – 4:15pm, HBG Convention Center 007A

Presider: Anat Yarden, Weizmann Institute of Science

Developing Scientific Language through Interactive STEM

Robert M. Capraro, Texas A&M University

Mary Margaret Capraro, Texas A&M University

Niyazi Erdogan, Balikesir University

Sencer Corlu, Bahcesehi University

Tufan Adiguzel, Bahcesehir University

Tugba Oncer, Texas A&M University

Examination of Chemical Representations in High School Chemistry Textbooks

Betul Demirdogen, Bulent Ecevit University

Some Factors that Constrain the Emergence of Epistemic Discourse in Science Classrooms

Ashley H. Murphy, University of Texas, Austin
Sarah Harris, University of Texas, Austin
Victor D. Sampson, University of Texas, Austin

Strand 2: Science Learning: Contexts, Characteristics and Interactions

Structuring Whole Group Interactions

2:45pm – 4:15pm, Hyatt Crockett CD

Presider: Shannon Gooden, Florida State University

Ambitious Science in the Kindergarten Classroom: Models as Mediators for Talk, Gesture, and Participation

Michelle Salgado, University of Washington
Mark Windschitl, University of Washington

Elementary Students' Metacognition in the Collaborative Problem-solving

Qingna Jin, University of Alberta
Mijung Kim, University of Alberta

Structuring Learning Tasks to Promote Whole-class Cooperative Behavior

Joshua Premo, Washington State University
Andy Cavagnetto, Washington State University
Kathleen M. Nitta, Washington State University

Whole Group Sense-making Discussions in Science and Mathematics Classrooms: A Query of the Literature

Shannon Gooden, Florida State University
Kirby Whittington, Florida State University

Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies
Integrating Science and Literacy in the Elementary Classroom

2:45pm – 4:15pm, HBG Convention Center 006A

Presider: Justin McFadden, University of Louisville

Emergent "Literacy for Sensemaking in Science" Practices for K-5

LeeAnna C. Hooper, Pennsylvania State University
Carla Zembal-Saul, Pennsylvania State University

Expanding Science Learning Opportunities for Grade 1-2 Students: Impact on Science and Literacy Achievement Outcomes

Nancy Romance, Florida Atlantic University
Michael R. Vitale, East Carolina University

Science and Literacy Integration in Elementary Classrooms: Student Outcomes as a Function of Instructional Practices

Xavier Fazio, Brock University
Tiffany L. Gallagher, Brock University

Using Nonfiction Text embedded in Inquiry-based Science to Improve Teacher Science Content and Student Achievement

Terry Shiverdecker, Ohio State University
Deborah Lan, The Ohio State University

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

Related Paper Set: Supporting Model-based Pedagogy in the Secondary Classroom: Stories of Teacher Learning and Enactment

2:45pm – 4:15pm, HBG Convention Center 007B

Teachers' Understanding of Modeling and Model-based Reasoning in High School Biology

Julia Gouvea, Tufts University
Candice Guy, University of California, Davis

"Model-based Reasoning is Not a Simple Thing": Investigating Teachers' Enactment of a Model-based Curriculum

Candice R. Guy, University of California, Davis
Cynthia Passmore, University of California, Davis

Framing for Sense-making in the Modeling Classroom

Alexandra Tobler, University of California, Davis
Emily Harris, University of California, Davis
Julia Gouvea, Tufts University

Positioning Students as Generators of Science Knowledge: Moving from the Specific to a General Account of Phenomena

Cynthia Passmore, University of California, Davis
Chris D. Griesemer, University of California, Davis

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

Biology Learning and Assessment

2:45pm – 4:15pm, HBG Convention Center 007C

Presider: Lynnsay Marsan, University of Texas

A Mixed Method Exploration of Evolution Acceptance Profiles as Delineated by the Measure of Acceptance of the Theory of Evolution (MATE)

Emily M. Walter, California State University, Fresno
Ephiram Bosse, California State University, Fresno
William L. Romine, Wright State University

Assessing Assessments: Does Success Equal Understanding?

Brian Sato, University of California, Irvine
Cynthia Hill, Tufts University

Does Evolution Acceptance Differ across Biological Scales? A Rasch Analysis of the I-SEA

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

Instructional Practices of Evolution Instructors at Christian Universities

Sara E. Brownell, Arizona State University
Elizabeth Barnes, Arizona State University

***Strand 6: Science Learning in Informal Contexts
Family Learning in Informal Settings***

2:45pm – 4:15pm, HBG Convention Center 006B

Presider: Nancy L. Staus, Oregon State University

Science Antagonist Identity in Everyday Family Engagement

Dana Vedder-Weiss, Ben-Gurion University of the Negev
Aliza Segal, Ben-Gurion University of the Negev

Learning as a Continuous Experience: A Case Study of a Family Learning about Salmon

Suzanne Perin, University of Alaska Fairbanks

Pointing-based Joint Observation Strategies used Among Families with an e-Trailguide to Support Sense Making Outside

Lucy R. McClain, Pennsylvania State University

***Strand 7: Pre-service Science Teacher Education
The Growth and Support of Pre-service Teachers***

2:45pm – 4:15pm, Hyatt Crockett AB

Presider: Julianne A. Wenner, Boise State University

"All Jumbled Up:" Agency, Emotions, and Climate Change

Elizabeth Hufnagel, University of Maine
Asli Sezen-Barrie, Towson University
Katherine Pontbriand, University of Maine

Challenging the 'Formal' and 'Informal' Divide Through an Ecological Approach to Science Teaching and Learning

Daniel Birmingham, Colorado State University
Lara Smetana, Loyola University Chicago

Promoting Character and Values for Global Citizens: A Socioscientific Issues Framework

Ozgul Yilmaz-Tuzun, Middle East Technical University
Dilek Karisan, Adnan Menderes University

Teachers to Teachers: Cultural-historical Analysis of Feedback from Experts to Novices

Asli Sezen-Barrie, Towson University
Gili Marbach-Ad, University of Maryland

***Strand 7: Pre-service Science Teacher Education
Engineering and Pre-service Teacher Learning***

2:45pm – 4:15pm, Hyatt Presidio ABC

Presider: Michelle Forsythe, Texas State University

Factors Associated with the Functionality of Triads in an Alternative Student Teaching Placement

Christopher Spinler, Iowa State University
Jacob Pleasants, Iowa State University
Joanne K. Olson, Iowa State University
Joleen Henning, Northview Middle School

Investigating Teachers' Developing Knowledge of Engineering during a STEM Professional Development Experience

Jacob B. Pleasants, Iowa State University
Joanne K. Olson, Iowa State University
Christopher Spinler, Iowa State University

Pre-service Teachers' Perceptions of Engineering and Familiarity with Teaching Design, Engineering, and Technology

Laura K. Ochs, University of Virginia
Frackson Mumba, University of Virginia
Jennifer Chiu, University of Virginia

Promoting Computational Thinking in Elementary Pre-service Science Teacher Education

Zoubeida R. Dagher, University of Delaware
Chrystalla Mouza, University of Delaware
Lori Pollock, University of Delaware

***Strand 8: In-service Science Teacher Education
STEM Teaching & Learning***

2:45pm – 4:15pm, HBG Convention Center 008A

Presider: Erin E. Peters-Burton, George Mason University

Defining STEM in a Rural School District: A Co-constructed and Co-evolving Process

Debbie Siegel, Oregon State University, Cascades
Michael Giamellaro, Oregon State University, Cascades

Realizing the Vision: Evidence for STEM Teacher Leadership Identity Development

Dawn Nachtigall, Stony Brook University
Brett Criswell, University of Kentucky
Sam Staggs, University of Kentucky
Greg Rushton, Stony Brook University

Understanding Conceptual Effects: How Teachers' Conceptual Models of Integrated STEM Education Influence Curriculum Writing

Elizabeth A. Ring, University of Minnesota
Emily A. Dare, Michigan Technological University
Gillian H. Roehrig, University of Minnesota
Preethi Titu, University of Minnesota
Elizabeth A. Crotty, University of Minnesota

Creating STEM Continua: A Phenomenographic Approach to Understanding Perceptions of STEM Integration Models

Emily A. Dare, Michigan Technological University
Elizabeth A. Ring, University of Minnesota
Gillian Roehrig, University of Minnesota

**Strand 8: In-service Science Teacher Education
Elementary & Middle Grades Teacher Development**

2:45pm – 4:15pm, Hyatt Republic ABC

Presider: Danielle K. Ross, Northern Arizona University

Enhancing Professional Practice in Primary Science, Technology, Engineering and Mathematics (STEM): An Activity Theory Analysis

Karen Goodnough, Memorial University

Teachers' Successes and Challenges in Designing and Implementing Middle School Project-based Investigations on Watersheds

Rebecca McNall Krall, University of Kentucky
Justin LeVaughn, University of Kentucky
Bharath Simpath Kumar, University of Kentucky
Jennifer A. Wilhelm, University of Kentucky
Carol Hanley, University of Kentucky

The Role of the Principal in In-service Teacher Elementary STEM Professional Development

Carolyn A. Parker, The John Hopkins University

**Strand 10: Curriculum, Evaluation, and Assessment
Crosscutting Concepts and Science and Engineering Practices in Curriculum and Assessment**

2:45pm – 4:15pm, HBG Convention Center 006C

Presider: Julie Bokor, University of Florida

Developing Assessments for Obtaining, Evaluating, and Communicating Information: Implications for Future assessment Development and Instruction

Jill A. Wertheim, Stanford University
Paolo C. Martin, Stanford University
Jonathan Francis Osborne, Stanford Graduate School of Education

Development of an Assessment Measuring Basic Competency in Scientific Data Interpretation and Argumentation

Josephine Louie, Education Development Center
Craig Hoyle, Education Development Center

Student Use of Crosscutting Concepts as Tools to Construct Three-Dimensional Science Understanding

Yi Li, Columbia University
Gary Weiser, Teachers College
Min Jung Lee, Columbia University
Ann E. Rivet, Columbia University

Students' Use of Crosscutting Concepts in Explanations of Natural Phenomenon

Ann E. Rivet, Columbia University
Xiaoxin Lyu, Columbia University
Diego Rojas-Perilla, Columbia University

Role Selection as a Framework for Examining Evidence of CCC Understanding in Student Work

Gary Weiser, Teachers College, Columbia University
Xiaoxin Lyu, Columbia University
Diego Rojas-Perilla, Columbia University
Ann Rivet, Columbia University

Evening Events

NARST Executive Board Meeting #2

5:00pm – 10:00pm, Hyatt Texas Ballroom D

In an effort to reduce paper consumption and promote environmental awareness, NARST has decided to exclude Abstracts from this year's paper program. You may find all Abstracts posted in the online program on the NARST website at www.narst.org. We hope that you will have a positive NARST Annual International Conference experience while supporting our sustainable practices.

Abstracts

When a presentation has greater than 5 authors, only the first 5 authors are indexed in accordance with the Publication Manual of the American Psychological Association (6th Edition).

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