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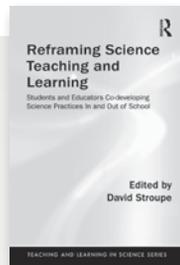
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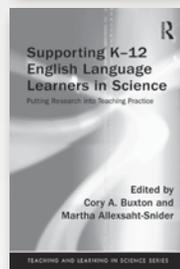
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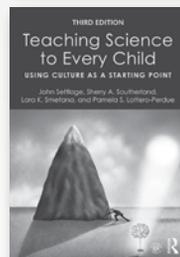
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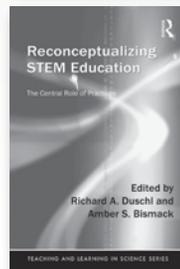
**Reframing Science Teaching and Learning**  
Students and Educators Co-developing Science Practices In and Out of School  
*David Stroupe*



**Supporting K-12 English Language Learners in Science**  
Putting Research into Teaching Practice  
*Cory A. Buxton and Martha Alleesaht-Snyder*



**Teaching Science to Every Child**  
Using Culture as a Starting Point  
*John Settlage, Sherry A. Southerland, Lara K. Smetana, Pamela S. Lottero-Perdue*



**Reconceptualizing STEM Education**  
The Central Role of Practices  
*Richard A. Duschl and Amber S. Bismack*

# NARST 2018

## 91st Annual International Conference

The Westin Peachtree Plaza | Atlanta, GA, USA  
March 10-13, 2018

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

## ACKNOWLEDGMENTS

The following members of the Program Committee helped to prepare and edit the 2018 NARST Annual International Conference Program Book.

Barbara Crawford, President  
and Program Committee Co-Chair

Gail Richmond, President-Elect  
and Program Committee Co-Chair

William C. Kyle Jr., Executive Director

Toni A. Sondergeld, NARST Scheduling Coordinator



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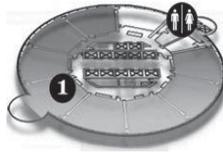
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### Disclaimer

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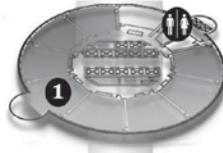


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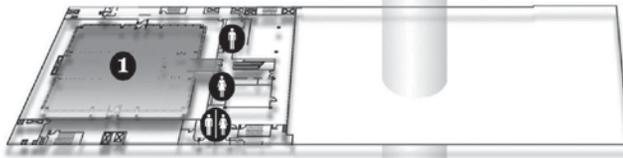
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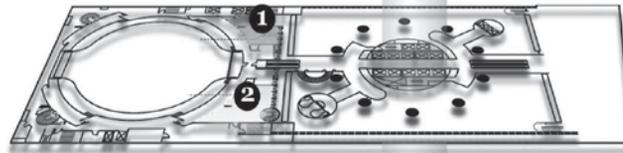
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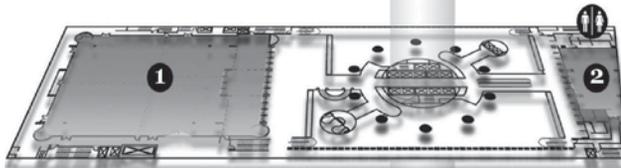
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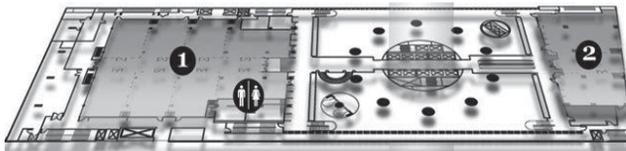
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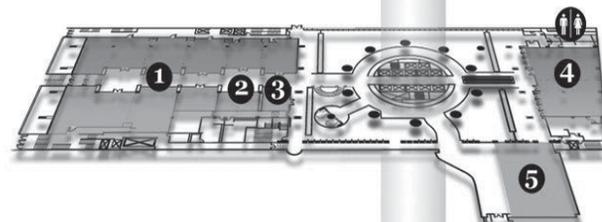
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# General Information

## Information about NARST

The National Association for Research in Science Teaching (NARST) 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 (JRST)*. NARST encourages presentations of a wide variety of investigations in all aspects of science education, including action, historical, philosophical, ethnographic, experimental, and evaluative research studies. Reports of empirical research, critical reviews, and theoretical works are encouraged. In October 2010, to reflect the Association's growing international focus and membership, the Board approved referring to the Association by its acronym only. At the April 2011 Board Meeting, the tagline for the Association was approved by the Board. Thus, the Association's name and tagline is: NARST—A 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](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.
- 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 on a poster display board. The poster display is 4 ft. wide x 8 ft. long (48 inches x 96 inches) – horizontal orientation. **PLEASE NOTE:** We are no longer using the tri-fold boards. Each presenter must set up their poster display prior to the start of the Poster Session and then remove it 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

## A Special Thanks to our Sponsors and Exhibitors

Springer Nature  
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We acknowledge Wiley-Blackwell and their work as publisher of the *Journal of Research in Science Teaching – JRST*

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#### Association Management

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Tara Reddy, Drohan Management Group

# 2019 NARST Annual International Conference

The Program Chair invites NARST members and others to participate in the 2019 NARST Annual International Conference and contribute to the 2019 conference by submitting program proposals.

## **VENUE:**

**2019 NARST Annual International Conference**

**Renaissance Baltimore Harborplace Hotel**

**Baltimore, MD, USA**

**March 31 – April 3, 2019**

## **THEME:**

### **Creating & Sustaining Collective Activism through Science Education Research**

The work we undertake in science education often unfolds in similar ways. We identify a problem, gather around us a group—usually quite small—of committed individuals to tackle these problems, and share the results through publications and presentations at conferences such as those provided by scholarly organizations such as NARST. This highly focused problem-solving work is important, and always will be. However, we find ourselves in a world where work of a different kind also is needed. Today we are faced with a host of challenges which will have significant, long-lasting and, in many cases, irreversible effects. Among these are: global warming, the consequences of which are ever more apparent; declining scientific understanding of events and processes in the natural world; the lack of significant transfer of what is learned from research to policies that could significantly improve human and environmental health and well-being; and the lack of access so many young people and adults across the globe have to science learning opportunities which could provide the tools to improve their lives. To address challenges such as these, we need to send clear and collectively generated messages informed by relevant research which can provide the basis for extended and reasoned conversation that rises above the din often created by charged and uninformed debate. Only this kind of conversation can lead to more informed public engagement and to decisions which result in more productive change.

The 2019 conference, with its theme of collective activism, sets two major challenges before the NARST community. The first is to find new ways to introduce or elevate the presence of activist elements within the work that we do. The second is to consider how our research might become more powerful through engaging others—including those who have traditionally resided outside the community of mainstream science education researchers—in its design, enactment and dissemination. This is a critical time for us as scholars and as members of the NARST community. We must ensure that the work that we do in science education has a deep, powerful and lasting impact on the health, well-being and future of our communities, our countries, and our world.

The 2019 conference provides us as individual researchers and as a scholarly collective with the opportunity to learn from each other about both existing and potential models of powerful and empowering work resulting from collaborations which are responsive, substantial, long-lasting and out-reaching. Above all, we should use this conference as an opportunity to first, learn about what we are doing and what we could do to push the boundaries of our field; and second, learn about how collaborative research could lead each and every stakeholder to use what is learned to protect and enhance our lives within our communities, both locally and globally. We are excited about the learning that will take place at our 2019 conference as well as the action plans that will develop as a result and hope that you will consider contributing to these conversation by submitting proposals for papers, interactive sessions, posters and/or workshops aligned with the conference theme.

Looking forward to seeing you in Baltimore!

## **SUBMISSION DEADLINE:**

The Program Chair or designate must receive your program proposals for the 2019 Annual International Conference by August 15, 2018. This deadline allows sufficient time for processing, reviewing, and evaluating the many submitted proposals in a fair manner. By early July 2018, the call for program proposals will appear on the NARST website.

## **CONFERENCE CHAIR:**

Gail Richmond, President-Elect

# Future Meeting Dates for NARST, NSTA, and AERA

## 2018

NSTA March 15 – 18 Atlanta, GA  
AERA April 13 – 17 New York, NY

## 2020

NSTA April 2 – 5 Boston, MA  
AERA April 17 – 21 San Francisco, CA

## 2019

NARST March 31 – April 3 Baltimore, MD  
AERA April 5 – 9 Toronto, ON, Canada  
NSTA April 11 – 14 St. Louis, MO

## NARST Sponsored Sessions at NSTA Conferences 2017-2018

### Milwaukee, WI (November 9 – 11, 2017)

- ***Integrating Science and Technology in Engineering Design Challenges to Teach Nature of Science***  
Presenter(s): Allison Antink-Meyer (Illinois State University: Normal, IL)
- ***Using Maker Activities and Formative Assessment Strategies to Enhance Computational Thinking Skills, Physics, and Engineering Learning***  
Presenter(s): Yue Yin (The University of Illinois at Chicago: Chicago, IL), Xiaodan Tang (The University of Illinois at Chicago: Chicago, IL), Qiao Lin (The University of Illinois at Chicago: Chicago, IL), C. Meghan Hausman (Northeastern Illinois University: Chicago, IL)

### New Orleans, LA (November 30-December 2, 2017)

- ***Selecting Cognitively Demanding Science Tasks That Meet the NGSS Vision***  
Presenter(s): Miray Tekkumru-Kisa (Florida State University: Tallahassee, FL)

### Baltimore, MD (October 27-29, 2017)

- ***How to Promote Successful Teacher Enactment of Spatial Thinking and Technology-Enhanced Inquiry: PD Research and Its Implications for Teachers and Administrators***  
Presenter(s): Bridget Mulvey (Kent State University: Kent, OH)
- ***Designing and Implementing Middle School Project-Based Watershed Investigations***  
Presenter(s): Rebecca Krall (University of Kentucky: Lexington, KY)

### Atlanta, GA (March 30-April 2, 2018)

- ***Understanding Conceptual Effects: How Teachers' Conceptual Models of Integrated STEM Education Influence Curriculum Writing***  
Presenter(s): Elizabeth Ring (STEM Education Center: St. Paul, MN), Emily Dare (Michigan Technological University: Houghton, MI), Gillian Roehrig (STEM Education Center: St. Paul, MN), Preethi Titu (STEM Education Center: St. Paul, MN), Elizabeth Crotty (STEM Education Center: St. Paul, MN)
- ***Using Agriculture as a Context for Teaching Genetics in Elementary Classrooms: Insights from UnICORN (Understanding Inheritance in CORN)***  
Presenter(s): Devarati Bhattacharya (University of Nebraska-Lincoln: Lincoln, NE), Erin Ingram (University of Nebraska, Lincoln: Lincoln, NE), Cory Forbes (University of Nebraska, Lincoln: Lincoln, NE), Tyler Wolken (University of Nebraska, Lincoln: Lincoln, NE), Maranda Kegley (University of Nebraska, Lincoln: Lincoln, NE)
- ***Participatory Action Research Using Annotated Videos to Promote Reflective STEM Practice***  
Presenter(s): Gloria Hardrict-Ewing (University of Missouri, St. Louis: Saint Louis, MO)
- ***The INSPIRES Curriculum for Connecting Engineering to a STEM Curriculum***  
Presenter(s): Jonathan Singer (University of Maryland, Baltimore County: Baltimore, MD), Tory Williams (University of Maryland, Baltimore County: Baltimore, MD), Julie Ross (Virginia Tech: Blacksburg, VA), Christopher Rakes (University of Maryland, Baltimore County: Baltimore, MD), Jacqueline Krikorian (University of Maryland, Baltimore County: Baltimore, MD)

• ***Uncovering Secondary Students' Alternative Conceptions in Biology***

**Presenter(s):** Andria Stammen (Ohio State University: Columbus, OH), Deborah Lan (Ohio State University: Columbus, OH), Anita Schuchardt (University of Pittsburgh: Pittsburgh, PA), Lin Ding (Ohio State University: Columbus, OH), Caroline Longo (Ohio State University: Columbus, OH), William Boone (Miami University: Oxford, OH), Zakee Sabree (Ohio State University: Columbus, OH)

• ***Making Time for Science Reading: The News Is Good***

**Presenter(s):** Billy McClune (Queen's University Belfast: Belfast, United Kingdom)

• ***Understanding Crosscutting Concepts in 3-D Science Learning: Strategies for Designing Lessons and Assessments***

**Presenter(s):** Ann Rivet (Teachers College, Columbia University: New York, NY), Xiaoxin Lyu (Teachers College, Columbia University: New York, NY), Diego Rojas-Perilla (Teachers College, Columbia University: New York, NY)

• ***Investigating and Designing Paper Airplanes***

**Presenter(s):** Augusto Macalalag, Jr. (Arcadia University: Glenside, PA), Joseph Johnson (Mercyhurst University: Erie, PA), Angela Keeley (Lower Merion School District: Ardmore, PA)

• ***I AM STEM: Transforming the Face of STEM One Community at a Time***

**Presenter(s):** Natalie King (Georgia State University: Atlanta, GA)

• ***Biology Alternative Conceptions and Your Students***

**Presenter(s):** Caroline Longo (Ohio State University: Columbus, OH), Andria Stammen (Ohio State University: Columbus, OH), Lin Ding (Ohio State University: Columbus, OH), Anita Schuchardt (University of Pittsburgh: Pittsburgh, PA), William Boone (Miami University: Oxford, OH), Zakee Sabree (Ohio State University: Columbus, OH)

## 2017-2018 Strand Coordinators

**Strand 1: Science Learning, Understanding, and Conceptual Change**

(19) Cesar Delgado, (18) Knut Neumann

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

(19) Erin Peters-Burton, (18) Fang-Ying Yang

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

(19) Anna Maria Arias, (18) Laura Zangori

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

(19) Amy Trauth, (18) Tom Bielik

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

(19) Jaime Sabel, (18) Carina Rebello

**Strand 6: Science Learning in Informal Contexts**

(19) Scott Pattison, (18) Kelly Riedinger

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

(19) Tamara Nelson, (18) Sara Raven

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

(19) Julianne Wenner, (18) Emily A Dare

**Strand 9: Reflective Practice**

(19) Nazan Bautista, (18) Patricia Gail Patrick

**Strand 10: Curriculum, Evaluation, and Assessment**

(19) Becky Matz, (18) Mauricio Pietrocola

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

(19) Julie Bianchini, (18) Anna Lewis

**Strand 12: Educational Technology**

(19) Meg Blanchard, (18) Joshua Alexander Ellis

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

(19) Valarie Akerson, (18) Ben Herman

**Strand 14: Environmental Education**

(19) Kim Haverkos, (18) Teresa Shume

**Strand 15: Policy**

(19) Eugene Judson, (18) Kathryn Hayes

# Program Proposal Reviewers

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Anwar, Tasneem	Burrell, Shondricka	Digel, Susanne	Gunckel, Kristin	Kastel, Dora
Arias, Anna Maria	Buxner, Sanlyn	Dogan, Nihal	Gupta, Preeti	Katz, Phyllis
Arslan, Harika Ozge	Buyuksahin, Yasemin	Dolphin, Glenn	Hacieminoglu, Esme	Kawasaki, Jarod
Atasoy, Volkan	Cain, Ryan	Donohue, Kerri	Hall, Georgia	Khishfe, Rola
Atwater, Mary	Cakir Yildirim, Birgul	Dou, Remy	Hall, Jonathan	Kildemoes Foss, Kristian
Auerbach, Anna Jo	Callahan, Brendan	Dove, Whitney	Han Tosunoglu, Cigdem	Kim, Eunjeong
Avila, Sabrina	Cam, Aylin	Doykos, Bernadette	Hancock, James	Kim, Hyoungbum
Avraamidou, Lucy	Canipe, Martha	Dozier, Sara	Handley, Jacqueline	Kim, Justine
Avsar Erumit, Banu	Capkinoglu, Esra	Dragnic-Cindric, Dalila	Hanley, Ian	Kim, Mijung
Aydeniz, Mehmet	Capps, Daniel	Drewes, Andrea	Hansen, Ali	Kim, Mi-young
Aydin, Abdullah	Carlone, Heidi	Dubek, Michelle	Harmoinen, Sari	Kind, Per Morten
Ayotte-Beaudet, Jean-Philippe	Carlson, Janet	Dulger, Mehmet	Harper, Susan	King, Gretchen
Azam, Saiqa	Carrion, Carmen	Dunk, Ryan	Harris, Sarah	King, Natalie
Bae, Yejun	Casper, Anne Marie	Easley, Ashley	Hartman, Brian	Kiran, Dekant
Bahng, Eunjin	Cassidy, Michael	Ellis, Joshua	Hartry, Ardice	Kite, Vance
Balgopal, Meena	Cavallo, Ann	Emenaha, Uchenna	Haverly, Christa	Klager, Christopher
Balta, Nuri	Cebesoy, Umrans Betul	Enderle, Patrick	Hayes, Kathryn	Kloser, Matthew
Bancroft, Senetta	Cellitti, Jessica	Enfield, Mark	Henderson, J. Bryan	Ko, Mon Lin
Barak, Miri	Cessna, Stephen	Espinosa, Allen	Heredia, Sara	Ko, Yeonjoo
Barlow, Benjamin	Chabalengula, Vivien	Fakoyede, Sina	Herrmann Abell, Cari	Koenen, Jenna
Bartels, Selina	Chakraverty, Devasmita	Fankhauser, Sarah	Hillman, Peter	Kornreich-Leshem, Hagit
Bateman, Kathryn	Chan, Kennedy	Feille, Kelly	Hinojosa, Leighanna	Kostur, Hakki Ilker
Batie, Ryan	Chen, Ming-Hsiu	Ferguson, Janna	Holmegaard, Henriette	Kotkas, Tormi
Bautista, Nazan	Cheng, Meng-Fei	Ferguson, Sarah	Holmlund, Tamara	Koval, Jayma
Bayne, Gillian	Cherbow, Kevin	Fick, Sarah	Holzer, Margaret	Krajcik, Joseph
Bedell, Kristin	Childers, Gina	Fleshman, Robin	Hong, Zuway-R	Krall, Rebecca
Bencze, John	Chiu, Mei-Hung	Foley, Brian	Houle Vaughn, Meredith	Kraus, Rudolf
Benedict, Brianna	Cho, Kyungjin	Forawi, Sufian	Huang, Ying Syuan	Krishnan, Sandhya
Benedict-Chambers, Amanda	Christodoulou, Andri	Ford, Michael	Huffman, Karen	Kubsch, Marcus
Benus, Matthew	Cian, Heidi	Forsythe, Michelle	Hunter, Roberta	Kunze, Andrea
Berry, Amanda	Çiftsüren, Zeynep Ceren	Fortus, David	Huziak-Clark, Tracy	Kuo, Eric
Bhattacharya, Devarati	Cigdemoglu, Ceyhan	Fouad, Khadija	Ibourk, Amal	Kwako, Alexander
Bianchini, Julie	Cikmaz, Ali	Fouk, Jaimie	Ibrahim, Bashirah	Labouta, Hagar
Bilican, Kader	Cisterna, Dante	Fowler, Samantha	Idin, Sahin	Lakhani, Heena
Bills, Patricia	Clough, Michael	France, Beverley	Idsardi, Robert	Lally, Diane
Birt, Julie	Cofre, Hernan	Fredlund, Tobias	Irmak, Meltem	Lamb, Richard
Blanchard, Margaret	Coker, Ryan	Frevert, Mareike	Jackson, David	Lan, Deborah
Blanquet, Estelle	Cole, Merryn	Friedrichsen, Patricia	Jamshidi, Arash	Lancaster, Megan
Boaventura, Diana	Cone, Neporcha	Fulmer, Gavin	Jardine, Hannah	Langbeheim, Elon

Langenhoven, Keith	Mesci, Gunkut	Polman, Joseph	Skeeles-Worley, Angela	Wilkerson, Michelle
Lardy, Corinne	Mikeska, Jamie	Pongsophon, Pongprapan	Smith, Brittany	Witherspoon, Eben
Lark, Amy	Miller, Alison	Pozzer, Lilian	Smith, Mandy	Witzig, Stephen
Laubach, Timothy	Minogue, James	Pratt, Justin	Smith, Patrick	Woithe, Julia
Laux, Katie	Minshew, Lana	Pringle, Malcolm	Snider, Julianne	Wood, Krista
Lavi, Rea	Mishkin, Refaeli	Pulgar, Javier	Sonam, Tenzin	Wray, Craig
Leammukda, Felicia	Moeller, Andrea	Purzer, Senay	Song, Youngjin	Wulff, Peter
Lederman, Norman	Morales, Consuelo	Quigley, Cassie	Soobard, Regina	Wyner, Yael
Lee, Cindy	Morphew, Jason	Quinlan, Catherine	Stammen, Andria	Yamaguchi, Etsuji
Lee, Eun Ah	Morrison, Deb	Qureshi, Azhar	Staus, Nancy	Yang, Fang-Ying
Lee, May	Morton, Terrell	Rachmatullah, Arif	Steele, David	Yang, Yang
Lee, Soonchun	Mulvey, Bridget	Rackley, Rhonda	Stephens, Marilyn	Yarema, Sandra
Lee, Sungeun	Mumba, Frackson	Rahman, S M Hafizur	Storksdieck, Martin	Yesilyurt, Ezgi
Lee, Tammy	Murray, Jaclyn	Rannikmae, Miia	Suarez, Enrique	Yilmaz, Sirin
Lehavi, Yaron	Nageotte, Nichole	Raven, Sara	Subramaniam, Karthigeyan	Yin, Xinying
Lemmi, Catherine	Namdar, Bahadir	Rebello, Carina	Suh, Jee Kyung	Yoo, Seunggyun
Lemons, Paula	Nargund, Vanashri	Reid, Joshua	Sullivan, Jason	Yoon, Sae Yeol
LePretre, Dawnne	Nasim Thompson, Amreen	Reilly, Joseph	Summers, Ryan	You, Hye Sun
Lewis, Anna	Navy, Shannon	Restrepo Nazar, Christina	Sun, Baoling	Yu, Felisa(Hsueh-Yun)
Lewis, Elizabeth	Nettles, Jenesta	Ricketts, Amy	Sung, Shannon	Yuksel, Tugba
Li, Chuan	Neumann, Knut	Riedinger, Kelly	Suriel, Regina	Yun Hee, Choi
Li, Siqi	Newell, Alana	Ring-Whalen, Elizabeth	Swanson, Rebecca	Zavala, Genaro
Li, Yue	Ng, Diana	Rivera Maulucci, Maria	Szyjka, Sebastian	Zeng, Pingfei
Lightner, Lindsay	Nguyen, Hai	Rivero, Ana Margarita	Talbot, Robert	Zhai, Xiaoming
Lim, Insook	Nicolaou, Christiana	Rodriguez, Idaykis	Telli, Sibel	Zimmerman, Heather
Lin, Jing	Nielsen, Wendy	Ross, Danielle	Tepner, Oliver	Zivic, Aliza
Lipscomb, Kemper	Nixon, Ryan	Rowe, Shawn	Terrell Shockley, Ebony	Wiseman, Dawn
Lipsitz, Kelsey	Nkrumah, Tara	Roy, Ranu	Thomas, Julie	Witzig, Stephen
Liu, ChangChia	Nyachwaya, James	Ruppert, John	Thompson, Meredith	Wizner, Francine
Llort, Kenneth	Nyirenda, Euginia	Russell, Melody	Ting, Melodie	Wong, Sissy
Lo, Stanley	Ochs, Laura	Rutt, Alexis	Titu, Preethi	Wood, Krista
Longhurst, Max	Ogodo, Justina	Ryoo, Kihyun (Kelly)	Tofel-Grehl, Colby	Woods-Townsend, Kathryn
Lotter, Christine	Ogunniyi, Meshach	Ryu, Minjung	Topcu, Mustafa	Woolcott, Geoff
Luna, Melissa	Ogunsola-Bande, Mercy	Ryu, Suna	Trauth, Amy	Wright, Ann
Lundgren, Lisa	Okebukola, Peter	Sabel, Jaime	Tretter, Thomas	Wyner, Yael
Luo, Tian	Oktay, Ozlem	Sahin, Alpaslan	Tsybulsky, Dina	Xiao, Sihan
Lynch, Sharon	Oladipo, Adenike	Sahin, Emine	Tursucu, Süleyman	Yalaki, Yalcin
Macalalag, Augusto	Oloruntegbe, Kunle	Sahingoz, Selcuk	Tutwiler, Michael	Yamaguchi, Etsuji
MacPherson, Anna	Omoifo, Christiana	Saint-Hilaire, Line	Upadhyay, Bhaskar	Yan, Xiaomei
Madden, Lauren	Ong, Yann Shiou	Salloum, Sara	Vaishampayan, Abha	Yarden, Anat
Maguire, Jennifer	Ortega, Ira	Sandoval, William	Van Driel, Jan	Yarema, Sandra
Makki, Nidaa	Ortega, Irasema	Sarikaya, Emine	Verbeke, Monae	Yarker, Morgan
Malcolm, Stephen	Osman, Kamisah	Sato, Takumi	Verdin, Dina	Yerdelen, Sündüs
Mandeville, David	Otulaja, Femi	Schademan, Al	Vergara, Claudia	Yestness, Nissa
Manuel, Mariam	Owens, David	Schaffer, Dannah	Verma, Geeta	Yeung, Yau-yuen
Marbach-Ad, Gili	Ozdem-Yilmaz, Yasemin	Schaunberg, Christopher	Vesterinen, Veli-Matti	Yilmaz-Tuzun, Ozgul
Mark, Sheron	Ozer, Ferah	Schellinger, Jennifer	Vincent-Ruz, Paulette	Yin, Xinying
Marshall, Stefanie	Ozturk, Nilay	Schenkel, Kathleen	Vo, Tina	Yin, Yue
Martin, Anita	Pabuccu, Aybuke	Schuchardt, Anita	Wade-Jaimes, Katherine	Yoon, Sae Yeol
Martin, Kit	Page, Heather	Schvartz, Ma'ayan	Waight, Noemi	Zaidi, Sania
Martino, Robert	Park, Soonhye	Schwartz, Renee	Wallon, Robert	Zangori, Laura
Maruyama Tank, Kristina	Parker, Carolyn	Sedawi, Wisam	Walls, Leon	Zastavker, Yevgeniya
Masters, Heidi	Parrish, Jennifer	Seiler, Gale	Walter, Emily	Zhang, Chunlei
Mat Noor, Mohd Syafiq Aiman	Patrick, Patricia	Semerjian, Amy	Wang, Jeremy	Zimmerman, Randi
Mathayas, Nitasha	Pattison, Scott	Sen, Mutlu	Warfa, Abdirizak	Zisk, Robert
Matthews, Michael	Peker, Deniz	Senel Çoruhlu, Tülay	Watkins, Shari	Zoellick, Bill
Matz, Rebecca	Pennock, Phyllis	Sengul, Ozden	Webb, Aubree	
Mauricio, Paulo	Perin, Suzanne	Shapiro, Donna	Weible, Jennifer	
McBeath, Jasmine Kyle	Perkins Coppola, Matthew	Sharma, Meenakshi	Weidler-Lewis, Joanna	
McClain, Lucy	Petitt, Destini	Sherwood, Carrie-Anne	Weiser, Gary	
McCollough, Cherie	Pfirman, Aubrie	Shume, Teresa	Wenner, Julianne	
Mccomas, William	Philippoff, Joanna	Siler, Stephanie	Wertheim, Jill	
Mcdonald, Christine	Piedrahita Uruena, Yuri	Silva Mangiante, Elaine	White, Francesca	
McFadden, Justin	Pietrocola, Mauricio	Siry, Christina	Whitford, Melinda	
McGinnis, Randy	Pleasants, Jacob	Siverling, Emilie	Wieselmann, Jeanna	
Menon, Preetha	Plummer, Julia	Skaza Acosta, Heather	Wild, Andrew	

## 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 Chiu
1949 Joe Young West	1972 Frank X. Sutman	1995 Dorothy L. Gabel	2018 Barbara Crawford
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

## NARST Emeritus Members

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

## NARST Award Recipients

### Distinguished Contributions to Science Education through Research Award

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

<b>Year</b>	<b>Awardee</b>	<b>Year</b>	<b>Awardee</b>	<b>Year</b>	<b>Awardee</b>
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 Ogunniyi
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	2018	Marissa Rollnick
1999	Peter J. Fensham		Joseph Krajcik		Jonathan Osborne
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
2018	Katherine Wade-Jaimes	Renée Schwartz

## 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	2002	Alan G. Harrison	2012	Victor Sampson
1994	Deborah J. Tippins	2003	Fouad Abd-El-Khalick	2013	Alandeom W. Oliveira
1995	Nancy B. Songer	2004	Grady J. Venville	2014	Cory Forbes
1996	Mary B. Nakhleh	2005	Randy L. Bell	2015	Benjamin C. Herman
1997	Peter C. Taylor	2006	Heidi Carlone	2016	Richard L. Lamb
1998	J. Randy McGinnis	2007	Bryan A. Brown	2017	Ying-Chih Chen
1999	Craig W. Bowen	2008	Hsin-Kai Wu		David Stroupe
	Gregory J. Kelly	2009	Troy D. Sadler	2018	Doug Lombardi
2000	Angela Calabrese Barton	2010	Thomas Tretter		
2001	Julie A. Bianchini	2011	Katherine L. McNeill		

## 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.

<b>Year</b>	<b>Awardee</b>	<b>Year</b>	<b>Awardee</b>
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	2011	Daphne Minner, Jeanne Century, and Abigail Jurist Levy
1988	(tie) Robert D. Sherwood, Charles K. Kinzer, John D. Bransford, Jeffrey J. Franks and Anton E. Lawson	2012	Julie A. Luft, Jonah B. Firestone, Sissy S. Wong, Irasema Ortega, Krista Adams, and EunJin Bang
1989	Glen S. Aikenhead	2013	Edys S. Quellmalz, Michael J. Timms, Matt D. Silbergliitt, and Barbara C. Buckley
1990	Richard A. Duschl and Emmett L. Wright	2014	Joseph Taylor, Susan Kowalski , Christopher Wilson, Stephen Getty, and Janet Carlson
1991	E. P. Hart and I. M. Robottom	2015	Matthew Kloser
1992	John R. Baird, Peter J. Fensham, Richard E. Gunstone, and Richard T. White		
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.

<b>Year</b>	<b>Awardee</b>
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.

<b>Year</b>	<b>Awardee</b>	<b>Major Professor</b>
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.

<b>Year</b>	<b>Awardee</b>
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 Westerback, 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 2017-2018

## Officers

### President

### President-elect

### Secretary – Treasurer

### Immediate Past President

### Executive Director

Barbara Crawford (2019)

Gail Richmond (2020)

Gregory Kelly (2020)

Mei-Hung Chiu (2018)

William C. Kyle, Jr. (2018)

University of Georgia

Michigan State University

Pennsylvania State University

National Taiwan Normal University

University of Missouri, Saint Louis

## Executive Board Members:

Judith S. Lederman (2020)

Femi S. Otulaja (2020)

Christina Siry (2020)

Lynn Dierking (2019)

Maria Rivera Maulucci (2019)

Katherine McNeill (2019)

Alicia C. Alonzo (2018)

Nam-Hwa Kang (2018)

Eileen Carlton Parsons (2018)

Illinois Institute of Technology

University of the Witwatersrand, Johannesburg

The University of Luxembourg

Oregon State University

Barnard College

Boston College

Michigan State University

Korea National University of Education (KNUE)

The University of North Carolina at Chapel Hill

## International Coordinator

## Graduate Student Representative

## NARST Liaison to NSTA

## NSTA Representative

## JRST Editors (term ends 2020)

Lucy Avraamidou (2019)

Francesca A. White (2019)

Deborah Hanuscin (2018)

Emily Schoerning (2020)

Fouad Abd-El-Khalick

Dana L. Zeidler

University of Groningen, Netherlands

Indiana University, Bloomington

Western Washington University

National Center for Science Education

University of Illinois, Urbana-Champaign

University of South Florida, Tampa Bay

## Equity and Ethics Committee

### Board Member Liaison

(20) Femi Otulaja

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### Chair

(18) Nam-Hwa Kang

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(20) Lilliann H Degand

(20) Catherine Quinlan

(20) Sara Raven

(20) Irasema Ortega

(19) Rekha Koul

(19) Lizette Ramos

(19) Senetta F. Bancroft

(19) Melody Russell

(18) Mercy Ogunsola-Bandele

(18) Deniz Saribas

(18) Sanghee Cho

Illinois Institute of Technology

Howard University

Texas A&M University

University of Alaska-Anchorage

Curtin University

University of Guadalajara

Grand Valley State University

Auburn University

Adamawa State University

Istanbul Aydin University

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(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

## International Committee

### Chair – International Coordinator:

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(18) Bahadır Namdar Recip Tayyip Erdogan University bahanamdar@gmail.com

## Membership Committee

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### Chair

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(20) Lynn Bryan Purdue University labryan@purdue.edu  
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# Elections Committee

## Board Member Liaison

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## Ex officio Member Immediate Past President

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## Representative from Ethics and Equity Committee

(19) Senetta F. Bancroft Southern Illinois University senetta.bancroft@siu.edu

## Representative from the International Committee

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## Co-Chairs

(19) Malcolm Butler (Lead Co-Chair) University of Central Florida malcolm.butler@ucf.edu

(18) Marcelle Siegel (Co-Chair) University of Missouri siegelm@missouri.edu

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(20) Norman Lederman Illinois Institute of Technology ledermann@iit.edu

(20) Leon Walls University of Vermont lwalls@uvm.edu

(19) Saouma BouJaoude University of Beirut boujaoud@aub.edu.lb

(19) Amber Sizemore University of Michigan acsize@umich.edu

(18) Rola Khishfe American University of Beirut rk19@aub.edu.lb

# Publications Advisory Committee

## Board Member Liaison

(20) Christina Siry University of Luxembourg christina.siry@uni.lu

## Chair

(18) Alicia Alonzo Michigan State University alonzo@msu.edu

## Research for Practitioners and Policymakers Sub-Committee

(18) Heba El-Deghaidy (Lead Co-chair) The American University in Cairo h.eldeghaidy@aucegypt.edu

(19) Andrea Bierema (Co-chair) Michigan State University abierema@msu.edu

## Scholarship Sub-Committee

(18) Lin Ding (Lead Co-chair) Ohio State University ding.65@osu.edu

(19) Eli Tucker-Raymond (Co-chair) TERC eli\_tucker-raymond@terc.edu

## Pre-Conference Workshop and Sponsored Symposium Sub-Committee

(18) Deborah Tippins (Lead Co-chair) University of Georgia dtippins@uga.edu

(19) Ron Gray (Co-chair) Northern Arizona University ron.gray@nau.edu

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(20) Hayat Alhokayem Texas Christian University h.hokayem@tcu.edu

# Research Committee

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(18) Phillip A. Boda Teachers College, Columbia University boda@exchange.tc.columbia.edu

# Program Committee

## Co-Chairs:

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Gail Richmond (Co-chair)	Michigan State University	gailr@msu.edu

## Members (Strand Co-Coordinator):

### Strand 1: Science Learning, Understanding, and Conceptual Change

(19) Cesar Delgado	North Carolina State University	cesar_delgado@ncsu.edu
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### Strand 2: Science Learning: Contexts, Characteristics and Interactions

(19) Erin Peters-Burton	George Mason University	epeters1@gmu.edu
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### Strand 3: Science Teaching – Primary School (Grades preK-6)

(19) Anna Maria Arias	Illinois State University	aarias4@ilstu.edu
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### Strand 4: Science Teaching – Middle and High School (Grades 5-12)

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

(19) Jaime Sabel	University of Memphis	jlsabel@memphis.edu
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### Strand 6: Science Learning in Informal Contexts

(19) Scott Pattison	Institute for Learning Innovation	scott.pattinson@freechoicelearning.org
(18) Kelly Riedinger	David Heil & Associates	kelly.riedinger@oregonstate.edu

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

(19) Tamara Nelson	Washington State University Vancouver	tnelson1@wsu.edu
(18) Sara Raven	Texas A&M University	sraven@tamu.edu

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

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(18) Emily A Dare	Michigan Technological University	eadare@mtu.edu

### Strand 9: Reflective Practice

(19) Nazan Bautista	Miami University	nubautista@miamioh.edu
(18) Patricia Gail Patrick	University of Warwick	trish.patrick.ise@gmail.com

### Strand 10: Curriculum, Evaluation, and Assessment

(19) Becky Matz	Michigan State University	matz@msu.edu
(18) Mauricio Pietrocola	University of São Paulo	mpietro@usp.br

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

(19) Julie Bianchini	University of California, Santa Barbara	julie.bianchini@ucsb.edu
(18) Anna Lewis	University of South Florida, St. Petersburg	arlewis@usf.edu

### Strand 12: Educational Technology

(19) Meg Blanchard	North Carolina State University	meg_blanchard@ncsu.edu
(18) Joshua Alexander Ellis	Michigan Technological University	ellisj@mtu.edu

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

(19) Valarie Akerson	Indiana University	vakerson@indiana.edu
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### Strand 14: Environmental Education

(19) Kim Haverkos	Thomas More College	kimberly.haverkos@thomasmore.edu
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### Strand 15: Policy

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## Graduate Student Committee

### Board Adviser

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### Chair

(19) Francesca White Indiana University frawhite@indiana.edu

### Members

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(19) Zhigang "Jacob" Jia Middle Tennessee State University zj2e@mtmail.mts  
(19) Alpha Thomas Bangura University of Missouri, St. Louis tbangura2@gmail.com

## Website Committee

### Chair

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(18) Diane Jass Ketelhut Harvard University diane@post.harvard.edu  
(18) Kihyun (Kelly) Ryoo University of North Carolina khryoo@email.unc.edu

## Awards Committee

### Board Member Liaison

(19) Lynn Dierking Oregon State University dierklin@science.oregonstate.edu

## Outstanding Doctoral Research Award Selection Subcommittee

### Co-Chairs

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(19) Barbara Hug (Co-chair) University of Illinois at Urbana-Champaign bhug@illinois.edu

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## Early Career Research Award Selection Subcommittee

### Co-Chairs

(18) Christiana Omoifo (Chair)  
(19) Troy Sadler (Co-chair)

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University of Missouri

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### Members

(20) Noemi Waight  
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(20) Michal Zion  
(20) Patricia Friedrichsen  
(20) Elizabeth Davis  
(19) Alandeom Oliveira  
(19) Victor Sampson  
(19) Hanna Sevian  
(19) Ravit Duncan  
(18) Mijung Kim

University at Buffalo, SUNY  
Griffith University  
Bar-Ilan University  
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## Distinguished Contributions in Research Award Selection Subcommittee

### Chair

(18) Alejandro J Gallard

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### Members

(20) Annemarie Palinscar  
(20) Jan Van Driel  
(20) Sherry Southerland  
(19) Joe Krajcik  
(19) Richard Duschl  
(19) Masakata Ogawa  
(18) Meshach Ogunniyi  
(18) Anita Roychoudhury  
(18) Peter A. Okebukola  
(18) Dale Baker

The University of Michigan  
Melbourne Graduate School of Education  
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# NARST Annual International Conference

## Schedule at a Glance – 2018

The Westin Peachtree Plaza

Atlanta, GA, USA

Date/Time	Event	Room
<b>Friday, March 9</b>		
7:30 AM – 5:00 PM	<p><b>NARST Executive Board Meeting #1</b></p> <p>Notice: The Board will be considering a proposed amendment to the Bylaws at this meeting. NARST Board Meetings are open to members to attend. If amended by a majority vote of the Board of Directors, then the amendment will be voted on by members. The specific amendment to be considered is as follows:</p> <p><b>NARST BYLAWS</b>  <b>Article IV: Governance and Responsibilities</b>  <b>Section 2: Composition (old)</b>                      The total number of Directors shall be established from time to time by the Board, but in no event shall there be fewer than eleven (11) or greater than fourteen (14) Directors. The Board shall include the (i) four (4) Officers, one (1) International Coordinator, and (iii) at least six (6) Directors.</p> <p><b>Section 2: Composition (new)</b>                      The total number of Directors shall be established from time to time by the Board, but in no event shall there be fewer than eleven (11) or greater than fourteen (14) Directors. The Board shall include the (i) four (4) Officers, one (1) International Coordinator, one (1) Graduate Student Coordinator, and (iii) at least five (5) Directors.</p> <p><b>Section 7: Terms (new)</b>                      The term of office for the Graduate Student Coordinator is two years. The Graduate Student Coordinator may not serve additional terms as the Graduate Student Coordinator, but is eligible to serve as a Director-at-Large or other elected Board member, provided the terms are non-consecutive.</p>	Chastain F
2:00 PM – 5:00 PM	<b>Conference Registration</b>	The Overlook
<b>Saturday, March 10</b>		
7:00 AM – 5:00 PM	<b>Conference Registration</b>	The Overlook
7:30 AM – 10:15 AM	<p><b>NARST Executive Board Meeting #1 (continued)</b></p> <p><i>Please note:</i> You must register for the Pre-conference Workshops with your Advance Conference Registration. You may only register for one workshop.</p>	Chastain F
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #1: Equity and Ethics Committee</b></p> <p>Free                      Maximum registration – 90</p> <p><b>Title:</b> Re-Centering on Scientific Literacy in an Era of Science Mistrust and Misunderstanding</p> <p><b>Organizers:</b> Senetta Bancroft, Southern Illinois University, USA (sfp4@ziips.uakron.edu)                      Saiqa Azam, Memorial University of Newfoundland, CAN (sazam@mun.ca)                      Sanghee Choi, University of North Georgia, USA (sanghee.choi@ung.edu)                      Deniz Saribas, Istanbul Aydin University, Turkey (denizsaribas@gmail.com)                      Phillip Boda, Teachers College, USA (Boda@exchange.tc.columbia.edu)                      Sheron Mark, University of Louisville, USA (sheron.mark@louisville.edu)                      Sara Raven, Texas A&amp;M University, sraven@tamu.edu                      Lizette Ramos, University of Guadalajara, Liz0920@gmail.com</p>	Savannah C

Date/Time	Event	Room
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #2: Research Committee</b>            Regular membership: \$25; All other memberships: Free            Maximum registration – 40</p> <p><b>Title:</b> LARIG: Supporting the Success of Early Career Educators and Scholars in Science Education (Multilingual Workshop)</p> <p><b>Presenters:</b> Fatima Terrazas Arellanes, University of Oregon, USA (Fatima@uoregon.edu)            Alejandro Gallard, Georgia Southern University, USA (agallard@georgiasouthern.edu)            Peter R. Licon, Elizabethtown College, USA (liconap@etown.edu)            Regina Suriel, Valdosta State University, USA (rlsuriel@valdosta.edu)            Diego Rojas-Perilla, Teachers College, Columbia University, USA (dfr2111@tc.columbia.edu)</p>	Augusta 3
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #3: Research Committee</b>            Free            Maximum registration – 40</p> <p><b>Title:</b> Using R for Rasch Analysis to Explore Student Learning Progression</p> <p><b>Presenters:</b> Ling Liang, La Salle University, USA (liang@lasalle.edu)            Xiufeng Liu, University at Buffalo, SUNY, USA (xliu5@buffalo.edu)            Gavin W. Fulmer, University of Iowa, USA (gavin-fulmer@uiowa.edu)            Irene Neumann, Leibniz-Institute for Science and Mathematics Education, Germany (ineumann@ipn.uni-kiel.de)</p>	Chastain 1
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #4: Research Committee</b>            \$25            Maximum registration – 30</p> <p><b>Title:</b> Integration of Neuroscience and Science Education to Understand Student Learning</p> <p><b>Presenters:</b> Richard Lamb, University at Buffalo, SUNY, USA (rlamb@buffalo.edu)            Pavlo Antonenko, University of Florida, USA (p.antonenko@coe.ufl.edu)            John B. Firestone, Washington State University, USA (jonah.firestone@gmail.com)</p>	Augusta A
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #5: External Policy and Relations Committee</b>            Free            Maximum registration – 50</p> <p><b>Title:</b> Research-practice Partnerships with State and Local Science Education Leaders</p> <p><b>Presenters:</b> Charles W. (Andy) Anderson, Michigan State University, USA (andya@msu.edu)            Phillip Bell, University Of Washington, USA (pbell@uw.edu)            Amelia Gotwals, Michigan State University, USA (gotwals@msu.edu)            Tiffany Neill, Oklahoma State Department of Education, USA (Tiffany.Neill@sde.ok.gov)            William Penuel, University of Colorado, USA (william.penuel@colorado.edu)            Tamara (TJ) Smolek, Michigan State University, USA (heckt@msu.edu)            Douglas Watkins, Denver Public School District, USA (douglas_watkins@dpsk12.org)            Mary Margaret Welch, Seattle Public Schools, USA (mmwelch323@gmail.com)</p>	Augusta 1
8:00 AM – 11:45 AM	<p><b>Pre-Conference Workshop #6: Publications Advisory Committee</b>            Free            Maximum registration – 40</p> <p><b>Title:</b> Workshop on Scholarly Writing and Innovation for NARST Newcomers</p> <p><b>Organizers:</b> Deborah Tippins, University of Georgia, USA (dtippins@uga.edu)            Sophia Jeong, University of Georgia, USA (sjfampicasa@gmail.com)</p> <p><b>Presenters:</b> Lynn Bryan, Purdue University, USA (lbryan@purdue.edu)            Felicia Mensah Moore, Teachers College, Columbia University, (moorefe@exchange.tc.columbia.edu)            Victor Sampson, University of Texas at Austin, USA (victor.sampson@utexas.edu)            Christina Schwarz, Michigan State University, USA (cschwarz@msu.edu)            Jan van Driel, Melbourne, Australia (j.vandriel@unimelb.edu.au)            Maria Varelas, University of Illinois Chicago, USA (mvarelas@uic.edu)            Deborah Tippins, University of Georgia, USA (dtippins@uga.edu)            Dana Zeidler, University of South Florida, USA (zeidler@usf.edu)</p>	Augusta F

Date/Time	Event	Room
10:00 AM – 11:45 AM	<b>Pre-Conference Workshop #7: Membership Committee</b> Free Maximum registration – 90 <b>Title:</b> Early Career Faculty Forum <b>Organizers:</b> Sonya Martin, Seoul National University (sonya.n.martin@gmail.com) Brooke Whitworth, University of Mississippi (bawhit@olemiss.edu) <b>Presenters:</b> Senior NARST Scholars	Savannah A
11:45 AM – 12:50 PM	<b>Attendees</b>	Lunch on your own
11:45 AM – 12:50 PM	<b>Committee Meetings</b> (Box lunch provided for committee members)	Concurrent Session Rooms
1:00 PM – 2:30 PM	<b>Plenary Session # 1</b> <b>Presenter:</b> Dr. Jane Lubchenco, Department of Integrative Biology, Oregon State University <b>Title:</b> Science in a Post-Truth World	Peachtree Ballroom
2:40 PM – 4:10 PM	<b>Concurrent Session # 1</b>	Concurrent Session Rooms
4:20 PM – 5:50 PM	<b>Concurrent Session # 2</b>	Concurrent Session Rooms
6:00 PM – 7:00 PM	<b>Mentor-Mentee Nexus</b>	Savannah A
6:00 PM – 7:00 PM	<b>Research Interest Groups (RIGs) Meetings</b> Contemporary Methods for Science Education Research Continental and Diasporic Africa in Science Education (CADASE) Engineering Education Indigenous Science Knowledge (ISK) Latino/a RIG (LARIG)	Augusta 3 Augusta C Augusta D Augusta E Augusta F
7:00 PM – 9:30 PM	<b>Presidential / Welcome Reception</b> (Appetizers served and cash bar)	Augusta Conference Center

## Sunday, March 11

6:00 AM – 7:15 AM	<b>Mind and Sole (Off-site)*</b> <i>*This event is not sponsored nor endorsed by NARST</i>	Westin Peachtree Plaza Lobby
7:00 AM – 5:00 PM	<b>Conference Registration</b>	The Overlook
8:30 AM – 10:00 AM	<b>Concurrent Session # 3</b>	Concurrent Session Rooms
10:15 AM – 11:45 AM	<b>Concurrent Session # 4</b>	Concurrent Session Rooms
12:00 PM – 1:00 PM	<b>NARST Annual Membership Meeting</b> (formerly NARST Business Meeting)	Chastain H and I
12:00 PM – 1:00 PM	<b>Lunch</b>	On your own
1:15 PM – 2:45 PM	<b>Concurrent Session # 5</b>	Concurrent Session Rooms
2:45 PM – 3:15 PM	<b>Coffee/Tea Break</b>	
3:15 PM – 4:15 PM	<b>Concurrent Session # 6A: Poster Session</b>	Augusta Conference Center
4:15 PM – 5:15 PM	<b>Concurrent Session # 6B: Poster Session</b>	Augusta Conference Center

Date/Time	Event	Room
5:30 PM – 7:00 PM	<b>Graduate Student Forum</b> <b>Description:</b> The Graduate Student Forum aims to guide and encourage beginning researchers by discussing the various parts of a 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 round table discussions with experienced colleagues on matters of academic interest. <b>Organizers:</b> Amber Bismack, University of Michigan (abismack@umich.edu), Christa Haverly, Michigan State University (haverlyc@msu.edu), and Francesca White, Indiana University (frawhite@indiana.edu)	Savannah A
6:00 PM – 8:30 PM	<b>JRST Editorial Team Meeting/Dinner</b> Sponsored by Wiley-Blackwell (By invitation only)	Chastain J
6:00 PM – 7:30 PM	<b>Reception: <i>International Journal of Science and Mathematics Education</i></b> Sponsored by Springer (By invitation only)	Chastain H and I

## Monday, March 12

7:15 AM – 8:30 AM	<b>Committee Meetings</b>	Concurrent Session Rooms
7:00 AM – 5:00 PM	<b>Conference Registration</b>	The Overlook
8:45 AM – 10:15 AM	<b>Concurrent Session # 7</b>	Concurrent Session Rooms
10:30 AM – 12:00 PM	<b>Plenary Session #2:</b> <b>Presenter:</b> Dr, Marcia C. Linn, Graduate School of Education, University of California, Berkeley <b>Title:</b> From Accumulating to Integrating Ideas: Technology Matters	Peachtree Ballroom
12:15 PM – 2:15 PM	<b>Awards Luncheon</b>	Americas Mart Building 2 – 4th Floor
2:30 PM – 4:00 PM	<b>Concurrent Session # 8</b>	Concurrent Session Rooms
4:15 PM – 5:45 PM	<b>Concurrent Session # 9</b>	Concurrent Session Rooms
6:30 PM – 9:00 PM	<b>Equity and Ethics Dinner</b> (Maximum attendance: 70) Dinner, including tax and gratuity, is \$53.10. <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: Braves All Star Grill 200 Peachtree St. NW Atlanta, GA (404) 205-5257

## Tuesday, March 13

7:00 AM – 8:15 AM	<b>Strand Meetings</b>	Concurrent Session Rooms
7:00 AM – 12:00 PM	<b>Conference Registration</b>	The Overlook
8:30 AM – 10:00 AM	<b>Concurrent Session # 10</b>	Concurrent Session Rooms
10:00 AM – 10:30 AM	<b>Coffee/Tea Break</b>	
10:15 AM – 11:45 AM	<b>Concurrent Session # 11</b>	Concurrent Session Rooms
12:00 PM – 1:00 PM	<b>Lunch</b>	On your own
1:00 PM – 2:30 PM	<b>Concurrent Session # 12</b>	Concurrent Session Rooms
2:45 PM – 4:15 PM	<b>Concurrent Session # 13</b>	Concurrent Session Rooms
5:00 PM – 10:00 PM	<b>NARST Executive Board Meeting #2</b>	Chastain H and I



# **PROGRAM**

**Friday, March 9, 2018**



## **NARST Executive Board Meeting Session #1**

**7:30am – 5:00pm, Chastain F**

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## **Conference Registration**

**2:00pm – 5:00pm, The Overlook**



**Saturday, March 10, 2018**



## Conference Registration

### 7:00am – 5:00pm, The Overlook

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## NARST Executive Board

### Meeting Session #1 (continued)

### 7:30am – 10:15am, Chastain F

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## Pre-Conference Workshops

### 8:00am – 11:45am

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**Pre-Conference Workshop #1: Equity and Ethics Committee (Free – 90 participants max)**  
***Re-Centering on Scientific Literacy in an Era of Science Mistrust and Misunderstanding***  
 8:00am – 11:45am, Savannah C

#### Organizers:

Senetta Bancroft, Southern Illinois University  
 Saiqa Azam, Memorial University of Newfoundland, CAN  
 Sanghee Choi, University of North Georgia  
 Deniz Saribas, Istanbul Aydin University, Turkey  
 Phillip Boda, Stanford University  
 Sheron Mark, University of Louisville  
 Sara Raven, Texas A&M University  
 Lizette Ramos, University of Guadalajara

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**Pre-Conference Workshop #2: Research Committee (\$25 for regular membership/Free for all other memberships – 40 participants max)**  
***LARIG: Supporting the Success of Early Career Educators and Scholars in Science Education (Multilingual Workshop)***  
 8:00am – 11:45am, Augusta 3

#### Presenters:

Fatima Elvira Terrazas Arellanes, University of Oregon  
 Alejandro Gallard, Georgia Southern University  
 Peter R. Licon, Elizabethtown College  
 Regina Suriel, Valdosta State University  
 Diego Rojas-Perilla, Teachers College, Columbia University

**Pre-Conference Workshop #3: Research Committee (Free – 40 participants max)**  
***Using R for Rasch Analysis to Explore Student Learning Progression***

8:00am – 11:45am, Chastain 1

#### Presenters:

Ling Liang, La Salle University  
 Xiufeng Liu, University at Buffalo, SUNY  
 Gavin W. Fulmer, University of Iowa  
 Irene Neumann, Stony Brook University, SUNY

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**Pre-Conference Workshop #4: Research Committee (\$25 – 30 participants max)**  
***Integration of Neuroscience and Science Education to Understand Student Learning***

8:00am – 11:45am, Augusta A

#### Presenters:

Richard Lamb, University at Buffalo, SUNY  
 Pavlo Antonenko, University of Florida  
 John B. Firestone, Washington State University

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**Pre-Conference Workshop #5: External Policy and Relations Committee (Free – 50 participants max)**  
***Research-practice Partnerships with State and Local Science Education Leaders***  
 8:00am – 11:45am, Augusta 1

#### Presenters:

Charles W. (Andy) Anderson, Michigan State University  
 Phillip Bell, University of Washington  
 Amelia Gotwals, Michigan State University  
 Tiffany Neill, Oklahoma State Department of Education  
 William Penuel, University of Colorado  
 Tamara (TJ) Smolek, Michigan State University  
 Douglas Watkins, Denver Public School District  
 Mary Margaret Welch, Seattle Public Schools

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**Pre-Conference Workshop #6: Publications Advisory Committee (Free – 40 participants max)**  
**Workshop on Scholarly Writing and Innovation for NARST Newcomers**

8:00am – 11:45am, Augusta F

**Organizers:**

Deborah Tippins, University of Georgia

Sophia Jeong, University of Georgia

**Presenters:**

Lynn Bryan, Purdue University

Felicia Mensah Moore, Teachers College, Columbia University

Victor Sampson, University of Texas at Austin

Christina Schwarz, Michigan State University

Jan van Driel, Melbourne, Australia

Maria Varelas, University of Illinois Chicago

Deborah Tippins, University of Georgia

Dana Zeidler, University of South Florida

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**Pre-Conference Workshop #7: Membership Committee (Free – 90 participants max)**

**Early Career Faculty Forum**

10:30am – 11:45am, Savannah A

**Organizers:**

Sonya Martin, Seoul National University

Brooke Withworth, University of Mississippi

**Presenters:**

Senior NARST Scholars

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**Lunch—On Your Own**  
**11:45am – 12:50pm**

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**Committee Meetings**

(Box lunch provided for committee members)

**11:45am – 12:50pm**

**Awards Committee Chairs & Co-Chairs Meeting**

11:45am – 12:50pm, Savannah A

**Equity and Ethics Committee Meeting**

11:45am – 12:50pm, Savannah B

**External Policy and Relations Committee Meeting**

11:45am – 12:50pm, Savannah C

**Research Committee Meeting**

11:45am – 12:50pm, Augusta 1

**Membership Committee Meeting**

11:45am – 12:50pm, Augusta 2

**Election Committee Meeting**

11:45am – 12:50pm, Augusta B

**International Committee Meeting**

11:45am – 12:50pm, Augusta 3

**Program Committee Meeting**

11:45am – 12:50pm, Chastain 1

**Publications Advisory Committee Meeting**

11:45am – 12:50pm, Augusta A

**Graduate Student Committee Meeting**

7:15am – 8:30pm, Augusta C

**Website Committee Meeting**

7:15am – 8:30pm, Augusta D

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**Plenary Session #1**

***Science in a Post-Truth World***

1:00pm – 2:30pm, Peachtree Ballroom

**Presenter:**

Jane Lubchenco, Oregon State University

**Concurrent Session #1****2:40pm – 4:10pm****Publications Advisory Committee*****Symposium – How to Get Your Research Published in Science Education Journals***

2:40pm – 4:10pm, Savannah C

**President:** Ron Gray, Northern Arizona University**Presenters:*****Journal of Research in Science Teaching***

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

Dana L. Zeidler, University of South Florida

***Science Education***

Sherry A. Southerland, Florida State University

John Settlage, University of Connecticut

***International Journal of Science Education***

Jan H. Van Driel, University of Melbourne

***CBE Life Sciences Education***

Erin L. Dolan, University of Georgia

***Cultural Studies in Science Education***

Catherine E. Milne, New York University

Christina Siry, University of Luxembourg

Michael Mueller, University of Alaska Anchorage

***Journal of Engineering Education***

Lisa Benson, Clemson University

***Journal of the Learning Sciences***

Leema Berland, University of Wisconsin

***Journal of Science Education and Technology***

Kent Crippen, University of Florida

***Journal of Science Teacher Education***

Normal Lederman, Illinois Institute of Technology

Judith Lederman, Illinois Institute of Technology

***Science & Education***

Kostas Kamourakis, University of Geneva

***Research in Science Education***

David Geelan, Griffith University

***School Science and Mathematics***

Carla C. Johnson, Purdue University

***Studies in Science Education***

Justin Dillon, University of Exeter

Lucy Avraamidou, University of Groningen

**Strand 1: Science Learning, Understanding and Conceptual Change*****The Role of Spatial Thinking in Science Learning: Examples from Early Childhood through Experts***

2:40pm – 4:10pm, Chastain 1

**President:** Kim Cheek, University of North Florida**Discussant:** Cesar Delgado, North Carolina State University***Spatial Thinking or Deliberate Practice: Understanding Diagrams on a High School Earth Science Assessment***

Nicole D. LaDue, Northern Illinois University

***Helping Students Learn Chemistry by Supporting Their Representational Competencies***

Martina Rau, University of Wisconsin, Madison

***Spatial Thinking in Meteorology***

Peggy M. McNeal, Western Michigan University

Heather Petcovic, Western Michigan University

Todd D. Ellis, Western Michigan University

Nicole D. LaDue, Northern Illinois University

***How Do Astronomy Textbook Images Support Learning about Scale, Proportion, and Quantity in Grades K-8?***

Kim Cheek, University of North Florida

Caroline George, University of North Florida

***Investigating Undergraduate Sub-meter Perceptions of Scale***

Laura A Tinigin, Western Michigan University

Heather L. Petcovic, Western Michigan University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Approaches for Studying Equitable and Responsive Science Teaching***

2:40pm – 4:10pm, Augusta A

**President:** Christa Haverly, Michigan State University**Discussant:** Jessica Thompson, University of Washington***Noticing and Responding Episodes: Accessing Elementary Teachers' Responsiveness Towards Equitable Sense-making***

Christina V. Schwarz, Michigan State University

Melissa Braaten, University of Colorado, Boulder

Angela Calabrese-Barton, Michigan State University

Christa Haverly, Michigan State University

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

***Situating Teachers' Productive Responsiveness  
in Instructional Contexts***

Hosun Kang, University of California, Irvine

***Examining How Responsive Teaching Supports Scientific  
Inquiry in an Online Learning Environment***

Lama Jaber, Florida State University  
Jessica Watkins, Tufts University  
Vesal Dini, Tufts University

***Supporting Emerging Bilingual Students' Translanguaging  
When Making Sense of Electrical Phenomena***

Enrique Suarez, University of Colorado, Boulder

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**Strand 4: Science Teaching – Middle and High School  
(Grades 5-12): Characteristics and Strategies  
*Student Participation in Science-Related Discourses –  
the Roles of Representations***

2:40pm – 4:10pm, Augusta C

**Discussant:** Carolyn Wallace, Kennesaw State University

***Using Representations to Learn about the Greenhouse Effect***

Tobias Fredlund, University of Oslo  
Erik Knain, University of Oslo  
Anniken Furberg, University of Oslo  
Carolyn S. Wallace, Kennesaw State University

***Students' Engagement with Representations in Science***

Torunn Aanesland Strømme, University of Oslo  
Anniken Furberg, University of Oslo  
Erik Knain, University of Oslo  
Line Ingulfsen, University of Oslo  
Carolyn S. Wallace, Kennesaw State University

***Students' Argumentation on SSI –  
the Role of Representations***

Erik Knain, University of Oslo  
Kari Beate Remmen, University of Oslo  
Tobias Fredlund, University of Oslo  
Carolyn S. Wallace, Kennesaw State University

***Representations and Student Teachers' Experiences  
from Teacher Practice***

Mai Lill Suhr Lunde, University of Oslo  
Ketil Mathiassen, University of Oslo  
Marianne Ødegaard, University of Oslo  
Erik Knain, University of Oslo  
Tobias Fredlund, University of Oslo  
Carolyn S. Wallace, Kennesaw State University

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

2:40pm – 4:10pm, Augusta H

**President:** Merchi Edry, Technion, Israel Institute of Technology

***Improving Students' Argumentation Performance  
Through a Socio-Scientific Issue Instruction Regarding  
Solar Cell Production***

Shih-Yeh Chen, National Taiwan Normal University  
Shiang-Yao Liu, National Taiwan Normal University  
Xiaoying Wang, Stony Brook University, SUNY

***Socio-Cultural Factors and Scientific Explanations by  
Biology Students***

Peter A. Okebukola, Lagos State University, Nigeria  
Tunde Owolabi, Lagos State University, Lagos, Nigeria  
Sunday Banjoko, Lagos State University, Nigeria

***Teaching Practices for the Enactment of Socio-Scientific  
Issues Oriented Teaching: How an Experienced Teacher  
Delivers SSI Instruction***

Troy Sadler, University of Missouri  
David Owens, University of Missouri

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

***Understanding Active Learning and Learning Assistant  
Support in Undergraduate Science Classrooms***

2:40pm – 4:10pm, Augusta D

**President:** Robert M. Talbot, University of Colorado, Denver

***Characterizing Mediating Artifacts:  
Authenticity of Active Learning Tasks***

Leanne Doughty, University of Colorado, Denver  
Robert M. Talbot, University of Colorado, Denver  
Laurel Hartley, University of Colorado, Denver  
Paul Le, University of Colorado, Denver  
Amreen Nasim Thompson, University of Colorado, Denver

***Learning Assistants' Actions: An Analysis of their  
Interactions with Students***

Amreen Nasim Thompson, University of Colorado, Denver  
Leanne Doughty, University of Colorado, Denver  
Robert M. Talbot, University of Colorado, Denver  
Paul Le, University of Colorado, Denver  
Laurel Hartley, University of Colorado, Denver

***The Classroom Community: What Students, Faculty and Learning Assistants are doing in the Active Learning Class***

Laurel Hartley, University of Colorado, Denver  
 Leanne Doughty, University of Colorado, Denver  
 Paul Le, University of Colorado, Denver  
 Amreen Nasim Thompson, University of Colorado, Denver  
 Robert M. Talbot, University of Colorado, Denver

***The Classroom Community: How Student Interaction Relates to Outcomes***

Paul Le, University of Colorado, Denver  
 Robert M. Talbot, University of Colorado, Denver  
 Andrew L. McDevitt, Illinois State University  
 Laurel Hartley, University of Colorado, Denver  
 Amreen Nasim Thompson, University of Colorado, Denver  
 Leanne Doughty, University of Colorado, Denver

***Strand 6: Science Learning in Informal Contexts  
Reimagining STEM Through Theatre: A Cross-Disciplinary  
Science-Theatre Project for Middle School Youth***

2:40pm – 4:10pm, Augusta B

**Presenters:**

Ariella F. Suchow, Boston College  
 Megan T. McKinley, Boston College  
 Amy R. Semerjian, Boston College  
 Helen Zhihui Zhang, Boston College  
 Mike Barnett, Boston College

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

2:40pm – 4:10pm, Augusta G

**Presider:** Meenakshi Sharma, Michigan State University

***From Didactic to Dialogical Teaching – Intervention  
to Foster Scientific Argumentation in Ethiopian  
Teacher Education***

Vanessa Kind, Durham University  
 Per Morten Kind, Durham University  
 Mulugeta Atnafu, Addis Ababa University  
 Kassa Michael, Addis Ababa University  
 Mekbib Alemu, Addis Ababa University  
 Mesfin Tadesse, Addis Ababa University

***Pre-service Teachers' use of Discourse to Control  
the Construction of Scientific Arguments***

Brent Gilles, University of West Georgia  
 Gayle A. Buck, Indiana University

***The Impact of Socio-Scientific Biology Instruction on  
Argumentation Skills of Pre-service Science Teachers***

Yilmaz Kara, Bartin University  
 Gozde Yalcin, Bartin University

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

2:40pm – 4:10pm, Savannah B

**Presider:** Michelle Forsythe, Texas State University

***Digital Community of Practice: What Do Veteran  
Teachers Talk About?***

Susan P. Unger, University of Rhode Island  
 Jay A. Fogleman, University of Rhode Island  
 Sara B. Sweetman, University of Rhode Island

***Mind the Gap: Exploring (Mis)alignment in In-service and  
Pre-service Science Teacher Mentoring Relationships***

Alison R. Miller, Bowdoin College  
 Laura Zangori, University of Missouri  
 Brooke A. Whitworth, University of Mississippi  
 Mandy Biggers, Texas Woman's University

***Promoting Science Teacher Candidate Learning through  
Content-Specific Disciplined Inquiry***

Danielle E. Dani, Ohio University

***The Triad Project: A Professional Development Activity  
System for Teaching to the NGSS***

Al Schademan, California State University, Chico  
 Mimi Miller, California State University, Chico  
 Tal Slemrod, California State University, Chico

***Strand 8: In-service Science Teacher Education  
Conceptions of Engineers and Engineering***

2:40pm – 4:10pm, Augusta E

**Presider:** Emily A. Dare, Michigan Technological University

***Exploring Teacher-Engineer Partnerships in Professional  
Development in the Time of NGSS***

Emily A. Dare, Michigan Technological University

***Identifying Teachers' Conceptions of Engineering and  
Teaching Engineering***

Shannon M. Smith, University of Cincinnati  
 William H. Thatcher, University of Cincinnati  
 Helen Meyer, University of Cincinnati

***Perspectives of Failure: Using Engineering Students' Viewpoints to Reimagine Failure in K-12 Schools***

Jessica Cellitti, Drexel University

**Strand 10: Curriculum, Evaluation, and Assessment**

***Assessing the Next Generation Science Standards***

2:40pm – 4:10pm, Augusta 3

***Identifying Construct Validity Issues Raised by NGSS Assessments***

Jill A. Wertheim, Stanford University  
Jonathan Francis Osborne, Stanford  
Cathy Zozakiewicz, Stanford University  
Nicole Holthuis, Stanford University  
Susan E. Schultz, Stanford University  
KC Busch, North Carolina State

***Designing Classroom-Based Assessments for Supporting 3-D Teaching and Learning***

Christopher J. Harris, SRI International  
Joseph S. Krajcik, Michigan State University  
James Pellegrino, University of Illinois, Chicago  
Kevin W. McElhaney, SRI International  
Phyllis H. Pennock, Western Michigan University  
Brian D. Gane, University of Illinois, Chicago

***Applying Automated Analysis to the Measurement of Constructed Responses: Applications in Student Argumentation***

Christopher Wilson, BSCS  
Molly Stuhlsatz, BSCS  
Brian M. Donovan, BSCS  
Zoe E. Buck Bracey, BSCS  
Jonathan Francis Osborne, Stanford University  
Mark Urban-Lurain, Michigan State University  
John Merrill, Michigan State University  
Kevin C. Haudek, Michigan State University

***Modeling the Relationship between Argumentation and Content Items: Possible Task Formats***

Mark Wilson, University of California, Berkeley  
Linda Morell, University of California, Berkeley  
Jonathan Francis Osborne, Stanford University

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

***Symposium – Cultural Connections – Hispanic and Latin American Teachers and Students***

2:40pm – 4:10pm, Augusta F

**Presenters:**

Anna R. Lewis, La Pontificia Universidad Católica del Perú  
Angela Chapman, University of Texas, Rio Grande Valley  
Becca Shareff, University of California, Berkeley  
Lorraine Ramirez, Florida Institute of Technology  
Nikeetha Dsouza, Clemson University  
Felicia Rodriguez, University of Texas, Rio Grande Valley

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

***The Experiences of Underrepresented Groups in STEM***

2:40pm – 4:10pm, Chastain J

**Presenter:** Natalie S. King, Georgia State University

***Black Girls Speak STEM!***

Natalie S. King, Georgia State University  
Rose M. Pringle, University of Florida

***Persistence in STEM: Perspectives from African American Male PhD Scientists and Engineers***

Shari Watkins, University of Delaware

***Exploring the Relationship between In-School and Out-of-School Time Science Experiences for African American Girls***

Katherine Wade-Jaimes, University of Memphis

***Using Personal Histories to Develop Racial Literacy with Science Teachers of Color: A Multiple Case Study***

Althea B. Hoard, Columbia University  
Felicia Moore Mensah, Columbia University

***A Case Study of the Experiences of Exclusion Among Undergraduate Engineering Students***

Christopher Dittrick, University of Virginia  
Robert H. Tai, University of Virginia  
Angela Skeeles-Worley, University of Virginia

**Strand 12: Educational Technology*****Augmented Reality***

2:40pm – 4:10pm, Augusta 2

**Presider:** Richard Lamb, University at Buffalo, SUNY***Understanding Student Engagement while Using an Augmented Reality Sandbox***

Nicholas A. Soltis, Auburn University

Karen S. Mcneal, Auburn University

Rachel M. Atkins, North Carolina State University

Lindsay C. Maudlin, North Carolina State University

Christine Schnittka, Auburn University

***Using Epistemic Network Analysis to Examine Discourse and Scientific Practice during a Mobile AR Game***

Denise M. Bressler, Rutgers University

Alec M. Bodzin, Lehigh University

***Gender Differences in the Engagement and Knowledge Gains of Students using a Virtual Field Trip***

Michael S. Tutwiler, University of Rhode Island

Ming-Chao J. Lin, National Taiwan Science Education Center

Chun-Yen Chang, National Taiwan Normal University

**Strand 13: History, Philosophy, Sociology, and Nature of Science*****Symposium – Creating a Polyphonic and Dialogic Process to Address the Issue of Science Mistrust and Misunderstanding***

2:40pm – 4:10pm, Augusta 1

**Presider:** Sophia (Sun Kyung) Jeong, University of Georgia**Discussant:** J. Oliver, University of Georgia**Presenters:**

Sophia (Sun Kyung) Jeong, University of Georgia

Gretchen P. King, University of Nebraska, Lincoln

David L. Pauli, University of Georgia

Cary W. Sell, University of Georgia

David P. Steele, University of Georgia

Daniel K. Capps, University of Georgia

David F. Jackson, University of Georgia

Logan M. Leslie, University of Georgia

J. Steve Oliver, University of Georgia

Deborah J. Tippins, University of Georgia

**Strand 14: Environmental Education*****Symposium – Provocative Tensions: How Four Approaches Inform Visions of Sustainability-Oriented Science Education***

2:40pm – 4:10pm, Savannah A

**Presider:** Kim Haverkos, Thomas More College**Discussant:** Theresa Shume, North Dakota State University**Presenters:**

John Lawrence Bencze, University of Toronto

Rachel Gisewhite, National Coalition of Independent Scholars

Sami Kahn, Ohio University

Bhaskar Upadhyay, University of Minnesota

**Concurrent Session #2****4:20pm – 5:50pm****Equity and Ethics Committee*****Re-centering Science Education for All***

4:20pm – 5:50pm, Savannah C

**Presiders:**

Miri Barak, Israel Institute of Technology

Nam-Hwa Kang, Korea National University of Education

Catherine Quinlan, Howard University

Mercy Ogunbandele, Adamawa State University

Melody Russell, Auburn University

**Presenters:**

Meshach Ogunniyi, University of the Western Cape, Republic of South Africa

Orit Ben Zvi Assaraf, University of the Negev, Israel

Mary M. Atwater, University of Georgia, USA

Pauline Chinn, University of Hawaii

Sonya N. Martin, Seoul National University, Korea

Regina Suriel, Valdosta State University, USA

**International Committee*****ESERA Symposium – Physics Education and Gender: Identity as an Analytic Lens for Research***

4:20pm – 5:50pm, Augusta 1

**Presenters:**

Allison Gonsalves, McGill University

Anna T. Danielsson, Uppsala University

Heidi B. Carlone, University of North Carolina, Greensboro

Louise Archer, University College London

Jennifer Dewitt, UCL Institute of Education

Anders Johansson, Uppsala University

Adrienne Traxler, Wright State University

Jennifer Blue, Miami University

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**Strand 1: Science Learning, Understanding and Conceptual Change**

***Communication, Argumentation and Problem-Solving In Science Learning***

4:20pm – 5:50pm, Augusta A

**Presider:** Amity F. Gann, Temple University

***Epistemic Games in Chemistry***

Hannah Sevia, University of Massachusetts, Boston

Steven Couture, University of Massachusetts, Boston

***Refining Methods for Assessing Cohesiveness in Multimodal Communication***

Andrea Malek, University of Iowa

Mark A. McDermott, University of Iowa

***Secondary Students' Argumentation Performance across Science and Social Topics***

Hui Jin, Educational Testing Service

Kenneth F. Llord, ETS

Cathy E. Mehl, Ohio State University

Wenju Cui, Educational Testing Service

Duanli Yan, Educational Testing Service

***Using Scenario-based Assessment to Investigate Students' Argumentation Practice***

Kenneth F. Llord, ETS

Hui Jin, Educational Testing Service

Scott Grapin, New York University

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

***Analyzing Conceptual Understanding***

4:20pm – 5:50pm, Augusta B

**Presider:** Asli Sezen-Barrie, University of Maine

***Multimodal Interaction Analysis of Student Science***

***Notebook Use: Science and Language In Action***

Sara Wilmes, University of Luxembourg

***Rasch Analysis of Measuring Students' Epistemic Language Practices in Science Learning***

Yejun Bae, The University of Iowa

Gavin W. Fulmer, University of Iowa

Brian M. Hand, University of Iowa

William Hansen, University of Iowa

***Reading to Problematize: An Exploratory Analysis of Students' Annotations as Evidence of Disciplinary Sensemaking***

Mon Lin Ko, University of Illinois, Chicago

Willard R. Brown, West Ed

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**Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies Shifting Elementary Science Classrooms to Support Science Practices**

4:20pm – 5:50pm, Savannah A

**Discussant:** Eve Manz, Boston University

***Instructional Leaders Views of "Good" Science Instruction: Moving from General Pedagogy and Hands on to the Science Practices***

Katherine L. McNeill, Boston College

Rebecca Lowenhaupt, Boston College

***Supporting Elementary Teachers to Cultivate Model-Centered Science Learning Environments***

Dante Cisterna, University of Missouri

Devarati Bhattacharya, University of Nebraska, Lincoln

Tina Vo, University of Nebraska, Lincoln

Laura Zangori, University of Missouri

Cory T. Forbes, University of Nebraska, Lincoln

***Pre-service Teachers Reframing Pedagogy to Support Scientific Sensemaking Practices***

Leema Berland, University of Wisconsin, Madison  
Corinna West, University of Wisconsin, Madison  
Rosemary Russ, University of Wisconsin, Madison

***Co-constructing Discursive Identities to Participate in the Scientific Practices***

Emily C. Miller, University of Wisconsin, Madison  
Leema Berland, University of Wisconsin, Madison

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

***Teachers' Use of Learning Progressions to Inform Classroom Instruction***

4:20pm – 5:50pm, Augusta D

**President:** Alicia C. Alonzo, Michigan State University

**Discussant:** Amelia Wenk Gotwals, Michigan State University

***Teachers' Use of a Learning Progression When Anticipating Student Responses to Assessment Items***

James B. Hancock, Michigan State University  
Alicia C. Alonzo, Michigan State University

***Design Decisions Supporting Teachers' Use of Learning Progressions***

Jason Buell, Colorado University of Colorado, Boulder  
Kelsey Tayne, University of Colorado, Boulder  
Erin M. Furtak, University of Colorado, Boulder

***Facilitating Teacher Sensemaking about Student Ideas Linked to a Learning Progression Through Score Reports***

Kate Henson, University of Colorado, Boulder  
Rajendra Chattergoon, University of Colorado, Boulder  
Erin M. Furtak, University of Colorado, Boulder

***Teachers' Use of a Learning Progression to Inform Planned Instruction***

Julie Christensen, Michigan State University  
Alicia C. Alonzo, Michigan State University

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

***Supporting Opportunities for Theoretical Practices in Undergraduate Biology***

4:20pm – 5:50pm, Augusta E

***Integrating Conceptual and Quantitative Understandings of Variation to Develop Students' Capacity to Theorize about Experimental Data***

Anita Schuchardt, University of Minnesota  
Maxwell Kramer, University of Minnesota  
Catherine Kirkpatrick, University of Minnesota

***How Equations Can Support Student Theorizing in Biology***

Matthew Lira, University of Iowa

***Supporting Generative Reasoning in an Undergraduate Laboratory Course through a Model-Based-Inquiry Curriculum***

Molly Bolger, University of Arizona  
Susan Hester, University of Arizona  
Michelle Nadler, University of Arizona  
Lisa Elfring, University of Arizona  
Jennifer Katcher, Pima Community College

***Exploratory Theorizing in the 'Hybrid Space' between Modeling and Experimentation***

Julia Gouvea, Tufts University  
Aditi Wagh, Tufts University

***Creating a Space for Students to Theorize about Model Evaluation***

Gretchen P. King, University of Nebraska, Lincoln  
Joseph Dauer, University of Nebraska, Lincoln  
Heather Bergan-Roller, University of Nebraska  
Nick Galt, University of Nebraska  
Tomas Helikar, University of Nebraska

**Strand 6: Science Learning in Informal Contexts**  
***Symposium – Ecological Perspectives on Learning: Rethinking Our Questions, Methods, and Partnerships***  
 4:20pm – 5:50pm, Augusta C

**Presenters:**

Martin Storksdieck, Oregon State University  
 Angela Calabrese-Barton, Michigan State University  
 Lynn D. Dierking, Oregon State University  
 Bronwyn Bevan, University of Washington  
 Edna Tan, University of North Carolina, Greensboro

**Strand 7: Pre-service Science Teacher Education**  
***Beginning Science Teachers' Subject Matter Knowledge, Misconceptions, and Emerging Inquiry-based Teaching Practices***  
 4:20pm – 5:50pm, Augusta F

***Guidelines to Ensure Beginning Science Teachers' Strong Subject Matter Knowledge***

Elizabeth B. Lewis, University of Nebraska, Lincoln  
 Brandon A. Holding, Boulder Learning, Inc.

***Teachers' Chemistry Misconceptions at Various Subject Matter Knowledge Levels***

Ana M. Rivero, Seattle University  
 Lyrica L. Lucas, University of Nebraska, -Lincoln

***Teachers' Misconceptions at Various Levels of Physics Subject Matter Knowledge***

Lyrica L. Lucas, University of Nebraska, Lincoln  
 Ana M. Rivero, Seattle University

***Subject Matter Knowledge Needed to Teach Middle School Life Science***

Amy Tankersley, University of Nebraska, Lincoln  
 Elizabeth B. Lewis, University of Nebraska, Lincoln

**Strand 8: In-service Science Teacher Education**  
***Science Teacher Learning in Communities***  
 4:20pm – 5:50pm, Augusta G

**Presider:** Jan H. Van Driel, University of Melbourne

***Establishing a Community of Practice (CoP) To Support Pre-service Science Teachers' Pedagogical Development***

Rebecca Cooper, Monash University  
 Karen Marangio, Monash University

***Developing Primary Teachers' TPACK through Digital Didactic Design (D3)***

Pernilla Nilsson, Halmstad University

***Pre-service Teachers' Conceptions of STEM and Self-Perceptions as STEM Educators throughout a Partner Mentoring Project***

Amanda K. Berry, RMIT University  
 Grant Cooper, RMIT University  
 Patricia McLaughlin, RMIT University

***Finding the Connection between Research and Design: A Professional Learning Community for STEM Teachers***

Tessa Vossen, Leiden University  
 Ineke Henze-Rietveld, Delft University of Technology  
 Marc J. De Vries, Delft University of Technology  
 Jan H. Van Driel, University of Melbourne

**Strand 8: In-service Science Teacher Education**  
***Considering Professional Development Design***

4:20pm – 5:50pm, Augusta H

**Presider:** Christine R. Lotter, University of South Carolina

***A Systematic Review of Equity Focused K-12 US Science Teacher Professional Development Programs: 2001-2016***

Senetta Bancroft, Southern Illinois University, Carbondale  
 Euginia M. Nyirenda, Southern Illinois University, Carbondale

***Investigation on the Professional Ethics of Science Teachers in China's Primary and Middle Schools***

Jing Lin, Beijing Normal University  
 Xiufeng Liu, University at Buffalo, SUNY  
 Chun-Yen Chang, National Taiwan Normal University  
 Tianying Sun, Beijing Normal University

***Variation As a Hard Reality: Profiles of Teacher******Learning Trajectories***

Max L. Longhurst, Utah State University  
 Hyunju Lee, Smithsonian Institute  
 Todd Campbell, University of Connecticut

***Strand 10: Curriculum, Evaluation, and Assessment  
 Crafting Assessments to Measure Student Learning  
 in Project-Based Science***

4:20pm – 5:50pm, Chastain 1

***Evaluating Learning of Conceptual, Procedural, and  
 Epistemic Knowledge in a Project-Based Learning Unit***

Jari Lavonen, University of Helsinki  
 Kalle Juuti, University of Helsinki

***Effect of Project-Based Learning on Student Performance:  
 A Simulation Study***

Israel Toutou, Michigan State University  
 Joseph S. Krajcik, Michigan State University  
 Barbara Schneider, Michigan State University  
 Christopher Klager, Michigan State University  
 Tom Bielik, Michigan State University

***Assessing Collaboration and Competition through  
 Project-Based Learning***

Katariina Salmela-Aro, University of Helsinki  
 Christopher Klager, Michigan State University  
 Lindsey W. Young, Michigan State University  
 Barbara Schneider, Michigan State University

***Using Artifacts Developed in Project-Based Learning  
 Classrooms as Evidence of 3-D Learning***

Deborah C. Peek-Brown, Michigan State University  
 Kellie Finnie, Michigan State University  
 Joseph S. Krajcik, Michigan State University  
 Tom Bielik, Michigan State University

**Strand 12: Educational Technology*****Digital Learning Environments***

4:20pm – 5:50pm, Augusta 3

**Presider:** Noemi Waight, University at Buffalo, SUNY

***Computationally-enabled Modeling Environments:  
 Simulating Epidemic Diseases in Science Classrooms  
 using Block-based Programming***

Bitra Akram, North Carolina State University  
 Andy Smith, North Carolina State University  
 Cody Smith, North Carolina State University  
 Osman Aksit, North Carolina State University  
 Eric N. Wiebe, North Carolina State University  
 James C. Lester, North Carolina State University

***Digital Games in the Science Classroom: How Students  
 Use Internal and External Scaffolds During Game Play***

Kara Krinks, Lipscomb University  
 Heather J. Johnson, Vanderbilt University  
 Douglas B. Clark, Vanderbilt University

***Roving with GigaPan Technology in a Garden-Based  
 Science Learning Context***

Ashley Murphy, West Virginia University  
 Melissa J. Luna, West Virginia University  
 James Rye, West Virginia University

**Strand 13: History, Philosophy, Sociology, and Nature  
 of Science**
***Symposium – Practical Perspectives in Teaching  
 and Learning Nature of Science***

4:20pm – 5:50pm, Augusta 2

**Presider:** Kostas Kampourakis, University of Geneva

**Discussant:** Judith Lederman, Illinois Institute of Technology

**Presenters:**

Kostas Kampourakis, University of Geneva  
 Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill  
 Judith S. Lederman, Illinois Institute of Technology  
 Norman G. Lederman, Illinois Institute of Technology  
 Michael Clough, Texas A&M University  
 William F. Mccomas, University of Arkansas  
 Sibel Erduran, University of Oxford  
 Ebru Kaya, Bogazici University  
 Busra Aksoz, Bogazici University  
 Selin Akgun, Bogazici University

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## Evening/Social Events

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### Membership 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, Savannah A

#### **Presiders:**

Gary Holiday, University of Akron

Selina Bartels, Illinois Institute of Technology

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### 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, and promote 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 2018 meeting we would will update you on the RIG projects, and more importantly structure the meeting to help those currently experiencing methodological roadblocks in their work. We invite all attendees to submit a short description of a project (at any stage) where you are experiencing difficulties figuring out how to move forward from a methodological standpoint. We will focus the discussions on a few methodological issues (sent to the RIG ahead of time) and you and your NARST peers will spend some time addressing the issues, with the goal of helping you to move forward. If you have such a methodological difficulty please send a brief description to robert.talbot@ucdenver.edu. The RIG steering committee will use the submissions to structure the conversations in a way that will hopefully benefit both the submitters of the methodological problems and all conversants. We also plan to provide light refreshments to promote a reception-style atmosphere for discussion.

6:00pm – 7:00pm, Augusta 3

**Presiders:** Robert (Bud) Talbot, University of Colorado, Denver

#### *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 2018 NARST-CADASE RIG business meeting, members will engage in the following: (a) a brief business meeting that will include the acceptance of the 2017 business minutes, the financial report from the treasurer, and a brief report from the CADASE Steering Committee Chair, (b) break-out sessions for the CADASE Graduate Students Committee, (c) break-out session for the CADASE Special Session Committee, (d) break-out session for the Publication Committee (newsletter), (e) break-out session for the CADASE logo, (f) break-out session for the Membership Committee, and (g) break-out session for the Special Journal Issue.

6:00pm – 7:00pm, Augusta C

**Presider:** Mary M. Atwater, University of Georgia

#### *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 2014 Business Meeting, the RIG members will discuss the following items: a) Updates on membership (60+ members), listserv, and development of a member directory; b) Discussion on revisions of NARST strands and how this may impact the ENE-RIG; c) Plans for collaborative paper sets, symposiums, and panels; and d) Updates on leadership team, roles, and budget.

6:00pm – 7:00pm, Augusta D

#### **Presiders:**

Cathy Lachapelle, Museum of Science, Boston

Tamara Moore, Purdue University

Selcen Guzey, Purdue University

***Indigenous Science Knowledge (ISK)***

The overarching goal of the ISK-RIG is to increase awareness of what indigenous knowledge systems research is all about. The RIG is a forum for showcasing and providing support for current and future research works of a growing number of Indigenous Knowledge Systems (IKS) researchers working within indigenous communities throughout the world who are members of NARST. Researchers are either members of indigenous community, or others, conducting researches in indigenous communities who are interested in decolonizing indigenous research world-wide. This group includes active NARST members from Africa and the African Diaspora, Alaska, Australia, Canada, Indigenous populations of the Americas, Asia and the Pacific, the Middle East, Thailand, Nordic Regions, New Zealand, Scandinavia, the West and East Indies, etc. The RIG is our fire-place (eZiko) — a social context for socio-cultural activities as we prepare, cook and share knowledge.

6:00pm – 7:00pm, Augusta E

**Presiders:**

Femi S. Otulaja, University of the Witwatersrand  
Cikigaq-Irasema Ortega, University of Alaska, Anchorage

***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 Latina 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, Augusta F

**Presider:**

Fatima Elvira Terrazas Arellanes, University of Oregon

**Presidential/Welcome Reception**

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

7:00pm – 9:30pm, Augusta Conference Center



**Sunday, March 11, 2018**



## Mind and Sole (Off-Site)

\*\*This event is not sponsored or endorsed by NARST.

6:00am – 7:15am,

Westin Peachtree Plaza Lobby

## Conference Registration

7:00am – 5:00pm, The Overlook

## Concurrent Session #3

8:30am – 10:00am

### Publications Advisory Committee

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

8:30am – 10:00am, Augusta 1

#### Presenters:

Deborah L. Hanuscin, Western Washington University  
Emily G. Schoerning, National Center for Science Education  
Heba El-deghaidy, American University, Cairo

### Strand 1: Science Learning, Understanding and Conceptual Change

*Epistemic Aims and Learning Progressions: Tensions Between Promoting Sensemaking and the Acquisition of Disciplinary Knowledge*

8:30am – 10:00am, Augusta A

*Learning Progressions in Context: Tensions and Insights from a Middle School Modeling Curriculum*

Ashlyn Pierson, Vanderbilt University  
Douglas B. Clark, University of Calgary

*Avoiding Overspecification of Expertise in Learning Progressions: The Example of Epistemic Aims*

Tiffanyrose Sikorski, George Washington University

*Contexts of Epistemic Practices*

Gregory J. Kelly, Pennsylvania State University

*Inquiry Science vs. Invented Science*

Rosemary Russ, University of Wisconsin, Madison  
Leema Berland, University of Wisconsin, Madison

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

*Multiple Factors Influencing Science Learning*

8:30am – 10:00am, Augusta C

**Presider:** Samia Khan, University of British Columbia

*Assessment of Science Teachers with English Language Learners and Self-Efficacy Levels*

Laura M. Crowe, Auburn City Schools/Auburn University  
Melody Russell, Auburn University

*Contextual Factors that Influence TIMSS 2015 Biology, Chemistry, Physics Performance in Twelve Diverse Countries*

Pongprapan Pongsophon, Kasetsart University  
Ben C. Herman, University of Missouri

*Factors Contributing to Student Participation in Science Classroom: A Survey Study*

Yu-Ta Chien, National Taiwan Ocean 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

*Factors Influencing the Transfer Process in Contextualized Learning Environments in the Chemistry Classroom*

Franziska Kehne, University of Paderborn  
Sabine Fechner, University of Paderborn

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

*Analyzing Classroom Discourse*

8:30am – 10:00am, Augusta H

**Presider:** Jan H. Van Driel, University of Melbourne

*Classroom Discourse and Student Learning in an Engineering Design-based Science Unit*

Richard Lie, Purdue University  
Maurina L. Aranda, Purdue University  
Selcen Guzey, Purdue University  
Murat Akarsu, Purdue University  
Tamara J. Moore, Purdue University

*Facilitating Student Scientific Discussions: Exploring the Enactment of Collaboration in a Middle Grades Science Classroom*

Kerry A. Bartlett, University of North Carolina, Chapel Hill  
Josh Corbat, University of North Carolina, Chapel Hill  
Janice L. Anderson, University of North Carolina, Chapel Hill  
Sharon J. Derry, University of North Carolina, Chapel Hill  
Lana Minshew, University of North Carolina, Chapel Hill  
Kelly Barber-Lester, University of North Carolina, Chapel Hill

**Hybrid Disciplinary Discourses within a Science and Engineering Unit**

Maurina L. Aranda, Purdue University  
 Selcen Guzey, Purdue University  
 Richard Lie, Purdue University  
 Tamara J. Moore, Purdue University

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

8:30am – 10:00am, Savannah C

**President:** Phillip A. Boda, Stanford University

**Does Subject Area Matter? Differences in Instruction Between Different Content Area Faculty**

Julie A. Luft, University of Georgia  
 Blake Whitt, University of Georgia  
 Robert Idsardi, University of Georgia  
 Jenna Wingfield, University of Georgia  
 Taurean Brown, Claremont College  
 Paola Barriga, University of Georgia  
 Jason Lang, University of North Georgia

**Exploring Instructors' Changing Conceptions of and Approaches to Teaching through Memorable Moments in the Classroom**

Stanley M. Lo, University of California, San Diego  
 Lindsey A. Warnock, University of California, San Diego

**Teacher Knowledge for Active-learning Instruction: What Do Instructors Need to Know to be Effective?**

Anna Jo J. Auerbach, University of Georgia  
 Tessa C. Andrews, University of Georgia

**The Characteristics of Pedagogical Content Knowledge (PCK) in Community College Biology Instructors**

Brandy L. Bowling, North Carolina State University  
 Soonhye Park, North Carolina State University

**Graduate Student International Collaboration for Investigating Science Teachers' Professional Learning**

Yael Shwartz, The Weizmann Institute of Science  
 Irene S. Bayer, Michigan State University  
 Tom Bielik, Michigan State University  
 Angela D. Kolonich, Michigan State University  
 Rachel Rosanne Eidelman, The Weizmann Institute of Science  
 Gabby Shwartz, Technion, Israel Institute of Technology  
 Stefanie Marshall, Michigan State University  
 Rea Lavi, Technion, Israel Institute of Technology  
 Kirsten Edwards, Michigan State University  
 Joshua M. Rosenberg, Michigan State University

**Strand 5: College Science Teaching and Learning (Grades 13-20)****Assessing Students' Ideas**

8:30am – 10:00am, Augusta F

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

**A Comparison of Hake's G and Cohen's D for Analyzing Student Learning**

Jayson M. Nissen, California State University, Chico  
 Robert M. Talbot, University of Colorado, Denver  
 Amreen Nasim Thompson, University of Colorado, Denver  
 Ben Van Dusen, California State University, Chico

**College Biology Instructors' Personal Practice Assessment Theories' Influence on Formative Assessment Practices**

Mojtaba Khajeloo, University of Missouri  
 Julie A. Birt, University of Missouri  
 Marcelle Siegel, University of Missouri, Columbia  
 Linh Ngo, University of Missouri, Columbia  
 Hai T. Nguyen, University of Missouri, Columbia  
 Elizabeth Gammel, University of Missouri, Columbia  
 Keala Cummings, University of Missouri, Columbia  
 Bethany Mordhorst, University of Missouri, Columbia

**Exploring Intent and Behavior through the Observed and Self-reported Teaching Practices of Postsecondary STEM Instructors**

Evelin E. Muñoz, California State University, Fresno  
 Mireya Lemus, California State University, Fresno  
 Emily M. Walter, California State University, Fresno

**Instructor Noticing in a General Biology Lecture Course for Non-Majors**

Ryan C. Coker, Florida State University  
 Anna S. Grinath, Middle Tennessee State University  
 Kate Hill, Florida State University  
 Brittany Kraft, Florida State University

**Strand 6: Science Learning in Informal Contexts****Promoting STEM Interest Pathways**

8:30am – 10:00am, Augusta E

**President:** Scott A. Pattison, Institute for Learning Innovation

**Deciphering the Code: Girls in the STEM Pipeline at the American Museum of Natural History**

Georgia S. Hall, Wellesley College  
 Preeti Gupta, American Museum of Natural History  
 Yvonne de la Pena, American Museum of Natural History

***Do STEM Ecosystem Approaches Positively Affect Youth Outcomes? Preliminary Results From an Under Served Community***

Nancy L. Staus, Oregon State University  
Lynn D. Dierking, Oregon State University  
John H. Falk, Oregon State University  
Jennifer N. Wyld, Oregon State University  
Yoon Ha Choi, Oregon State University

***Making Her Way, One Youth's Path to Well-Developed Interest in Digital Fabrication***

Ryan Cain, Utah State University  
Abigail L. Phillips, Utah State University  
Victor R. Lee, Utah State University

***STEM Friends: A Case Study of Agency and Interest in an After-school STEM Club***

Deena Gould, Arizona State University

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

***Content Knowledge***

8:30am – 10:00am, Augusta D

**President:** Consuelo J. Morales, University of Michigan

***Assessing Pre-service Elementary Teachers' Understanding of Science Practices Using Dual-Purpose Children's Storybooks***

Julia Plummer, Pennsylvania State University  
Christopher Palma, Pennsylvania State University  
Timothy G. Gleason, Pennsylvania State University  
Daniel Barringer, Pennsylvania State University

***Elementary Pre-service Teachers' Use of Professional Learning Networks for Science Teaching***

Jeanne Brunner, University of Massachusetts, Amherst  
Torrey Trust, University of Massachusetts, Amherst

***Examining the Impact of a Museum-based Teacher Preparation Program on New Science Teachers***

Bernadette Doykos, University of Southern Maine  
Cathie Fallona, University of Southern Maine

***Misunderstanding of Neuroscience in Pre-service Science Teacher Education***

Finja Grospietsch, Universität Kassel  
Jürgen Mayer, Universität Kassel

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

8:30am – 10:00am, Augusta 3

**President:** Jeanna Wieselmann, University of Minnesota

***Developing Middle School Science Teachers' Views of NOS and PCK for Argumentation***

Renee S. Schwartz, Georgia State University  
Patrick J. Enderle, Georgia State University  
Ozden Sengul, Georgia State University

***Elementary Students' Group Decision-Making for Engineering Design***

Elaine M. Silva Mangiante, Salve Regina University

***Teachers' Planning for Argumentation During Engineering Design Professional Development***

Anna Maria Arias, Illinois State University  
Allison Antink-Meyer, Illinois State University

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

***NGSS Instruction & 3-D Learning***

8:30am – 10:00am, Augusta G

**President:** Lisa A. Borgerding, Kent State University

***Influential Factors Impacting the Design and Use of 3-D, Formative Assessments in Elementary Science Classrooms***

Thomas R. Tretter, University of Louisville  
Justin McFadden, University of Louisville  
Brian Robinson, University of Louisville

***Real Kids in Real Time: Teachers Learning From Live Demonstrations of NGSS-Aligned Science Lessons***

Patricia S. Bills, Northern Kentucky University  
Madhura Kulkarni, Northern Kentucky University  
Joseph Nolan, Northern Kentucky University  
Alyssa Farmer, Northern Kentucky University

***Understanding Pedagogical Content Knowledge in a 3-D Learning Context***

Quentin Bidy, University of Oklahoma  
Timothy A. Laubach, University of Oklahoma

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

***NGSS Practices and Scientific Inquiry***

8:30am – 10:00am, Savannah B

**President:** Sanlyn Buxner, University of Arizona

***A Professional Development Program to Advance Science Centre-School Curricula Integration – The Effects on Views about Scientific Inquiry of Teachers***

Ceyhan Cigdemoglu, Atilim University

Fitnat Köseoglu, Gazi University

***Professional Learning in Urban Advantage and the Development of Core Science Teaching Practices***

Anna C. MacPherson, American Museum of Natural History

Michael Chavez-Reilly, American Museum of Natural History

Karen Hammerness, American Museum of Natural History

***Understanding Teacher Instructional Change: The Case of Integrating NGSS and Stewardship in Professional Development***

Kathryn N. Hayes, California State University, East Bay

Mele Wheaton, Stanford University

Deborah Tucker, University of La Verne

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**Strand 10: Curriculum, Evaluation, and Assessment**

***ELeVATE: Exploring Learning in Various Approaches to Teaching Energy***

8:30am – 10:00am, Augusta B

***A Teacher's Perspective on Teaching Energy Differently: Transitioning from a Forms and Transformation Approach to a Transfer Approach***

Israel Touitou, Michigan State University

Katherine Carswell, Holly Academy

Joseph S. Krajcik, Michigan State University

Jeffrey Nordine, Leibniz Institute for Science Education (IPN) Kiel

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

David L. Fortus, Weizmann Institute of Science

***Assessing Students' Progression in Developing a Deeper Understanding of Energy***

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

Marcus Kubsch, Leibniz Institute for Science Education (IPN) Kiel

Jeffrey Nordine, Leibniz Institute for Science Education (IPN) Kiel

David L. Fortus, Weizmann Institute of Science

Joseph S. Krajcik, Michigan State University

***Assessing Middle School Students' Preparation for Future Learning about Energy***

Jeffrey Nordine, Leibniz Institute for Science Education (IPN) Kiel

Sebastian T. Opitz, Michigan State University

Yaron Lehavi, The Weizmann Institute of Science

Marcus Kubsch, Leibniz Institute for Science Education (IPN) Kiel

David L. Fortus, The Weizmann Institute of Science

Joseph S. Krajcik, Michigan State University

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

***Students' Sense of Self-Efficacy in Using the Energy Concept***

David L. Fortus, The Weizmann Institute of Science

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

Joseph S. Krajcik, Michigan State University

Jeffrey Nordine, Leibniz Institute for Science Education (IPN) Kiel

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

***Gender Equity in STEM I***

8:30am – 10:00am, Chastain J

**President:** Edmund S. Adjapong, Teachers College, Columbia University

***A Critical Analysis of the Representation and Portrayals of Females in YALSA Award-Winning Science Comics***

Christopher R. Bowen, University of Tennessee

***Gendered Genetics: Reading about the Genetics of Sex Differences could Affect Gender Stereotypes about Intelligence***

Brian M. Donovan, BSCS

Molly Stuhlsatz, BSCS

Daniel C. Edelson, BSCS

***Impostor Phenomenon among Graduate Students in STEM***

Devasmita Chakraverty, Washington State University

***Making the Invisible Visible: Providing Context of Women's STEM Experiences***

Helen Douglass, SVVSD

Geeta Verma, University of Colorado, Denver

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

***Symposium – Equity in Science Teacher Education: Toward an Expanded Definition***

8:30am – 10:00am, Savannah A

**Presenters:**

Deb Morrison, University of Washington

Brian Scott Fortney, University of North Texas

Bhaskar Upadhyay, University of Minnesota

Alaina Szostkowski, University of Minnesota

Alexis Patterson, University of California, Davis

**Strand 12: Educational Technology*****Attitudes Towards Technology***

8:30am – 10:00am, Chastain 1

**Presenter:** Margaret R. Blanchard, North Carolina State University***Student Opinions on Digital Art Media:***Joseph T. Wong, University of California, Irvine  
Christa Greenfader, University of California, Irvine  
Brad Hughes, UCI***Transformations in Students' Attitudes about Learning with Personal Laptops: During the Program and in Retrospect***Tal Berger-Tikochinski, Bar-Ilan University  
Michal Zion, Bar-Ilan University  
Ornit Spektor-Levy, Bar-Ilan University***How Culture and Values Impact Realizations of Technology-Supported, Inquiry-Based Science Teaching and Learning***Noemi Waight, University at Buffalo, SUNY  
Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill**Strand 13: History, Philosophy, Sociology, and Nature of Science*****Literacy and Language***

8:30am – 10:00am, Augusta 2

**Presenter:** Valarie L. Akerson, Indiana University***Exploring Using Literacy to Teach about Nature of Science—Case Studies of Pre-service Early Childhood Teachers***Valarie L. Akerson, Indiana University  
Banu Avsar Erumit, Indiana University  
Naime Elcan, Indiana University***Effects of Argumentation Instruction on Teachers' Conceptions of the Nature of Science***

Meshach Mobolaji Ogunniyi, University of the Western Cape

***Effects of Historical Story Telling on Student Understanding of NOS and Mendelian Genetics***Cody T. Williams, Western Michigan University  
David W. Rudge, Western Michigan University***Learning About the Unique Linguistic Characteristics of Scientific Texts Through Adapted Primary Literature (APL)***Moriah Ariely, The Weizmann Institute of Science  
Zohar Livnat, Bar-Ilan University  
Anat Yarden, The Weizmann Institute of Science**Concurrent Session #4****10:15am – 11:45am****Presidential Sponsored Symposium*****International Perspectives on Re-centering on Scientific Literacy in Classrooms***

10:15am – 11:45am, Augusta 3

**Presenters:**Barbara A. Crawford, University of Georgia  
Kok-Sing Tang, Curtin University, Western Australia  
Christine Tippet, University of Ottawa, Canada  
Sandra Nitz, Landau University, Germany  
Marianne Odegaard, University of Oslo, Norway  
Lay Hoon Seah, National Institute of Education, Singapore  
Mark McDermott, University of Iowa  
William McClune, Queens University Belfast, Northern Ireland**Strand 1: Science Learning, Understanding and Conceptual Change*****Integrating Computational Thinking and Data Sense-making to Build Model-based Water Literacy***

10:15am – 11:45am, Augusta C

**Discussant:** Amy Pallant, Concord Consortium***A Systems Thinking Framework for Integrating Computational Thinking and Data Sense-making into Learning about Hydrologic Systems***John C. Moore, Colorado State University  
Kristin L. Gunckel, University of Arizona  
Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
Beth A. Covitt, University of Montana***Student Ideas about Computational Thinking Concepts When Learning About Modeling Hydrologic Systems***Kristin L. Gunckel, University of Arizona  
Judith Cooper-Wagoner, University of Arizona  
Beth A. Covitt, University of Montana  
Garrett Love, North Carolina School of Science and Mathematics  
Randall Boone, Colorado State University  
Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
John C. Moore, Colorado State University***Patterns in Student Sense-making about Data Representations from Hydrological Contexts***Beth A. Covitt, University of Montana  
Bess Caplan, Cary Institute of Ecosystem Studies  
Agatha Podrasky, University of Montana  
Kristin L. Gunckel, University of Arizona  
Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
John C. Moore, Colorado State University

***Teachers' Experiences Integrating Data Sense-making and Computational Thinking into Science Instruction***

Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
 Kristin L. Gunckel, University of Arizona  
 Beth A. Covitt, University of Montana  
 Bess Caplan, Cary Institute of Ecosystem Studies  
 Agatha Podrasky, University of Montana  
 John C. Moore, Colorado State University  
 Amanda J. Morrison, Colorado State University

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

***Exploring Supports for Teachers and Students to Engage with Productive Uncertainty in Science Activity***

10:15am – 11:45am, Augusta B

**Discussant:** Brian Reiser, Northwestern University

***Incorporating Productive Uncertainty into Empirical Work in Elementary Classrooms***

Eve Manz, Boston University  
 Andrea Wells, Boston Teacher Residency

***Examining How Classroom Communities Take up Uncertainty for Scientific Sense-making***

Jessica Watkins, Tufts University  
 Eve Manz, Boston University

***Designing for Productive Uncertainty in Novice Teacher Learning***

Tammy L. Cook-Endres, Exploratorium  
 Sara C. Heredia, The University of North Carolina, Greensboro

***Exploring the Process of Incorporating Uncertainty in Middle School Science: One Teacher's Sensemaking about NGSS***

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

**Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies Elementary Students? Thinking about Scientists and Engineers**

10:15am – 11:45am, Augusta 1

**President:** Georgia Hodges, University of Georgia

***A Mixed Methods Study of Learning Gains Associated with Serious Educational Gameplay by Primary Learners***

Georgia Hodges, University of Georgia  
 Kayla Pritchard, University of Georgia  
 Sandhya Krishnan, University of Georgia  
 Austin Betancourt  
 Emoni Cook  
 Juyeon Lee

***Enclothed Cognition: The Effects of Lab Coats on Students' Science Identities and Career Aspirations***

M. Gail Jones, North Carolina State University  
 Tammy D. Lee, East Carolina University  
 Katherine Chesnutt, North Carolina State University  
 Sarah J. Carrier, North Carolina State University  
 Lauren Madden, The College of New Jersey  
 Megan Ennes, North Carolina State University  
 Marissa Bellino, City University of New York  
 Emily Cayton, North Carolina State University  
 Lanette Phillips, North Carolina State University  
 Pamela Huff, North Carolina State University

***Revisiting Students' Understanding of Scientists and Engineers in Light of STEM: the Case of Elementary Students***

Tian Luo, The Education University of Hong Kong  
 Wing Mui Winnie So, The Education University of Hong Kong

***Science Identity, Enclothed Cognition and Self Efficacy: Kids in White Lab Coats***

M. Gail Jones, North Carolina State University  
 Tammy D. Lee, East Carolina University  
 Emily Cayton, North Carolina State University  
 Lauren Madden, The College of New Jersey  
 Sarah J. Carrier, North Carolina State University  
 Katherine Chesnutt, NC State University  
 Megan Ennes, North Carolina State University  
 Pamela Huff, North Carolina State University  
 Lanette Phillips, North Carolina State University  
 Marissa Bellino, City University of New York, Graduate Center

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

***Exploring Teachers' Pedagogical Content Knowledge***

10:15am – 11:45am, Augusta H

**President:** Marissa S. Rollnick, Wits University

***A Grand Rubric for Differentiating the Quality of Science Teachers' Pedagogical Content Knowledge***

Kennedy Chan, The University of Hong Kong  
 Marissa S. Rollnick, Wits University  
 Julie Gess-Newsome, Oregon State University, Cascades

***Researching Chemistry Teachers' PCK Development Using Midstream Modulation Focusing on Formative Assessment in Design Education***

Hanna Stammes, Delft University of Technology  
 Steven Flipse, Delft University of Technology  
 Ineke Henze-Rietveld, Delft University of Technology  
 Erik Barendsen, Radboud University Nijmegen  
 Marc J. De Vries, Delft University of Technology

***Teacher Profiles for Teaching Stoichiometry Based on Topic-Specific Pedagogical Content Knowledge, Content Knowledge and Conceptions of the Mole***

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

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

***Course Reform***

10:15am – 11:45am, Augusta F

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

***Educating towards Responsible Conduct of Research: Science and Engineering Graduates' Perspective***

Miri Barak, Technion, Israel Institute of Technology  
Gizelle Green, Technion, Israel Institute of Technology

***Influence of Metacognitive Practice and Increased Structure on Student Calibration and Achievement***

Paula Soneral, Bethel University  
Kelsey J. Metzger, University of Minnesota, Rochester  
Brittany Smith, Minnesota State University, Mankato

***Introductory Earth Science for Pre-service Elementary Teachers: Incorporating the NGSS, Active, and Placed-based Learning***

Danielle J. Ford, University of Delaware  
Jennifer Gallo-Fox, University of Delaware  
Susan McGeary, University of Delaware  
Cheryl Ackerman, University of Delaware

***The Influence of College Professor's Epistemology on their Application of Culturally Relevant Pedagogy***

Paulette Vincent-Ruz, University of Pittsburgh  
Gina A. Garcia, University of Pittsburgh

**Strand 6: Science Learning in Informal Contexts Conservation and Environmental Education In Out-of-School Contexts**

10:15am – 11:45am, Augusta D

**President:** Martin Storksdieck, Oregon State University

***A Typology of Media Use in Aquariums***

Kea Anderson, SRI International  
Claire Christensen, SRI International  
Savitha Moorthy, SRI International

***Investigating the Confluence of Visitor and Institutional Agendas***

Kelly Riedinger, Oregon State University  
Nicolette Canzoneri, Oregon State University  
Martin Storksdieck, Oregon State University

***Effects of Interest and Engagement in Learning Science on Adults' Environmental Actions and Scientific Competency***

Yi Ting Pan, National Sun Yat-Sen University, Taiwan  
Kuay-Keng Yang, National Sun Yat-Sen University, Kaohsiung, Taiwan  
Zuway-R Hong, National Sun Yat-Sen University  
Huann-Shyang Lin, National Sun Yat-Sen University

***A Field Trip Partnership: Views from Outdoor Educators***

James F. Ammons, The University of Georgia  
Barbara A. Crawford, The University of Georgia

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

***Nature of Science***

10:15am – 11:45am, Augusta E

**President:** Anna Maria Arias, Illinois State University

***Investigating Pre-service Science Teachers' Understanding about Cognitive-Epistemic Systems of Science***

Busra Aksoz, Bogazici University  
Sibel Erduran, University of Oxford, University of Limerick  
Ebru Kaya, Bogazici University  
Selin Akgun, Bogazici University

***Pre-service Science Teachers' Pedagogical Content Knowledge for NOS and NOSI: A Successful Case Study***

Gunkut Mesci, Giresun University  
Renee S. Schwartz, Georgia State University

***Promoting Science Pre-service Teachers' Cognitive and Affective Learning with Constructivist Pedagogical Instruction***

Jianlan Wang, Texas Tech University  
Stacey Sneed, Texas Tech University

***The Impact of a Course on Nature of Science Pedagogical Views and Rationales***

Jaclyn M. Easter, Grand View University  
Jerrid W. Kruse, Drake University  
Hallie Edgerly, Drake University

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

***Symposium – Re-framing Problems of Practice in Preparing New Science Teachers for Equity in the NGSS Era***

10:15am – 11:45am, Savannah B

**President:** Hosun Kang, University of California, Irvine

**Discussant:** Maria Varelas, University of Illinois, Chicago

**Presenters:**

Julie A. Bianchini, University of California, Santa Barbara  
 Angela Calabrese-Barton, Michigan State University  
 Megan Hopkins, University of California, San Diego  
 Heather J. Johnson, Vanderbilt University  
 Hosun Kang, University of California, Irvine  
 Kirsten K. Mawyer, University of Hawaii  
 Felicia Moore Mensah, Teachers College, Columbia University  
 David Stroupe, Michigan State University  
 Carla Zembal-Saul, Pennsylvania State University  
 Edna Tan, University of North Carolina, Greensboro

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

***Professional Learning Communities***

10:15am – 11:45am, Augusta G

**President:** Amy R. Ricketts, University of Delaware

***Developing a Shared Understanding of Explanation-Driven Instruction in a Teacher Learning Group***

Amy R. Ricketts, University of Delaware

***Effects of Professional Development on Teacher Knowledge, Practice, and Student Learning of Interdisciplinary Science***

Yang Yang, Qingdao University  
 Peng He, Northeast Normal University  
 Yin Wu, University at Buffalo, SUNY  
 Xiufeng Liu, University at Buffalo, SUNY  
 Joseph Gardella, University at Buffalo, SUNY  
 Siqi Li, University at Buffalo, SUNY

***Lock-Step: Teacher Agency Over Curriculum in an Online Community of IB Physics Teachers***

Andrew Wild, Woodrow Wilson Academy of Teaching and Learning  
 Jodie Galosy, Knowles Teacher Initiative  
 Melissa Kagle, Knowles Teacher Initiative  
 Nicole Gillespie, Knowles Teacher Initiative  
 Jeffrey J. Rozelle, Knowles Teacher Initiative  
 Kate Miller, Knowles Teacher Initiative Senior Fellow  
 Mark Hartman, Knowles Teacher Initiative Senior Fellow  
 Heather Hotchkiss, Knowles Teacher Initiative Senior Fellow

**Strand 9: Reflective Practice**

***New Developments in Video-Based Professional Learning Communities for STEM Educators***

10:15am – 11:45am, Savannah C

**President:** Sue Allen, Maine Mathematics and Science Alliance

***The Potential of Video Annotation Tools for Promoting Teacher Growth and Reflection***

Lynne Zummo, Stanford University  
 Janet Carlson, Stanford University  
 Mary Hauser, Stanford University

***Video Clubs as Professional Learning Communities for Teachers' Reflective Practice***

Anushree D. Bopardikar, TERC, Cambridge, MA  
 Susan Doubler, TERC, Cambridge, MA

***Supporting Science Teacher Learning through Capturing and Selecting Video of One's Own Classroom***

Elizabeth B. Dyer, Stanford University  
 Miriam G. Sherin, Northwestern University

***Adapting Video-Based Reflections to After-school Settings***

Sue Allen, Maine Mathematics and Science Alliance  
 Alexandria Brasili, Maine Mathematics and Science Alliance  
 Scott Byrd, Maine Mathematics and Science Alliance  
 Perrin C. Chick, Maine Mathematics and Science Alliance  
 Kristy Ouelette, University of Maine  
 Jennifer Lobley, University of Maine

**Strand 10: Curriculum, Evaluation, and Assessment**

***Designing and Implementing Instructionally Supportive Assessment Tasks for Promoting 3-D Learning for all Students***

10:15am – 11:45am, Chastain 1

**President:** Joseph S. Krajcik, Michigan State University

**Discussant:** Ted Willard, National Science Teachers Association

***An Equity Framework to Inform the Design and Development of NGSS-Aligned Formative Assessment Tasks***

Nonye M. Alozie, SRI International  
 Phyllis H. Pennock, Michigan State University  
 Krystal Madden, University of Illinois, Chicago  
 Sania Z. Zaidi, University of Illinois, Chicago  
 Christopher J. Harris, SRI International  
 Joseph S. Krajcik, Michigan State University

***Designing NGSS-aligned Assessment Tasks and Rubrics to Support Classroom-based Formative Assessment***

Kevin W. McElhane, SRI International  
 Sania Z. Zaidi, University of Illinois, Chicago  
 Brian D. Gane, University of Illinois, Chicago  
 Joseph S. Krajcik, Michigan State University  
 Nonye M. Alozie, SRI International  
 Christopher J. Harris, SRI International

***Analysis of Student and Item Performance on 3-D Constructed Response Assessment Tasks***

Brian D. Gane, University of Illinois, Chicago  
 Kevin W. McElhane, SRI International  
 Sania Z. Zaidi, University of Illinois, Chicago  
 James Pellegrino, University of Illinois, Chicago

***Portraits of Teachers Using 3-D Assessment Tasks to Inform Instruction***

Sania Z. Zaidi, University of Illinois, Chicago  
 Mon Lin Ko, University of Illinois, Chicago  
 Brian D. Gane, University of Illinois, Chicago  
 Krystal Madden, University of Illinois, Chicago  
 Diksha Gaur, University of Illinois, Chicago  
 James Pellegrino, University of Illinois, Chicago

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

***Gender Equity in STEM II***

10:15am – 11:45am, Chastain J

**Presenter:** Felicia Leammukda, University of Minnesota

***Are Male and Female STEM Faculty Encouraged Toward Research, Leadership, and Teaching Differently?***

Eugene Judson, Arizona State University  
 Lydia Ross, Arizona State University  
 Kristi Glassmeyer, Arizona State University

***Attracting and Supporting First-Generation Female STEM Undergraduates through an NSF-Funded Program***

Carol C. Johnston, Mount Saint Mary's University, Los Angeles  
 Suzanne Markoe-Hayes, Mount Saint Mary's University, Los Angeles

***Gender Equity in STEM Education: The Case of Egyptian STEM Girls***

Mohamed A El Nagdi, University of Minnesota  
 Gillian Roehrig, University of Minnesota

***Women in Science: What's Intersectionality Got to Do With It?***

Lucy Avraamidou, University of Groningen, Netherlands

**Strand 12: Educational Technology**

***Learning Through Interactive Technologies***

10:15am – 11:45am, Augusta A

**Presenter:** Choi Yun Hee, Soongmoon Middle School

***PlayFlu: A Kinesthetic Learning Approach in Alignment with the NGSS***

Nirit Glazer, PlayFlu  
 Yariv Glazer, PlayFlu  
 Kevin Linder, PlayFlu

***Professional Molecular Modeling Software: An Authentic Tool for Learning about Modeling in High School Biology***

Stephen R. Burgin, University of Arkansas  
 Jennifer F. Oramous, University of Arkansas  
 Michelle J. Childress, University of Arkansas

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

***Poster Symposium – International Collaborative Investigation of High School Students' Understandings of Scientific Inquiry – A Follow Up Study***

10:15am – 11:45am, Savannah A

**Presenters:**

Judith S. Lederman, Illinois Institute of Technology  
 Norman G. Lederman, Illinois Institute of Technology  
 Juan Jimenez, Illinois Institute of Technology  
 Selina L. Bartels, Concordia University Chicago  
 Cigdem Han Tosunoglu, Marmara University  
 Mark Akubo, Florida State University  
 Irene Neumann, Leibniz Institute for Science Education (IPN) Kiel  
 Anne-Marie Hattingh, University of Cape Town  
 Cheng Liu, Beijing Normal University  
 Christine V. McDonald, Griffith University  
 David Santibanez Gomez, Universidad Catholica Silva Henriquez  
 Enshan Liu, Beijing Normal University  
 Estella Blanquet, Universite de Bordeaux  
 Frauke Voitle, Leibniz Institute for Science Education (IPN) Kiel  
 Gary Holliday, The University of Akron  
 Heba El-Deghaidy, American University in Cairo  
 Jari Lavonen, University of Helsinki  
 Jessica Leung, The University of Hong Kong  
 Jim Concannon, Westminster College  
 Naruho Fukuda, University of Tsukuba  
 Niwat Srisawasdi, Khon Kaen University  
 Ozgur Kivilcan Dogan, Marmara University  
 Patrick Brown, Fort Zumwalt School District  
 Rachel Mamlok-Naaman, The Weizmann Institute of Science  
 Renee Schwartz, Georgia State University  
 Runaaz Sharma, Fiji National University  
 Serhat Irez, Marmara University  
 Shiang-Yao Liu, National Taiwan Normal University  
 Shu-Fen Lin, National Changhua University of Education  
 Xiao Huang, Zhejiang Normal University  
 Yaozhen Pan, Zhejiang International Studies University  
 Yovita Gwekwerere, Laurentain University

**Strand 15: Policy**

**Symposium – Evolution Education around the Globe**

10:15am – 11:45am, Augusta 2

**President:** Hasan Deniz, University of Nevada

**Discussant:** Lisa Borgerding, Kent State University

**Presenters:**

- Lisa A. Borgerding, Kent State University
- Hasan Deniz, University of Nevada
- Saouma B. Boujaoude, American University, Beirut
- Patricia J. Friedrichsen, University of Missouri, Columbia
- Khadija E. Fouad, Appalachian State University
- Amanda Glaze, Georgia Southern University
- Kostas Kampourakis, University of Geneva
- Kamisah Osman, Universiti Kebangsaan Malaysia
- Arif Rachmatullah, Kangwon National University
- Martie Sanders, University of the Witwatersrand, South Africa

**NARST Annual Membership Meeting**

(formerly NARST Business Meeting)

**12:00pm – 1:00pm, Chastain H and I**

**Lunch—On Your Own**

**12:00pm – 1:00pm**

**Concurrent Session #5**

**1:15pm – 2:45pm**

**Administrative Session**

**Poster Symposium – Abell Institute 2017**

1:15pm – 2:45pm, Savannah A

**Presenters:**

Sibel Erduran, University of Oxford

**Exploring Internal and External Influences on Students' Attitudes towards STEM Subjects**

Benjamin James Barlow, Griffith University

**Exploring the Influence of Policy Messages on Teachers' Instructional Choices**

Kathryn M. Bateman, Pennsylvania State University

**Designing for Model-Based Explanation**

Jason Y. Buell, University of Colorado, Boulder

**Unveiling Student STEM Interest, Belongingness and Empathy**

Henriette Burns, Washington State University, Vancouver

**How an Environmental Science Camp Can Improve Environmental Science Learning**

Carmen Carrion, Georgia State University  
Renee Schwartz, Georgia State University

**Come Some Blending? Teachers' Beliefs and Instructional Strategies Regarding Out-of-School Science Activity in Schools**

Chen Chih-Ling, National Dong Hwa University, Taiwan  
Lin Jing-wen, National Dong Hwa University, Taiwan

**Exploring 7th-grade Students' Initial Mental Model of Blood Circulation in both Biology and Physical Education Classes**

Tsung-Hui Cheng, National Dong Hwa University  
Jing-Wen Lin, National Dong Hwa University

**A Phenomenological Study Research: Do Science Teachers' Classroom Practices Really Align with their Perceived Technological Pedagogical Content Knowledge Level?**

Jale Ercan Dursun, Gazi University

**A Longitudinal Study of Science Teachers' Epistemic Beliefs and Opinions of Education Studies as Useful to Professional Practice**

Liam Guilfoyle, University of Limerick  
Orla McCormack, University of Limerick  
Sibel Erduran, University of Oxford

**Research Practice Partnerships with Urban Elementary Teachers: Affordances & Challenges**

Christa Haverly, Michigan State University

**Small Group Discourse to Support Literacy and Epistemic Practices for Sense-making in K-5 Science**

LeeAnna Hooper, Pennsylvania State University

**Understanding Korean Elementary School Teachers Who Avoid Teaching Science**

Eunjin Jang, Seoul National University  
Chan-jong Kim, Seoul National University  
Seung-Urn Choe, Seoul National University

**Using Actor-Network Theory to Explore the Culture of an AP Biology Class: Reconceptualization of Gender and Race in Science Education**

Sophia (Sun Kyung) Jeong, University of Georgia  
Deborah J. Tippins, University of Georgia

***Pre-service Science Teachers' Perceptions of Economics of Science and Entrepreneurship in Ireland***

Sila Kaya, University of Limerick, Ireland  
Naomi Birdthistle, Swinburne University of Technology, Australia  
Sibel Erduran, University of Oxford, UK

***Examining Middle School Students' Development of Model-based Explanations over Time Using a Web-based Modeling Tool***

Li Ke, Michigan State University  
Joseph Krajcik, Michigan State University  
Christina Schwarz, Michigan State University

***A Model of Science Teachers' Knowledge and Behavior Changing Progress Based on a Conceptual Change PD Program***

Nuo Li, Beijing Normal University  
Enshan Liu, Beijing Normal University

***A Comparison of the Effectiveness of Animation and Augmented Reality in Learning the Concepts of DNA***

Jia-ying Lin, National Taiwan Normal University  
Mei-Hung Chiu, National Taiwan Normal University  
Jia-Hong Lin, National Sun Yat-Sen University  
Chun-Mei Hu, National Taiwan Normal University

***Exploring the Current State of Modeling in High School Biology Courses in a Large School District***

Karen Lionberger, University of Georgia

***Teacher Conceptions of Authentic Science: Exploring One Teacher's Practical and Formal Epistemologies***

Kelsey Lipsitz, University of Missouri

***The Influence of School-based Mathematics Teacher Professional Learning Community with Pre-service Teachers' Participation on the Development of the Participants' Knowledge of Inquiry Teaching***

Pei-Wan Liu, National Changhua University  
Erh-Tsung Chin, National Changhua University

***The Development of Technology Integration Practices of Beginning Secondary Science Teachers: Barriers and Gateways in the First Five Years of Teaching***

Lyrice L. Lucas, University of Nebraska, Lincoln  
Elizabeth B. Lewis, University of Nebraska, Lincoln

***Elementary Student Perception of their Teacher's Self-Efficacy, Interest, and Enjoyment in Science and Science Teaching***

Noelle A. Luccioni, Temple University  
Doug Lombardi, Temple University

***The Impact of Race on Sensemaking within an Elementary Science Network***

Stefanie Marshall, Michigan State University

***Rasch Modelling and Cognitive Interview: Construct Validation of the Primary Scientific Reasoning Test***

Diana Ng, Oxford University

***STEM Education: Origins and Implications from an Australian Perspective***

Ann Osman, The University of Melbourne

***Preparing Undergraduate Biology Instructors to Teach with Technology: An Exploratory Multi-Case Study of Biology Graduate Teaching Assistants Technology Integration Capacity***

Joshua W. Reid, Middle Tennessee State University

***Supporting the Development of Youth-Centered, Equity-Oriented Teaching Practices in an Elementary Methods Science Education Course***

Christina Restrepo Nazar, Michigan State University  
Angela Calabrese Barton, Michigan State University

***Exploring High School Teachers' Pedagogical Framing about Scientific Modeling from their Interactions in a Professional Learning Community and Classrooms***

Soo-Yean Shim, University of Washington  
Jessica Thompson, University of Washington

***Using Scientific Modeling and Technology to Explore Elementary Pre-service Teachers' Conceptualizations about Water***

Tina Vo, University of Nebraska, Lincoln

***Factors Influencing First-year Science Teacher's Enactment of High-leverage Practices***

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

***Teenager's Online Science Learning: Analysis of Factors Affecting Engagement or Lack Thereof***

Dong Yang, University of Helsinki  
Jari Lavonen, University of Helsinki  
Hannele Niemi, University of Helsinki

***Investigation of High School Students' Learning Outcomes via Modeling-based Inquiry Instruction in "Inquiry and Practice" Science Curriculum***

Tsai Che-Ming, Taipei Municipal Jianguo High School, Taipei, Taiwan  
Mei-Hung Chiu, NTNU, Taipei, Taiwan

**Strand 1: Science Learning, Understanding and Conceptual Change**

***Symposium – Evolving Theoretical Perspectives on Student Learning***

1:15pm – 2:45pm, Augusta B

**Presenters:**

Joseph S. Krajcik, Michigan State University  
 Richard A. Duschl, Pennsylvania State University  
 Marcia C. Linn, University of California, Berkeley  
 Andrea diSessa, University of California, Berkeley  
 Hannah Sevan, University of Massachusetts, Boston

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

***Learning in the Socio-Scientific Issues Context***

1:15pm – 2:45pm, Chastain 1

**Presenter:** Dana L. Zeidler, University of South Florida

***An Exploration of Students’ Communication about Controversial, Agricultural Issues as they Engage In International Exchanges***

Andri Christodoulou, University of Southampton  
 Willeke Rietdijk, University of Southampton  
 Kathryn Garthwaite, University of Auckland  
 Laurence Simonneaux, Ecole Nationale de Formation Agronomique

***Identifying the Static that can Influence Students’ Views of a Socio-Scientific Issue***

Beverly M.A. France, The University of Auckland  
 Sally E. Birdsall, University of Auckland  
 Ralph Levinson, University College London  
 Michel Vidal, SuprAgro Montpellier, Institut d’éducation à l’agro-environnement de Florac  
 Andri Christodoulou, University of Southampton  
 Willeke Rietdijk, University of Southampton  
 Laurence Simonneaux, Ecole Nationale de Formation Agronomique

***Plurilingual Students’ Engagement with Socio-Scientific Issues – Between Curiosity, Need for Admiration, and Resistance***

Anna M. Gorges, University of Luxembourg

***Socio-Scientific Issues: Teaching and Learning in an Evolving Context***

Dana L. Zeidler, University of South Florida  
 Scott M. Applebaum, University of South Florida  
 Michael Mitchell, University of South Florida  
 Karrie A. Wikman, University of South Florida  
 Selene Y. Willis, University of South Florida  
 Tara M. Nkrumah, University of South Florida  
 Melanie Kinskey, University of South Florida  
 Eunhang Lee, University of South Florida

**Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies Elementary Teachers? Experiences and Perspectives**

1:15pm – 2:45pm, Augusta 3

**Presenter:** Jamie N. Mikeska, ETS

***“I’ve Got Some Work to Do”: Elementary Teachers Learning Science through Teaching Experience***

Ryan S. Nixon, Brigham Young University  
 Leigh K. Smith, Brigham Young University  
 Richard R. Sudweeks, Brigham Young University

***Sophisticated Pre-service Teacher Beliefs: Predictors of Effective, Reflective Instruction as Novice Teachers?***

Joseph A. Brobst, Western Washington University  
 Josie Melton, Western Washington University

***Teachers’ Practices and Enactments of their Conceptual Models of STEM During Classroom Implementation of an Integrated STEM Curriculum***

Elizabeth A. Ring-Whalen, St. Catherine University  
 Emily A. Dare, Michigan Technological University  
 Gillian Roehrig, University of Minnesota  
 Jeanna Wieselmann, University of Minnesota

***Teaching About Engineering Versus Teaching About Science: Perspectives From Elementary Teachers***

Jacob Pleasants, Iowa State University  
 Joanne K. Olson, Texas A&M University  
 Christopher Spinler, Iowa State University

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

***Integrating STEM Fields in Formal and Informal Learning***

1:15pm – 2:45pm, Augusta H

**Presenter:** Mike Ryan, Georgia Institute of Technology

***A Social Cognitive Career Lens onto 10th Grade Students’ STEM College Major Plans***

Alpaslan Sahin, Harmony Public Schools  
 Adem Ekmekci, Wiess School of Natural Sciences Rice University  
 Hersh C. Waxman, Director, Texas A&M University

***Exploring Approaches to the Implementation of Middle School Science Fairs***

Jacqueline DeLisi, Education Development Center, Inc.  
 Abigail Jurist Levy, Education Development Center, Inc.  
 Janna Kook, Education Development Center, Inc.  
 Erica T. Fields, Education Development Center, Inc.  
 Marian Pasquale, Education Development Center, Inc.  
 Leana Nordstrom, Education Development Center, Inc.

***Increasing High School Students' Interest in STEM Careers Through Participation in a Project-Based Bioscience Course***

Danielle K. Ross, Northern Arizona University  
Ron Gray, Northern Arizona University

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

***Epistemic Beliefs***

1:15pm – 2:45pm, Augusta F

**Presider:** Carina M. Rebello, Purdue University

***Characterizing Epistemic Beliefs Among Scientists***

Katherine E. Ray King, University of Louisville  
Linda C. Fuselier, University of Louisville  
Justin McFadden, University of Louisville

***Characterizing Graduate Teaching Assistant Epistemic Beliefs as They Emerge in the Biology Laboratory***

Justin McFadden, University of Louisville  
Linda C. Fuselier, University of Louisville  
Katherine E. Ray King, University of Louisville

***Faculty Epistemological Beliefs: The Influence of a Professional Development***

Lloyd M. Mataka, Lewis-Clark State College  
Jon Saderholm, Berea College  
Tracy Hodge, Berea College

***Can Concept Mapping Improve Biology Students' Metacognition, Academic Self-Efficacy, and Course Grades at an HBCU?***

Catherine Martin-Dunlop, Morgan State University  
Samala Lewis, Morgan State University  
Dara Davis, Morgan State University

**Strand 6: Science Learning in Informal Contexts  
*Science Agency as Transformational Pivots for Science and Learning***

1:15pm – 2:45pm, Augusta C

***Scholars Taking on Authentic Science: Producing Science and Films***

April L. Luehmann, University of Rochester  
Angela Calabrese-Barton, Michigan State University  
Jessica J. Thompson, University of Washington  
Sara Hagenah, Boise State University  
Rachel L. Chaffee, American Museum of Natural History  
Day W. Greenberg, Michigan State University

***Of Fancy Grandmothers & Blue Jay Mansions: Engineering Designs for Community, Videos for the World***

Day W. Greenberg, Michigan State University  
Angela Calabrese-Barton, Michigan State University

***Green Lake: Building Cultural Bridges Across School, Home, Community and [The Club]***

Sara Hagenah, Boise State University  
Jessica J. Thompson, University of Washington

***You are Not Alone: Making Science and a Difference***

Rachel L. Chaffee, American Museum of Natural History  
April Lynn Luehmann, University of Rochester

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

***Computational Thinking***

1:15pm – 2:45pm, Augusta D

**Presider:** Amanda Benedict-Chambers, Missouri State University

***Emerging Trends in Computational Thinking Research and Best-Practices for Computational Thinking Education in Science***

Vance J. Kite, North Carolina State University  
Soonhye Park, North Carolina State University  
Eric N. Wiebe, North Carolina State University

***Investigating Pre-service Science Teachers' Understanding of an NGSS Practice: Using Mathematics and Computational Thinking***

Walter Aminger, University of California, Santa Barbara  
Sarah Hough, University of California, Santa Barbara  
Valerie Meier, University of California, Santa Barbara  
Mandy McLean, University of California, Santa Barbara  
Sungmin Moon, University of California, Santa Barbara  
Stacey L. Carpenter, University of California, Santa Barbara  
Julie A. Bianchini, University of California, Santa Barbara

***Pre-service Elementary Science Teachers' Inclusion of Computational Thinking Concepts in Lesson Plans***

Zoubeida R. Dagher, University of Delaware

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

1:15pm – 2:45pm, Savannah B

**Presider:** David F. Jackson, University of Georgia

***Comparing Practicum Experiences in Science Methods Courses: Effects of Field on Science Teaching Efficacy***

Sheryl L. McGlamery, University of Nebraska, Omaha  
Bridget Franks, University of Nebraska, Omaha  
Saundra L. Shillingstad, University of Nebraska, Omaha

***Observation Based Learning Experiences on Pre-service Teachers' Perceptions of Self Efficacy Beliefs for Teaching Science***

Ranu Roy, Indiana University, Bloomington  
Meredith A. Park Rogers, Indiana University, Bloomington

***Relationship between Pre-service Teachers' Conceptions of Science Teaching and Self-efficacy for Inquiry Science Teaching***

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

***Role of Self-efficacy in Pre-service Science Teacher Identity: The Influence of Field-experiences***

Deepika Menon, Towson University, Maryland

***The Effect of Collective Efficacy on Group Performance regarding Preparing Science Lesson Plans***

Volkan Atasoy, Kastamonu University  
Jale Cakiroglu, Middle East Technical University

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

1:15pm – 2:45pm, Augusta E

**President:** Enrique Suarez, University of Colorado, Boulder

***Mapping Pre-service Teachers' STEM Teaching Preparedness through Engagement in Integrated STEM Modules***

Tejaswini S. Dalvi, University of Massachusetts

***Practicum Student Teachers and Middle Schoolers: Teaching and Learning a STEM-based Interdisciplinary Curriculum***

Regina L. Suriel, Valdosta State University  
Robert Spires, Valdosta State University  
Barbara Radcliffe, Valdosta State University  
Deborah G. Paine, Valdosta State University  
Ellice Martin, Valdosta State University

***Pre-service Math and Science Teachers and their Conception and Emerging Implementation of Humanizing STEAM***

Imelda L. Nava, University of California, Los Angeles  
Jarod Kawasaki, University of California, Los Angeles

***The Impact of Engagement in STEM Activities on Primary Teachers' Conceptualization of STEM and STEM Pedagogy***

Mehmet Aydeniz, University of Tennessee  
Kader Bilican, Kirikkale University

**Strand 7: Pre-service Science Teacher Education  
Symposium – Implications of Inclusive Science Education  
Research for Pre-service Science Teacher Education**

1:15pm – 2:45pm, Augusta 2

**Discussant:** Sami Kahn, Ohio University

**Presenters:**

Sami Kahn, Ohio University  
Michele Koomen, Gustavus Adolphus College  
Lauren Madden, The College of New Jersey  
Lacey D. Huffling, Georgia Southern University  
Kevin Fleming, Area Cooperative Educational Services  
Bill Lindquist, Hamline University  
Judith S. Lederman, Illinois Institute of Technology  
Phillip A. Boda, Stanford University  
Teresa Shume, North Dakota State University  
Elaine M. Silva Mangiante, Salve Regina University

**Strand 8: In-service Science Teacher Education  
Physics, Engineering, and Technology**

1:15pm – 2:45pm, Augusta G

**President:** Meenakshi Sharma, Michigan State University

***Constraining Secondary Science Teacher Development: An Examination of Teaching Out-of-Field***

Jessica B. Bennett, Gwinnett County Public Schools  
Harleen Singh, The University of Georgia  
Julie A. Luft, University of Georgia

***Design-Based Pedagogy: A Model for Collaborative Lesson Planning for Integrating Robotics***

Adam Devitt, New York University  
Catherine E. Milne, New York University

***Elementary Teachers' Implementation of the Nature of Technology in the Classroom***

Hallie S. Edgerly, Drake University  
Jerrid W. Kruse, Drake University  
Jaclyn M. Easter, Grand View University  
Jesse L. Wilcox, Drake University

**Strand 10: Curriculum, Evaluation, and Assessment  
Designing for Coherence in NGSS Storylines: Supporting K-12 Students in Meaningful Sensemaking**

1:15pm – 2:45pm, Augusta A

**President:** Brian J. Reiser, Northwestern University

***Engaging First Grade Students in NGSS Practices through Engineering Design***

Laura Zangori, University of Missouri  
Kelsey Edwards, Northwestern University

***'I'm Just Saying That's the Question I Have': Co-Constructing Investigations in a Fifth Grade Classroom***

John F. Smith, Northwestern University

Brian J. Reiser, Northwestern University

***Supporting Students in Incrementally Developing Wave***

***Models of How Matter Produces Sound***

Michael J. Novak, Northwestern University

Tara A. W. McGill, Northwestern University

***Journey to the Structure of the Atom: Motivating***

***Chemical Thinking at All Levels***

Aliza Zivic, Northwestern University

Brian J. Reiser, Northwestern University

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

***The Intersection of Identity and Science***

1:15pm – 2:45pm, Chastain J

**President:** Felisa (Hsueh-Yun) Yu, National Changhua University of Education

***The Experiences of Gay Men in STEM Majors with***

***Heteronormativity and Heterosexism***

David P. Steele, The University of Georgia

***Examining First Year Science Teachers' Beliefs About***

***Culturally Relevant Teaching***

Preethi Titu, University of Minnesota

Hillary A Barron, University of Minnesota, Twin Cities

Julie C. Brown, University of Minnesota

***Gender and Culture Effects on High School Students'***

***Overconfidence Bias Genetics and Evolution Exams***

Arif Rachmatullah, Kangwon National University

Minsu Ha, Division of Science Education, Kangwon National University

***Understanding Science Identity and Capital: A Study***

***of Undergraduate Research Experiences in Life***

***Sciences Education***

Danielle K. Jensen-Ryan, University of Wyoming

Jennifer Jo Thompson, University of Georgia

***The Changing Nature of Science Identity: Examining***

***the Physics Identity of Female Physics Students***

Zahra Hazari, Florida International University

Geoff Potvin, Florida International University

Eric Brewes, Drexel University

Deepa Chari, Florida International University

Renee Michelle Goertzen, American Physical Society

Theodore Hodapp, American Physical Society

**Strand 14: Environmental Education**

***Environmental Attitudes and Motivations***

1:15pm – 2:45pm, Augusta 1

**President:** Peter A. Okebukola

***Environmental Perceptions and Uni- or Multi-Dimensional:***

***Comparison of the NEP and 2-MEV***

Bruce Johnson, University of Arizona

Sanlyn Buxner, University of Arizona

Constantinos C. Manoli, Cooper Center for Environmental Learning

***Relationship of***

Franz X. Bogner, University of Bayreuth

Michael Wiseman, Leibniz Computing Center

**Break**

**2:45pm – 3:15pm**

**Concurrent Session #6A**

**Poster Session**

**3:15pm – 4:15pm**

**Poster Session A**

**3:15pm – 4:15pm,**

**Augusta Conference Center**

**Strand 1: Science Learning, Understanding and Conceptual Change**

***Poster Session A***

3:15pm – 4:15pm, Augusta Conference Center

***A1. Development of a Model Describing Scientific Thinking in Earth Science Students***

Shondricka Burrell, Temple University

Doug Lombardi, Temple University

Elliot S. Bickel, Temple University

Janelle M. Bailey, Temple University

**A3. An Empirically-Based Conditional Learning Progression for Climate Change**

Wayne Breslyn, University of Maryland, College Park  
 Andrea Drewes, University of Delaware  
 J. Randy McGinnis, University of Maryland  
 Emily Hestness, University of Maryland, College Park  
 Chrystalla Mouza, University of Delaware

**A5. Elementary Students' Knowledge Sources of Ecosystems**

Hayat Hokayem, Texas Christian University  
 Hui Jin, Educational Testing Service  
 Shelly Wu, Texas Christian University

**A7. Investigating Teachers' and Students' Understanding of Scientific Models**

Meng-Fei Cheng, National Changhua University of Education  
 Tsung-Yu Wu, National Changhua University of Education  
 Shu-Fen Lin, National Changhua University of Education

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

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A9. Cultivating Scientific Literacy among Future Malaysians by Rejuvenating their Interest towards Science**

Kamisah Osman, Universiti Kebangsaan Malaysia  
 Nurnadiah Mohamed Bahari, Universiti Kebangsaan Malaysia  
 Cindy Wong Chee Chen, Universiti Kebangsaan Malaysia

**A11. Dialogic Teaching and the Interactive Whiteboard: Case Studies from Science Classrooms in Northern Lebanon**

Sara Salloum, University of Balamand  
 Maria Al Merheby, University of Balamand

**A13. Examining Teacher-Student Exchange Occurring within Evolution and Human Genetics Units in a Rural High School**

Banu Avsar Erumit, Recep Tayyip Erdogan University  
 Valarie L. Akerson, Indiana University

**A15. Experimentation With Pictorial Based Worked Examples In The Context of Scientific Inquiry In Biology**

Annika Vohl, Universität Duisburg-Essen  
 Angela Sandmann, Universität Duisburg-Essen  
 Christine Florian, Universität Duisburg-Essen

**A17. Exploring the Differences in Epistemic Beliefs in Science and Reasoning Performance between Students from Taiwan and India**

Fang-Ying Yang, National Taiwan Normal University  
 Kaushal Kumar Bhagat, Beijing Normal University

**A19. Linguistically-Diverse Pairs' Collaborative Discourse Patterns in the Context of Visualization-Rich Inquiry-Based Learning**

Kristin Bedell, University of North Carolina, Chapel Hill  
 Kihyun (Kelly) Ryoo, University of North Carolina, Chapel Hill

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

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A21. Exploring How 3rd-grade Students' Engage in Socio-Scientific Argumentation**

Laura Zangori, University of Missouri  
 Troy Sadler, University of Missouri  
 Amanda N. Peel, University of Missouri

**A23. Exploring the Translation into Practice of Elementary Engineering Design-based Instruction**

Kristina Maruyama Tank, Iowa State University  
 Michale DuPont, Iowa State University  
 Anne Estapa, Iowa State University

**A25. Facilitating Discussions Focused on Argumentation via Simulated Classrooms: Results from a Pilot Study**

Jamie N. Mikeska, ETS  
 Heather Howell, ETS  
 Adam Devitt, New York University

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

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A27. Scientific Literacy through Materials Based on Socio-Scientific Issues: How Students Connect Chemistry Content to Everyday Life**

Dürdane Bayram-Jacobs, Radboud University Nijmegen  
 Ineke Henze, Delft University of Technology  
 Erik Barendsen, Radboud University Nijmegen

**A29. An Exploration of High School Biology Teachers' Knowledge About Students' Natural Selection Ideas**

Margaret M. Lucero, Santa Clara University  
 Katie Green, North Carolina State University  
 Cesar Delgado, North Carolina State University

**A31. An Exploration of Students' Socio-Scientific Reasoning through Socio-Scientific Issue-based Instruction**

Hai T. Nguyen, University of Missouri, Columbia  
 Andrew T. Kinslow, University of Missouri  
 Troy Sadler, University of Missouri

**A33. Citizen Science brought to the Underrepresented Population of Puerto Rico through Socio-Scientific Issues**

Lorraine Ramirez, Florida Institute of Technology  
Samantha R. Fowler, Florida Institute of Technology

**A35. Exploring Teacher Questioning During Model-Based Inquiry Lessons in a High School Biology Classroom**

Trevor T. Tuma, Whittier College  
Lauren H. Swanson, Whittier College

**A37. High School Biology Students' Learning Interests and Formal Curriculum Emphasis**

Ian Nicolaides, Southern Illinois University  
Vivien M. Chabalengula, University of Virginia  
Frackson Mumba, University of Virginia

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

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A39. A Qualitative Exploration of Graduating Seniors' Perceptions of Their Undergraduate Studies**

Carly Hunt, University of Maryland, College Park  
Gili Marbach-Ad, University of Maryland  
Michelle Bertke, University of Maryland, College Park  
Katerina Thompson, University of Maryland

**A41. An Investigation of Science Writing Tasks and Cognitive Processing**

Richard Lamb, University at Buffalo, SUNY  
Brian M. Hand, University of Iowa  
Sae Yeol Yoon, Delaware State University

**A43. Differential Impact of Science Teaching on Undergraduates' Science Self-Efficacy**

Nicholas Stroud, Massachusetts College of Liberal Arts

**A45. Enhancing Graduate Students' Ability to Conduct and Communicate Research Through an Interdisciplinary Lens**

Hailey V. Marr, University of Maryland  
Gili Marbach-Ad, University of Maryland

**A47. Gains in Undergraduate Biology Student Achievement from a Combined Cognitive-Motivational Intervention across Multiple Semesters**

Jennifer Cromley, University of Illinois, Urbana-Champaign  
Avi Kaplan, Temple University  
Kyle Mara, University of Southern Indiana  
Martin Van Boekel, The SEARCH Institute  
Michael J. Balsai, Temple University  
Ting Dai, University of Illinois, Chicago  
Tony Perez, Old Dominion University  
Wanda Brooks, Old Dominion University

**A49. Guiding Students' STEAM Projects with the Integrated Approach Checklist**

Eun Ah Lee, University of Texas, Dallas  
Roger F. Malina, University of Texas, Dallas

**A51 Holistic STEM Faculty Development**

Cindy M. Lee, Clemson University  
Karen A. High, Clemson University  
Sandra M. Linder, Clemson University  
Shannon K. Stefl, Clemson University

**Strand 6: Science Learning in Informal Contexts**

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A53. Educative Social Media for Informal Science Learning: Effective Message Design Across Two Digital Niches**

Lisa Lundgren, University of Florida  
Kent J. Crippen, University of Florida

**A55. Examination of Interactions between Museum Educators and Students on a School Visit to Science Museum**

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

**A57. How to Assess Learning School Visits? Personal Meaning Maps as a Tool for Assessing Learning**

Cláudia Faria, Institute of Education of the University of Lisbon

**A59. Identifying High Leverage Practices in an Informal Project: Sustaining a Research Practice Partnership**

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

**A61. Science Capital and Identity: Factors influencing STEM Interests**

Megan Ennes, North Carolina State University  
M. Gail Jones, North Carolina State University  
Emily Cayton, North Carolina State University  
Katherine Chesnutt, North Carolina State University  
Pamela Huff, North Carolina State University  
Lanette Phillips, North Carolina State University

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

**Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A63. A Storied-Identity Analysis of a Teacher Candidate's Learning to Teach in an Urban Setting**

Amal Ibourk, Florida State University

**A65. *Disrupting Traditional Science Teaching: Ambitious Science Teaching in a Practice-based Teaching Methods Course***

Gale A. Seiler, Iowa State University  
Hildah Makori, Iowa State University

**A67. *Early Childhood and Elementary Education Teacher Preparation in Science: Variations in Content and Methods***

Diane Silva Pimentel, Brown University

**A69. *Effect of the Practicum Course on Pre-service Science Teachers' Beliefs and Attitudes toward Teaching Sciences***

Iyad M. Dkeidek, Al-Quds University

**A71. *Efficacy of Argumentation Models for Discourses about Scientific Literacy Inherent in Indigenous Knowledge***

Keith R. Langenhoven, University of the Western Cape

**A73. *Exploring Influencing Factors on Pre-service Early Elementary Educators' Science Teaching Self-Efficacy Beliefs: Teachers and Standards***

Shannon Gooden, Florida State University

**A75. *Use of Schema Theory to Explain Argumentation Dialogues of Pre-service Students during a Science Investigation***

Catherine L. Quinlan, Howard University

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

3:15pm – 4:15pm, Augusta Conference Center

**A77. *A Case Study of Panamanian Teachers in a Blended Elementary Science Teaching Professional Development Program***

Katie Laux, University of South Florida  
Jeni R. Davis, Salisbury University

**A79. *An Examination of Persistence in Becoming a Rural Teacher***

Diane Wright, Colorado State University  
Meena M. Balgopal, Colorado State University  
Andrea Weinberg, Colorado State University  
Laura B. Sample McMeeking, Colorado State University  
STEM Center

**A81. *Determining the Effectiveness of a Design-based, Continuous Professional Development Programme for Science Teachers***

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

**A83. *Gaps in Science Teacher Understanding of the Epistemic Nature of NGSS Science Practices***

Vance J. Kite, North Carolina State University  
Soonhye Park, North Carolina State University  
Lanette Phillips, North Carolina State University

**A85. *Measuring Pedagogy and the Integration of Engineering Design in STEM Classrooms***

Tory H. Williams, University of Maryland, Baltimore  
Jonathan Singer, University of Maryland, Baltimore  
Christopher Rakes, University of Maryland, Baltimore  
Jacqueline Krikorian, University of Maryland, Baltimore  
Julia Ross, Virginia Polytechnic Institute and State University

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**Strand 10: Curriculum, Evaluation, and Assessment  
Poster Session A**

3:15pm – 4:15pm, Augusta Conference Center

**A87. *Assessing Students' Disciplinary and Interdisciplinary Understanding of Global Carbon Cycling***

Hye Sun You, New York University  
Cesar Delgado, North Carolina State University  
Jill A. Marshall, University of Texas, Austin

**A89. *Charting Coherence in State System K-12 STEM Education: Focus Group Study of Teachers and Administrators***

Thomas A. Kameronoski, Pennsylvania State University  
Richard A. Duschl, Pennsylvania State University  
Carla Zembal-Saul, Pennsylvania State University

**A91. *Identifying Best Practices in Implementing Complex Neuroscience Content In Elementary School***

Alana Newell, Baylor College of Medicine  
Nancy Moreno, Baylor College of Medicine

**A93. *Expert Panel Review of the Middle School-Life Science Concept Inventory (MS-LSCI)***

Andria Stammen, Ohio State University  
Kathy Lea Malone, Nazarbayev University  
William Boone, Miami University  
Karen E. Irving, Ohio State University  
Zakee Sabree, Ohio State University

**A95. *Scientific Literacy in Zambian High School***

Vivien M. Chabalengula, University of Virginia  
Frackson Mumba, University of Virginia

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

3:15pm – 4:15pm, Augusta Conference Center

**A97. A Counternarrative from the Mississippi Delta: Teacher and Student Experiences in a Pre-Engineering Program**

Takumi Sato, Virginia Polytechnic Institute and State University  
 Brenda R. Brand, Virginia Polytechnic Institute and State University  
 Anza Mitchell, Virginia Polytechnic Institute and State University  
 Lezly Taylor, Virginia Polytechnic Institute and State University

**A99. African American Persistence in STEM Majors at a Predominantly White Institution**

Andre M. Green, University of South Alabama  
 Brenda R. Brand, Virginia Polytechnic Institute and State University  
 George E. Glasson, Virginia Polytechnic Institute and State University

**A101. Network Differences in Underrepresented Students in Learning Assistant Supported Undergraduate Science Classrooms**

Paul Le, University of Colorado, Denver  
 Robert M. Talbot, University of Colorado, Denver  
 Laurel Hartley, University of Colorado, Denver  
 Leanne Doughty, University of Colorado, Denver  
 Amreen Nasim Thompson, University of Colorado, Denver  
 Andrew McDevitt, University of Colorado, Denver

**A103. Pre-service Teachers' use of Culturally Relevant Instruction**

Kirby Whittington, Florida State University  
 Sherry A. Southerland, Florida State University  
 Harini C. Krishnan, Florida State University

**A105. The Dependency of Middle School Student' STEM-related Career Awareness on Gender and Career Field Choices**

Tormi Kotkas, University of Tartu  
 Miia Rannikmae, University of Tartu  
 Jack B. Holbrook, University of Tartu

**A107. Beyond the City Lights: Resiliency of Secondary Science Teachers in Rural Schools.**

Beverly R. DeVore-Wedding, University of Nebraska, Lincoln  
 Julie A. Thomas, University of Nebraska

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

3:15pm – 4:15pm, Augusta Conference Center

**A109. 2-D or 3-D? Effects of Stimulus Dimensionality on Molecular Model Comparison in Organic Chemistry Task**

Pavlo D. Antonenko, University of Florida  
 Matthew Schneps, Smithsonian Astrophysical Observatory  
 Richard Lamb, University at Buffalo, SUNY  
 Marc Pomplun, University of Massachusetts, Boston  
 Do H. Koh, University of Massachusetts, Boston  
 Kendra Saunders, University of Florida  
 Andrea Burgess, University of Florida  
 Li Cheng, University of Florida  
 Zhen Xu, University of Florida  
 Jingwei Li, University of Florida

**A111. Elementary Teacher Candidates in the 3-D Online Virtual World Second Life**

EunJin Bahng, Iowa State University  
 Mimi Lee, Hongik University

**A113. Identifying Productive Discussion in Peer Instruction with Clickers to Promote Student Conceptual Understanding of Science**

Yu-Ta Chien, National Taiwan Ocean University

**A115. Learning Science through Practice and Play**

Kayla Pritchard, University of Georgia  
 Georgia Hodges, University of Georgia

**A117. Upper Elementary Students' Explanations of "Why Ice Melts" and the Influence of Haptic Force-feedback**

James Minogue, North Carolina State University  
 Diane Hunter, North Carolina State University  
 David Borland, Renaissance Computing Institute (RENCI)  
 Marc Russo, North Carolina State University

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

3:15pm – 4:15pm, Augusta Conference Center

**A119. A Case Study of a Year-long Science Internship to Teach Nature of Science**

Cary W. Sell, University of Georgia  
 J. Steve Oliver, University of Georgia

**A121. Change of Secondary Students' Perceptions of the Theory of Evolution after an Instructional Intervention that Include Nature of Science: Relevance, Acceptance and Understanding Issues**

Beatriz Becerra, Pontificia Universidad Católica de Valparaíso  
 Alejandra Vegas, Pontificia Universidad Católica de Valparaíso  
 Kareen Norambuena, Pontificia Universidad Católica de Valparaíso  
 Hernan Cofre, Pontificia Universidad Católica de Valparaíso

***A123. Fake News and Climate Change: Understanding the Framework***

Amelia A. Brown, University of Tennessee, Knoxville  
Barry Golden, University of Tennessee

***A125. Mind the Gap: Combining Bachelards' Philosophy of Science and Chemistry Education in Theory and Practice***

Mareike Frevert, University of Kassel  
David S. Di Fuccia, University of Kassel

**Strand 14: Environmental Education**

***Poster Session A***

3:15pm – 4:15pm, Augusta Conference Center

***A127. Designing Conservation Education Programs Using Community Participatory Approaches***

Ian Hanley, University of New Hampshire  
Sameer Honwad, University of New Hampshire

***A129. Exploring the Sustainability-Related Career Outcome Expectations of Community College Students Interested in Science***

Allison Godwin, Purdue University

**Strand 15: Policy**

***Poster Session A***

3:15pm – 4:15pm, Augusta Conference Center

***A131. How Students are Recruited into Enrolling into AP Courses and Enticed to Take AP Exams***

Eugene Judson, Arizona State University  
Nicole Bowers, Arizona State University  
Kristi Glassmeyer, Arizona State University

***A133. A Logic Model of Successful STEM-Focused Elementary Schools: Analysis of Critical Components***

Erin E. Peters-Burton, George Mason University  
Ann House, SRI International  
Vanessa L. Peters, SRI International  
Julie Remold, SRI International

**Concurrent Session #6B**

**Poster Session**

**4:15pm – 5:15pm**

**Poster Session B**

**4:15pm – 5:15pm,**

**Augusta Conference Center**

**Strand 1: Science Learning, Understanding and Conceptual Change**

***Poster Session B***

4:15pm – 5:15pm, Augusta Conference Center

***B2. Learning That Models Are Abstract: A Description of the Learning Processes Within Synthesis Modeling***

Ayca Karasahinoglu, University of Georgia  
Daniel K. Capps, University of Georgia

***B4. Students' Self-Efficacy Towards Competences and the Content Frame in which Big Ideas are Embedded***

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

***B6. The Nature of Solutions and Solubility (NSS–DI Eng) Pilot Evaluation for Cultural Layout Norms***

Mandy McCormick Smith, Ohio State University

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

### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B8. Relationship of Contextual Interest and Motivation Dimensions among Grade 6 and 9 Students' in Science Learning***

Moonika Teppo, University of Tartu  
Miiia Rannikmae, University of Tartu  
Margus Pedaste, University of Tartu

#### ***B10. Scientific Epistemological Beliefs between the Poles of Professional and Classroom Science***

Frauke Voitle, Leibniz Institute for Science Education (IPN) Kiel  
Nele Kampa, Leibniz Institute for Science Education (IPN) Kiel  
Julia Schwanewedel, Leibniz Institute for Science Education (IPN) Kiel  
Irene Neumann, Leibniz Institute for Science Education (IPN) Kiel  
Kerstin Kremer, Leibniz Institute for Science Education (IPN) Kiel

#### ***B12. Secondary Student's Science-Learning Motivation in Korea and Indonesia***

Arif Rachmatullah, Kangwon National University  
Sein Shin, Chonbuk National University  
Jun-Ki Lee, Chonbuk National University  
Fenny Roshayanti, Universitas PGRI Semarang  
Minsu Ha, Kangwon National University

#### ***B14. The Ethic of Care, English learners, and their Teachers in Middle School Science Classes***

Rhonda K. Rackley, The Gwinnett School of Mathematics, Science, & Technology  
Mary M. Atwater, University of Georgia

#### ***B16. The Longitudinal Relationship of Positive and Negative Science Attitudes of Middle School Students***

Angela Skeeles-Worley, University of Virginia  
Robert H. Tai, University of Virginia  
Ji Hoon Ryoo, University of Virginia  
Christopher Dittrick, University of Virginia

#### ***B18. Thinking Spatially: Improving Middle-school Students' Use of Perspective Taking Through An Astronomy Curriculum***

Abha Vaishampayan, Pennsylvania State University  
Julia Plummer, Pennsylvania State University  
Kyungjin Cho, Pennsylvania State University  
Patricia Udomprasert, Harvard University  
Erin Johnson, Harvard University  
Susan Sunbury, Harvard-Smithsonian Center for Astrophysics  
Henry Houghton, Harvard University  
Erika Wright, Harvard-Smithsonian Center for Astrophysics  
Helen Zhang, Boston College  
Alyssa Goodman, Harvard University

#### ***B20. Using Cogenerative Dialogues to Address Emotional Issues in a Project-Based Learning Science Internship***

Pei-Ling Hsu, University of Texas, El Paso  
Kenneth George Tobin, The City University of New York

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

### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B22. Supporting Scientific Modeling Practices in Elementary Science Instruction about Inheritance***

Devarati Bhattacharya, University of Nebraska, Lincoln  
Cory T. Forbes, University of Nebraska, Lincoln  
Erin Ingram, University of Nebraska, Lincoln  
Leslie Hawley, University of Nebraska, Lincoln  
Jared Stevans, University of Nebraska, Lincoln  
Dante Cisterna, University of Nebraska, Lincoln

#### ***B24. The Tendency of Children's Evidence-based Reasoning During Classroom Problem Solving***

Mijung Kim, University of Alberta  
Jerine Pegg, University of Alberta

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

### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B26. Integrating Programming and Biology in 8th Grade***

Kit Martin, Northwestern University  
Ashlyn Pierson, Vanderbilt University  
Pratim Sengupta, University of Calgary

#### ***B28. Investigating Students' Attitudes About STEM and 21st Century Skills In A Project-Based Learning Program***

Stephen C. Scogin, Hope College  
Katie Rietberg, Hope College  
Michelle Austin, Hope College  
Katherine Supanich, Hope College  
Carly Sommavilla, Hope College  
Cindy Alexander, Hope College  
Lara Iaderosa, Hope College  
Julie Isola, Hope College

**B30. Moving from Realist to Relativist Worldview in the Digital Age**

Dina Tsybulsky, Tel Aviv University  
Asaf Dajczman, Tel Aviv University  
Ilya Levin, Tel Aviv University

**B32. Teaching Genetics Using Learning Technologies:**

**A Snap Shot of Four Case Studies**

Dionysius T. Gnanakkan, Illinois Institute of Technology  
Norman G. Lederman, Illinois Institute of Technology  
Judith S. Lederman, Illinois Institute of Technology

**B34. The Role of Teachers' Epistemic Aims and Cognition in SSI Teaching**

Suna Ryu, Korea National University of Education  
Hangnam Jeong, Korea National University of Education  
Sunhee Noh, Korea National University of Education  
Soyoung Beyon, Korea National University of Education

**B36. The State of Climate Change Education in the First State**

Andrea Drewes, University of Delaware  
Joseph Henderson, University of Delaware  
Amy Trauth, University of Delaware

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

**Poster Session B**

4:15pm – 5:15pm, Augusta Conference Center

**B38. Helping Undergraduate Students' CREATE Understanding of Scientific and Popular Media Articles about Contemporary Water Issues**

Diane Lally, University of Nebraska, Lincoln  
Cory T. Forbes, University of Nebraska, Lincoln  
Jenny M. Dauer, University of Nebraska, Lincoln

**B40. How Do Students use Writing-to-learn Activities to Demonstrate Aspects of Science Literacy across Three Domains?**

Samantha L. Jusino, West Virginia University

**B42. Learning Assistants' Actions in Undergraduate Science Courses: Point-of-View Video Analysis**

Amreen Nasim Thompson, University of Colorado, Denver  
Leanne Doughty, University of Colorado, Denver  
Robert M. Talbot, University of Colorado, Denver  
Laurel Hartley, University of Colorado, Denver  
Paul Le, University of Colorado, Denver

**B44. Learning Assistants in Large-Enrollment Undergraduate Biology: Results of a Multi-Year Quasi-Experimental Study**

Ellen Christine Davis, University of Florida  
Pavlo D. Antonenko, University of Florida  
Alice Harmon, University of Florida

**B46. Process-Oriented Guided-Inquiry Learning Marginally Effects Student Achievement but Increases the Odds of Passing a Course**

Abdirizak M. Warfa, University of Minnesota  
Lindsey Walker, University of Minnesota

**B48. Toward the Development of Interdisciplinary Course and an Analytical Framework for Assessing Interdisciplinary Sciences Reasoning**

Shannon H. Sung, Spelman College  
Derrick J. Hylton, Spelman College

**B50. Transdisciplinary Students' Learning and Reasoning about Socio-hydrological Issues in an Undergraduate Water Course**

Destini N. Petitt, University of Nebraska, Lincoln  
Diane Lally, University of Nebraska, Lincoln  
Cory T. Forbes, University of Nebraska, Lincoln  
Nick Brozovic, University of Nebraska, Lincoln  
Trenton Franz, University of Nebraska, Lincoln

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**Strand 6: Science Learning in Informal Contexts**

**Poster Session B**

4:15pm – 5:15pm, Augusta Conference Center

**B52. Students' Role Taking Patterns in an Integrated STEM and Literacy Academy**

Ji Shen, University of Miami  
Blaine E. Smith, University of Arizona  
Shiyan Jiang, University of Miami  
Guanhua Chen, University of Miami  
Marie Hamaoui, University of Miami  
Juan Torralba, University of Miami

**B54. The Non/Canonical Nature of Science Fair Project Titles and the Relationship to Prize Winning**

G. Michael Bowen, Mount Saint Vincent University  
Kimberley P. Good, Dalhousie University  
J. Lawrence Bencze, University of Toronto

**B56. Using Science Storybooks to Support Preschool-Age Children's Development of Evidence-Based Explanations during Museum-based Programming**

Kyungjin Cho, Pennsylvania State University  
Julia Plummer, Pennsylvania State University

**B58. Individual Family Members' Perspectives of a Science-Themed Community Event**

Jennifer L. Idema, Texas State University  
Patricia Patrick, Columbus State University

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

4:15pm – 5:15pm, Augusta Conference Center

**B60. Programmatic Model Building in Undergraduate Elementary Science Teacher Education for Computational Thinking**

J. Randy McGinnis, University of Maryland  
 Diane Jass Ketelhut, University of Maryland  
 Emily Hestness, University of Maryland, College Park  
 Hannoori Jeong, University of Maryland

**B62. Iterative Development and Use of an Online Problem-Based Learning Module for Pre-service and In-service Teachers**

Peter Rillero, Arizona State University  
 Laurie Camposeco, Arizona State University

**B64. Preparing Reform-Minded Science and Mathematics Teachers: An Empirical Investigation Across Six Teacher Education Programs**

Alexandria K. Hansen, University of California, Santa Barbara  
 Stacey L. Carpenter, University of California, Santa Barbara  
 Julie A. Bianchini, University of California, Santa Barbara  
 Elisa Stone, University of California, Berkeley  
 Cheryl Forbes, University of California, San Diego

**B66. Pre-service Science Teachers' Notice and Response to Students' Scientific Thinking**

Meenakshi Sharma, Michigan State University  
 Christina V. Schwarz, Michigan State University

**B68. Pre-service Science Teachers' Views towards Socio-Scientific Issues and Socio-Scientific Issue-based Instruction**

Okan Sibiç, Istanbul University  
 Mustafa S. Topcu, Yildiz Technical University

**B70. The Effectiveness of Using 5E Lesson Planning on Understanding of Pre-service Science Teachers' Nature of Scientific Inquiry and Its Transferring to Teaching Practice**

Funda Hasançebi, Giresun University  
 Seda Çavuş Güngören, Çanakkale Onsekiz Mart University  
 Gunkut Mesci, Giresun University

**B72. The Effects of Socio-Scientific Contexts on Pre-service Science Teachers' Socio-Scientific Reasoning**

Emine Sarikaya, Yildiz Technical University  
 Mustafa Sami Topçu, Yildiz Technical University

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

4:15pm – 5:15pm, Augusta Conference Center

**B74. Middle School Science Teachers' Experiences in Implementing Scientific Practices-based Argumentation Lessons**

Bahadır Oguz Namdar, Recep Tayyip Erdogan University  
 Aysegül Oguz Namdar, Recep Tayyip Erdogan University

**B76. Productive Disciplinary Engagement as a Model for Science Teacher Learning in the Age of NGSS**

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

**B78. STEAM Professional Development for Teachers in Indigenous Contexts: Using The Language and Inquiry Science Tool**

Irasema Ortega, University of Alaska-Anchorage  
 Katherine Galauska

**B80. The Pivotal Role of Academic Collaborations in Boosting Confidence in Teaching Inquiry and Inquiry Enactment**

Pongprapan Pongsophon, Kasetsart University  
 Ben C. Herman, University of Missouri

**B82. The Role of Teacher Questioning for Maintaining Cognitive Demand in Science Classrooms**

Miray Tekkumru Kisa, Florida State University

**B84. Three Secondary Science Teachers' Experiences with the NGSS: A Social Practice Theory Perspective**

Elysa N. Corin, Institute for Learning Innovation  
 Tammy L. Cook-Endres, Exploratorium

**B86. Understanding Science as Culture: Examining the Influence of a Research Experience for Teachers Program**

Shannon Gooden, Florida State University

**Strand 10: Curriculum, Evaluation, and Assessment****Poster Session B**

4:15pm – 5:15pm, Augusta Conference Center

**B88. INSECT: A Framework for INtegrating Science Education and Computational Thinking**

Amanda N. Peel, University of Missouri  
 Troy Sadler, University of Missouri

***B90. Examining Physics Teachers' Formative Assessment Knowledge of Force and Motion: A Rasch Model Approach***

Marilyn M. Stephens, University of Alabama  
 Dennis Sunal, University of Alabama  
 James W. Harrell, University of Alabama  
 Stephanie Wind, University of Alabama

***B92. Developing an Interactive Simulation-based Formative Assessment System: A feasibility Study***

Mihwa Park, University at Buffalo, SUNY  
 Ying Sun, University at Buffalo, SUNY  
 Jennifer Tripp, University at Buffalo, SUNY

***B94. A Design Framework for the Development of Scenario-Based Assessments for Summative Assessment Settings***

Gary Weiser, Teachers College Columbia University  
 Lei Liu, Educational Testing Service

***B96. Science and Mathematics Performance and College Readiness in an Urban Portfolio Community High School***

Robin E. Fleshman, Columbia University  
 Felicia Moore Mensah, Columbia University

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

***Poster Session B***

4:15pm – 5:15pm, Augusta Conference Center

***B98. The Process of Becoming: Identity Challenges for African-American Female Science and Mathematics***

***Pre-service Teachers***  
 David M. Sparks, University of Texas, Arlington

***B100. Using Writing to Understand Self, Others and Learning Science Concepts***

Line A. Saint-Hilaire, City University of New York, Queens College

***B102. Sixth Graders of the "Law of the Lever" Through a Culturally Responsive Inquiry Activity***

Felisa (Hsueh-Yun) Yu, National Changhua University of Education  
 Erh-Tsung Chin, National Changhua University of Education  
 Huey-Lien Kao, National Pingtung University of Education

***B104. Culturally-responsive Science Education: Restructuring Science in Interdisciplinary Contexts***

Sheron Mark, University of Louisville  
 Geena Constantin, Jefferson County Public Schools  
 Olivia Alexander, University of Louisville

***B106. Gender and Grade Differences in Student Preferences for Making/Creating and Discovering Activities Associated with Science Career Aspirations in Grades 3-6***

Angela D. Skeeles-Worley, University of Virginia  
 Robert H. Tai, University of Virginia  
 Ji Hoon Ryoo, University of Virginia  
 Christopher Dittrick, University of Virginia

***B108. Using Scientific Practice to Address the Girls' Crisis: Designing Science Education From a Feminist Perspective***

Heather B. Page, New York University

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**Strand 12: Educational Technology**

***Poster Session B***

4:15pm – 5:15pm, Augusta Conference Center

***B110. Capturing Gender Differences on Creativity in High School Students Participating in a Serious Educational Game Design and Development Project: How A Technological Project-Based Learning Approach Affects Creative Endeavors***

Len Annetta, East Carolina University  
 Marina Shapiro, George Mason University  
 Richard Lamb, University at Buffalo, SUNY  
 David B. Vallett, University of Nevada, Las Vegas  
 Amanda Luh, George Mason University  
 Rebecca Cheng, George Mason University

***B112. The Impacts of a Computer Simulation on Student Learning Experience in Science Classrooms***

Xiaoyang Gong, University of Maryland  
 Diane Jass Ketelhut, University of Maryland  
 Ebony Terrell Shockley, University of Maryland

***B114. AugmentedWorld: Preparing Pre-service STEM Teachers to Create Location-based Multimedia Questions***

Miri Barak, Technion, Israel Institute of Technology  
 Shadi Asakle, Technion, Israel Institute of Technology

***B116. Programming and Science Literacy: Examining Enactment of a Robotics Course for High School Girls***

Noemi Waight, University at Buffalo, SUNY  
 Alyssa Mello, University at Buffalo, SUNY  
 Somaia Morsy, University at Buffalo, SUNY  
 Melissa Lindner, Saints Peter and Paul School

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

#### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B118. Novel Method for Teaching the Difference and Relationship Between Theories and Laws***

Khadija E. Fouad, Appalachian State University

Kathryn L. Gray, Caldwell Early College High School

#### ***B120. The Influence of a History of Science Course on Jamaican Teachers' Nature of Science Conceptions***

Sharon Bramwell-Lalor, The University of the West Indies

#### ***B122. Use of Schema Theory and Think Alouds to Study Knowledge Progression Patterns for Socio-Scientific Issues***

Catherine L. Quinlan, Howard University

#### ***B124. What do K-12 Students Need to NoE? A Delphi Study into the Nature of Engineering***

Brian Hartman, Walla Walla University

Randy L. Bell, Oregon State University

#### ***B126. Relationships between Changes in Teachers' Understanding of Scientific Inquiry and Nature of Science***

Yue Li, Miami University

Sarah B. Woodruff, Miami University

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### Strand 14: Environmental Education

#### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B128. How Experts Frame Socio-Scientific Issues During Lectures***

Anne Marie A. Casper, Colorado State University

Meena M. Balgopal, Colorado State University

#### ***B130. What Role Have Environmental Education Standards Played in Curriculum Development? An Historical Investigation***

Margaretann G. Connell, Illinois Institute of Technology

Norman G. Lederman, Illinois Institute of Technology

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### Strand 15: Policy

#### Poster Session B

4:15pm – 5:15pm, Augusta Conference Center

#### ***B132. International Standards Documents' Inclusion of the Nature of Science: A Twenty Year Retrospective***

Joanne K. Olson, Texas A&M University

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## Evening/Social Events

### Graduate Students Committee Sponsored Session

#### ***Graduate Student Forum***

The Graduate Student Forum aims to guide and encourage beginning researchers by discussing the various parts of a 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 round table discussions with experienced colleagues on matters of academic interest.

5:30pm – 7:00pm, Savannah A

#### **Organizers:**

Amber Bismack, University of Michigan

Christa Haverly, Michigan State University

Francesca White, Indiana University

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### ***JRST Editorial Team Meeting/Dinner***

***By invitation only – Sponsored by Wiley-Blackwell***

6:00pm – 8:30pm, Chastain J

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### ***Reception: International Journal of Science and Mathematics Education***

***By invitation only – Sponsored by Springer***

6:00pm – 7:30pm, Chastain H and I



**Monday, March 12, 2018**

## Conference Registration

7:00am – 5:00pm, The Overlook

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## Committee Meetings

(Continental breakfast provided for committee members)

7:15am – 8:30am

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### Outstanding Doctoral Research Award Committee Meeting

7:15am – 8:30pm, Augusta E

### Early Career Research Award Committee Meeting

7:15am – 8:30pm, Augusta F

### Distinguished Contributions through Research Award Committee Meeting

7:15am – 8:30pm, Augusta G

### Equity and Ethics Committee Meeting

7:15am – 8:30pm, Savannah B

### External Policy and Relations Committee Meeting

7:15am – 8:30pm, Savannah C

### Research Committee Meeting

7:15am – 8:30pm, Augusta 1

### Membership Committee Meeting

7:15am – 8:30pm, Augusta 2

### Election Committee Meeting

7:15am – 8:30pm, Augusta B

### International Committee Meeting

7:15am – 8:30pm, Augusta 3

### Program Committee Meeting

7:15am – 8:30pm, Chastain 1

### Publications Advisory Committee Meeting

7:15am – 8:30pm, Augusta A

### Graduate Student Committee Meeting

7:15am – 8:30pm, Augusta C

### Website Committee Meeting

7:15am – 8:30pm, Augusta D

## Concurrent Session #7

8:45am – 10:15am

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### Administrative Session

#### *Graduate Student Research Poster Symposium*

8:45am – 10:15am, Savannah A

#### Presenters:

Francesca A. White, Indiana University  
 Christa Haverly, Michigan State University  
 Marcus Kubsch, Leibniz Institute for Science Education (IPN) Kiel  
 Heidi Cian, Clemson University  
 Thomas A. Kameronoski, Pennsylvania State University

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### Presidential Sponsored Symposium

#### *Data Sharing and Research Transparency at the Article*

#### *Publishing Stage: Advantages and Limitations*

8:45am – 10:15am, Augusta 3

#### Discussant:

Felice Levine, AERA Executive Director

#### President:

Barbara A. Crawford, University of Georgia

#### Presenters:

Fouad Abd-El-Khalick, (Editor) *Journal of Research in Science Teacher*  
 Dana L. Zeidler, (Editor) *Journal of Research in Science Teaching*  
 Norman G. Lederman, (Editor) *Journal of Science Teacher Education*  
 Judith Lederman, (Editor) *Journal of Science Teacher Education*  
 Sherry Southerland, (Editor) *Science Education*  
 Lisa C. Benson, (Editor) *Journal of Engineering Education*  
 Jan van Driel, (Editor) *International Journal of Science Education*  
 Kostas Kampourakis, (Editor) *Science and Education*  
 David Geelan, (Editor) *Research in Science Education*  
 Donna King, (Editor) *Research in Science Education*  
 Huann-shyang Lin, (Editor) *International Journal of Science and Mathematics Education*

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### Strand 1: Science Learning, Understanding and Conceptual Change

#### *Modeling-Based Inquiry and Science Learning*

8:45am – 10:15am, Chastain 1

**President:** Sabrina Avila, City University of New York

#### *Modeling-based Instruction and Assessment for Learning*

#### *Electrochemistry at the Secondary School*

Mei-Hung Chiu, National Taiwan Normal University  
 Mao-Ren Zeng, Taipei Municipal Dazhi High School, Taiwan  
 Shiao-Lan Chung, New Taipei High School, Taiwan

***Students' Models about Quantization and Atomic Spectra  
Before and After Engaging with Model-Based Inquiry***

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

***The Role of Scientific Modeling and Conceptual Knowledge  
in Context-Based Tasks***

Susanne A. Digel, DFG Graduate School Teaching and Learning  
Processes  
Jochen Scheid, University of Landau  
Alexander Kauertz, University of Koblenz-Landau  
David F. Treagust, Curtin University

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

***STEM Education***

8:45am – 10:15am, Augusta B

**Presenter:** Senay Purzer, Purdue University

***Impact of an Integrated Engineering Curriculum on Students'  
Knowledge of and Self-efficacy in Engineering Design***

Wondimu Ahmed, The University of Akron  
Nidaa Makki, The University of Akron  
Kristin L. Koskey, The University of Akron  
Nicholas G. Garafolo, The University of Akron  
Donald P. Visco, The University of Akron

***Middle School Students' Attitudes towards Science-  
Technology-Engineering-Mathematics (STEM) Fields  
and their Interests towards STEM Careers***

Ayse Ciftci, Mus Alparslan University  
Mustafa S. Topcu, Yildiz Technical University  
Ibrahim Erdogan, Mus Alparslan University

***Productive Conflict: The Anomalous Role of 'Getting Along' in a  
High-Needs Elementary Engineering Classroom***

Heidi B. Carlone, University of North Carolina, Greensboro  
Megan R. Lancaster, University of North Carolina, Greensboro

***Research Apprenticeship Program for High School Students:  
Participants' Characteristics and STEM Career Pathways***

Irit Sasson, Tel-Hai College  
Merchi Edry-Malul, Technion, Israel Institute of Technology  
Yehudit Judy Dori, Technion, Israel Institute of Technology

**Strand 3: Science Teaching – Primary School  
(Grades preK-6): Characteristics and Strategies  
*Integrating Arts, Literacy, and Language with Science***

8:45am – 10:15am, Augusta 2

**Presenter:** Jessica Cellitti, Drexel University

***A Comparison of Arts- and Inquiry-based Methods  
for Teaching Life Sciences to Fifth Graders***

Christa Greenfader, University of California, Irvine  
Brad Hughes, UCI  
Drew Bailey, UCI  
Joseph Wong, ESCAPE Program University of California, Irvine

***Can Fourth Grade Science Misconceptions  
Be Reversed Through Inquiry or Arts Integration?***

Brad Hughes, UCI  
Christa Greenfader, University of California, Irvine  
Sage O'Toole, University of California, Irvine  
Joseph Wong, ESCAPE Program University of California, Irvine  
Drew Bailey, UCI

***Investigating Elementary Pre-service Teachers' Designs  
for Integrated Science/Literacy Instruction Highlighting  
Similar Cognitive Processes***

Carolyn S. Wallace, Kennesaw State University  
Debra Coffey, Kennesaw State University

***Planning and Implementing Scaffolds for Science Academic  
Language: Successes and Challenges in Elementary Science***

Karl G. Jung, University of South Florida

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

***Organized Poster Session: Using Data to Develop Systems  
Supporting 3-D Science Learning***

8:45am – 10:15am, Savannah C

**Presenter:** Charles W. Anderson, Michigan State University

**Discussant:** William Penuel, University of Colorado

***Designing Curriculum to Support Students in Engaging  
in the Science Practices***

Kirsten Edwards, Michigan State University  
Emily Scott, University of Washington, Seattle  
Charles W. Anderson, Michigan State University

***Curriculum Materials Supporting 3-D Learning  
about the Global Carbon Cycle***

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

***Machine Scoring and IRT analysis***

Jay Thomas, ACT, Inc.  
Jinho Kim, University of California, Berkeley  
Karen Draney, University of California, Berkeley

***Teacher Effectiveness and Their Carbon TIME Practices and Knowledge***

Qinyun Lin, Michigan State University  
JinHo Kim, University of California, Berkeley  
Karen Draney, University of California, Berkeley  
Ken Frank, Michigan State University

***How Chinese and American Students Construct Explanations of Carbon-Transforming Processes***

Pingping Zhao, Hebei Normal University  
Emily Scott, University of Washington, Seattle  
Charles W. Anderson, Michigan State University

***Teachers' Sensemaking about Accountability and Assessment***

Elizabeth X. De Los Santos, University of Nevada, Reno  
Stefanie Marshall, Michigan State University  
James B. Hancock, Michigan State University  
Sarah Bodbyl, Michigan State University  
Qinyun Lin, Michigan State University  
Andrea Forsyth, University of Nevada, Reno  
William R. Penuel, University of Colorado  
Charles W. Anderson, Michigan State University

***Characterizing Discourse Patterns for Assessment Purposes with Evidence from Classroom Video and Student Work***

Beth A. Covitt, University of Montana  
Christie Morrison Thomas, Michigan State University  
Sarah Bodbyl, Michigan State University  
Charles W. Anderson, Michigan State University

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

8:45am – 10:15am, Augusta H

**President:** Tia C. Madkins, University of Texas at Austin

***Comparative Analysis of 3-D Research-Based and Classroom-Based Rubrics for Formative Assessment***

Phyllis H. Pennock, Western Michigan University  
Samuel Severance, Michigan State University  
Kevin W. McElhaney, SRI International  
Joseph S. Krajcik, Michigan State University

***Locating Responsive Formative Assessment Practices for English Learners in Middle School Science Teaching***

Edward G. Lyon, Sonoma State University

***The Effect of Self-Efficacy on Students' Science Achievement***

Somaia Morsy, University at Buffalo, SUNY

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

***Evolution Education***

8:45am – 10:15am, Augusta F

**President:** Amy M. Lark, Michigan Technological University

***An Exploration of Post-Instruction Shifts in Evolution Acceptance 'Profiles' as Documented by the Measure of Acceptance of the Theory of Evolution (MATE)***

Ephiram R. Bosse, California State University, Fresno  
Emily M. Walter, California State University, Fresno

***Changes During a Year of Introductory Biology on Acceptance of Evolution and Associated Factors***

Ryan D.P. Dunk, Syracuse University  
Jason R. Wiles, Syracuse University

***The Gestalt of it: Do Gestalt Grouping Principles Influence College Student Interpretation of Phylogenetic Trees?***

Linda C. Fuselier, University of Louisville  
Laura R. Novick, Vanderbilt University

***The Role of Statistical Thinking in Learning, Understanding, and Accepting Evolution***

Daniela Fiedler, Leibniz Institute for Science Education (IPN) Kiel  
Ross H. Nehm, Stony Brook University, SUNY  
Gena C. Sbeglia, Stony Brook University, SUNY  
Ute Harms, Leibniz Institute for Science Education (IPN) Kiel

**Strand 6: Science Learning in Informal Contexts Learning Outcomes in Out-of-School Youth Programs**

8:45am – 10:15am, Augusta A

**President:** Nancy L. Staus, Oregon State University

***Youths Learning with a Genetics and Genealogy Approach: Scientific and Personal Engagement in Summer Camp***

Heather Toomey Zimmerman, Pennsylvania State University  
Jennifer L. Weible, Central Michigan University  
Elizabeth Wright, Pennsylvania State University  
Chrystal Maggiore, Pennsylvania State University  
Nina G. Jablonski, Pennsylvania State University

***Newcomer Positioning's Effect on Critical Robotics Agency Development***

Colin Hennessy Elliott, New York University

***Students' Perceptions of Gender in an Out-of-School STEM Context***

Jeanna R. Wieselmann, University of Minnesota  
Justine Kim, University of Minnesota  
Gillian Roehrig, University of Minnesota

***Empowering Youth within the Community to Engage in STEM Activities***

Daniel Birmingham, Colorado State University  
Christopher W. Schaumburg, Colorado State University  
Bhreanna Quinlan, Colorado State University

***How a Science Summer Camp can Change Campers' Views on Nature of Science***

Carmen A. Carrion, Georgia State University  
Renee S. Schwartz, Georgia State University  
Andrea Kunze, NCSU

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

8:45am – 10:15am, Augusta E

**President:** Claudia Vergara, Alberto Hurtado University

***Gender and Creativity among College Pre-service Chemistry Teachers Using Model Based Inquiry (MBI)***

Apollonia A. Nwosu, University of Nigeria, Nsukka  
Sa'idu Danladi, Jigawa State College of Education

***Pre-service Teacher Education Activities and their Impact on Model-based Teaching***

Samia Khan, University of Dundee  
Alexis Gonzales, University of British Columbia

***Prospective Teachers' Development of Knowledge of Modeling: its Implementation in the Context of Peer Teaching***

Young Ae Kim, University of Georgia  
J. Steve Oliver, University of Georgia

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

8:45am – 10:15am, Augusta D

**President:** Phillip A. Boda, Stanford University

***Analyzing Methods Course to Develop Pre-service Teachers' Knowledge to Teach Academic Language to ELLs***

Vanashri Nargund, New Jersey City University

***Co-Teaching for STEM Education: Collaboration between Teacher Candidates and Faculty***

Michelle M. Dubek, OISE/University of Toronto  
Carol Doyle-Jones, Niagara University  
Suzanne de Castell, University of Ontario Institute of Technology

***PCK Development of Science and Mathematics Pre-service Teachers in a Minor Teacher Education Program***

Begum Coskun, Delft University of Technology  
Ineke Henze-Rietveld, Delft University of Technology  
Marc J. De Vries, Delft University of Technology

***Pre-service Teachers' Reflections on Project-Based Learning: Main Themes and Connections to Pedagogical Content Knowledge***

Dalila Dragnic-Cindric, University of North Carolina, Chapel Hill  
Janice L. Anderson, University of North Carolina, Chapel Hill

**Strand 8: In-service Science Teacher Education Socio-Scientific Issues & Science Teacher Education**

8:45am – 10:15am, Augusta G

**President:** Stephen B. Witzig, University of Massachusetts, Dartmouth

***"They Said Oh, Just Talk About Climate!" Tensions Teachers Face Implementing Climate Change Lessons***

Asli Sezen-Barrie, University of Maine  
Gili Marbach-Ad, University of Maryland  
Mary Stapleton, Towson University

***Investigating the Development of In-service Biology Teachers' Orientations and Practices Toward Crafting Socio-Scientific Issues-Based Lessons***

Stephen B. Witzig, University of Massachusetts, Dartmouth

***STEM Graduate Course: Successes and Challenges of K-12 Teachers to Learn the Socio-Scientific Issues***

Augusto Z. Macalalag, Arcadia University  
Joseph A. Johnson, Mercyhurst University  
Michelle Lai, Arcadia University

**Strand 8: In-service Science Teacher Education Implementing High Leverage Practices**

8:45am – 10:15am, Augusta C

**President:** Jeni R. Davis, Salisbury University

***Attending and Responding to Students' Ideas: Developing Professional Noticing in Expert Secondary Science Teachers***

Meredith Houle Vaughn, San Diego State University  
Lauren Stewart, San Diego State University  
Megan D'Errico, San Diego State University  
Donna L. Ross, San Diego State University

***Identifying High Leverage Science Teaching Practices Linked to Student Achievement***

Kathleen J. Roth, Cal Poly Pomona Foundation  
Susan M. Kowalski, BSCS  
Jody Bintz, BSCS

***Struggles to Organize Productive Discourse  
in Secondary Science***

Alexander Kwako, University of California, Los Angeles  
William A. Sandoval, University of California, Los Angeles  
Anahid Modrek, University of California, Los Angeles

***Science Teachers' Changing Assessment Practices: Case  
Studies of Individual Change through PD and Professional  
Collaboration***

Stephanie Rafanelli, Stanford University  
Hilda Borko, Stanford University  
Matthew Kloser, University of Notre Dame  
Matthew Wilsey, University of Notre Dame

***Strand 10: Curriculum, Evaluation, and Assessment  
NGSS Curriculum and Performance Assessments: Mechanisms  
for Classroom Change and Student Learning***

8:45am – 10:15am, Savannah B

***Designing a NGSS-Aligned, Project-Based Curriculum  
with Embedded Performance Assessments***

Susan E. Schultz, Stanford University  
Rebecca Deutscher, Stanford University  
Nicole Holthuis, Stanford University  
Arash Jamshidi, Stanford University  
Lauren K. Stoll, Stanford University

***Features of Professional Development to Support Teacher  
Learning and Implementation of the Learning Through  
Performance (LTP) Curriculum***

Arash Jamshidi, Stanford University  
Rebecca Deutscher, Stanford University  
Nicole Holthuis, Stanford University  
Susan E. Schultz, Stanford University  
Lauren Stoll, Stanford University

***Supporting Teacher Learning and Shifts in  
Instructional Practices***

Nicole Holthuis, Stanford University  
Rebecca Deutscher, Stanford University  
Arash Jamshidi, Stanford University  
Susan E. Schultz, Stanford University  
Lauren Stoll, Stanford University

***The Impact of the Learning Through Performance (LTP)  
Curriculum on Student Engagement and Learning***

Rebecca Deutscher, Stanford University  
Nicole Holthuis, Stanford University  
Arash Jamshidi, Stanford University  
Susan E. Schultz, Stanford University  
Lauren Stoll, Stanford University

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

***The Multilingual Classroom***

8:45am – 10:15am, Chastain J

**President:** Mercy Ogunsola-Bandele, National Open University  
of Nigeria

***Contradictions and Congruence in Multi-Lingual Science  
Classrooms: An Activity Theory Perspective***

Saouma B. Boujaoude, American University of Beirut  
Sara Salloum, University of Balamand

***Examination of Burmese Youth's Participation and Identity Work  
in a Community-based Science Program***

Minjung Ryu, Purdue University  
Mavreen Rose S. Tuvilla, Purdue University  
Casey E. Wright, Purdue University

***How does Knowing about Misconceptions in a Bilingual  
Context Help Students Learning: An Indian Experience?***

Narendra D. Deshmukh, University of the Witwatersrand,  
South Africa

***Investigating Science Capital, Family Support for Science,  
and Physics Identity amongst Latino Physics Students***

Idaykis Rodriguez, Florida International University  
Anabel Sanchez, Florida International University  
Jose Lima, Florida International University  
Geoff Potvin, Florida International University  
Zahra Hazari, Florida International University

***Students' Translanguaging and the Next Generation  
of Science Standards: Bilingual Science Teaching  
in Engineering Education***

Greses A. Perez Gonzalez, Stanford University  
Bryan A. Brown, Stanford University  
Kathryn Ribay, Stanford Graduate School of Education

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

***Promoting Teacher's and Student's NOE and NOS Engagement***

8:45am – 10:15am, Augusta 1

**President:** Bridget K. Mulvey, Kent State University

***Scientific Practices in the Digital Age***

Dina Tsybulsky, Tel Aviv University  
Ilya Levin, Tel Aviv University

***K-8 Science and Mathematics Teachers' Nature of  
Engineering Understandings***

Allison Antink-Meyer, Illinois State University  
Anna Maria Arias, Illinois State University

***Developing a Questionnaire to Measure Students' Conceptions of the Nature of Technology***

Katrin Vaino, University of Tartu  
Toomas Vaino, University of Tartu  
Miia Rannikmae, University of Tartu

***Adapting and Reflecting: Elementary Teachers' and Students' NOS Explorations Associated with a Professional Development Program***

Bridget K. Mulvey, Kent State University  
Lucy Kulbago, Kent State University  
Eileen G. Merritt, West Arizona State University  
Jennifer Chiu, University of Virginia  
Randy L. Bell, Oregon State University

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## Plenary Session #2

***From Accumulating to Integrating Ideas: Technology Matters***

10:30am – 12:00pm, Peachtree Ballroom

**Presenter:** Marcia C. Linn, University of California, Berkeley

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## Awards Luncheon

**12:15pm – 2:15pm, Americas Mart Building 2 – 4th Floor**

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## Concurrent Session #8

**2:30pm – 4:00pm**

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### Equity and Ethics Committee

***Jhumki Basu Poster Symposium – Hear the Unheard: Voices in Science Education Research***

2:30pm – 4:00pm, Savannah A

**Presiders:**

Nam-Hwa Kang, Korea National University of Education  
Rekha B. Koul, Curtin University  
Sanghee Choi, University of North Georgia

***A Teachable Moment: Hidden Figures Articulation of African American Women in STEM***

Tara Nkrumah, University of South Florida

***Beyond Performance Metrics: Examining a Decrease in Students' Physics Self-efficacy through a Social Networks Lens***

Remy Dou, Florida International University

***If You're Willing to Silence Part of Yourself, Then You Can Probably Get the Same Access – Heteronormativity and Heterosexism in STEM: Exploring the Experiences of Gay Men in STEM Majors***

David Paul Steele, University of Georgia

***The Training Future Scientist Program Impact on Pre-service Teacher's Fears to Teach Science and Providing***

Rona Robinson-Hill, Ball State University

***Pre-service Science Teachers in Racially/Ethnically Diverse Classrooms***

Suzanna Roman, Georgia State University

***Science Education Students' use of Feedback with Struggling Students***

Heidi Cian, Clemson University

***The Effects of the Engineering Design on Student Learning in Science Classrooms***

Eunjeong Kim, University of Georgia

***Metrics of Success STEM Attitudes of Female Students of Color***

Felicia Leammukda, University of Minnesota

***The Role of Prior Research Experience and Other Related Experiences in Medical School Entry***

Devasmita Chakraverty, Washington State University

***Using Actor-Network Theory to Follow the Actors: Exploring a Culture of an Advanced Biology Classroom***

Sophia Jeong, University of Georgia

***Discursive Construction of STEM Participation and Identities in Promotional Videos***

Francesca A. White, Indiana University, Bloomington

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### Publications Advisory Committee

***Publishing In, and Reviewing For, The Journal of Research in Science Teaching***

2:30pm – 4:00pm, Augusta 1

**Presenters:**

Dana L. Zeidler, University of South Florida  
Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill

**Methods RIG Sponsored Session*****The Problem of Attrition in Large Scale Studies of Science Teacher Professional Development: Lessons Learned***

2:30pm – 4:00pm, Augusta D

**Presenters:**

Molly Stuhlsatz, BSCS  
 Deborah L. Hanuscin, Western Washington University  
 Joseph A. Taylor, BSCS  
 Joan I. Heller, Heller Research Associates  
 Okhee Lee, New York University  
 Sharon J. Lynch, George Washington University  
 Robert M. Talbot, University of Colorado Denver

**Strand 1: Science Learning, Understanding and Conceptual Change*****Scientific Literacy and Socio-Scientific Issues: The Role of Decision-Making and Epistemic Thinking***

2:30pm – 4:00pm, Augusta B

**Presider:** Lori Andersen, University of Kansas***A Framework for Quality Decision-making to Promote Science Literacy in a Postsecondary Classroom Setting***

Jenny M. Dauer, University of Nebraska, Lincoln  
 Ashley R. Alred, University of Nebraska, Lincoln

***Characterizing the Epistemic Role of Aims in Science Engagement for Socio-Scientific Sustainability***

John R. Ruppert, Saint Peter's University  
 Paul Bartlett, Saint Peter's University  
 Ricardo Pereira, Saint Peter's University  
 Matthew Hankins, Saint Peter's University  
 Masiel Infante, Saint Peter's University

***Encouraging Science Literate Students: Applying Scientific Evidence When Solving Socio-Scientific Issues Using a Decision-Making Tool***

P. Citlally Jimenez, University of Nebraska, Lincoln  
 Jenny M. Dauer, University of Nebraska, Lincoln

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Promoting Secondary Students' Modeling Practice Using an Online Modeling Tool***

2:30pm – 4:00pm, Savannah B

**Presider:** Joseph S. Krajcik, Michigan State University**Discussant:** Christina Schwarz, Michigan State University***Building Models: Developing Students' Modeling Practice***

Tom Bielik, Michigan State University  
 Li Ke, Michigan State University

***Using an Online Modeling Tool to Develop Students' Modeling Knowledge***

Lynn Stephens, University of Massachusetts

***The Added Value of Technology in Scaffolding Students' Learning and Modeling Practices***

Irene S. Bayer, Michigan State University  
 Idit Adler, Michigan State University  
 Jane J. Lee, Michigan State University  
 Joshua Meyer, University of Michigan  
 Elliot Soloway, University of Michigan

***Linking Agent-Based and Systems Dynamics Modeling Practices***

Carolyn Staudt, Concord Consortium  
 Hee Sun Lee, Concord Consortium

***Social and Emotional Experiences of Students Using an Online Modeling Tool***

Christopher Klager, Michigan State University  
 Richard A. Chester, Michigan State University  
 Israel Toutou, Michigan State University

**Strand 3: Science Teaching – Primary School (Grades preK-6): Characteristics and Strategies Supporting Scientific Modeling in the Elementary Classroom**

2:30pm – 4:00pm, Augusta 3

**Presider:** Sara P. Raven, Texas A&M University***Developing 3rd Grade students' Understanding of Inheritance using a Model-based Curriculum***

Devarati Bhattacharya, University of Nebraska  
 Cory T. Forbes, University of Nebraska, Lincoln  
 Erin Ingram, University of Nebraska, Lincoln  
 Leslie Hawley, University of Nebraska, Lincoln  
 Jared Stevans, University of Nebraska, Lincoln  
 Dante Cisterna, University of Nebraska, Lincoln

***Development of an Empirically Grounded Learning Performance Framework for Elementary Students' Modeling Competency of Water***

Florian Böschl, University of Leipzig  
 Tina Vo, University of Nebraska, Lincoln  
 Cory T. Forbes, University of Nebraska, Lincoln  
 Kim Lange-Schubert, University of Leipzig

***Exploring Elementary Teachers' Understanding of Modeling and Socio-Scientific Issues with Model-Oriented Issue-Based Teaching***

Jaimie Foulk, University of Missouri  
Laura Zangori, University of Missouri  
Troy Sadler, University of Missouri

***The Selection and Use of Visual Models for Teaching Systems Science***

Tammy D. Lee, East Carolina University  
M. Gail Jones, North Carolina State University  
Bonnie B. Glass, East Carolina University  
Katherine Chesnutt, North Carolina State University

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

2:30pm – 4:00pm, Augusta H

**President:** Karen Sokolov, Bar-Ilan University

***A Comparative Study of the Impacts of Two Active Learning Methods in High School Biology***

Grant E. Gardner, Middle Tennessee State University  
Jennifer C. Parrish, University of Northern Colorado  
Thomas Cheatham, Middle Tennessee State University

***Development and application of a Case-Based Reasoning Instructional Model on Climate Change Topics***

Hyoungbum Kim, Chungbuk National University

***Influences on Urban Science Teachers' Implementation of Literacy: Three Case Studies***

Michelle R. Eades-Baird, State University of New York, Empire State College  
Xiufeng Liu, University at Buffalo, SUNY  
H. Emily Hayden, Iowa State University

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

***Equity and Ethics***

2:30pm – 4:00pm, Augusta F

**President:** Zahra Hazari, Florida International University

***Faith in Science? The Role of Spirituality in Black Women's STEM Identity Development and Retention***

Terrell R. Morton, University of Missouri, Columbia

***Group Gender Composition Predicts Student Engagement in an Undergraduate Biology Class for Non-Majors***

Jonathan Andicoechea, University of Minnesota  
Sehoya Cotner, University of Minnesota  
Cissy Ballen, University of Minnesota

***Improving Classroom Community in an Introductory Engineering Classroom through Targeted Micro-Interventions***

Ron Gray, Northern Arizona University  
Robin Tuchscherer, Northern Arizona University  
Christine A. Gray, Northern Arizona University

***The Impact of Peer Assisted Learning on STEM Equity and Student Success***

Jennifer Lundmark, California State University, Sacramento  
Joel Schwartz, California State University, Sacramento  
Lynn M. Tashiro, California State University, Sacramento

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

***Physics***

2:30pm – 4:00pm, Augusta E

**President:** Sebastian Szyjka, Western Illinois University

***Increasing Motivation by Focusing on School-Related Content Knowledge in University Physics Courses***

Joost Massolt, University of Potsdam  
Andreas Borowski, University of Potsdam

***Modeling and Development of Professional Content Knowledge of Pre-service Physics Teachers***

Patrick Enkrott, University of Potsdam  
David Buschhüter, University of Potsdam  
Andreas Borowski, University of Potsdam

***Recruiting Future Physics Teachers through a Field-based Summer Enrichment Program***

Lauren Madden, The College of New Jersey  
Marissa Bellino, City University of New York  
AJ Richards, The College of New Jersey  
Nathan Magee, The College of New Jersey  
Melissa Chessler, The College of New Jersey

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

***Improving Science Teacher Education through Leadership, Coaching, and Analysis of Practice***

2:30pm – 4:00pm, Augusta C

**President:** Tamara Holmlund, Washington State University, Vancouver

***Analysis of Effective Science Coaching: What, Why, and How***

Gwen Nugent, University of Nebraska  
Gina Kunz, University of Nebraska  
James A. Houston, University of Nebraska, Lincoln  
LinLin Luo, University of Nebraska, Lincoln  
Danae Peterson, University of Nebraska, Lincoln  
Sonia Linder, University of Nebraska, Lincoln

***Sustainable Video-based, Analysis-of-Practice Science PD in a High-Needs District: Year 1 Teacher and Student Learning Results***

Paul M. Beardsley, California State Polytechnic University, Pomona  
Kathleen J. Roth, Cal Poly Pomona Foundation  
John A Caine, California State Polytechnic University, Pomona  
Nicole Wickler, California State Polytechnic University, Pomona

***The Role of Teacher Leadership in Implementing STEM Education***

Tamara D. Holmlund, Washington State University  
Kristin S. Huggins, Washington State University

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**Strand 9: Reflective Practice**

***Improving Teacher Education and Development***

2:30pm – 4:00pm, Savannah C

**President:** Lana Minshew, University of North Carolina, Chapel Hill

***Being and Becoming Science Education Professional Developers: A Co-Autoethnographic Examination***

Christina Siry, University of Luxembourg  
Kerstin Te Heesen, University of Luxembourg  
Sara Wilmes, University of Luxembourg  
Nora Kneip, University of Luxembourg  
Sandy Heinericy, University of Luxembourg

***Educational Research Experience as Means to Bridge STEM Teacher Preparation Pipeline and Teacher Preparation Program***

Shannon H. Sung, Assistant Professor, Spelman College  
N'sou Hoba, Graduating Senior, Spelman College

***Fostering Teacher Educators' Professional Development Through Collaborative Action Research***

Kader Bilican, Ataturk University  
Mehmet Aydeniz, University of Tennessee  
Burcu Senler, Mugla University  
Dilek Karisan, Adnan Menderes University

***Looking Inside the Classroom: Formative Assessment Practices in Physics Classroom***

Hye-Eun Chu, Macquarie University  
Kok Siang Tan, National Institute of Education Singapore

***Utilizing the EQuIP Rubric as a Tool for Teachers to Reflect on their own Science Lessons***

Kimberly A. Lebak, Stockton University  
Stacey Culleney, Stockton University

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

***Symposium – Youth Leadership and Activism in/across STEM Learning Spaces***

2:30pm – 4:00pm, Chastain J

**President:** Day W. Greenberg, Michigan State University

**Presenters:**

Day W. Greenberg, Michigan State University  
Angela Calabrese Barton, Michigan State University  
Marcos González, Michigan State University  
Christina Restrepo Nazar, Michigan State University  
Kathleen A. Schenkel, Michigan State University  
Sarah Keenan, Michigan State University  
Autumn McDaniel, GET City Program, Boys and Girls Club  
Stephen Harden, GET City Program, Boys and Girls Club  
Frankie Calabrese Barton, GET City Program, Boys and Girls Club

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**Strand 12: Educational Technology**

***In-service Teachers***

2:30pm – 4:00pm, Augusta A

**President:** Tasneem Anwar, University of Minnesota

***E-Learning Platform for Science Inquiry: Primary Teachers' Pedagogical Practices and the Underlying Factors***

Wing Mui Winnie So, The Education University of Hong Kong  
Yu Chen, The Education University of Hong Kong

***Integration of Learning Technologies: Results from a Multiple Case Study of Eight Biology Teachers***

Dionysius T. Gnanakkan, Illinois Institute of Technology  
Norman G. Lederman, Illinois Institute of Technology  
Judith S. Lederman, Illinois Institute of Technology

***What do Teachers Say? Exploring Teachers Experience in Computer-Based Science Instruction***

Lu Wang, University of Georgia  
Georgia Hodges, University of Georgia

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**Strand 14: Environmental Education**

***Patterns in the Wild: Fieldwork and Observations***

2:30pm – 4:00pm, Augusta 2

**President:** Christopher Schaunberg, Colorado State University

***Disciplining the Wild: The Co-Development of Students' Scientific Knowledge and Practice During Ecological Fieldwork***

Michelle Forsythe, Texas State University

***Moving from Exploring Patterns to Causal Explanations  
in Ecosystems Science Reasoning***

Tina Grotzer, Harvard University  
Emily Gonzalez, Project Zero  
Amy M. Kamarainen, Harvard University  
Shari J. Metcalf, Harvard University  
Chris Dede, Harvard University

***Place-based Environmental Education through the  
Scientific Observation of Birds: Reflections from a  
Bedouin Student's Perspective***

Wisam Sedawi, Ben-Gurion University of the Negev, Israel  
Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev, Israel  
Michael J. Reiss, University of London

***The Role of Naming and Botanical Vocabulary in Students'  
Ability to Observe Neighborhood Trees***

Yael Wyner, City College of New York  
Jennifer H. Doherty, University of Washington

**Strand 15: Policy**

***STEM and Sustainability Education Reforms***

2:30pm – 4:00pm, Chastain 1

**Presider:** Sharon J. Lynch, George Washington University

***Taking Stock of Oregon STEM Hubs: Accomplishments  
and Challenges***

Martin Storksdieck, Oregon State University  
Kari O'Connell, Oregon State University  
Brianna Keys, Oregon State University

***STEM Education Centers: Promoting Educational Reform  
through Research and Translation across Boundaries***

Deborah L. Carlisle, University of Massachusetts, Amherst  
Gabriela C. Weaver, University of Massachusetts, Amherst  
Kacy Redd, Association of Public Land Grant Universities

***Teacher Generated Models of STEM Integration  
When Prescribed Standardized Curricula is Present***

Justine Kim, University of Minnesota  
Gillian Roehrig, University of Minnesota  
Julie C. Brown, University of Minnesota

***From Science Teaching to "Know" to Trans-disciplinary  
Learning to "Think" for Sustainability in Multicultural Societies***

Uri Zoller, Haifa University, Oranim

**Concurrent Session #9**

**4:15pm – 5:45pm**

**Administrative Symposium**

***Learn about Elections and Get Involved!***

4:15pm – 5:45pm, Savannah A

**Presenters:**

Malcolm B. Butler, University of Central Florida  
Marcelle Siegel, University of Missouri, Columbia  
Saouma BouJaoude, American University, Beirut  
Rola Khishfe, American University, Beirut  
Ravinder Koul, Pennsylvania State University  
Norman G. Lederman, Illinois Institute of Technology  
Amber C. Sizemore, University of Michigan  
Leon Walls, University of Vermont  
Eileen Carlton Parsons, University of North Carolina, Chapel Hill  
Mei-Hung Chiu, National Taiwan Normal University

**Strand 1: Science Learning, Understanding and  
Conceptual Change**

***Cross-Cutting Concepts in Science: Energy and Systems***

4:15pm – 5:45pm, Savannah B

**Presider:** Amanda Glaze, Georgia Southern University

***Building an Integrated Understanding of Energy In Middle  
School around the Idea of Energy Transfers***

Marcus Kubsch, Leibniz Institute for Science Education (IPN) Kiel  
Jeffrey Nordine, Leibniz Institute for Science Education (IPN) Kiel

***Energy for Future Scientists***

Shahar Abramovitch, Weizmann Institute of Science  
David L. Fortus, Weizmann Institute of Science

***The Role of Systems-Oriented Approach in Promoting Students'  
Systems Understanding of Environmental Issues***

Narmin Ghalichi, University of Minnesota  
Anita Schuchardt, University of Minnesota  
Gillian Roehrig, University of Minnesota

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

***Instructional Interventions***

4:15pm – 5:45pm, Savannah C

**Presider:** Deb Morrison, University of Washington

***Investigating the Potential Effects of Living-Learning Communities on Motivational Support in College Biology Courses***

Stephen C. Scogin, Hope College  
Michelle Austin, Hope College  
Katie Rietberg, Hope College  
Cindy Alexander, Hope College

***Scaffolding Students When Constructing Models of Phenomena in a Project-Based Learning Environment***

Idit Adler, Michigan State University  
Irene S. Bayer, Michigan State University  
Jane J. Lee, Michigan State University  
Joseph S. Krajcik, Michigan State University

***Tracing Students' Evolving Embodied Conceptions of Heat Transfer: Implications for Designing Dynamic Computer Simulations***

Nitasha Mathayas, University of Illinois, Urbana-Champaign  
David E. Brown, University of Illinois  
Robb Lindgren, University of Illinois, Urbana-Champaign

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

***Investigating Novice Teachers' Practice***

4:15pm – 5:45pm, Augusta H

**President:** Gloria Gajewicz, Bowling Green High School

***Bonding Ideas about Inquiry: Exploring Knowledge and Practices of Metacognition in Beginning Secondary Science Teachers***

Ana Margarita Rivero, University of Nebraska, Lincoln  
Elizabeth B. Lewis, University of Nebraska, Lincoln

***Crossing the Border: First Year Science Teachers' Experiences Teaching Science as Inquiry***

Jeanette Bartley, University of Chicago

***Factors Affecting the Enactment of High-Leverage Teaching Practices Among Novice Science Teachers***

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

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

***Student Knowledge and Understanding***

4:15pm – 5:45pm, Augusta F

**President:** Ryan Coker, Florida State University

***College Students' Cognitive Processes in Two Writing Tasks: Understanding Resources and Demands for Scientific Literacy***

Sae Yeol Yoon, Delaware State University  
Brian M. Hand, University of Iowa  
Richard Lamb, University at Buffalo, SUNY

***Protein X Structure and Function: How Undergraduate Students Solve a Well-Defined Biochemistry Problem***

Stephanie M. Halmo  
Kush S. Bhatia  
Alexandra Howell  
Ersta P. Ferryanto  
Bryant Choe  
Cheryl A. Sensibaugh  
Kaitlin P. Kehoe  
Morgan Watson  
Paula P. Lemons

***Students' Mathematical Performance on Simultaneous Synthesis Physics Problems with Varying Mathematical Complexity***

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

***The Importance of Prior Knowledge in General Chemistry for Content Knowledge Acquisition of Chemistry Freshmen***

Daniel Averbeck, University of Duisburg-Essen  
Eckart Hasselbrink, University of Duisburg-Essen  
Elke Sumfleth, University of Duisburg-Essen

***Understanding Undergraduates' Meaning Making through Reflective Disequilibria in a Science-focused Service-learning Course***

Gretchen P. King, University of Nebraska, Lincoln  
Deborah J. Tippins, University of Georgia

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

***Cooperative Grouping***

4:15pm – 5:45pm, Augusta B

**President:** Anna S. Grinath, Middle Tennessee State University

***Considering Peer Ideas: Relationships between Student Trust, Credibility, and Performance during Group Learning***

Kate Juergens, Washington State University  
Zachary Coleman, Washington State University  
Joshua Premo, Washington State University  
William B. Davis, Washington State University  
Andy Cavagnetto, Washington State University

***Do They Like it or Not? Student Motivation From and Resistance to Active Learning***

David C. Owens, University of Missouri  
Troy D. Sadler, University of Missouri  
Angela T. Barlow, University of Central Arkansas  
Cindi Smith-Walters, Middle Tennessee State University

***Social CUREs: Optimizing Student Interactions to Promote Richer Collaborative Engagement in Course-based Undergraduate Research Experiences***

Joshua Premo, Washington State University  
Andy Cavagnetto, Washington State University  
William B. Davis, Washington State University

***Student Collaborative Engagement and Group Achievement within a Cooperative Course-based Undergraduate Research Experience***

Joshua Premo, Washington State University  
William B. Davis, Washington State University

***Strand 6: Science Learning in Informal Contexts Forging Career Pathways through Informal STEM Learning Experiences***

4:15pm – 5:45pm, Augusta 3

**President:** Georgia S. Hall, Wellesley College

***Talking Science: Experiences that Predict STEM Identity and Career Goals***

Remy Dou, Florida International University  
Zahra Hazari, Florida International University  
Katherine P. Dabney, Virginia Commonwealth University  
Philip M. Sadler, Harvard Smithsonian  
Gerhard Sonnert, Harvard Smithsonian

***Identity-forming Recognition in Informal and Formal Science Learning Experiences***

Brianna S. Benedict, Purdue University  
Allison Godwin, Purdue University

***Using Cogenerative Dialogues to Identify and Address Challenges That Occur in High School Students' Science Internships***

Pei-Ling Hsu, University of Texas, El Paso

***Examining Youth Pathways using Social Network Theory and Analysis***

Timothy Podkul, SRI International  
Preeti Gupta, American Museum of Natural History  
Rachel L. Chaffee, American Museum of Natural History  
Karen Hammerness, American Museum of Natural History

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

***Core Practices***

4:15pm – 5:45pm, Augusta D

**President:** Tamara Holmlund, Washington State University, Vancouver

***Characterizing Sense-making Conversations of Elementary Science Teacher Candidates***

Meenakshi Sharma, Michigan State University  
Christina V. Schwarz, Michigan State University

***Connecting the Dots: Secondary Science Teacher Candidates' Uptake of Facilitating Discussions from Teacher Education Experiences***

Matthew Kloser, University of Notre Dame  
Matthew Wilsey, University of Notre Dame  
Tia C. Madkins, University of Texas at Austin  
Mark Windschitl, University of Washington  
Andrea Wells  
Elizabeth A. Davis, University of Michigan  
Janet Carlson, Stanford University

***Developing Practices in a 'CoLABorative' Setting: Pre-service Teachers' Progress in Noticing and Interpreting Student Ideas***

Julie A. Birt, University of Missouri  
Dante Cisterna, University of Nebraska, Lincoln

***Development of Science Classroom Discourse During the Student Teaching Year***

Heidi Cian, Clemson University  
Michelle P. Cook, Clemson University

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

4:15pm – 5:45pm, Augusta E

**President:** Meredith Thompson, Massachusetts Institute of Technology

***Exploring Core Teaching Practices: A Case Study of a New Teacher in a High-needs School***

Elaine V. Howes, American Museum of Natural History Richard Gilder Graduate School  
Jamie Wallace, American Museum of Natural History, Education Department

***Pre-service Teachers' Noticing of Instances for Revision During Rehearsals: A Comparison Across Three University Contexts***

Amanda Benedict-Chambers, Missouri State University  
Anna Maria Arias, Illinois State University  
Sarah J. Fick, Wake Forest University

***Profession Noticing Unmasked: Factors Influencing the Selective Noticing of Science Teachers***

Michelle Forsythe, Texas State University

***Using a Video-based Approach to Investigate Pre-service Science Teachers' Situation-specific Skills for Informal Formative Assessment***

Dirac Lam, The University of Hong Kong

Kennedy Chan, The University of Hong Kong

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

4:15pm – 5:45pm, Augusta C

**President:** Nuri Balta, Almaty Management University***Teacher Professional Development in Inquiry Science: Gains Re-Examined After Three Years***

Joanna Philippoff, University of Hawaii, Manoa

***The Impact of a Short-Term Follow-up PD over a Prior PD on Secondary Science Teachers' Inquiry-Based Science Instruction in Rural Schools***

SoonChun Lee, Wichita State University

***Turkish Middle School Science Teachers' Pedagogical Orientations towards Direct and Inquiry Instructional Approaches***

Selcuk Sahingoz, Western Michigan University

William W. Cobern, Western Michigan University

**Strand 10: Curriculum, Evaluation, and Assessment*****Promoting Science Literacy through STEM Integration***

4:15pm – 5:45pm, Augusta 1

**Discussant:** Brenda Capobianco, Purdue University***Integrating Middle School STEM in Practice: Constraints to the Nature & Scope***

Marion Usselman, Georgia Institute of Technology

Mike Ryan, Georgia Institute of Technology

Meltem Alemdar, Georgia Institute of Technology

***Science Modules Designed to Serve STEM Integration and NGSS***

Mike Ryan, Georgia Institute of Technology

Marion Usselman, Georgia Institute of Technology

Meltem Alemdar, Georgia Institute of Technology

Sabrina Grossman, Georgia Institute of Technology

Jayma Koval, Georgia Institute of Technology

Brenda M. Capobianco, Purdue University

***Science Integration in a Middle School Engineering Course***

Meltem Alemdar, Georgia Institute of Technology

Jessica Gale, Georgia Institute of Technology

Sunni Newton, Georgia Institute of Technology

Jeremy Lingle, Georgia Institute of Technology

Jeff Rosen, Georgia Institute of Technology

Roxanne A. Moore, Georgia Institute of Technology

Brenda M. Capobianco, Purdue University

***Exploring Curriculum Implementation Using Self-Report Enactment Checklists***

Jessica Gale, Georgia Institute of Technology

Sabrina Grossman, Georgia Institute of Technology

Mike Ryan, Georgia Institute of Technology

Sunni Newton, Georgia Institute of Technology

Marion Usselman, Georgia Institute of Technology

Brenda M. Capobianco, Purdue University

**Strand 11: Cultural, Social, and Gender Issues*****Ways of Knowing***

4:15pm – 5:45pm, Chastain J

**President:** Enrique Suarez, University of Colorado, Boulder***College Students' Perceptions of Socio-Ecological Systems in a Multicultural Society Context***

Adiv Gal, Kibbutzim College

Dafna Gan, Seminar Hakibuzim – Northeastern University

***Indigenous ways of Knowing, Being, and Doing in Canadian Science and Mathematics Teaching and Learning***

Dawn Wiseman, McGill University

Florence A Glanfield, University of Alberta

Lisa Lunney Borden, St. Francis Xavier University

Alexandre Soares Cavalcante, McGill University

Ellen Carter, St. Francis Xavier University

Rebecca Clancey, St. Francis Xavier University

Katy Grosicki, St. Francis Xavier University

Eun-Ji A. Kim, McGill University

Simon Sylliboy, St. Francis Xavier University

Christine Wiebe Buchanan, University of Alberta

***Rasch Analysis of Survey on Teaching Science to K-12 Students with Disabilities***

Anna R. Lewis, La Pontificia Universidad Católica del Perú

William S. Lang, University of South Florida

***Science in Silence: How Educators of the Deaf and Hard-of-Hearing Teach Science***

Sara P. Raven, Texas A&amp;M University

Gretchen Whitman, Kent State University

**Strand 12: Educational Technology*****Observation and Assessment***

4:15pm – 5:45pm, Chastain 1

**President:** Dionysius T. Gnanakkan, Illinois Institute of Technology***Mind the Gap: Reviewing Measures of Quality and Technology Use In Classroom Observation Protocols***

Cathlyn Stylinski, University of Maryland

Jacqueline DeLisi, Education Development Center, Inc.

Joseph Wong, Education Development Center, Inc.

Christina Bonney, Education Development Center, Inc.

Caroline Parker, Education Development Center, Inc.

***Peer Assessment in a Project-based Engineering Course: Comparing between On-campus, SPOC, and MOOC Learners***

Maya Usher, Technion, Israel Institute of Technology

Miri Barak, Technion, Israel Institute of Technology

***Using Eye-tracking Technology to Investigate Cognitive Load Theory***

Tianlong Zu, Purdue University

John Hutson, Kansas State University

Lester C. Loschky, Kansas State University

N. Sanjay Rebello, Purdue University

**Strand 13: History, Philosophy, Sociology, and Nature of Science*****Nature of Science and Pre-service Teachers***

4:15pm – 5:45pm, Augusta 2

**President:** Kamisah Osman, Universiti Kebangsaan Malaysia***Pre-service Special Education Teachers' Nature of Science Conceptions and Related Experiences***

Mila Rosa L. Librea-Carden, Kent State University

Bridget K. Mulvey, Kent State University

Tanzimul Ferdous, Kent State University

***A Typology of Pre-service Elementary School Teachers' Relationships with Scientific Experts***

Audrey Groleau, Université du Québec à Trois-Rivières

Chantal Pouliot, Université Laval

***From Traditional to Contemporary Aspects of NOS: Trainee Science Teachers' Perceptions on Economics and Entrepreneurship***

Sila Kaya, University of Limerick

Naomi Birdthistle, Assoc. Prof Dr.

Sibel Erduran, University of Oxford

***A Document Analysis of Online Curricula for Teaching Human Evolution in K-12 Science Education***

Rebecca Hite, Texas Tech University

Kristopher J. Childs, Texas Tech University

Elizabeth Kirman, Texas Tech University

**Evening/Social Events*****Equity and Ethics Committee Sponsored Outing Equity Dinner (Maximum Attendance: 70)***

6:30pm – 9:00pm, Off-Site

Braves All Star Grill

200 Peachtree St. NW

Atlanta, GA

Telephone: 404-205-5257

***Dinner, including tax and gratuity, is \$53.10.******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, March 13, 2018**

## Conference Registration

### 7:00am – 12:00pm, The Overlook

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## 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, Savannah A

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

Meeting—7:00am – 8:15am, Savannah B

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

Meeting—7:00am – 8:15am, Savannah C

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

Meeting—7:00am – 8:15am, Augusta 1

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

Meeting—7:00am – 8:15am, Augusta 2

#### **Strand 6: Science Learning in Informal Contexts**

Meeting—7:00am – 8:15am, Augusta 3

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

Meeting—7:00am – 8:15am, Chastain 1

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

Meeting—7:00am – 8:15am, Augusta A

#### **Strand 9: Reflective Practice**

Meeting—7:00am – 8:15am, Augusta B

#### **Strand 10: Curriculum, Evaluation, and Assessment**

Meeting—7:00am – 8:15am, Augusta C

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

Meeting—7:00am – 8:15am, Augusta D

#### **Strand 12: Educational Technology**

Meeting—7:00am – 8:15am, Augusta E

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

Meeting—7:00am – 8:15am, Augusta F

#### **Strand 14: Environmental Education**

Meeting—7:00am – 8:15am, Augusta G

#### **Strand 15: Policy**

Meeting—7:00am – 8:15am, Augusta H

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## Concurrent Session #10

### 8:30am – 10:00am

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#### **Research Committee**

#### ***Symposium – Research Interest Groups (RIGs) and NARST***

8:30am – 10:00am, Savannah C

**President:** Maria Rivera Maulucci, Barnard College

#### **Presenters:**

Carolyn A. Parker, American University

Phillip A. Boda, Stanford University

Ling L. Liang, La Salle University

Kelsey Lipsitz, University of Missouri

Mary M. Atwater, University of Georgia

Leon Walls, University of Vermont

Irasema Ortega, University of Alaska, Anchorage

Femi S. Otulaja, University of the Witwatersrand

Fatima Elvira Terrazas Arellanes, University of Oregon

Cathy P. Lachapelle, Museum of Science

Leanne M. Avery, SUNY Oneonta

Robert M. Talbot, University of Colorado

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#### **Strand 1: Science Learning, Understanding and Conceptual Change**

#### ***The Role of Content Knowledge in Science Learning***

8:30am – 10:00am, Augusta A

**President:** May Lee, Michigan State University

#### ***Challenges in Representing 3-D Knowledge: Cases of Different Knowledge from the Same Time***

Sarah J. Fick, Wake Forest University

***Designing Computer Games about Climate Change:******Assessing Students' Content Knowledge***

Michael Cassidy, TERC

Gillian Puttick, TERC

Eli Tucker-Raymond, TERC

Rena Stroud, TERC

Jackie Barnes, Northeastern

Casper Hartevelde, Northeastern

Gillian Smith, Worcester Polytechnic Institute

Amy Hoover, Northeastern

***Sports Experiences as Funds of Knowledge for Science:******College Students' Ideas about Science in Sports***

Lisa A. Borgerding, Kent State University

Fatma Kaya, Kent State University

Mila Rosa Librea, Kent State University

Davida Buehler, Kent State University

Jaren Maybin, Kent State University

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**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Student Reasoning and Explanations***

8:30am – 10:00am, Chastain 1

**President:** Laura M. Crowe, Auburn City Schools/Auburn University***A Mixed Methods Comparison of Elementary Students'******Model Based Explanations about Water***

Tina Vo, University of Nebraska, Lincoln

Cory T. Forbes, University of Nebraska, Lincoln

***Argumentation in Elementary Science Classroom***

Qingna Jin, University of Alberta

Mijung Kim, University of Alberta

***The Importance of Interviewing Elementary-Grade Students When Using Scientific Modeling to Assess Conceptual Understanding***

Meredith B. Marcum, University of Michigan

Annemarie Palincsar, University of Michigan

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**Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies*****Investigating Students' Argumentation Practice***

8:30am – 10:00am, Augusta H

**President:** James B. Hancock, Michigan State University***Effects of the Argument-Driven Inquiry on High School Students' Self-Efficacy and Perceptions about Inquiry and Laboratory Skills***

Guluzar Eymur, Giresun University

***Teaching Science through an Immersive Augment-Based Inquiry: Results of a Three-Year Professional Development Program***

Jee Kyung Suh, University of Alabama

Yejun Bae, University of Iowa

Soonhye Park, North Carolina State University

Brian M. Hand, University of Iowa

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

8:30am – 10:00am, Savannah B

**President:** Rebecca L. Matz, Michigan State University***Chemistry Teaching Assistants' Beliefs about Project-Based Guided Inquiry Instruction***

Alexis A. Rutt, University of Virginia

Frackson Mumba, University of Virginia

Laura K. Ochs, University of Virginia

Vivien Chabalengula, University of Virginia

***Faculty Conceptions of Student Learning during Engagement in Different Professional Development Programs***

Robert Idsardi, University of Georgia

Jenna L. Wingfield, University of Georgia

Blake Whitt, University of Georgia

Paola Barriga, University of Georgia

Jason Lang, University of North Georgia

Julie A. Luft, University of Georgia

***Science Faculty Perspectives on the Discipline-Specific Academic Needs of Summer Bridge Students***

Angela Google, Middle Tennessee State University

***University Teachers' Expectations on STEM Freshmen's Mathematical Knowledge and Skills***

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

Christoph Pigge, Leibniz Institute for Science Education (IPN) Kiel

Aiso Heinze, Leibniz Institute for Science Education (IPN) Kiel

***Chemists' and Chemical Engineers' Perceptions of Chemistry-Related Careers in Industry***

Zehavit Kohen, Technion, Israel Institute of Technology  
Or Shav-Artza, Technion, Israel Institute of Technology  
Ortal Nitzan-Tamar, Technion, Israel Institute of Technology  
Yehudit Judy Dori, Technion, Israel Institute of Technology

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

***Laboratory Science***

8:30am – 10:00am, Augusta F

**President:** Idaykis Rodriguez, Florida International University

***Creating Usable Engineering Design Challenges for General Chemistry Lab***

Kent J. Crippen, University of Florida  
Lorelie Imperial, University of Florida  
Corey A. Payne, University of Florida  
Maria D. Korolev, University of Florida  
Phil J. Brucat, University of Florida  
Chang-Yu Wu, University of Florida

***Designing and Implementing an Engineering Design Unit in a Physics Course for Pre-service Elementary Teachers***

Yuri B. Piedrahita, Purdue University  
Jeffrey W. Murray, Purdue University  
Brenda M. Capobianco, Purdue University  
N. Sanjay Rebello, Purdue University

***Principles to Fostering Critical Thinking in an Undergraduate Chemistry Practical Course***

Lilian Dania, Humboldt-Universität Zu Berlin  
Jenna Koenen, Universität Hamburg  
Rüdiger Tiemann, Humboldt-Universität Zu Berlin

**Strand 6: Science Learning in Informal Contexts Supporting Family Learning: Museums, Libraries, and Everyday Experiences**

8:30am – 10:00am, Augusta B

**President:** Sue Allen, Maine Mathematics and Science Alliance

***Engineering in Early Childhood: Describing Family-Level Interest Development Systems***

Scott A. Pattison, Institute for Learning Innovation  
Pam Corrie, Mt. Hood Community College Head Start  
Gina N. Svarovsky, University of Notre Dame  
Marcie Benne, Oregon Museum of Science and Industry  
Shannon Weiss, Oregon Museum of Science and Industry  
Verónica Nuñez, Oregon Museum of Science and Industry

***Families' Shared Inventing: Using Prototyping Technology to Learn Engineering Design in the Library***

Heather Toomey Zimmerman, Pennsylvania State University  
Soo Hyeon Kim, Pennsylvania State University  
Michele Crowl, Pennsylvania State University

***How Scientists use Questions to Engage Families in Personally-relevant Learning during Science-themed Workshops***

Lucy R. McClain, Pennsylvania State University  
Torri H. Withrow, Pennsylvania State University  
Heather Toomey Zimmerman, Pennsylvania State University

***Ocean Data Visualization on a Touch-Interactive Tabletop Promotes Group Engagement with Science Content and Practices***

Carrie Schuman, University of Florida  
Kathryn Stofer, University of Florida  
Annie Luc, University of Florida  
Nikita Soni, University of Florida  
Alice Darrow, University of Florida  
Lisa Anthony, University of Florida  
Brittani Kirkland, University of Florida  
Amanda Morales, University of Florida  
Jeremy Alexandre, Brooklyn College/University of Florida

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

***Inquiry***

8:30am – 10:00am, Augusta D

**President:** Baoling Sun, Tianjin Normal University

***A Case Study of Elementary Pre-service Teachers: Field and Course Disconnection with Use of Inquiry***

Stacey Sneed, Texas Tech University  
Jianlan Wang, Texas Tech University  
Chen Wang, Texas Tech University

***Characterizing Science Practices in an Inquiry-Oriented Chemistry Labs***

Suna Ryu, Korea National University of Education  
Youngmin Kim, Korea National University of Education  
Heontae Sim, Korea National University of Education

***Phenomena to Promote Scientific Literacy: Pre-service Teacher******Data Informing Instruction in Science Methods Courses***

Michelle L. Sinapuelas, California State University, East Bay  
 Meredith Houle Vaughn, San Diego State University  
 Lin Xiang, Department of Biology, University of Kentucky  
 Donna L. Ross, San Diego State University  
 Larry Horvath, University of California, Davis  
 Corinne H. Lardy, California State University, East Bay  
 Michele Korb, California State University, East Bay  
 Rachelle DiStefano, California State University, East Bay

***Pre-service Biology Teachers' Conceptions of Controls in Experiments***

Bianca Reinisch, Freie Universität Berlin  
 Sabrina Mathesius, Freie Universität Berlin  
 Dirk Krüger, Freie Universität Berlin

**Strand 7: Pre-service Science Teacher Education*****Socio-Scientific Issues***

8:30am – 10:00am, Augusta E

**President:** Augusto Z. Macalalag, Arcadia University

***Case-Based Learning for Prospective Elementary Teachers' Conceptualization of Socio-Scientific Issues and Socio-Scientific Issue-Based Teaching***

Mutlu Sen, Bogazici University  
 Sophia (Sun Kyung) Jeong, University of Georgia  
 Deborah J. Tippins, University of Georgia  
 Janette R. Hill, University of Georgia

***Psychological Distances to Three Socio-Scientific Issues and their Connections to Enjoyment and Perceived Behavioral Control when Teaching***

Alexander G. Buessing, Osnabrueck University  
 Maike Schleper, Osnabrueck University  
 Susanne Menzel, Osnabrueck University

***The Effect of Attitudes and Media Literacy on Pre-service Teachers' Informal Reasoning about Hydroelectric Power***

Bahadır Namdar, Recep Tayyip Erdogan University  
 Burak Aydn, Recep Tayyip Erdogan University  
 Sara P. Raven, Texas A&M University

***The Effects of Socio-Scientific Issues-Based Instruction on Pre-service Science Teachers' Genetics Knowledge and Socio-Scientific Reasoning***

Mustafa S. Topcu, Yildiz Technical University  
 Emine Sarikaya, Yildiz Technical University

**Strand 8: In-service Science Teacher Education*****Novel Models of Science Teacher Professional Development***

8:30am – 10:00am, Augusta C

**President:** Lillian H. Degand, Illinois Institute of Technology

***A Novel Model for Professional Development in Project-Based Learning, Evaluated***

Katie Green, North Carolina State University  
 Cesar Delgado, North Carolina State University

***Assessing the Impact of a Professional Development Program on Teacher Implementation of the ASSIST Approach***

Mark A. McDermott, University of Iowa  
 Kathleen Weiss, University of Iowa  
 Nathan Quarderer, Northeast Iowa Community College  
 Lillie Durow, University of Iowa

***Using Self-Efficacy to Gauge the Effects of Teacher Professional Development and for a Sustainable Impact***

Robert H. Evans, University of Copenhagen  
 Jesper Bruun

**Strand 8: In-service Science Teacher Education*****Teacher Efficacy Related to Modeling Instruction and Engineering***

8:30am – 10:00am, Augusta G

**President:** Malcolm S. Pringle, The Bay School of San Francisco

***Challenges to Teachers' Implementation of Inquiry Strategies in the Physics Classroom***

Nidaa Makki, The University of Akron  
 Kristin L. Koskey, The University of Akron

***Impact of Modeling Instruction Professional Development on Teacher Content Knowledge, Self-efficacy and Job Satisfaction.***

Tracy L. Huziak-Clark, Bowling Green State University  
 Jacob Burgoon, Bowling Green State University

***The Differential Impact of Two Engineering Professional Development Programs on Elementary Teachers' Engineering Teaching Efficacy Beliefs***

Hasan Deniz, University of Nevada  
 Erdogan Kaya, University of Nevada, Las Vegas  
 Ezgi Yesilyurt, University of Nevada, Las Vegas

**Strand 10: Curriculum, Evaluation, and Assessment*****Developing Curriculum for Middle and High School***

8:30am – 10:00am, Augusta 3

**Presenter:** Enrique Suarez, University of Washington***Precipitating Change: Embedding Computational Thinking into the Middle School Science Classroom***Nanette Dietrich, Millersville University of Pennsylvania  
Carolyn Staudt, Concord Consortium***Modeling Energy Flow and Matter Cycling: How the Curricular Approach Influences Students Development of Models***Maia K. Willcox, University of California, Berkeley  
Barbara Nagle, University of California, Berkeley***Adapted Primary Literature as an Apprenticeship Genre for Learning Scientific Writing in High School Biology***Galia Zer-Kavod, Weizmann Institute of Science  
Anat Yarden, Weizmann Institute of Science***A Grounded Theory Study of Secondary Science Teachers Collaboratively Co-Designing Socio-Scientific Issues-based Curriculum Units***Patricia J. Friedrichsen, University of Missouri, Columbia  
Tamara Hancock, University of Missouri  
Andrew T. Kinslow, University of Missouri  
Troy Sadler, University of Missouri***Developing a Learning Progression to Track 3-D Learning of Energy in High School Physical Science***Leonora Kaldaras, Michigan State University  
Joseph S. Krajcik, Michigan State University**Strand 11: Cultural, Social, and Gender Issues*****Critical Theory and Social Justice in Science Education***

8:30am – 10:00am, Chastain J

**Presenter:** Franklin S. Allaire, University of Houston, Downtown***Race, Gender, Power and Critical Science Agency***Kathleen A. Schenkel, Michigan State University  
Angela Calabrese Barton, Michigan State University***Developing a Hybridized Research Methodology for Aligning Science Curriculum with School Vision in Indigenous Communities***Mae Hey, Virginia Polytechnic Institute and State University  
George E. Glasson, Virginia Polytechnic Institute and State University  
Brenda R. Brand, Virginia Polytechnic Institute and State University***Agential Realism Meets Pedagogy of the Oppressed: Towards a Liberatory Chemistry Literacy***

Katherine Doerr Morosky, The University of Texas, Austin

***Addressing Inequities in Science Teacher Preparation from a Critical Race Perspective***Nikeetha Dsouza, Clemson University  
Alison Leonard, Clemson University  
Cassie Quigley, Clemson University***Planting Seeds of Social Justice Leadership in Science***Malcolm B. Butler, University of Central Florida  
Tonjua B. Freeman, University of Central Florida  
Jonathan L. Hall, University of Central Florida  
Kimberly Davis, University of Central Florida**Strand 11: Cultural, Social, and Gender Issues****Symposium – Interaction Analysis in Multilingual Science Classrooms: Analytical Frameworks and Methods**

8:30am – 10:00am, Savannah A

**Presenters:**Sara Salloum, University of Balamand  
Saouma B. Boujaoude, American University of Beirut  
Mariona Espinet, Universitat Autònoma, Barcelona  
Christina Siry, University of Luxembourg  
Minjung Ryu, Purdue University  
Margie J. Probyn, University of the Western Cape  
Laura Valdés-Sánchez, Universitat Autònoma de Barcelona  
Anna M. Gorges, University of Luxembourg  
Roberto Gómez Fernández, University of Luxembourg**Strand 12: Educational Technology*****Pre-service Teachers***

8:30am – 10:00am, Augusta 2

**Presenter:** Joshua A. Ellis, Michigan Technological University***Clinical Experiences Using Virtual Reality to Train Pre-service Science Teachers***Richard Lamb, University at Buffalo, SUNY  
Elisabeth Etopio, University at Buffalo, SUNY  
Len Annetta, East Carolina University  
Lynn Shanahan, University at Buffalo, SUNY  
Rebekah Lamb, Enterprise Charter School  
Julie Schwab, Enterprise Charter School

***Effects on an iPad-based Curriculum: Investigating Pre-service Elementary Teachers' Science Conceptual Understanding and Technology Self-efficacy***

Meera Chandrasekhar, University of Missouri  
Deepika Menon, Towson University, Maryland  
Matthew Conway, Towson University, Maryland  
Dorina Kosztin, University of Missouri, Columbia  
Douglas Steinhoff, University of Missouri, Columbia

***How Do Pre-service Elementary Teachers Perceive and Use Mobile Tools in Developing Mobile-Based Lesson Materials?***

Eunhee Kang, Seoul National University

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

***Philosophy of Science/History of Science***

8:30am – 10:00am, Augusta 1

**Presider:** Glenn Dolphin, University of Calgary

***Goethe's Conception of "Experiment as Mediator" and Implications for School Science Practical Work***

Wonyong Park, Seoul National University  
Jinwoong Song, Seoul National University

***Promoting Teachers' Understanding about the NOS through The Activity of Eratosthenes' Measurement of Earth's Circumference***

Gizem Sivrikaya, Ankara University  
Uygar Kanli, Gazi University  
Yasemin Ozdem-Yilmaz, Gaziosmanpasa University  
Fitnat Koseoglu, Gazi University

***Scientific Explanation in Science Education: A Critical Review of Literature***

Sahar Alameh, University of Illinois, Urbana-Champaign  
Fouad Abd-El-Khalick, University of North Carolina, Chapel Hill

***Non-science Majors' Development of NOS Understandings during a Historically Contextualized Introductory Undergraduate Geology Course***

Glenn Dolphin, University of Calgary

**Concurrent Session #11**  
**10:15am – 12:00pm**

**International Committee**

***Symposium – Science Identities: Embracing the Diversity and Multiplicity of Theory and Research***

10:30am – 12:00pm, Augusta 1

**Presiders:**

Lucy Avraamidou, University of Groningen, Netherlands  
Henriette Tolstrup Holmegaard, University of Copenhagen, Denmark

**Discussant:** Justin Dillon, University of Exeter

**Presenters:**

Jennifer Adams, University of Calgary, Canada  
Heidi Carlone, University of North Carolina, Greensboro, USA  
Anna Danielsson, Upsalla University, Sweden  
Björn Friis Johannsen, University of Gothenburg, Sweden,  
Day Greenberg, Michigan State University, USA  
Allison Gonsalves, McGill University, Canada  
Zahra Hazari, Florida International University, USA  
Henriette Tolstrup Holmegaard, University of Copenhagen, Denmark  
Angela Johnson, St Mary's College of Maryland, USA  
Katherine Wade-Jaimes, University of Memphis, USA  
Peter Wulff, Leibniz Institute for Science Education (IPN) Kiel  
Billy Wong, University of Reading, UK  
Felicia Moore, Columbia University, USA

**Strand 1: Science Learning, Understanding and Conceptual Change**

***The Role of Students' Conceptions for Science Learning***

10:30am – 12:00pm, Augusta B

**Presider:** Phillip A. Boda, Stanford University

***Exploring Misconception as a Trigger for Enhancing Students' Conceptual Understanding in Biochemistry and Molecular Biology***

Allen A. Espinosa, The University of Melbourne  
Heather Verkade, The University of Melbourne  
Terrence D. Mulhern, The University of Melbourne  
Jason M. Lodge, The University of Melbourne

***Give Me That Cookie! Middle School Students' Understanding of and Learning about Competition***

Amanda L. Goncz, Michigan Technological University  
Brenda G. Bergman, Michigan Technological University  
Jacqueline E. Huntoon, Michigan Technological University

***Prior Conception of the Relationships between Genes and Traits Affect Students' Understanding of Genetic Mechanisms***

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

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

### *Teaching Strategies*

10:30am – 12:00pm, Augusta C

**President:** P. Citlally C. Jimenez, University of Nebraska, Lincoln

### *Resources for Managing Uncertainty During Argumentation in a Fifth-grade Science Classroom*

Xue Qiao, Arizona State University

Ying-Chih Chen, Arizona State University

Jaclyn Hernandez, Arizona State University

Chin-Chung Tsai, National Taiwan Normal University

### *Teaching and Learning the Learning of the Control-of-Variables Strategy: What Works Best?*

Johanna Kranz, University of Trier

Katrin Kaufmann, University Trier

Tobias Tempel

Andrea Moeller, University Trier

### *The Multimodal Nature of the Iconicity of the Gestures Used in Science Lecturing*

Lilian Pozzer, University of Manitoba

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

### *3-D Learning in the Elementary Classroom*

10:30am – 12:00pm, Savannah A

**President:** Melissa Luna, West Virginia University

### *Elementary Engineering Diagrams as Design Tools*

Carmen M. Vanderhoof, Pennsylvania State University

Gregory J. Kelly, Pennsylvania State University

Christine M. Cunningham, Museum of Science, Boston

### *Assessing Five Year Old Pupils Understanding of Reproducibility through a Counter-Intuitive Experiment*

Estelle Blanquet, University of Bordeaux

Eric Picholle, CNRS Nice

### *Integrating Scientific Practice into Learning Science Core Ideas? Exploring Cognitive Bases to Test NGSS Approach*

Lin Zhang, Providence College

### *Promoting Children's Engagement in Learning Science and Science Self-efficacy through a SADI Intervention*

Ying-Yan Lu, National Sun Yat-Sen University

Zuway-R Hong, National Sun Yat-Sen University

Hsiang-Ting Chen, National Sun Yat-Sen University

Hsin-Hui Wang, National Sun Yat-Sen University

Kuay-Keng Yang, Institute of Education

Huann-Shyang Lin, National Sun Yat-Sen University

### *Telling the Energy Story: Preliminary Results from Grades 4 and 5*

Roger G. Tobin, Tufts University

Sara J. Lacy, TERC

Sally Crissman, TERC

Nick Haddad, TERC

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

### *Physics Teaching and Learning*

10:30am – 12:00pm, Augusta H

**President:** Jennifer L. Weible, Central Michigan University

### *Creating Reform in High School Physics Classrooms: Does it Work?*

Dennis Sunal, University of Alabama

Cynthia Szymanski Sunal, University of Alabama

Marsha Simon, University of Alabama

James Harrell, University of Alabama

Michelle Wooten, University of Alabama

Justina A. Ogado, The University of Alabama, Tuscaloosa

Marilyn M. Stephens, University of Alabama

Mohan Aggarwal, Alabama A&M University

Marius Schamschula, Alabama A&M University

### *Tracking Elements of Specialized Knowledge for Teaching Physics*

Shulamit Kapon, Technion, Israel Institute of Technology

Avraham Merzel, Technion, Israel Institute of Technology

### *Using Choice to Uncover the Role of Gender Stereotypes in High School Physics Assignments*

Samuel R. Wheeler, North Carolina State University

Meg Blanchard, North Carolina State University

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

### *Self-Regulated Learning*

10:30am – 12:00pm, Augusta F

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

***Examining the Effectiveness of A Light-Touch Study Skills Intervention in a Large-Enrollment Biology Course***

Brian Sato, University of California, Irvine  
Fernando Rodriguez, University of California, Irvine  
Mariela Rivas, University of California, Irvine

***Exploring Self-Efficacy, Reflection Behaviors, and Learning Outcomes in the Context of Mobile Learning Technologies***

Muhsin Menekse, Purdue University  
Saira Anwar, Purdue University

***Investigating Introductory Biology Students' Self-Regulating Learning Strategies using a Reflective Routine***

Brittany Smith, Minnesota State University Mankato  
Paula Soneral, Bethel University  
Kelsey J. Metzger, University of Minnesota, Rochester

***Understanding Relationships between Confidence Calibration, Question Complexity, and the Dunning-Kruger Effect in Neuroscience Students***

G. Michael Bowen, Mount Saint Vincent University  
Kimberley P. Good, Dalhousie University

**Strand 6: Science Learning in Informal Contexts**

***Understanding the Impact of Citizen Science and Public Outreach Efforts***

10:30am – 12:00pm, Augusta D

**President:** Heather Toomey Zimmerman, Pennsylvania State University

***The Identity Development of Citizen Scientists in a Museum-based Genetics of Taste Program***

Leighanna Hinojosa, University Colorado, Boulder  
Rebecca D. Swanson, University of Colorado, Boulder  
Joseph L. Polman, University of Colorado, Boulder

***Promoting Science through Public Engagement: Exploring Citizens' Science Interest and Motivation in Attending Science Cafes***

Gina Childers, University of North Georgia  
Donna Governor, University of North Georgia  
Stacey Britton, University of West Georgia

***The Impact of K-12 Outreach Experiences on Undergraduate STEM Majors' Scientific Literacy and STEM Communication Skills***

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

***Evaluating University-Led STEM Outreach***

Efrat Eilam, Victoria University  
Kirsten Sadler, Victoria University  
Stephen W. Bigger, Victoria University  
Fiachra Barry, Victoria University

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

***Teacher Beliefs and Attitudes***

10:30am – 12:00pm, Augusta E

**President:** Sheryl L. McGlamery, University of Nebraska, Omaha

***Assessing the Dimensions of Attitudes towards Science (DAS) of Australian Pre-service Primary Teachers***

Christine V. McDonald, Griffith University  
Harry Kanasa, Griffith University  
Helen Klieve, Griffith University

***Features of Student Teacher Reflections about Self and Peer Classroom Video that Cultivate Reform-Minded Thinking***

Robert Danielowich, Adelphi University

***Prospective Teachers' Resistance to Teach Inquiry in Secondary Science Classrooms***

Kayla P. Flanagan, University of Georgia  
Barbara A. Crawford, University of Georgia

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

***Supporting New (or New to Grade Level) Science Teachers***

10:30am – 12:00pm, Augusta G

**President:** Joshua A. Ellis, Michigan Technological University

***Availability and Activation of Contextual Resources by New Secondary Science Teachers***

Shannon L. Navy, Kent State University  
Ryan Nixon, Brigham Young University  
Julie A. Luft, University of Georgia  
Melissa A. Jurkiewicz, Mercer University

***Practices in the Mentoring Process of STEM Teachers during their Integration into the School System***

Efrat Akiri, Technion, Israel Institute of Technology  
Gabriella Shwartz, Technion, Israel Institute of Technology  
Nitza Barnea, Technion, Israel Institute of Technology  
Orit Herscovitz, Technion, Israel Institute of Technology  
Yehudit Judy Dori, Technion, Israel Institute of Technology

***The Consequences of Grade-Level Reassignment for Elementary Science Teacher Professional Development Efforts: A Case Study***

Deborah L. Hanuscin, Western Washington University  
Kelsey Lipsitz, University of Missouri  
Dante Cisterna, University of Nebraska, Lincoln  
Mark Ehler, University of Missouri

**Strand 10: Curriculum, Evaluation, and Assessment  
*Developing 3-D Assessments and Teaching Models***

10:30am – 12:00pm, Augusta A

**President:** Michael S. Tutwiler, University of Rhode Island

***Developing Assessment Tasks to Measure Student Sense-Making of Phenomena Using Three Dimensions of Scientific Proficiency***

Emily C. Miller, University of Wisconsin, Madison  
Susan K. Codere, Michigan State University  
Angela DeBarger, George Lucas Educational Foundation  
Joseph S. Krajcik, Michigan State University

***Using Evidence-Centered Design to Create Assessments for Understanding of Core Chemistry Ideas in Introductory Biology***

Rebecca L. Matz, Michigan State University  
Sonia M. Underwood, Florida International University  
Amelia Wenk Gotwals, Michigan State University  
Kristin N. Parent, Michigan State University

***Automated Scoring of Scientific Practices through Open-ended, Scenario-based Assessments***

A.J. Womack, University of Missouri  
Troy Sadler, University of Missouri  
Eric P. Wulff, University of Missouri

***The Development of Universally Designed, Fine-Grained Science Learning Map Models***

Lori Andersen, University of Kansas  
Russell Swinburne Romine, University of Kansas

***How Steady is the Direction of Reform? Textbook Analysis and the NGSS***

Rudolf V. Kraus, Rhode Island College  
Lesley Shapiro, Northeastern University

**Strand 11: Cultural, Social, and Gender Issues  
*Students and Teachers Constructing Identities: People of Color and Science***

10:30am – 12:00pm, Savannah B

***Developing Identities and Changing Roles of Latinx Science Students in College***

David Segura, University of Illinois, Chicago

***A Black Woman's Transition from Scientist to Science Teacher to Science Teacher Leader: Science Identity Development in Various Contexts***

Olayinka A. Mohorn-Mintah, University of Illinois, Chicago

***Let's Get PHYSICS-cal: An Ethno-dance-o-graphy of Black High School Students' Transition from Biology to Physics***

Mindy Chappell, University of Illinois, Chicago

***Constructing Identities as Science Teachers Seeking Equity and Excellence***

Maria Varelas, University of Illinois, Chicago  
Daniel Morales-Doyle, University of Illinois, Chicago  
David Segura, University of Illinois, Chicago  
Carole P. Mitchener, University of Illinois, Chicago  
Marcela Bernal-Munera, University of Illinois, Chicago

**Strand 12: Educational Technology  
*Scientific Literacy***

10:30am – 12:00pm, Chastain 1

**President:** Stephen R. Burgin, University of Arkansas

***Developing Scientific Literacy through Science Notebooks: Affordances and Limitations of Digital Notebooks***

Lori A. Fulton, University of Hawaii, Manoa  
Seungoh Paek, University of Hawaii, Manoa  
Jon Yoshioka, University of Hawaii, Manoa

***ESCOLAR: Improving Science Literacy for Diverse Learners with Online Units***

Fatima Elvira Terrazas Arellanes, University of Oregon  
Alejandro J. Gallard, Georgia Southern University  
Lisa Strycker, University of Oregon  
Emily Walden, University of Oregon

***Wikis and Interdisciplinary Project-based Learning in Teacher Education Programmes***

Heba El-deghaidy, American University, Cairo  
Michele Biasutti, University of Padova, Italy

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

***Scientific Inquiry and Nature of Science***

10:30am – 12:00pm, Augusta 2

**President:** Dawnne M. LePrete, Illinois Institute of Technology-MSED

***Using Students' Exemplar Responses from NOS and SI Survey Instruments as an Explicit and Reflective Approach for Developing Teachers' Understanding of Nature of Science and Scientific Inquiry***

Jennifer C. Parrish, University of Northern Colorado  
Grant E. Gardner, Middle Tennessee State University

***A Sample of Turkish Middle School Students' Views of Nature of Scientific Inquiry***

Esra Capkinoglu, Independent Researcher  
Gulsen Leblebicioglu, Abant Izzet Baysal University  
Duygu Metin, Bozok University  
Renee S. Schwartz, Georgia State University  
Ismail Berkyurek

***Ninth/Tenth versus Eleventh/Twelfth Graders' Views About Scientific Inquiry***

James P. Concannon, Westminster College  
Patrick Brown, Ft. Zumwalt  
Norman G. Lederman, Illinois Institute of Technology  
Judith S. Lederman, Illinois Institute of Technology

***The Strange Case of "the Scientific Method" Revisited: NGSS's Impact on References in Practitioner Journals***

Daniel Z. Meyer, Illinois College

**Strand 14: Environmental Education**

***Preparing Pre-service and In-service K-12 Teachers for Sustainability Education***

10:30am – 12:00pm, Savannah C

**President:** Ying Syuan Huang, McGill University

***"Be a Better Person for the Environment": Teachers' Perceptions of Responsibility for Teaching Climate Change***

Andrea Drewes, University of Delaware

***A Socio-Cultural Approach Investigating Pre-service Elementary Teachers' Perceived Obstacles to Taking Students Outdoors***

Teresa Shume, North Dakota State University  
Erica Blatt, Rowan University

***Elementary Teachers' Views on Environmental Sustainability Education: Understandings from A Multi-case Study***

Lauren Madden, The College of New Jersey  
Rachel DiVanno, Edgar Middle School, Metuchen New Jersey Public Schools

***Investigating the Use of Communities of Practice for Sustainability Instruction in Rural Agricultural Education***

Craig A. Kohn, Michigan State University

**Strand 15: Policy**

***The Role of Teacher Leadership in Science Education***

10:30am – 12:00pm, Augusta 3

**President:** Kathryn N. Hayes, California State University, East Bay

***A Synthesis of Math/Science Teacher Leadership Development Programs: Consensus and Recommendation***

Jody Bintz, BSCS  
Lindsey Mohan, University of Notre Dame/University of Texas Austin  
Jodie Galosy, Knowles Science Teaching Foundation  
Barbara Miller

***Teacher Leadership STEM Teams Examining Critical Components for STEM Schools***

Elizabeth A. Crotty, University of Minnesota  
Elizabeth A. Ring-Whalen, St. Catherine University  
Illana C. Livstrom, University of Minnesota  
Gillian Roehrig, University of Minnesota  
Julie C. Brown, University of Minnesota

***The Impact and Implementation of a High School Science Leadership Program***

Joseph A. Taylor, BSCS  
Jody Bintz, BSCS  
Molly Stuhlsatz, BSCS

**Lunch—On Your Own**

**12:00pm – 1:00pm**

**Concurrent Session #12**

**1:00pm – 2:30pm**

**Strand 1: Science Learning, Understanding and Conceptual Change**

***The Complexity of Science Learning: The Role of Discourse, Motivation, and Self-Generation***

1:00pm – 2:30pm, Chastain 1

**President:** Molly Bolger, University of Arizona

***"This is Basically the Thingy, Right?": Student Sense Making in Science***

Hillary Barron, University of Minnesota  
Michele Koomen, Gustavus Adolphus College

***Motivation and Conceptual Learning: An Examination of Self-Efficacy and Achievement Goals in 6th Grade Science***

Kelly Boden, University of Pittsburgh  
Eric Kuo, University of Pittsburgh  
Timothy J. Nokes-Malach, University of Pittsburgh  
Tanner Wallace, University of Pittsburgh  
Muhsin Menekse, Purdue University

***The Role of Self-Generation In Inquiry-Based Learning***

Irina Kaiser, Universität Kassel  
Jürgen Mayer, Universität Kassel

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

***Teacher's Role in Science Classrooms***

1:00pm – 2:30pm, Augusta B

**Presenter:** Mon Lin Ko, University of Illinois, Chicago

***Current K-8 Science Instruction: Similarities and Differences with the Science Practices***

Kevin Cherbow, Boston College  
Megan T. McKinley, Boston College  
Katherine L. McNeill, Boston College  
Rebecca Lowenhaupt, Boston College

***Framing Goals for Argumentation Discussions: Individual Versus Communal Understanding***

María González-Howard, University of Texas, Austin  
Katherine L. McNeill, Boston College

***Teaching and Learning the Practices of Doing Science***

Maayan Schwartz, Technion, Israel Institute of Technology  
Shulamit Kapon, Technion, Israel Institute of Technology

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

***Symposium – Working Towards Robust Early Childhood Science Education Approaches that Support Scientific Inquiry and Practices***

1:00pm – 2:30pm, Savannah B

**Presenters:**

Christina V. Schwarz, Michigan State University  
Charlene M. Czerniak, University of Toledo  
Amelia Wenk Gotwals, Michigan State University  
Soo-Yean Shim, University of Washington  
Rachel Larimore, Michigan State University  
Jessica J. Thompson, University of Washington  
Kirsten D. Edwards, Michigan State University  
Jennifer Richards, University of Washington  
Laurie V. Van Egeren, Michigan State University  
Tanya Wright, Michigan State University

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

***Student Engagement in Scientific Practices***

1:00pm – 2:30pm, Augusta H

**Presenter:** Consuelo J. Morales, University of Michigan

***Exploring the Development and Implementation of Integrating Essential Competencies of Scientific Inquiry in Teaching***

Ya-Chun Chen, National Sun Yat-Sen University  
Huann-Shyang Lin, National Sun Yat-Sen University

***Investigating Teacher Effects on English Learners' Chemistry Understanding during Visualization-Rich Inquiry Instruction***

Kristin Bedell, University of North Carolina, Chapel Hill  
Kihyun (Kelly) Ryoo, University of North Carolina, Chapel Hill

***Middle School Students' Spatial Thinking and Understanding of the Conservation of Matter***

Merryn Cole, University of Nevada, Las Vegas  
Jennifer A. Wilhelm, University of Kentucky  
Hailey Fish, University of Wisconsin, LaCrosse  
Corinne Fish, Reedsburg Area High School

***The Difference Between Peer-Explaining and Device-Explaining***

Katja Löppenber, Universität Duisburg-Essen  
Angela Sandmann, Universität Duisburg-Essen  
Christine Florian, Universität Duisburg-Essen

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

***Scaffolds to Support Student Reasoning***

1:00pm – 2:30pm, Augusta F

**Presenter:** Robert M. Talbot, University of Colorado, Denver

***Constructing Explanations to Aid in Conceptual Chemistry Learning in an Active Learning Environment***

Sandhya Krishnan, University of Georgia  
Molly Atkinson, University of Georgia  
LaShawn A. McNeil, University of Georgia  
Julie A. Luft, University of Georgia

***Contrasting Designs and Argumentation Scaffolds Impact Pre-service Elementary Teachers' Science Ideas in Engineering Design Tasks***

Carina M. Rebello, Purdue University  
Yuri B. Piedrahita Uruena, Purdue University  
Chandan Dasgupta, Purdue University  
Alejandra Magana, Purdue University  
N. Sanjay Rebello, Purdue University

***The Impact of the Course on College Students' Spatial Thinking Abilities***

Youngjin Song, California State University, Long Beach  
Hye Sun You, Michigan State University  
Lisa M. Martin-Hansen, California State University, Long Beach  
Susan Zwiép, California State University, Long Beach

***Using the Claim, Evidence, and Reasoning Framework to Develop Prospective Teachers' Scientific Explanations in Physics***

Heidi Masters, University of Wisconsin, La Crosse  
Jennifer Docktor, University of Wisconsin, La Crosse

**Strand 6: Science Learning in Informal Contexts**  
***Professional Learning in Out-of-school Contexts***

1:00pm – 2:30pm, Augusta C

**President:** Shawn Rowe, Oregon State University

***Professional Development for Informal STEM Educators: Instructors as Boundary Crossers in a Community of Practice***

Rebecca D. Swanson, University of Colorado, Boulder

***Impact of In-service Teacher Professional Development Program about Science Centers on Teachers' Nature of Science Views***

Harika Ozge Arslan, Duzce University  
Fitnat Koseoglu, Gazi University  
Uygar Kanli, Gazi University

***Measurements of Professional Learning: Surveys and Observation Tools Designed to Improve Quality of Reflective Practice***

Ardice Hartry, University of California, Berkeley  
Rosalinda Nava, University of California, Berkeley

***Elementary School Teachers Learning to Integrate Outdoor Learning and NGSS***

Tali Tal, Technion, Israel Institute of Technology  
Irene S. Bayer, Michigan State University  
Kara Haas, Michigan State University

**Strand 7: Pre-service Science Teacher Education**  
***Culturally Relevant Teaching***

1:00pm – 2:30pm, Augusta E

**President:** Samia Khan, University of British Columbia

***Elementary Science Teacher Development to Empower ELLs***

Neporcha Cone, Kennesaw State University

***Pre-service Teachers Cultural Perceptions of Latino Families: Encounters Through Family Math and Science***

Cherie McCollough, Texas A&M University, Corpus Christi  
Olga Ramirez, University of Texas, Rio Grande Valley

***Promoting Pre-service Science Teachers' Cultural Competence***

Danielle E. Dani, Ohio University

***Role of Service Learning Teaching Events for Fostering Pre-service Science and Math Teacher Development***

Lisa A. Borgerding, Kent State University

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

***Engineering Design***

1:00pm – 2:30pm, Augusta D

**President:** Umran Betul Cebesoy, Usak University

***Developing Pre-service Science Teachers' Understanding of Engineering Design Strategies Through Teaching Scenarios***

Laura K. Ochs Pottmeyer, University of Virginia  
Jennifer Chiu, University of Virginia  
Frackson Mumba, University of Virginia

***Engineering Design as an Approach to Developing Conceptual Knowledge within integrated STEM Curricula***

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

***Pre-service and Mentor Teachers Co-Learning to Teach Engineering in Elementary Classrooms***

Beau Vezino, University of Arizona  
Kristin L. Gunckel, University of Arizona

***Pre-service Science Teachers' Learning and Cognizance about STEM Education through an Engineering Design Project***

Hee Jin Noh, Korea National University of Education, South Korea  
Seoung-Hey Paik, Korea National University of Education, South Korea

**Strand 10: Curriculum, Evaluation, and Assessment**  
***Assessment of Scientific Reasoning, Scientific Literacy, and Computational Thinking***

1:00pm – 2:30pm, Augusta 2

**President:** Mauricio Pietrocola, University of Sao Paulo

***How Science Teachers DiALoG Classrooms:  
Towards a Practical and Responsive Formative  
Assessment of Oral Argumentation***

J. Bryan Henderson, Arizona State University  
Nicole S. Zillmer, Arizona State University  
Eric J. Greenwald, University of California, Berkeley  
Megan Goss, University of California, Berkeley  
M. Lisette Lopez, University of California, Berkeley  
Kevin Close, Arizona State University  
April Holton, Arizona State University  
P. David Pearson, University of California, Berkeley

***Biology Instruction under the View of a Generic Framework  
of Scientific Reasoning and Argumentation***

Tobias Dorfner, LMU Munich  
Christian Förtsch, LMU Munich  
Michael Germ, LMU Munich  
Birgit Jana Neuhaus, LMU Munich

***Measuring Scientific Reasoning: Construct Validation  
of the Primary Scientific Reasoning Test (PSRT) using  
Rasch Modelling***

Diana Ng, Oxford University Centre for Educational Assessment

***The Impact of PISA-driven Inquiry Teaching Practices  
on Students' Scientific Competencies***

Shu-Fen Lin, National Changhua University of Education

***Exploring Student Conceptual Understanding Using  
a Model-Based Assessment***

Kelly Barber-Lester, University of North Carolina, Chapel Hill  
Lana Minschew, University of North Carolina, Chapel Hill  
Kerry Bartlett, University of North Carolina, Chapel Hill  
Janice L. Anderson, University of North Carolina, Chapel Hill  
Sharon J. Derry, University of North Carolina, Chapel Hill

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

***Women and Careers in STEM***

1:00pm – 2:30pm, Chastain J

**Presenter:** Cassie Quigley, Clemson University

***At a Crossroads with Nature of Science Research:  
Where Do We Go from Here?***

Leon Walls, University of Vermont  
Cassie Quigley, Clemson University  
Bryan Shao-Chang Wee, University of Colorado, Denver

***Gender Equitable Teaching and Learning in STEM Spaces***

Jennifer Schellinger, Florida State University  
Barbara Billington, University of Minnesota  
Brenda Britsch, EdLab Group  
Sarah Carter  
Roxanne M. Hughes, Florida State University  
Alicia Santiago

***STEM Begets STEM: Examining the Effect of Familial Careers on  
Students' STEM Career Aspirations***

Susie M. Cohen, Florida International University  
Zahra Hazari, Florida International University  
Geoff Potvin, Florida International University

***Women Give Up on Pre-med Plans even When They do Well in  
STEM 'Weeder' Classes***

Eben B. Witherspoon, University of Pittsburgh  
Christian D. Schunn, University of Pittsburgh

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

***Symposium – Race, Politics & Teacher Identity: Reflecting on  
Professional Learning and Practice***

1:00pm – 2:30pm, Savannah A

**Discussant:** Lucy Avraamidou, University of Groningen, Netherlands

**Presenters:**

Jennifer Adams, University of Calgary  
Susan McCullough, City University of New York  
LaToya Strong, City University of New York  
Atasi Das, The Graduate Center, City University of New York  
Lucy Avraamidou, University of Groningen, Netherlands

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**Strand 12: Educational Technology**

***Simulation***

1:00pm – 2:30pm, Augusta A

**Presenter:** Mi-young Kim, Ewha Womans University

***Design-based Research on a Gesture-controlled Dynamic  
Simulation to Better Help Students Refocus Causal Intuitions***

David E. Brown, University of Illinois, Urbana-Champaign  
Nitasha Mathayas, University of Illinois, Urbana-Champaign  
Robb Lindgren, University of Illinois, Urbana-Champaign  
Robert C. Wallon, University of Illinois, Urbana-Champaign

***Effect of an Embodied Simulation on Student Gesturing and  
Science Reasoning***

Jason W. Morphew, University of Illinois, Urbana-Champaign  
Sahar Alameh, University of Illinois, Urbana-Champaign  
Stephanie Sroczynski, University of Illinois, Urbana-Champaign  
Robb Lindgren, University of Illinois, Urbana-Champaign  
Jina Kang, University of Illinois, Urbana-Champaign

***Supporting Role of Computer Simulation on Scientific  
Argumentation about Behavior of Gases in Student Drawings***

Tugba Keser Solak, Trakya University

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

### *Scientific Literacy*

1:00pm – 2:30pm, Augusta 3

**President:** Jacob Pleasants, Iowa State University

### *The Relationship Between Biology Teachers' Understanding of the Nature of Science and the Understanding and Acceptance of the Theory of Evolution*

Hernan Cofre, Pontificia Universidad Católica de Valparaíso  
 Beatriz Becerra, Pontificia Universidad Católica de Valparaíso  
 Emilia Cuevas, Pontificia Universidad Católica de Valparaíso  
 Claudia Vergara, Alberto Hurtado University  
 David Santibáñez, Universidad Católica Silva Henríquez  
 Juan Jimenez, Illinois Institute of Technology

### *Scientific Literacy or Scientific Proficiency? Covenants as Mitigating-Circles in Educational Standards Development*

Silvia Lizette Ramos de Robles, Centro Universitario de Ciencias Biológicas y Agropecuarias  
 Alejandro J. Gallard, Georgia Southern University  
 Katie Brkich, Georgia Southern University  
 Wesley Pitts, City University of New York, Lehman College

### *Understanding Activism and Scientific Literacy*

Jill Birren, Marquette University  
 Jennifer Gaul-Stout, Marquette University

### *"Even a Monk can Become a Scientist:" Dialectical Discourse at a Tibetan Buddhist Monastery*

Meena M. Balgopal, Colorado State University  
 Nicole M. Gerardo, Emory University

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## Strand 14: Environmental Education

### *Student Ideas and Voices Revealed Through Digital Technologies and Modeling*

1:00pm – 2:30pm, Augusta 1

**President:** Patricia Patrick, Columbus State University

### *#60above60: Creating Global Scientific Discourse around Local Issues*

Mary E. Short, George Washington University  
 Laura C. Engel, George Washington University

### *Initial Results of an Assessment of Students' Spatial Thinking Related to Enhanced Greenhouse Effect*

Heather J. Skaza Acosta, Florida Gulf Coast University  
 Marykay Orgill, University of Nevada, Las Vegas  
 Kent J. Crippen, University of Florida

### *Snapping Stories in Science - Local Cultures and Social Media as Entry Points to Sustainable Education*

Marianne Odegaard, University of Oslo  
 Eugene Boland  
 Mysa Chu  
 Heidi Kristensen

### *Using Watershed Modeling and Probreware to Teach Environmental Sustainability*

Nanette Dietrich, Millersville University of Pennsylvania  
 Carolyn Staudt, Concord Consortium  
 Steven Kerlin, Stroud Water Research Center

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## Concurrent Session #13

### 2:45pm – 4:15pm

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### Strand 1: Science Learning, Understanding and Conceptual Change

#### *Students' Misconceptions about Science Concepts*

2:45pm – 4:15pm, Savannah B

**President:** Carina M. Rebello, Purdue University

#### *Students' Model-Based Explanations about Natural Selection and Antibiotic Resistance through Socio-Scientific Issues Based Learning*

Amanda N. Peel, University of Missouri  
 Laura Zangori, University of Missouri  
 Patricia J. Friedrichsen, University of Missouri, Columbia  
 Eric Hayes, Southern Boone County High School  
 Troy Sadler, University of Missouri

#### *Genetic Determinism, Teleology and Essentialism: A Detailed Look at Secondary Students' Conceptions*

Florian Stern, University of Geneva  
 Kostas Kampourakis, University of Geneva  
 Andreas Müller, University of Geneva

#### *Using TIMSS and TIMSS Advanced Data to Explore Physics Misconceptions of U.S. Students*

Teresa A. Neidorf, American Institutes for Research  
 Liana Bloom, Washington University in St. Louis  
 Ebru Erberber, American Institutes for Research

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

### *Social Interactions in the Science Classroom*

2:45pm – 4:15pm, Augusta 2

**Presenter:** Yen-Ruey Kuo, National Changhua University of Education

### *Co-configuring a 6th Grade Lepidoptera Learning Community*

David Stroupe, Michigan State University

Peter White, Michigan State University

Marcos D. Caballero, Michigan State University

### *Shifts of Students' Positional Framing in Transitioning*

*Zones of Interaction during Advancement toward*

*Dialectical Argumentation*

Heesoo Ha, Seoul National University

Heui-Baik Kim, Seoul National University

### *Age-dependent Effects of Role Assignment on Student Activity*

*During Cooperative Inquiry Learning in Science Class*

Andrea Moeller, University Trier

Katrin Kaufmann, University Trier

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

### *Student Factors Related to Science Learning*

2:45pm – 4:15pm, Savannah C

**Presenter:** Lisa A. Borgerding, Kent State University

### *Early Indications of Scientific Curiosity and Science Orientation toward Tenable Indicators*

Ornit Spektor-Levy, Bar-Ilan University

Yael Kesner-Baruch, Bar-Ilan University

Zemira Mevarech, Bar-Ilan University

### *Evaluation of Student Motivational, Career-Related and Context-Based Scenarios*

Miia Rannikmae, University of Tartu

Regina Soobard, University of Tartu

Tormi Kotkas, University of Tartu

Tuula Keinonen, University of Eastern Finland

### *Examining Relationships between Youths' Science Curiosity and Personal Interests, In-and Out-of-School Experiences, and Familial Attitudes*

Jennifer L. Weible, Central Michigan University

Heather Toomey Zimmerman, Pennsylvania State University

### *Factors that Positively Influence Students' Situational Interest During Outdoor Science Lessons*

Jean-Philippe Ayotte-Beaudet, Université Sherbrooke

Patrice Potvin, Université du Québec à Montréal

### *What Led Me Here? An Exploration of Secondary Students' Attitudes and Intentions in Relation to Elective Course Enrollment*

Ryan Summers, University of North Dakota

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

### *Teachers' Orientations and Beliefs*

2:45pm – 4:15pm, Augusta H

**Presenter:** May Lee, Michigan State University

### *Does Teachers' Epistemic Orientation and Epistemic Understanding Matter in Implementing Science Practices?*

Soonhye Park, North Carolina State University

Vance J. Kite, North Carolina State University

Lanette Phillips, North Carolina State University

Jee Kyung Suh, University of Alabama

Jinhong Jung, North Carolina Central University

### *Exploring Science Teachers' Epistemological Beliefs and Their Proposed Teaching Practices in Socio-Scientific Issues Context*

Sule Aksoy, Syracuse University

### *Ultrasound Infused Project-based Curriculum: Influence on Teachers' Content Knowledge, Beliefs, and Practice*

Christine Lotter, University of South Carolina

Nathan Carnes, University of South Carolina

Jeff C. Marshall, Clemson University

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

### *TA Development*

2:45pm – 4:15pm, Augusta F

**Presenter:** Jaime L. Sabel, University of Memphis

### *A Network Initiative to Develop Research Skills in Professional Developers Working with Biology Teaching Assistants*

Gili Marbach-Ad, University of Maryland

Grant E. Gardner, Middle Tennessee State University

Kristen R. Miller, University of Georgia

Judy S. Ridgway, The Ohio State University

Elisabeth Schussler, University of Tennessee

***Chemistry Teachers' and Teaching assistants' Explanatory Frameworks and TSPCK for Chemical Bonding***

Frackson Mumba, University of Virginia  
Rene Toerien, University of Cape Town  
Marissa S. Rollnick, Wits University

***Exploring how Biology Teaching Assistants use Positioning Acts to Promote or Constrain Scientific Discourse***

Anna S. Grinath, Middle Tennessee State University  
Sherry A. Southerland, Florida State University

***Undergraduate Teaching Assistants as a Source of Feedback to Improve Teaching and Learning in Biology***

Hannah Jardine, University of Maryland

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

2:45pm – 4:15pm, Augusta E

**President:** Meredith M. Thompson, Massachusetts Institute of Technology

***Assessing Pre-service Teachers' Scientific Reasoning Competencies: Translation of a German MC Instrument into Spanish/English***

Moritz Krell, Freie Universität Berlin  
Claudia Vergara, Alberto Hurtado University  
Jan H. Van Driel, University of Melbourne  
Annette Upmeier Zu Belzen, Humboldt-Universität Zu Berlin  
Dirk Krueger, Freie Universität Berlin

***Enhancing or Degrading Quality?: Teacher Educators Talk About a High-Stakes Science Assessment for Pre-service Teachers***

Dante Cisterna, University of Nebraska, Lincoln  
Shannon Burcks, University of Missouri  
Marcelle Siegel, University of Missouri, Columbia  
Christopher D. Murakami, University of Missouri, Columbia  
Suleyman Cite, University of Missouri, Columbia  
Nilay Muslu, University of Missouri, Columbia

***Examining the Effects of Teacher Education on Pre-service Science and Mathematics Teacher Readiness***

Sungmin Moon, University of California, Santa Barbara  
Alexandria K. Hansen, University of California, Santa Barbara  
Leslie Bushong, University of California, Riverside  
Stacey L. Carpenter, University of California, Santa Barbara  
Julie A. Bianchini, University of California, Santa Barbara

***Moving from Diagnosis to Understanding Students Ideas through the Game of Eliciting Learner Knowledge (ELK)***

Meredith M. Thompson, Massachusetts Institute of Technology  
Dan Roy, Massachusetts Institute of Technology  
Tiffany Wong, Massachusetts Institute of Technology  
Justin Reich, Massachusetts Institute of Technology  
Eric D. Klopfer, Massachusetts Institute of Technology

**Strand 8: In-service Science Teacher Education  
Engineering, STEM, and Teacher Identity**

2:45pm – 4:15pm, Augusta C

**President:** Carolyn A. Parker, American University

***An Interdisciplinary Elementary STEM Education Partnership: A Vehicle for Engaged Teaching and Learning***

Carolyn A. Parker, American University  
Nicholas Lehn, Hanover Research  
David E. McKinney, Johns Hopkins University  
Susan G. Harper, University of Georgia

***Analysis of Science Teachers' Drawings Before and After an NGSS-Based PD Experience***

Carrie-Anne Sherwood, Southern Connecticut State University

***STEM Teacher Identity in Developing STEM Schools***

Felicia D.T. Leammukda, University of Minnesota  
Mohamed El Nagdi, University of Minnesota  
Gillian Roehrig, University of Minnesota

**Strand 10: Curriculum, Evaluation, and Assessment  
Assessment Administration, Learning Progressions, and Interdisciplinary Curricula**

2:45pm – 4:15pm, Savannah A

**President:** Sanghee Choi, University of North Georgia

***Comparability of Computer-Based and Paper-and-Pencil Science Assessments***

Cari F. Herrmann Abell, American Association for the Advancement of Science – Project 2061  
Joseph M. Hardcastle, American Association for the Advancement of Science  
George E. De Boer, American Association for the Advancement of Science – Project 2061

***Performance and Participation Differences for In-Class and Online Administration of Low-Stakes Research-Based Assessments***

Ben Van Dusen, California State University, Chico  
Jayson M. Nissen, California State University, Chico  
Manher Jariwala, Boston University  
Xochith Herrera, California State University, Chico  
Eleanor W. Close, Texas State University

***Students' Use of Science During Engineering Design Within Life Science-Focused STEM Integration Units***

Emilie A. Siverling, Purdue University  
Selcen Guzey, Purdue University  
Tamara J. Moore, Purdue University

***Using a Novel Assessment and Rasch Analysis to Quantify a Plate Tectonics Learning Progression***

Aubree Webb, Pennsylvania State University  
Scott McDonald, Pennsylvania State University  
Tanya Furman, Pennsylvania State University  
Kathryn M. Bateman, Pennsylvania State University  
Helen D. Gall, Pennsylvania State University  
Arzu Tanis Ozcelik, Recep Tayyip Erdogan University, Turkey

***Using Rasch Modeling to Construct a Rating Scale for Teaching Competence of Secondary Science Teachers***

Silin Wei, Hangzhou Normal University  
Qiaoli Wang, Hangzhou Normal University  
Yuane Jia, University of Virginia  
Zuhao Wang, East China Normal University

**Strand 11: Cultural, Social, and Gender Issues**  
***Symposium – Engaging in Epistemic Disobedience Towards Taking a Critical Stance Towards Science Literacy***  
2:45pm – 4:15pm, Augusta 3

**President:** Maria Varelas, University of Illinois, Chicago

**Presenters:**

Gillian U. Bayne, Lehman College of City University of New York  
Jennifer Adams, University of Calgary  
LaToya Strong, City University of New York  
Jean R. Aguilar-Valdez, Portland State University  
Maria Varelas, University of Illinois, Chicago  
Maria S. Rivera Maulucci, Barnard College

**Strand 12: Educational Technology**

***Technology Integration***

2:45pm – 4:15pm, Augusta B

**President:** Bridget K. Mulvey, Kent State University

***Integrating GIS into Secondary School Science Curriculums: A Mixed-Method Study on Students' Spatial Thinking Ability***

Siqi Li, State University at Buffalo, SUNY  
Xiufeng Liu, University at Buffalo, SUNY

***Integrative STEM learning Using 3D Scanning and Printing Technologies: Evidence from a Mixed-Method Study***

Pavlo D. Antonenko, University of Florida  
Mayra Cordero, PK Young Developmental Research School  
Claudia Grant, University of Florida  
Bruce MacFadden, University of Florida  
Wenjing Luo, University of Florida  
Victor Perez, University of Florida  
Jeanette Pirlo, University of Florida  
Min-Chuan Tsai, University of Florida  
Tugba Arslantas, Middle Eastern Technical University  
Bradford Davey, Technology for Learning Consortium, Inc.

***Does Higher Extent of Mobile-Technology-Integrated Physics Learning Indicate Greater Effects?***

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

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

***Socio-Scientific Issues***

2:45pm – 4:15pm, Chastain 1

**President:** Brendan E. Callahan, Kennesaw State University

***In Search of Socio-Scientific Perspective Taking: Empirical Refinement of a Theoretically-Derived Construct***

Sami Kahn, Ohio University  
Sarah Cross, Ohio University

***Teachers' Pedagogical Content Knowledge For  
Socio-Scientific Issues***

Cigdem Han Tosunoglu, Marmara University  
Serhat Irez, Marmara University

***Place-based Contentious Environmental SSI Instruction  
and Students' NOS Understanding, Compassion, and  
Pro-Environmental Engagement***

Ben C. Herman, University of Missouri

***Discourse Analysis of an Online SSI Discussion***

Brendan E. Callahan, Kennesaw State University  
Michael Dias, Kennesaw State University  
Jen S. Dail, Kennesaw State University  
Joy Brookshire, Kennesaw State University

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## **Evening Events**

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### **NARST Executive Board Meeting #2 5:00pm – 10:00pm, Chastain H and I**



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](http://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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